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ТЕМАТИЧЕСКИЙ РЕФЕРАТИВНЫЙ СБОРНИК № 44-2/1

“Light Emitting Diode”
(«Светодиоды»)

Публикации в трудах конференций

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"LED jitter-induced limitation effects in the baud rate of VLC systems"

In this paper we show that the effect of jitter due to driver and LED is the limiting factor in the baud rate in L-PPM formats for VLC systems. [C1]

"A TV pointing device using LED directivity"

A low-cost, absolute pointing device for the TV exploiting the directivity of LEDs is presented. The main technical issues to solve were 1) the irregularity of the directivity of LEDs, 2) susceptibility to external infrared noise, and 3) instability due to hand tremor. The efficiency of the prototype was evaluated in comparison with GyroPoint and Wii remote. [C2]

"Design considerations for pico-projector based on LCoS and 3-LEDs"

In this paper, two considerations were presented for designing pico-projector based-on LCoS panel and LED. To have a clear picture, LED duty cycle has to be less than 50% of whole possible LED illumination times. And, a constant current circuit is needed to maintain a white balance of picture. [C3]

"Bridging light applications to the IP domain"

With the advent of LED lights as well as lighting systems that have communication capabilities, new lighting setups and scenarios have become possible. New standards of the ZigBee Cluster Library (ZCL) in lighting systems describe the protocols for controlling and monitoring devices in such systems. In this paper we examine the problem of bridging this ZigBee domain to the IP domain such as allowing standardized access and easy integration of advanced lighting scenarios. We define two access levels for the bridging: a message-based API, which translates the protocol and which allows integration in arbitrary networked environments and an HTTP interface that gives access to an embedded web application for direct control purposes. We show a realization of this design on a prototype board of ZigBee and IP modules along with measurements on response times. [C4]

"High Power Efficiency and Low Nonlinear Distortion for Wireless Visible Light Communication"

High power efficiency and low nonlinear distortion is very important for wireless visible light communication system. OFDM (orthogonal frequency division multiplexing) system has been studied a lot as the method to transmit high speed data in wireless visible light communication system. However, OFDM system has drawbacks which are non-linear distortion by high PAPR characteristic and ICI problem occurred by RF impairments. In wireless visible light communication system, output power of visible light which is generated by driven current of LED (light emission diode) has non-linear characteristic. Therefore, transmitted signal is distorted by it. Researches for receive performance of visible light output which is emitted by non-linear LED transfer function and OFDM signal have been studied. In this paper, we suggest a new PAPR reduction technique to reduce non-linear distortion of LED for reducing the PAPR. Also, we propose an adaptive ICI suppression algorithm in order to improve receive performance through enhanced SNR (signal to noise power ratio) by an adaptive channel estimation method of proposed algorithm. Improved performance of proposed system is verified through computer simulation. [C5]

"Variation-tolerant and self-repair design methodology for low temperature polycrystalline silicon liquid crystal and organic light emitting diode displays"

In low temperature polycrystalline silicon (LTPS) based display technologies, the electrical parameter variations in thin film transistors (TFTs) caused by random grain boundaries (GBs) result in significant yield loss, thereby impeding its wide deployment. In this paper, from a system and circuit design perspective, we propose a new self-repair design methodology to compensate the GB-induced variations for LTPS liquid crystal displays (LCDs) and active-matrix organic light emitting diode (AMOLED) displays. The key idea is to extend the charging time

for detected low drivability pixel switches, hence, suppressing the brightness non-uniformity and eliminating the need for large voltage margins. The proposed circuit was implemented in VGA LCD panels which were used for prediction of power consumption and yield. Based on the simulation results, the proposed circuit decreases the required supply voltage by 20% without performance and yield degradation. 7% yield enhancement is observed for high resolution, large sized LCDs while incurring negligible power penalty. This technique enables LTPS-based displays either to further scale down the device size for higher integration and lower power consumption or to have superior yield in large sized panels with small power overhead. [C6]

"A remote pointing device by projecting a two-axis striped pattern with modulated IR signal"

In the TV market, there is an increasing demand for a handheld pointing device which can recognize user handling motions in the air. As conventional pointing devices suffer from high cost, high power consumption, limited motions, or short operating distance, we propose an economic and efficient pointing device that is intuitive to use. In the proposed device, the transmitter generates two infrared (IR) signals, modulated by an optical filter and lens in front of each infrared light emitting diode (IR-LED), and the receiver estimates two-axis motion vectors from the two modulated IR signals and user handling motions. [C7]

"GaN nanorods for improved light emitting diode performance"

GaN nanorod arrays are grown by selective area growth. The exposed nonpolar planes of the nanostructures can be utilized as a potential solution to improve the efficiency of light emitting diodes. [C8]

"Spontaneous emission enhancement using hyperbolic metamaterials"

Control of spontaneous emission is one of the fundamental concepts in the field of quantum optics with applications such as lasers, light emitting diodes, single photon sources among others. The control of emission of quantum dots (QDs) has been reported using photonic crystals and microcavities through the Purcell effect [1-4]. Increasing the photonic density of states (PDOS) is the key to enhancing the spontaneous emission from emitters which have a low quantum yield [5]. There have been several reports on the enhancement of spontaneous emission from QDs embedded in microcavities[3,4,6-8]. In all of these demonstrations, the emitter and the emission was confined within the microcavity which enabled the greater interaction between the emitter and the cavity mode. In contrast, the system that we present here does not rely on localization of electromagnetic field for increase in PDOS and thereby the enhancement in spontaneous emission. Instead, the metamaterial structure exploits the hyperbolic dispersion in the PDOS to create more states for the emitter to emit through [9]. Schematic drawing of the one-dimensional structure used for the present demonstration along with the anticipated dispersion and calculated effective dielectric constants determined using effective medium theory [10] are shown in Fig 1. The opposite signs of the dielectric permittivity tensor in perpendicular directions gives rise to hyperbolic dispersion. For a fixed frequency the wavevector for the anisotropic medium can take on arbitrary large values. In addition, the hyperbolic dispersion is achieved in a wide spectral range and is tolerant to deviations in the thickness of each of the constituent layers. [C9]

"Illumination sensing using sparse modeling"

Light emitting diodes (LEDs) are becoming a common ingredient in many modern day lighting systems as they are capable of producing high intensity light across a wide spread of frequencies. To efficiently obtain desired lighting effects, it is important to sense the light received across different target locations and estimate its unknown properties (amplitudes, frequency offsets and phases) to design the driving waveforms for the LEDs. This procedure is known as illumination sensing and it enables efficient and effective usage of light energy to achieve the intended lighting effects. We propose a novel two-step approach to perform this estimation using sparse modeling which exploits the fact that the measurements at the sensors are sparse in the frequency offset space and the phase space. We show that exploiting this knowledge of sparsity will provide accurate estimates of the desired parameters. [C10]

"High performance InGaN/GaN dot-in-a-wire light emitting diodes on Si(111)"

We report on the epitaxial growth, fabrication, and characterization of full-color InGaN/GaN dot-in-a-wire nanoscale LEDs on Si(111), which can exhibit an internal quantum efficiency of 45% and negligible saturation up to 300 A/cm2. [C11]

"High-speed LED driver for visible light communications with drawing-out of remaining carrier"

The visible light communications that communicates by modulating the light of illumination, which is the existing infrastructure, attracts attention. So as to improve the speed, to increase the bandwidth, and to miniaturize

hardware of this communication system, improvement in the transmission speed by a single LED for lighting is important. The transmission speed of an LED is greatly restricted by the carrier that remains in junction capacity. Therefore, the transmission speed can be increased by drawing out the remaining carrier. We proposed and applied the carrier drawing-out circuit to the driver circuit that drives a blue LED. An optical measurement shows that the fall time decreases from 56 to 10 ns (decreases to one fifth), and the horizontal eye opening ratio has been improved from 29% to 61% (increases to 213%) for 50 Mb/s PRBS. [C12]

"All-in-one Traffic Indicator"

All-in-One Traffic Indicator is a single screen of traffic indicator with multi functions. Which is capable of simultaneously displaying traffic lights(red, green and yellow), moving directions(right turn and left turn) and real time countdown information on the same screen of a traffic lantern. All-in-One Traffic Indicator proposes a new method of traffic light display named "The Unified Standard Traffic Light Display" for the conventional traffic lanterns in order to save energy, protect environment and improve transportation safety. The results showed that Unified Standard Traffic Light Display is practical for public facility, and All-in-One Traffic Indicator benefits not only the government but also road users and environment. [C13]

"Structure and reductive dechlorination of supported nano Cu/Fe bimetal"

Supported nano Cu/Fe bimetal was prepared by using KBH4as the reducing agent when micro-scale graphite as a support material. This supported nano bimetal showed the well reductive chlorination to trichloroethylene(TCE) in the solution. The nano Cu/Fe with spherical particle and spherical nanocluster structure were synthesized in the H2O and ethanol/H2O system respectively. The size of spherical nano Cu/Fe was non-uniformly when the Fe2+concentration was 0.02mol/L during the synthesizing. And the Cu/Fe with spherical nanocluster had the uniformly sphere shape while the Fe2+concentration was 0.05mol/L. When the Fe2+concentration was 0.2mol/L, bimetal had the nano whisker shape. The experiment results showed that the nano Cu/Fe bimetals which were synthesized in the ethanol/H2O system and the Fe2+concentration was 0.05mol/L had the fastest dechlorination rate on TCE. [C14]

"Portable biomarker detection with magnetic nanotags"

This paper presents a hand-held, portable biosensor platform for quantitative biomarker measurement. By combining magnetic nanoparticle (MNP) tags with giant magnetoresistive (GMR) spin-valve sensors, the hand-held platform achieves highly sensitive (picomolar) and specific biomarker detection in less than 20 minutes. The rapid analysis and potential low cost make this technology ideal for point-of-care (POC) diagnostics. Furthermore, this platform is able to detect multiple biomarkers simultaneously in a single assay, creating a promising diagnostic tool for a vast number of applications. [C15]

"Measurement of extreme ultraviolet (EUV) and the electron temperature for relative electron density ratio using stark broadening of the coaxial focused plasma"

Summary form only given. The research fields of soft X-rays and extreme ultraviolet (EUV) were used in a wide variety of EUV lithography techniques for semiconductor chip manufacture and soft Xray microscopy. We have generated Ar plasma in dense plasma focus device with coaxial electrodes and investigated an emitted visible and EUV light for electro-optical plasma diagnostics. We have applied an input voltage 4.5 kV to the capacitor bank of 1.53 uF and the diode chamber has been filled with Ar gas. EUV light have measured with EUV photodiode and X-ray film with pinhole. If we assumed that the focused plasma regions satisfy the local thermodynamic equilibrium (LTE) conditions, the electron temperature and density of the coaxial plasma focus could be obtained by Stark broadening of optical emission spectroscopy (OES). The electron densities of several emission lines for Ar II can be measured by Stark broadening for spectrum profile. The electron temperature can be estimated by the Boltzmann plot method using this relative densities ratio. [C16]

"Investigation of gaseous electron multipliers with magnesium photocathodes for optical triggering of back-lighted thyratrons"

Summary form only given. Developing reliable and compact optical triggering systems for back-lighted thyratrons (BLTs), light-activated pseudospark switches is of interest for applications of compact pulsed power. Investigation of the electron multiplication methods is crucial for utilization of low-intensity light sources, including ultraviolet (UV) light emitting diodes (LEDs), as optical sources for triggering BLTs. Recent advances on gaseous electron multipliers(GEMs) whose operation is based on gas multiplication within small, sub-millimeter to millimeter diameter holes has shown multiplication gains of 103in both atmospheric and low pressure gas mixtures and noble gases.In this work, we present investigation of GEM type triggering units with magnesium photocathodes

for triggering BLTs. Quantum efficiency (QE) of magnesium under BLT relevant pressure conditions (upto 100 mTorr) were measured to be 105. Higher quantum yield was demonstrated for utilization of Mg photocathode compared to Cu and Mo photocathodes. Measurements of the gaseous electron multiplication in argon and helium within the pressure range of 200 mTorr to 1 Torr are presented. Possible schemes for integration of such electron multiplier units with metal photocathode materials to the switch are discussed. [C17]

"Mix brush: An interactive digital painting tool with shaking interaction and color feedback"

In this paper, we present an interactive digital brush, which invites people to create a work of art with mixing colors. The Mix Brush aimed at enriching traditional screen based interactions with shaking interaction and color feedback. It was created using a tablet pen and the RGB Light-emitting Diode (LED). The tablet pen enables tracking of the contact point of brush on the interactive display, and RGB LEDs presents the picked up colors. People are able to do their creative activities on the interactive display with our own brush and software. The Mix Brush approaches two important properties: immediate indication of the selected colors with LEDs and mixing colors with shaking the brush. Pilot study shows that this interactive digital brush enhances the user experience (UX) and it capable of applying to child education. [C18]

"Biometric verification using hand vein-patterns"

In this research, we proposed a new grip-type hand vein authentication system. By incorporating this system into a door handle, an individual's indentity can confirmed by simply gripping the handle. Then, we proposed a new ROI (region of interesting) extracting method to extract the same part of the same hand every time using hand sharp. In the recognition system, we proposed a new minutiae-based method. The experimental results show the efficiency of our proposed algorithm. [C19]

"Red light-emitting diode degradation and low-frequency noise characteristics"

Comprehensive investigation of AlInGaP red light-emitting diodes (red LEDs) radiating at 625 nm characteristics and physical processes that take place in device structure during aging has been carried out. Analysis of noise characteristics (the emitting-light power and the LED voltage fluctuations and their cross-correlation factor) shows that investigated red LEDs degradation is caused by defects that lead to the non-radiating recombination increase in the active region or its interfaces. Our results have shown that noise characteristics are more sensitive to the formation of such defects in the red LED structure, and to its degradation. [C20]

"An organic complementary differential amplifier for flexible AMOLED applications"

Active Matrix Organic Light-Emitting Diode (AMOLED) displays offer distinct benefits for portable electronics applications, including light weight, high brightness, low power consumption, wide viewing angle, and low processing costs. They also are attractive candidates for highly flexible substrates. In active matrix displays, a small transistor circuit is used to drive each OLED device. Recently developed organic thin film transistors (TFTs) have made complementary TFT circuits possible on flexible substrates. We present an organic complementary amplifier as an AMOLED pixel driver. The 7 TFT amplifier circuit is able to achieve less than 1% current drift for a 2x Vtchange, and fill factor of 75% with a 20µm minimum channel length. The amplifier combines programming speed comparable to an equivalent 2-TFT voltage-programmed circuit with stability akin to a 4-TFT circuit, the trade-off being higher TFT count. [C21]

"Design and implementation of high frequency AC-LED driver with digital dimming"

In this paper a two-stage high frequency AC-LED driver is designed and studied. The front-stage is a boost power-factor correction (PFC) circuit and the rear-stage is a halfbridge series resonant inverter. The lighting characteristics of high frequency AC voltage driving LEDs, and the effect of LED to half-bridge resonant circuit are discussed. The proposed design uses the digital dimming control to reduce LED chromaticity shift, and connect the LEDs as a full-bridge rectifier to simplify the current sensing circuit. An 80-W high frequency AC-LED driver with universal voltage input (90~264 Vrms) is implemented to verify the design. Experimental results show that the variation of chromaticity coordinates (u', v') from brightness 100% to 20% is within 0.0023. [C22]

"Disturbance observer-based control of a dual output LLC converter for solid state lighting applications"

Feedback sensor isolation is often an expensive necessity in power converters, for reasons of safety and electromagnetic compatibility. A disturbance observer-based control strategy for a dual-output resonant converter is proposed to overcome this problem. Current control of two LED loads is achieved through estimation rather than measurement. Robustness against temperature changes, which have significant impact on

the behaviour of the LEDs, is achieved through estimation of offsets in the forward voltages of the LED-strings. The power converter and LEDs are modelled accurately to obtain a good estimation accuracy. The whole implementation is steered towards a low cost solution. [C23]

"Indoor white light wireless data transmission based on new generation environment-friendly solid state lighting"

White light emitting diode (LED) is viewed as the new generation green solid state lighting (SSL) source by academia and industry based on its charming advantages, such as high brightness, low cost, steadily improved power efficiency and etc. Visible light communication based on white LED which aims to realize lighting and data transmission simultaneously is attracting more and more attention. In this paper, two indoor VLC design schemes which need less power cost are proposed and corresponding illuminance ability is estimated in a moderate size office. One proves that distributed design scheme can improve the power efficiency (add 300 lx in central area) and related SNR performance is improved as well. And the other illustrates the amount of needed chips can be reduced (from 900 to less than 800) maintaining the similar illuminance level. The performance of systems based on improved modulation schemes in terms of pulse position modulation (PPM), multiple pulse position modulation (MPPM) and overlapping pulse position modulation (OPPM) are tested. [C24]

"Transplant of Linux and Embedded System of Boot Loader and LED Driver"

The widely used 32-bits embedded CPU not only satisfies the need of high-speed provides processing, but also a platform which makes the embedded speedily systems run steadily, and credibly. The use of the embedded operating system greatly accelerates the software development and enhances the system's stability and security. It plays an important role in the embedded field. As its advantage of price, tiny kernel and rich resource, Linux has been widely used in embedded system than the Windows in “black”. The new coming 2.6 kernel has a lot of specialties for embedded applications, and also has some improving in arithmetic of scheduling. All these make Linux to be a hot point in embedded system. This paper introduced the S3C2410x CPU and the system structure. Based on this, it mainly researched the development of system software. Firstly the paper described how to establish the cross compiling environment, after that analyzed the working process of the embedded boot loader, and based on the analyses of the Linux kernel structure the paper discussed the methods of kernel porting and configuration. Then the paper presented theory of Linux device drivers, and designed several key device drivers, and gave the detail implement scheme. [C25]

"An AC LED smart lighting system with white light FSO communication"

Due to the AC LED applications are simpler and higher conversion efficiency than DC LED, the white AC LED is the better choose for general illumination in future. And LED can be applied for data transmission. In this paper, we propose a AC LED smart lighting system of visible light FSO transmission with AC LED as the transmitter and a photo sensor as the receiver. The timing of data transmitting is synchronous with the AC power source, and transmitting optical signal would keep in a level. [C26]

"A smart lighting system with white LED FSO communication"

Due to the reliability and high efficiency, the white LED sources are widely used for general illumination, and they can also be applied for data transmission. In this paper, we propose a smart lighting system of visible light FSO transmission with white LEDs as the transmitter and a photo sensor as the receiver. The advantage is that the brightness of LEDs keeps consistent regardless of whether the transmission carries or not. [C27]

"Lighting in extreme temperature environments: The highs and the lows"

This paper discusses the effects of ambient temperature on lamps and lighting fixtures. Lamps and lighting systems are designed for an ambient temperature of 25°C. Both colder and higher temperatures can affect the performance of a fixture. In extremely cold temperatures, lamp starting capability and fixture efficacy can be negatively impacted and the choice of lighting systems decreases with the temperature. In high ambient conditions, the life of both lamp and control gear can be significantly reduced, along with decreases in lumen output performance. The lighting systems discussed include metal halide, high pressure sodium (SON), fluorescent, incandescent, induction and LED. Each has different challenges with extreme temperatures. [C28]

"Control systems challenges in energy efficient portable UV based water sterilizer"

This paper presents a real world challenge of constructing an energy efficient portable ultra-violet-based water sterilizer. We discuss a novel approach where UV radiation has a dual use, (i) to detect microbial activity through biofluorescence, and (ii) to sterilize the water. This dual use scenario enables us to propose a feedback

control based operation scheme. The goal that we want to achieve is to make sure that the bacteria population does not exceed the allowed level, while keeping the energy usage as low as possible. We propose a mathematical model for both the detection and sterilization process, based on experimental data. We then formulate an optimal control problem that minimizes the energy consumption while meeting a probabilistic performance criterion. By using an idea from dynamic programming, we propose a solution where the optimization in the detection and sterilization processes can be decoupled. [C29]

"The analysis of failure rate and reliability test for LED based general lighting"

We had achieved the accelerated life test for and the accelerating factor and activation energy based on the results obtained for the LED PKG. In this results, We had evaluated failure rate for LED lighting array and made reference to Mil-HDBK-217F for basic standard. [C30]

"The fabrication of LED detecting system"

In recent years, the brightness of light-emitting diodes with efficiency has reached a high level, and the next surge is in demand for various types of luminous equipments, such as those can be used in the urban landscape of electronic outdoor billboards, aviation and electronic equipment indicators, which can replace the automobile's headlights. Particularly in view of the safety factor, such as solid-state components, the hardness of life, and the reliability. Therefore, they become the most suitable alternative with lower maintenance costs. However, when the factory produces a few thousands of light-emitting diode, traditional expensive detecting systems have been used to determine whether their characteristics are good or bad. It is noteworthy that this work will design and fabricate the effective detection and measurement system for the advanced light-emitting diodes, and this system can be used to analyze the stability as well. [C31]

"Automatic measurement system for junction temperature of light emitting diodes"

In this paper, we present a PC-based automatic measurement system for measuring the junction temperatures of light-emitting diodes (LEDs) operated at different forward currents. This system is described in three major parts: (1) screen panel and function design of control software (2) data acquisition and heating hardware (3) system integration and function test. In order to check and demonstrate its performance, the junction temperatures of three InGaN/GaN multiquantum well (MQW) LEDs have been performed by this system. The operating currents are reported in the range of 10-300 mA and the measured junction temperatures are obtained from 30 to 200°C. [C32]

"Multi-kev X-ray yields from HIGH-Z gas targets fielded at the national ignition facility"

The National Ignition Facility (NIF) is a 192-beam laser system now operating at the LLNL. We report on the measured X-ray flux from gas-filled targets shot with 112-132 laser beams at the NIF. The targets were driven with up to 75 TW of laser power (350 kJ of 3ω laser energy delivered in a 5 ns modified-flat-top pulse). The laser delivered power and energy within 2% of the requested values on all shots. The targets were thin walled (25 μm), 4 mm long, 4 mm inner-diameter epoxy pipes designed to transmit X rays in the 1-10 keV spectral band. The pipes were filled with 1.2 atm of an Ar: Xe mixture. The emitted X-ray flux was monitored with multiple channels of the NIF facility's two X-ray-diode based DANTE instruments in the sub-keV range, as well as around 3.2 keV (Ar K-shell emission) and in the 4.0-6.5 keV band (Xe L-shell emission). Temporal waveforms of the emitted X rays, and the total emitted fluence are presented. Two-dimensional X-ray imaging (for energies > 8 keV) of the targets was performed with a gated X-ray detector that used a four-strip microchannel plate. The two dimensional images confirm supersonic, volumetric heating of the gas targets. Laser light scattered via laser-plasma instabilities from the target plasma was monitored with the facility's full aperture backscatter system (FABS), and hard X rays produced by hot electrons from the target plasma were measured with FFLEX diagnostic. We measure 15-20% laser-to-X-ray conversion efficiency for X rays with energies greater than 3.0 keV This is significantly greater than any previous measurements in this spectral band. [C33]

"Fabrication and design of Diffractive Optical layer applied to Resonant Cavity LED"

To optical packaging cost and enhance alignment accuracy, a new application strategy of Diffractive Optical Element (DOE) had been proposed to develop a new technology that can integrate DOE and Resonant Cavity LED (RCLED) in semiconductor manufacture processing. The passivation layer SiO2used to fabricate the integrated DOE of Dammann Grating. Applied scalar diffraction principle through using G-solver software, Binary Phase Fourier Grating (B.P.F.G.) was designed to control the spatial distribution of emitted light energy along LED surface through adjusting geometric shape and depth of grates. Confirming several B.P.F.G. designs by measuring outcome light distributions, such DOE had been successfully manufactured directly on LED wafers. [C34]

"A High-efficiency integrated circuit for LED driving"

This study proposes a high-efficiency circuit for LED driving. The circuit combines an AD-DC flyback circuit, a DC-DC Boost LED constant current driving circuit and a battery charging circuit. The result demonstrated that the proposed circuit can successfully drive a white light LED module with high efficiency and low-light decline in a long period of operating time. In addition, the LED module can operate at wide input voltage range (85 ~ 265 VAC) with the circuit. Moreover, the circuit can be used to drive other types of LED light module. The advantage of this proposed circuit is that it can drive LED with high-efficiency performance and suitable for multi-propose using. [C35]

"Multi-Block Liquid Crystalline Organic Semi-Conductors for Organic (opto)electronic applications"

Four Multi-Blocks Liquid Crystalline Organic SemiConductors (MBLCOSCs) were synthesized via a solvent-less one pot melt-condensation of 4,4'-(butane-1,4-diylbis(oxy))bis(butane-4,1-diyl) bis(4-aminobenzoate) with (tailored-made) π-conjugated building blocks bearing a terminal reactive aldehyde function. Their optoelectronic properties and thermotropic mesomorphic behavior were investigated by UV-Vis absorption and Photoluminescence (PL) spectroscopies, and by Differential Scanning Calorimetry (DSC) and Polarizing Optical Microscopy (POM), respectively. Finally, current-voltage (I-V) measurements were performed on Organic Light-Emitting Diodes (OLEDs) fabricated with a ITO/MBLCOSCs/Alq3/Al multi-layered architecture. [C36]

"Driving circuit for high-brightness LED lamps"

This paper proposes a high efficiency driving circuit for multiple high-brightness light emitting diode (HB-LED) lamps with dimming feature. A high-frequency half-bridge series resonant inverter is adopted as a current driver. By appropriately controlling the frequency of the active switches and the resonant tank, the lamp currents can be regulated effectively. On the other hand, the LED lamps can be dimmed individually by the integral cycle control. The tactful circuit ensures high circuit efficiency owing to the advantages of less conducting losses and zero-voltage switching (ZVS) operation of the active power switches and zero current switching (ZCS) operation of the dimming switches. A prototype circuit designed for three white light HB-LED lamps was built and tested to verify the analytical predictions. [C37]

"Improvement of efficiency for red resonantcavity light-emitting diodes using periodic gain medium with modified electron stopped layers"

The analysis of electro-optical properties of 635 nm InGaP/InGaAlP resonant-cavity light-emitting diodes (RCLED) with AlGaAs mirrors is presented. We show that including the periodic gain medium with slightly p-doped electron stop layer in both side of active layer improves the efficiency of such device due to increasing the electron capture efficiency in the quantum wells and decreasing the electrical field across the active layer. [C38]

"Priority-based resource allocation scheme for visible light communication"

Due to limited resources in wireless communication, an effective resource allocation mechanism is needed to optimize utilization by reducing blocking probability and dropped call rates. When different users with different priorities use the same network resource, utilization of the resource according to the priority is important. This idea, along with multi-color optical channels can be used in the promising communication technology, visible light communication (VLC), an encouraging green and energy-efficient communication technology. In this paper, we support priority-based resource allocation and show that priority schemes have better performances than non-priority schemes. Numerical results show that, with the proposed system, we can reduce the blocking probability and improve the system performance. [C39]

"Stabilization of organic materials for sensors"

This paper deals with research and development of organic humidity sensors. These sensors are based on organic sensitive layer which is applied on the substrate with interdigital electrodes. The main work is focused on the stabilization of organic sensor layers. The stabilisation of mechanical and electrical parameters is based on passive polymer matrix where the active organic sensitive material is fixed. The sensor sensitivity, impedance-humidity characteristics and long term stability of electrical parameters were measured and discussed in detail. [C40]

"Design of boost-flyback converter with small capacitor for energy-storage"

This paper presents the idea of utilizing large voltage ripple with small capacitance for energy storage in LED circuit, instead of large capacitance with small voltage ripple. A typical Single-Stage PFC converter with small capacitor is adopted. The presented converter has high input power factor and low output voltage ripple at the same time. Calculation method of main parameters are derived. In order to verify the method, a prototype with 198 265V AC input/ 24V DC output/60W is designed. The experimental results show that the design method is feasible. [C41]

"Large scale LED video display data flow management"

The development of flexible and inexpensive controller for large scale light emitting diode (LED) video display image rendering is presented. The concept and system components of such system are presented. Controller is capable of discrete pixel intensity dimming by using the pulse width modulation (PWM). It can control the LED boards containing pixel arrays or the individual pixels/pixel strings. High dimming resolution usually contradicts with high refresh frequency and number of controllable LEDs. Thanks to novel dimming technique the dimming resolution can be varied without significant loss of refresh frequency or number of controllable LEDs. Data between the structure blocks circulates in a series fashion using the conventional shielded twisted pair (STP) cable. The structure and functional diagram of the serializer and deserializer needed for data transmission are presented. Control is accomplished by personal computer (PC) via a high speed universal serial bus (USB2) interface. Video data is transmitted via USB. All the controlling state machines were implemented using inexpensive complex programmable logic (CPLD) integrated circuit (IC) combined with static random access memory (SRAM) instead of field programmable gates array (FPGA). [C42]

"Semantic interoperability in a heterogeneous smart lighting system"

Smart spaces typically consist of collaborating heterogeneous nodes with various resource capacities, e.g. processing, memory, storage, energy capabilities. Low capacity nodes can operate using very simple protocols, allowing them to provide and consume only simple services, as opposed to devices with higher capacity, which are not limited by such constraints. Providing seamless connection and collaboration between low and high capacity nodes, i.e. interoperability, remains a challenge. This paper presents an approach for interoperability among nodes of a smart lighting system via a gateway node considering nodes of two platforms: low capacity wireless light sensors and actuators on the one hand and high capacity Smart-M3 nodes on the other hand. The gateway node is able to communicate over heterogeneous networks using different communication protocols, transferring light model information between the smart space nodes. [C43]

"LEDs' operation optimizing for long term lumen maintenance"

Investigations deals with optimization of operating regimes of LEDs in lighting equipment for obtaining two purposes-maximum light output in dependence of ambient conditions and long term lumen maintenance. Thermal management calculations and heat sink choice are experimentally tested at various ambient conditions (air temperatures from 20oC to 55oC) and different current values through LEDs-up to 700 mA. Infrared thermography is used for evaluation of temperature distribution on LEDs and heat sink. Thermal management investigations allow determining safety operating conditions for LEDs at maximum light output in dependence of ambient conditions. [C44]

"Modeling the light of LED's for position detection with an optical sensor"

The optical systems are increasingly used to determine the motion. The optical systems use a light source like a LED and an optical sensor, they are based on the object view on the optical sensor. One parameter measured in building management is building movement. The accuracy is critical in building safety, the requirements is ±150 µm. The geometrical principle of measurements considers the LED's as a point and a uniform light source. The emitted light is affected by the refraction on LED and on the optical sensor surface. The optical phenomenon and the erroneous position of LED on the PCB affect the geometry of measurement. All these introduce an error in object position calculation having the magnitude of mm. These phenomena can be modeled by a calibration equation which is established by interpolating the measured value with the object position measured with a high accuracy position system. For increasing the accuracy of measurement the calibration equation is determinate on areas. The measurement system use a microcontroller as a central processing unit, the complexity of calibration equation is limited by the power calculus of microcontroller. Using the modeling equation the accuracy of measurement is essential improved. On 0X direction the accuracy is of ±50 µm and on direction 0Y is ±150 µm. [C45]

"New testing platform-from PC to personal laboratory"

The new testing platform is a package of hardware and software tools for testing real circuits with the use of

virtually implemented instruments. The versatility of the system is given by the wide range of instruments implemented in the software, which make the platform suitable for usage in any place, not having the constraints of a laboratory. The working space dimensions of the platform and the lack of connection between all the sockets allow the usage of the platform for testing more circuits or separate parts of the same circuit at the same time. This has proven to be very useful for error debugging since any circuit can be broken down to elementary parts without extra materials, time or cost of rebuilding the circuit again. The purpose of the paper is to investigate the abilities offered by the package, the various ways of using the board for implementing circuits and the combinations of functions offered through the virtual instruments. [C46]

"Copyright page"

The following topics are dealt with: solders; electronics packaging; LTCC layers; power semiconductor devices; wire bonding; printed circuit board; LED; electronic module reliability; CMOS integrated circuit design; sensors; antennas; electric engineering education; and radio network. [C47]

"Multifunctional LED lamp thermal management"

Investigations in this work are connected with design of energy effective multifunctional lamp for interior lighting. A mechanical construction of a desk lamp is used. LEDs are chosen as light sources. Characteristics of LEDs allow creating lightweight construction which can serve as: desk lamp (light flux about 600 ч 700 lm); night light for baby room (light flux about 100 ч 200 lm) and lamp for general lighting of a living room (light flux about 1000 ч 1200 lm). Choice of proper LEDs is made. Investigations in thermal camera for optimization of thermal management of LEDs are aided by application of infrared camera. Proper choice of heat sink ensures low operation temperature regimes for LEDs and long life of the light equipment. [C48]

"Characterization of the thermal impedance of high-power LED assembly based on innovative printed circuit board technology"

We present a method of dynamic thermal characterization of an entire test assembly, consisting of high-power Light Emitting Diodes (LED) and a printed circuit board (PCB) by measuring the thermal response on a power-on-step function and describing the thermal impedance with a Foster RC network. For this purpose, we record temporal temperature functions on test assemblies during pulse load experiments under defined initial and boundary conditions (the assemblies were horizontally positioned under free air in a test chamber), establish the LEDs' junction temperature-versus-time functions for known power functions and calibrate the parameters of the Foster RC network. Moreover, we reveal connections between design parameters (conductor layout, thermal via geometry, and PCB material) and the thermal impedance of the assembly. The method allows the user to predict the LED's junction temperature as transient thermal response on an arbitrary pulse load function (as e.g. flashes with different intensity, duration and repetition rate) with low effort. [C49]

"Design and analysis for backlight inverter with six-phase PWM dimming control circuit"

This paper proposes a novel dimming control scheme which possesses six-phase PWM dimming control for backlight inverter. We adopt six-phase PWM dimming control circuit to control the brightness of twelve lamps. Each phase driving circuit can control two lamps. Circuit architecture is full bridge circuit which can improve the total efficiency of driving circuit. Due to single-phase PWM dimming consumes large input current Iin(A) Iin(A) than six -phase PWM dimming at the same PDIM. So, it causes that single-phase dimming presents larger percent error range (-6.36 ~ +9.8%) and six-phase dimming presents smaller percent error range(-1.26~+1.98%)in average lamp current Ioavg (mA) comparing with lamp currents Io(mA). Hence the six-phase dimming achieves uniform output lamp currents which is called current equalization. From the experimental results, We verify that six-phase dimming is better than conventional single-phase dimming in the performance and in power efficiency η. We use twelve CCFLs(300-mm/2.4-mm) inside of a 24 inch LCDTV. [C50]

"Display gamut reshaping for color emulation and balancing"

Emerging next generation digital light projectors are using multiple LED/laser sources instead of one white lamp. This results in a color gamut much larger than any existing display or capture device. Though advantageous in theory, when used to display contents captured/processed at a smaller gamut, a large gamut expansion results in hue-shift artifacts. We present a hardware-assisted 3D gamut reshaping method that handles the gamut expansion in LED based DLP displays by hierarchical temporal multiplexing of the multiple primaries. This, in turn, results in a color emulation technique by which projectors with such large gamuts can also achieve a standard color gamut and white point-the two most important color properties in terms of display quality, with an additional advantage of increased brightness and dynamic range. The same method can also be used for color balancing across multiple projectors that are often used to create large-scale high resolution displays. [C51]

"A magnetic component-less series resonant converter using a piezoelectric transducer for low profile application"

In this paper, a series resonant converter (SRC) using a piezoelectric transducer for low profile application is proposed. The proposed circuit allows integration of the power circuit by eliminating conventional bulky magnetic components. Effects of the material constants such as electromechanical coupling coefficient and mechanical quality factor on the converter performance are discussed. Design considerations of piezoelectric transducer for power converter applications are presented. Experimental results with a 15W prototype converter driving light emitting diode (LED) backlight using a single-layered piezoelectric transducer verify the feasibility of the piezoelectric transducer application in power converters. [C52]

"Transition-mode dimmable LED driver for illumination applications"

A transition-mode (TM) dimmable high brightness light-emitting-diode (LED) driver for general and residential illumination applications is presented. An improved pulse-width modulation dimming technique utilizing a low cost micro-controller is studied and implemented with a current-regulated LED drive. Under universal input voltage operation, high power factor and high efficiency can be achieved by a coupled inductor flyback converter, regulated by a TM power-factor-correction controller. The operation principles of the proposed LED driver will be discussed and evaluated. A laboratory prototype is also designed and tested for verification. [C53]

"LED driver IC with an adaptive slope compensation technique"

In this paper, an adaptive slope compensation circuit is proposed that can be applied for the current-controlled DC-DC converter. In order to maintain stability, the negative-slope compensation should be used for this converter with duty ratio higher than 0.5. Fixed value of this slope results in the limited operating range. The proposed adaptive slope compensation is designed that can be suitable for wide range of input and output voltages and incorporated into the DC-DC boost converter for LED driver applications. Operations are verified through measurement results of circuit implementation in a 0.35-μm BCD technology. [C54]

"Design of intelligent traffic light control system based on traffic flow"

The article puts forward a design of intelligent traffic control system based on traffic flow, and proposes the intersection video image processing and traffic flow detection algorithm. Application of DSP technology, design the system hardware, write the corresponding software, and realize the intelligent control of traffic light at the intersection according to traffic flow, improving the intersection vehicle capacity of passage. [C55]

"Investigation of LED street lighting's disturbances"

Power LEDs used in street lighting have many advantages comparing to the widely used high pressure sodium vapor lamps or metal halide lamps. Optical characteristics and white light night vision is better, efficiency is getting better, expected lifetime is definitely higher, but power LEDs need switched mode electronic drives which cause high disturbances both in harmonics and in transients. This paper investigates the emission of harmonics and the transient behavior of lamps in different power system conditions. [C56]

"Development of high-gain high-efficiency grid-connected inverter for PV Module"

This paper proposes a high gain and high efficiency power conditioning system for grid connected PV module. The system consists of a one module of PV, boost converter with high gain transformation ratio, and singlephase H-bridge inverter. The system is suitable for using less number of PV modules or using only one PV module for the grid connection applications which called ac modules. Since the controller will disconnect the whole string of PV modules in case of one PV module is affected by, for example, the shadow. As a result, the proposed system can avoid this phenomenon which results in increasing the whole system efficiency. The paper also proposes an accurate PV cell model which considers the environmental conditions such as temperature and shadow effects. A modified maximum power point tracking (MPPT) algorithm based on the conductance MPPT will be proposed. Additionally, the system will be connected to the utility grid at unity power factor. The proposed system have been studied, analyzed, and simulated for the validation. Also some selected of the experimental results have been provided. [C57]

"Primary side control circuit of a flyback converter for HBLED"

This paper presents a constant-current power supply for HB-LED(High Brightness LED). The proposed power supply is designed and implemented by adopting a flyback converter with primary side control and without

galvanic isolation. Based on discontinuous conduction mode (DCM), the flyback converter has constant average output current when the peak current on the transformer primary side and the ratio of t'offto TSare constant. A laboratory prototype based on UC3843 PWM controller has been built and tested. Laboratory experimental results from a 12.6W prototype are given to verify the validity and effectiveness. The converter meets the performance requirements of HB-LED driver with ±3% current accuracy in the wide output voltage range. [C58]

"The intelligent system for LED lighting based on STCMCU"

An intelligent dimming system based on LED lamps is presented. The design of hardware and software is given. The system has two working modes. One is manual mode and another is automatic mode. In manual mode, the brightness level of LED lamps is adjusted by keys. In automatic mode, the brightness level is adjusted automatically according to environment. An Infrared detector and a photo sensor are used to sample environment information. A STC-MCU is used to process the information and generate PWM control signals to set the lamps into predefined illumination modes. Compared to traditional control modes, the system features lower power consumption and is suitable for aisles and stair well. [C59]

"A new PWM dimmer using two active switches for AC LED lamp"

This paper presents a new dimmer using only two active switches for AC LED lamp. The control method of the proposed dimmer is pulse width control (PWM) method. Compared with the conventional phase- controlled dimmer, the proposed PWM dimmer can produce sine wave and it does not cause harmonics problem. Furthermore, the proposed control method does not amplify the light flicker due to independence of the input voltage. Therefore, the proposed PWM dimmer can be used as the AC LED lamp's dimmer instead of the conventional phase-controlled dimmer. The experimental result shows that the proposed PWM dimmer has good performances. [C60]

"A single stage converter for feeding high power leds which can be used in a project based learning of electrical circuits"

This paper deals with a single stage power electronic converter used for feeding at constant current series connected high power LEDs by taking power from the mains at unity power factor. It is shown that the control of the converter can be achieved by combining a bang-bang control of the current taken from the mains with a feedforward action on the amplitude of this current which is based on the voltage across the diodes. As this control strategy can be easily understood by undergraduate students (before they learn automatic control), the design and analysis of a low voltage variant (without galvanic insulation) of the proposed circuit can be a support to a project based learning of the fundamentals of electrical circuits: applications of Kirchoff laws, study of simple transients, use of operational amplifier both in linear and non linear operation modes, basics of signal processing through filtering, power in AC and DC circuits. It is also easy to implement it in a simulation software like PSpice®to realize virtual labs. [C61]

"Luminaires for explosive atmospheres: Evaluating new technologies from the IEC and NEC perspectives"

Nationally Recognized Testing Laboratories (NRTLs) and Explosive Atmosphere Notified Bodies (ExNBs) test luminaire products to IEC, CENELEC and ANSI standards in order to rate products appropriately for use in potentially explosive atmospheres. The ultimate goal of this testing is to ensure safety for end-users-a goal that is shared by design engineers, manufacturers, testing bodies and end-users alike. Despite the shared goal of safety, however, the specifics of luminaire design, construction, testing, installation and maintenance can vary widely, raising questions about how standards should be interpreted and applied. IEC and ANSI provide similar standards, and we endorse the ongoing convergence toward a global set of harmonized standards. But as new technologies emerge, standards must continue to evolve, while manufacturers and testing bodies must continue to evaluate and fine-tune their interpretation of standards in real-world conditions. Safety, as always, should be the number-one concern. This paper discusses existing and emerging luminaire technologies in the light of current standards and testing methodologies, and proposes best practices that go beyond the standards to ensure the safety of luminaire products installed in potentially explosive atmospheres. Far more important than simply meeting a standard, product manufacturing, testing, installation and maintenance must be performed with the goal of ensuring unquestioned product safety. [C62]

"Design of High-Power White LED Drive Chip with Fully Integrated PWM Dimming Function"

A novel high-power white Light Emitting Diodes (LED) drive chip with fully integrated PWM dimming function has been implemented in this paper. The chip can be easily used in any application environment which needs a high

integration or avoids electromagnetic interference (EMI), for it can accomplish LED drive and on-chip dimming with very simple peripheral interface circuit. Since Pulse Width Modulation (PWM) is used as the dimming mode, the drive chip can get a wide dimming range without color shift. At the same time, a capacitor-less Low Dropout Linear Voltage (LDO) Regulator is used as a compact and efficient power conversion circuit to ensure the stability of the output. The circuit is simulated with CSMC 0.5μm mixed signal models, and the results show that the chip can operate normally. [C63]

"Performance Enhanced OLEDs Using a Li3N Doped Tris(8-Hydroxyquinoline) Aluminum(Alq3) Thin Film as Electron-Injecting and Transporting Layer"

Lithium nitride (Li3N) is demonstrated to be an efficient n-type dopant in the widely used electron-injecting and transporting material tris(8-hydroxyquinoline) aluminum (Alq3) for Organic Light-emitting Diodes (OLEDs). Li3N doped Alq3 thin film can availably enhance the electron injection and transport ability of OLEDs, which can improve the luminance and the efficiency of doped OLEDs compared to the referenced device. Device ITO/m-MTDATA/NPB/Alq3/Alq3:Li3N/Al with optimized doping concentration and thickness exhibits a maximal luminance of 28640 cd/m2, and current efficiency 2.30cd/A, a turn-on voltage 2.9V, in contrast to 6334 cd/m2, 0.44cd/A and 4.7V for the non-doped device. Processing of Li3N is much easier and safer than that of alkaline metals, since Li3N is air-stable and has low deposition temperature which is similar to that of organic semiconductor materials. [C64]

"620Nm Red Light Promotes Celluar Viability and Mrna Expression of Collagen Type I in Bone Mesenchymal Stem Cells of Rat"

Phototherapy has attracted increasing attention in recent years because numerous applications and controlled studies on the method have been reported. According to these reports, low-level red light irradiation can lead to celluar proliferation and enhance cell differentiation. The purpose of this in vitro study is to investigate the influence of red light from a light-emitting diode (LED) on rat bone mesenchymal stem cells (BMCs). The cells were seeded in 35-mm tissue culture dishes and cultured in osteogenic differentiation medium (ODM). BMSCs were irradiated once with low-level red light (620nm, 1W, 1.5 J/cm2). Then we analyzed celluar viability via methyl-tetra-zolium (MTT) assay and mRNA expression of collagen, type I, alpha 1 (COL1A1) via reverse transcriptase-polymerase chain reaction (RT-PCR). MTT assay result indicated that irradiated cells significantly proliferated. The irradiated cells had higher mRNA expression of COL1A1 than the control. In conclusion, low-level red light from LED could enhance cellular viability and osteogenic differentiation of MSCs. [C65]

"Theoretical analysis of carbon-nanotube-based mixers and frequency multipliers"

In this paper closed-form expressions are presented for the current components in a CNT-based p-n junction diode resulting from a multisinusoidal input voltage. The expressions obtained, in terms of the modified Bessel functions, are simple and can be used for calculating the amplitudes of the fundamental, harmonics and intermodulation (mixing) current components in the CNT-based p-n junction diode. Using these expressions the performance of the CNT-based p-n junction diode excited by an equal-amplitude two-tone was studied in detail. The results obtained show that the amplitudes of the harmonic and mixing components are strongly dependent on the DC bias voltage, the series resistance and the ideality factor of the p-n junction diode. [C66]

"The Research of Macro-Quality about LED Substrate during Precision Machining Process"

The macro-quality of LED substrate includes integrity, the degree of warp, dimension accuracy and so on. We get the factors which affect macro-quality of LED substrate by experiment. The factors include the methods of substrate slicing, pasting, grinding and polishing. It is proposed to use wire cutting and the method of pasting by vacuum in order to improve the flatness of substrate. To prevent the collapse of edge during polishing we use special planet cage with protection edge. The velocity of chemical reaction has been coordinated with the rate of mechanical removal by adopting special chemical mechanical polishing liquid. As a result we can control the macro-quality of substrates efficiently and realize the shape integrity of surface, the degree of warp is less than 5 micron and the thickness error is less than 3 micron. [C67]

"Efficient Red Light-Emitting Diodes Based on Novel Europium Complexes in Poly(9,9-Dioctylfluorene) Host"

The derivatives of tri(4,4,4-trifluoro-l-phenyl-1,3- butanedione) (1,10-phenanthroline) europium(III) (Eu(TPD)3Phen), i.e. Eu(Ph-TPD)3Phen and Eu(BiPh-TPD)3Phen, were synthesized. Efficient red polymer light-emitting diodes (PLEDs) based on the europium complexes are fabricated with poly(9,9-dioctylfluorene) (PFO) in the presence of 30 wt.% electron-transporting compound 2-(4biphenylyl)-5-(ptertbutylphenyl)-1,3,4,oxadiazole

(PBD) as the host. A significant improvement in the electroluminescent (EL) performances was observed by increasing the conjugated length of the europium complexes, and for the complex Eu(TPD)3Phen, Eu(Ph-TPD)3Phen and Eu(BiPh-TPD)3Phen, the maximum luminance efficiency were respectively 0.12 cd/A, 0.45 cd/A and 1.27 cd/A, and the maximum brightness were 54 cd/m2, 91 cd/m2and 231 cd/m2, respectively. [C68]

"Design of Light Guide Plate Using White Light Emitting Diode for Direct Illumination of Liquid Crystal Display"

Traditional large-size direct-illumination structures for liquid crystal display (LCD) do not contain light guide plates. Though the uniformity meets the demand of LCD module, the whole thickness of the illumination system is difficult to reduce. With the development of white light emitting diode, many changes can be introduced in LCD for improving performances of system. In this paper, a design method based on that technique for direct illuminated LCD with light guide is presented. A LCD illuminating module was designed with this method, and uniformity can reach 86% which satisfied the illumination demand. [C69]

"Projectile Location Measurement System Based on Photo-Electric Conversion Technique"

In weapon-ammunition system, firing accuracy of projectile is major characteristic parameter weighing fire effect and capability of weapon-ammunition system for target. At present, firing accuracy of projectile is obtained by measuring the two-dimensional coordinates of projectile for target. In order to measure the parameters of two-dimensional coordinates of projectile for target, a new type of measurement system is proposed. The measurement system is composed of four high sensitivity light screens (known as target) with special geometrical frame. Light source of the screens is formed by special infrared LED array. The PIN infrared photodiodes array is used as the sensors. The longest effective distance between light source and sensors is 4 m. It is impossible to achieve using traditional methods. Four light screens and high-precision timers are combined in order to acquire the value of time when the projectile flies across the position of four light screens. The real-time data acquirement and processing and display of two-dimensional coordinates and the projectile velocity can be realized. The principle of measurement system and the design of high sensitivity light screen are introduced emphatically. The measurement system was verified by using five kinds of small caliber pellets. As compared with the paper target sheet, the measurement system designed can meet the demand of check-up test of gun, bullet and ammunition. The firing testing in the target field has proved that the measurement system has the advantages of simple construction, easy operation and high precision and high sensitivity. [C70]

"Luminescent Properties of Ba3MgSi2-XAlxO8: EuI+, MnI+ Phosphor for White LED"

Series of Ba3MgSi2-xAlxO8: Eu2+, Mn2+phosphors were synthesized by solid-state reaction and X-ray powder diffraction analysis confirmed the formation of the samples. These phosphors have a broad excitation band range from near ultraviolet to blue region (340-460nm). The phosphors have three emission bands peaking at 615nm, 480nm and 420 nm respectively under excitation of 380nm irradiation. Two emissions peaking at 420nm and 480nm originated from the 5d to 4f transition of Eu2+ions that occupy two Ba2+sites in the crystal of Ba3MgSi2-xAlxO8. The 615nm emission is attributed to the energy transferring from Eu2+to Mn2+. The intensity ratio between the 420nm and 480nm emissions varied with different concentration of Al ions. When the concentrations of the Eu2+, Mn2+and Al3+were 0.1mol, 0.1mol and 0.35mol in the phosphor respectively, the phosphor presented intense white emitting under the excitation of 380nm irradiation. The GaN (380nm)-based Ba2.9Mg0.9Si1.65Al0.35O8:0.1Eu2+0.1Mn2+white LED with the CIE coordinate of (0.3085, 0.3139) and color rendering of over 85 was obtained. [C71]

"Visible Light Communications-Recent Progresses and Future Outlooks"

The trends of LED replacing fluorescent and incandescent lamps for lighting are obvious in commercial applications. Then the visible light communications based on white light LED are promising communication technologies for high speed data transmissions. A bottleneck for this technology is the limited modulation bandwidth of LED. This paper reviews the recent improvements on bandwidth extension and methods increasing transmission speed at first. Then, major application areas of the visible light communications are discussed. At last, a conclusion and prospects are given. [C72]

"A Novel Method to Adjust the White Point of the Normal Black TFT-LCD"

A novel method is proposed for the normal black (NB) TFT-LCD white point adjustment. The method provides an easy way to adjust the white point by LCD gamma voltage re-setting when the LCD color filter and backlight are fixed design. An example is given to explain the method in details. The example results show that we can obtain bluish white point chromaticity coordinate deviation by slightly optimizing the gamma voltage settings. [C73]

"A Research of Liquid Level Measurement Based on Linear CCD"

A new method of liquid level measurement based on linear charge coupled device is presented in this paper. It is proposed that the liquid level images are directly projected onto the linear charge coupled device without any optical lens by using light emitting diode. The method is studied experimentally with a measuring device, which is designed for the proposed method on the basis of field programmable gate array and a host computer. Field programmable gate array is used as the control core to generate timing pulses and to control the main chips of the hardware circuit. The host computer is used to process the image data. The proposed method is on the basis of the contact measurement and has the advantages of high precision, high reliability, good real-time performance and so on. The experimental results show that the changes of the temperature have little effect on the measuring accuracy. In addition, the measuring device works normally even in some rigorous environments, such as in corrosive liquid and in sloshing liquid. Therefore, the proposed method has great potentialities, especially in small range and high precision situation. [C74]

"Efficiency droop in GaInN solid-state-lighting devices"

The efficiency droop in GaInN light-emitting diodes (LEDs) is an impediment for the introduction of solid-state lighting technology. The origin of the droop will be discussed along with measures that mitigate the droop. [C75]

"Study of polarization properties of light emitted from tensile strained InGaN/AlInN quantum well"

This paper discusses the optical polarization anisotropic of a c-plane InGaN/AlInN quantum well under the tensile strain. The calculation results indicate that with particular In composition of AlInN alloy for the tensile strain, it is possible to reduce the quantum-confined Stark effect and make an out-planed polarized light source for edge emitting laser diodes or light emitting diodes. [C76]

"Damp heat induced physical aging of PV encapsulation materials"

Apart from its chemical structure, mechanical properties of polymers depend mainly on polymer morphology, which is determined by the processing conditions. Exposure of the materials at elevated temperatures lead to changes in polymer morphology. The main objective of this study was to investigate the change in thermo-mechanical properties of different encapsulation materials (EVA, Ionomer) after damp heat testing. Therefore the materials were exposed for 1000 h to three different temperature and humidity levels and the thermo-mechanical properties of unaged and aged materials were measured by dynamic mechanical analysis (DMA) and by differential scanning calorimetry (DSC). At temperatures below -20°C, EVA and Ionomer showed high elastic modulus values around 1000 MPa, which decrease significantly to below 10 MPa at temperatures higher than 20°C. All films showed an increase in elastic modulus values over the whole temperature range due to damp heat exposure. Using DSC, recrystallization was found to be the dominant physical aging mechanism. Higher temperature levels during exposure caused greater changes in the polymer morphology, which led to stiffening of the polymer. The significant increase in film stiffness under application relevant temperatures could cause some severe problems during the service life time of a PV module, starting with delamination and a reduced ability to withstand mismatches in thermal expansion and eventually cracking of the cell or the wiring. [C77]

"Novel growth and device concepts for high-efficiency InGaN quantum wells light-emitting diodes"

The growths and characteristics of staggered InGaN quantum wells (QWs) and type-II InGaN-GaNAs QWs are presented for high-efficiency green-emitting light-emitting diodes (LEDs). Approaches for enhancing internal-quantum-efficiency, light-extraction-efficiency, and efficiency-droop in nitride LEDs are discussed. [C78]

"Green light emitting diodes with high internal quantum efficiency InGaN/GaN self-organized quantum dots grown by RF-Plasma Assisted Molecular Beam Epitaxy"

Self-Organized green InGaN/GaN quantum dots with high internal quantum efficiency have been grown by RF-Plasma Assisted Molecular Beam Epitaxy. Green light emitting diodes based on these dots were fabricated and electroluminescence spectra were measured. [C79]

"Reduction of the efficiency droop effect of a light-emitting diode through surface plasmon coupling"

The efficiency droop effect of a light-emitting diode is significantly reduced through the coherent coupling of its emitting quantum wells with the surface plasmons generated on the fabricated Ag structure on the device top surface. [C80]

"A two-phase heat spreader for cooling high heat flux sources"

A two-phase heat spreader has been developed for cooling high heat flux sources in high-power lasers, high-intensity light-emitting diodes (LEDs), and semiconductor power devices. The heat spreader uses a passive mechanism to cool heat sources with fluxes as high as 5 W/mm2without requiring any active power consumption for the thermal solution. The prototype is similar to a vapor chamber in which water is injected into an evacuated, air-tight shell. The shell consists of an evaporator plate, a condenser plate and an adiabatic section. The heat source is made from aluminum nitride, patterned with platinum. The heat source contains a temperature sensor and is soldered to a copper substrate that serves as the evaporator. Tests were performed with several different evaporator microstructures at different heat loads. A screen mesh was able to dissipate heat loads of 2 W/mm2, but at unacceptably high evaporator temperatures. For sintered copper powder with a 50 μm particle diameter, a heat load of 8.5 W/mm2was supported, without the occurrence of dryout. A sintered copper powder surface coated with multi-walled carbon nanotubes (CNT) that were rendered hydrophilic showed a lowered thermal resistance for the device. [C81]

"Indoor MIMO Optical Wireless Communication Using Spatial Modulation"

In this paper, a multiple-input multiple-output (MIMO) technique for indoor optical wireless (OW) communication is proposed. The technique is referred to as optical spatial modulation (OSM). The key concept is based on spatial modulation (SM). At any given time instant, only one transmitter is active and the others are inactive. A transmitter in space is considered as a spatial constellation point which is assigned a unique bit sequence. Consequently, transmitters are turned on and off depending on the incoming data bits, similar to the activation of constellation points in traditional digital modulation schemes. Hence, a data rate of the base two logarithm of the number of transmit units is achieved. The active transmitter radiates a certain intensity level at a particular time instant. At the receiver side, the optimal SM detector is slightly modified and used to estimate the spatial constellation point. The estimated spatial constellation point is used to arrive at the original bit stream via de-mapping. The upper bound bit-error-ratio (BER) of OSM is analyzed for a MIMO configuration consisting of four transmit units (light emitting diodes (LEDs)) and four receive units (photo diodes (PDs)) in a room. The BER performance is determined for different transmitter and receiver separation distances and different transmitter half power semiangles (Φ1/2). It is shown that the proposed OSM technique achieves twice and four times the data rate as compared to OOK (on-off keying) and PPM (pulse-position modulation), respectively. [C82]

"Averaged value analysis of 24-pulse rectifiers for aerospace applications"

This paper presents a new average modeling approach for 24-pulse rectifiers. The model is based on the former non-linear averaged value models for different configurations of an 24-pulse rectifier. The models allow rectifier and drive system interactions to be examined analytically, or through rapid simulation. The models are validated by comparison with a detailed circuit simulation. [C83]

"Conduction cooling of large LED array systems"

Large LED (light emitting diode) array lights are currently being designed and sold as replacements for lights on roadways, tunnels, parking lots and other large areas. These lights are typically 75 W to 200 W in thermal dissipation, and the lighting structure is designed to handle a predominately conductive heat path until contact with the outer air is made. At this point convection to the ambient air removes the heat from the system. To handle this internal conduction path to a suitable area for convection, most LED array lights have been developed using an aluminum heat sink, which causes a weight problem and additional costs over conventional light systems which are manufactured with sheet metal. Conventional sheet metal designs are deficient in providing an adequate thermal path for the LED thermal dissipation. A proposed solution is given in this paper with a sheet metal design enhanced for thermal conduction with flexible graphite. Eliminating the typical LED heat sink, it is shown that a sheet metal and graphite system can effectively cool the same thermal load. To prove this, an off-the-shelf LED street light was purchased, tested as a baseline, and then modified with the sheet metal and graphite design. Initial design work was performed with an analytical model, and then a prototype created from this design and shown to be of similar performance to the baseline-a system thermal resistance of 3°C/W from the PCB to the ambient, and a savings of 0.9 kg. A detailed CFD was also performed to evaluate the performance of the system and suggest possible improvements in air flow paths. Comparisons of the experimental and numerical results are given showing agreement in most areas. [C84]

"Immersion Cooling of Light Emitting Diodes"

Light emitting diodes (LEDs) historically have been used for indicators and produced low amounts of heat. The introduction of high brightness LEDs with white light and monochromatic colors has allowed them to penetrate

specialty and general illumination applications. The increased electrical currents used to drive the LEDs have resulted in higher heat fluxes than those for average silicon CPUs. This has created a need to focus more attention on the thermal engineering of LED power packages. The output of a typical commercial high brightness 1mm2LED has exceeded 100 lumens at drives levels exceeding 300 W/cm2. LEDs belong to the Solid State Lighting family, and are limited by their junction temperature (<;150 C). Temperature affects both performance and the reliability of the LED lighting systems. Immersion cooling has been studied for integrated circuits, and other consumer electronics for the last three decades. It is found that it can provide an order of magnitude higher heat fluxes removel than air-cooling due to the phase change heat transfer. This study explores the use of immersion cooling of LED chips in a unique light engine. An experimental and computational study has been carried out to obtain the thermal and optical performance of a multi chip LED light engine. Heat transfer has been kept at the single phase in dielectric fluids, which is compared to conduction in the conventional silicone capping material. [C85]

"Thermal characteristics of edge-illumination type LED backlight system in a thin flat panel display"

Light Emitting Diode (LED) is one of promising source in lighting industry and applied as light source of a backlight system in flat panel display with advantages of performance and environmental-friendly feature. The inherent characteristic of LED causes high heat dissipation from the device and careful thermal management is required. Therefore, the thermal management in LED backlight system is crucial for the display development. However, narrow volume of flat panel display cause non-uniform temperature distribution over the system and the dependency of LED operating temperature necessitate the carful thermal design for light source. The objective of present study aimed to investigate the effect of design parameters in edge illuminating type backlight system. It is presented thermal characteristics of LED light source in edge-illumination type backlight system and evaluated performance of the thermal management system to ensure the reliability of the system. [C86]

"Room Temperature Ultraviolet Electroluminescence from ZnO Based Homojunction Device"

To realize practical application of short-wavelength optoelectronic devices (such as LEDs and LDs) based on ZnO materials, electroluminescence (EL) from ZnO based junction device is pivotal. In our recent studies, ZnO based homojunction devices with different structures were grown by metal organic chemical vapor deposition (MOCVD). Desirable rectifying behavior is observed from the current-voltage curve of the ZnO p-n homojunction. Furthermore, a distinct electroluminescence with a dominant emission peak centered at blue-violet region was observed at room temperature from the heterojunction structure under forward bias conditions. The origins of the EL emissions are discussed in comparison with the photoluminescence spectra. [C87]

"Room-temperature operation type-II GaSb/GaAs quantum-dot infrared light-emitting diode"

A GaSb/GaAs quantum-dot light-emitting diode (QD LED) with a single GaSb QD layer is investigated in this paper. The room-temperature photoluminescence peak blue shift with increasing excitation power densities suggests a type-II alignment of the GaSb/GaAs hetero-structures. Significant electroluminescence is observed for the device under forward biases, which suggests that pronounced dipole transitions occur at the GaSb/GaAs interfaces. With increasing forward biases, the observed EL peak blue shift confirms that the origin of luminescence is from the type-II GaSb/GaAs QD structures. [C88]

"Photodynamic Effects of Quantum Dots on Inactivation of Leukemic HL60 Cells in vitro"

Photosensitization of quantum dots was activated with a LED light source (410nm) delivered at 5mw/cm2to give a different dose by altering the radiation period. Cellular proliferative activity and apoptosis was measured using the cell counting kit-8 (CCK-8) assay. After four hours following photodynamic treatment, the degree of apoptosis was significantly increased, and the best experimental parameters of inactivation of leukemic HL60 cells in vitro, 2.0Ч10-6mol/l (the concentration of QDs), 18J/cm2(the radiation dose), were obtained. [C89]

"Experimental Research on the Cytotoxicity of CdSe Nanocrystals with the Irradiation of Violet Light"

The present study processed the absorption spectrum of CdSe nanocrystals (Ncs) which was modified by mercaptoacetic acid (MA). Based on this, the LEDs whose emission peak is near the absorption peak of the NCs were selected to form a LED array. The leukemia cell line HL60 was cultured in two 96-well plates and incubated with different concentrations of MA-Coated CdSe NCs. One of the 96-well microplates was irradiated by the LED array mentioned above, and the other wasn't. Then the viability of the cells on both microplates was determined using CCK-8 assay. The results in vitro demonstrated that the ability of MA-Coated CdSe NCs to induce cell death can be promoted under the irradiation of the light source we used. [C90]

"InAs/InP QDs broadband LED using selective MOVPE growth and double-cap procedure"

InAs/InP QDs broadband LED more than 450 nm spectrum width was successfully demonstrated. The broadband spectrum was obtained from the height controlled double-cap procedure and strain controlled buffer layer fabricated by the selective MOVPE technique. [C91]

"Nanowires for quantum optics"

We present optical measurements on nanowire heterostructured quantum dot devices. Quantum dots defined with hetero-material structures are presented as well as a novel type of quantum dot defined by the crystal phase of the semiconductor. We demonstrate the possibility of electrically addressing a single quantum dot with photocurrent and perform electroluminescence measurements on a single nanowire light emitting diode. The applicability of our devices to advanced quantum optics and quantum plasmonics measurements is discussed. [C92]

"Front cover"

This paper dealt with the following topics: photonic-electronic convergence; CMOS technologies; semiconductor growth; quantum optics; LED; quatum dots; MOSFET; III-V semiconductors; lasers; modulators; nanostructured devices; epitaxy; HBT; high-speed switches; Sb-based alloys; heterostructures; towards THz; nitrides; optoelectronic devices; integrated light sources; photodetectors; HEMT; MMIC; integrated receivers; heteroepitaxy; photonic crystal devices; FET for logic; MOS; and other related semiconductor devices. [C93]

"Heat Dissipation for LED Lighting: Vapor Chamber Substrate Printed Circuit Board"

Heat dissipation is an inevitable subject during the design of light emitting diode (LED) lighting, especially for museums and medical equipment. In this paper, a novel substrate technology for an effective solution to two major problems that affect the heat dissipation performance has been introduced. (1) The non-uniform junction temperature of the module across the LED arrays and the uneven operational temperature of LED arrays; (2) The high operational temperature caused by the accumulated heat. This new type of Vapor chamber substrate printed circuit board (PCB) consists of a thermally-conductive Vapor chamber substrate which is insulated by a dielectric layer of aluminum nitride (ALN). Circuit is formed on the dielectric layer with pulse magnetron sputtering technology. Experimental results in the form of average temperature show that the vapor chamber substrate PCB can improve the temperature uniformity. And good thermal performance for high power LED arrays can also be achieved. [C94]

"Effects of Self-Motion and Illuminance on Visual Attention in Traffic Driving Environment"

Studies have shown that prior information concerning the spatial location of a subsequent target facilitates the selection of that target for further visual processing in 3D space. Using Posner's paradigm, our work examined the reaction time of drivers when cue duration and peripheral environment luminance was changed, and explored the effect color and location on reaction time. Experiment 1 showed that reaction time was not affected by cue duration, and that shifts of attention operated more efficiently for cue location validity. Experiment 2 showed that there was no main effect of background luminance on reaction time. Experiment 3 showed that location produces a greater effect than color. [C95]

"Design and Implement of Responder Based on Freescale HCS12 Single Chip Microcomputer"

An 8-channel responder based on Freescale HCS12 single chip microcomputer is designed. The responder can display the number of the first player correctly. It also can count the scores and show the player with the highest score. The system includes four modules: CPU12, the SCI serial communication, digital display tube and timer. When competition signal input, it is been caught and then cause interruption, the timer is used to time accurately, the serial port is used to send and receive the start answer signal, judgment signal and other signals, the digital display tube is used to show the scores of the current player. LCD display tube shows subjects and answers. So the basic functions of the responder are achieved. [C96]

"High power factor Flyback converter for LED driver with Boundary Conduction Mode control"

A varying-frequency control Flyback rectifier for LED driving in Boundary-Conduction Mode (BCM) is presented. Comparing with Discontinuous-Conduction Mode, BCM has the advantages like smaller coupling inductor current, less current stress for circuit component, slight output current ripple, and higher power factor performance. For lower output application circumstance, the boundary conduction mode can be chosen with smaller inductance value. In this control scheme, input line voltage sensing, analog multiplier/divider and inner

current loop are neglected. Design and analysis for BCM control circuit are derived and simulated. To verify the ideal vary-frequency controller, the circuit experiment has been applied to driving LED module, and stabilized the output current. The experimental results show that the system can provide constant current output with high power factor and it also compared with the system is operating in DCM. [C97]

"Rapid Determination of Semi-VOC Using Partly-Immersed Three-Phase Hollow Fiber Liquid Phase Microextraction Combined with High Performance Liquid Chromatography"

A novel method to determine semi-volatile organic compound(semi-VOC) was established by HPLC coupled with a partly-immersed three-phase hollow fiber liquid phase microextraction (PI-LPME) technique for sample preparation. The influence of extraction parameters including organic solvent, pH of donor and acceptor phase, extraction time, the proportion of hollow fiber in gas and liquid were optimized. Under the optimum conditions, the proposed method provided linear range of 0.05-10 μg/ml with r2 0.9992, detection limit of 5 ng/ml (S/N=3), RSD<;5%(n=5) and relative recovery of 95.91-97.95%. [C98]

"Study on the Optimal Method for Photoplethysmograph Measurement at radial Artery"

An electronic circuit for detecting photoplethy-smograph (PGp) at radial artery is developed, and experiment study on the optimal method for PGp measurement at the radial artery using local pressurizing cuff is carried out. Also, amplitudes of the arterial volume pulsation detected under the same cuff pressure are used as the evaluation standard, the optimal measurement position, the combination of photoelectric sensor and the method for PGp measurement are discussed and experimented. Experimental results show that the bigger PGp can be detected under the condition that the photoelectric sensor is located at 20mm position in wrist, the distance between centerlines of light-emitting diode (LED) and photodiode (PD) is set to 7mm, the photoelectric sensor is set in the vertical placement, and LED is just located on the radial artery. From the study, the optimal method for PGp measurement at the radial artery is determined. [C99]

"Broadband linear array with photoconductive attenuators"

This paper describes the design, construction, and testing of an 8 element broadband array with photoconductive attenuators at each broadband monopole element. The photoconductive attenuators are controlled by an IR LED and vary between on and off with a small reflection coefficient and small insertion loss. Test results for the elements and array are presented. Low sidelobe Chebyshev amplitude tapers are demonstrated by controlling the illumination of the photoconductive weights. [C100]

"Desktop orthogonal-type robot with abilities of compliant motion and stick-slip motion for lapping of LED lens molds"

In this paper, a new desktop orthogonal-type robot, which has abilities of compliant motion and stick-slip motion, is first presented for lapping small metallic molds with curved surface. The robot consists of three single-axis devices with a high position resolution of 1 μm. A thin wood stick tool is attached to the tip of the z-axis. The tool tip has a small ball-end shape. The control system is composed of a force feedback loop, position feedback loop and position feedforward loop. The force feedback loop controls the polishing force consisting of tool contact force and kinetic friction forces. The position feedback loop controls the position in pick feed direction, e.g., z-direction. The position feedforward loop leads the tool tip along a desired trajectory called cutter location data (CL data). The CL data are generated from the main-processor of a CAM system. The proposed robot realizes a compliant motion required for the surface following control along a spiral path. In order to improve the lapping performance, a small stick-slip motion control strategy is further added to the control system. The small stick-slip motion is orthogonally generated to the direction of the tool moving direction. Generally, the stick-slip motion is an undesirable phenomenon and should be eliminated in precision machineries. However, the proposed robot employs a small stick-slip motion to improve the lapping quality. The effectiveness of the robot is examined through an actual lapping test of an LED lens mold with a diameter of 4 mm. [C101]

"Autonomous re-alignment of multiple table robots"

This paper reports an experimental system of autonomous omni directional mobile tables and their automatic rearrangement. This system 1. detects the position of meeting tables using a camera on ceiling, 2. makes a route from the detected position by a motion planning and 3. arranges the table robots to the desired positions. We developed 4 table robots as multiple omni-directional mobile robots and constructed a position detecting system using LEDs (Light Emitting Diode) attached on the tables. A camera is fixed on the ceiling. We also developed a motion planning algorithm for the robots. Consequently, the table robots can move from an arbitrary arrangement to an arbitrary arrangement. The effectiveness of the proposed algorithm was confirmed. [C102]

"Thermal Analysis and Design of High-Power LED Street Light"

LED is called the fourth generation of lighting, which has already been widely used in display and illumination devices. The junction temperature has directly influence upon the life time and reliability of high-power LED, so keeping the junction temperature of LED is a key issue. A method researching radiators based on finite element analysis was introduced. In this paper, the heat performance of LED COB (chip on board) packaging was studied. The radiating model of LED street lamp with a radiator was introduced, and simulated the changing of parameters of radiator by ANSYS. [C103]

"High Density of Si Nanocrystals Fabricated in a VHF-PECVD System for Light-Emitting Devices"

High-quality nanocrystalline silicon films were fabricated in plasma enhanced chemical vapor deposition system by using a high excitation frequency (40.68 MHz) at low temperatures. It is found that the nanocrystalline Si films with high crystallinity of 89% can be obtained by using SiH4highly diluted with H2. Furthermore, the area density of the nanocrystalline Si is as high as 4.4Ч1011/cm2. The Fourier transform infrared spectroscopy and transmission spectroscopy manifest that the nanocrystalline Si film possesses small microstructure factor, low hydrogen content and wide optical band gap. [C104]

"Polarization Properties of Metal-Dielectric Composite Subwavelength Gratings on GaN Substrate"

A novel type of GaN substrate for light emitting devices with a highly polarized output using metal-dielectric composite subwavelength grating structure is proposed. Characteristics of both optical transmission and polarization extinction ratio of the polarized GaN-based LED with a double-layer grating structures are investigated. It is found that both TM transmission (TTM) and the extinction ratio(ER) of the LED output can be effectively enhanced by incorporating a dielectric transition grating between the metal grating and GaN substrate with a lower refractive index than that of the GaN substrate. Flat sensitivity of the TTMon the period, duty cycle of the grating, and the wide range of operating wavelength have been achieved. Up to 0.7 high duty cycle of the grating can be employed to achieve ER > 56dB while TTMmaintains higher than ~93%. The results provide guidance in designing, optimizing and fabricating the novel integrated GaN-based and polarized photonic devices. [C105]

"Single-stage Flyback converter for led driver with inductor voltage detection power factor correction"

A constant current output Flyback converter with power factor correction used for LED driving is presented in this paper. The inductor voltage detection method is applied and acquired the inductor voltage to generate the control signal. Based on this design principle, the inner loop of input current shaping is eliminating, the input voltage sensing and multiplier are also not necessary. The simulation and experimental results are provided to demonstrate the effectiveness of the control scheme based on the lab prototype boards. The output load condition is set from full load to light load, and the results show that the system drives the LEDs with high power factor. [C106]

"Implementation of a colorful RGB-LED light source with an 8-bit microcontroller"

This paper depicts the implementation of a colorful RGB-LED light source with an 8-bit microcontroller. The microcontroller regulates LED light output with pulse-width modulation current and changes the light color with the current ratios of red, green and blue LEDs. While the LED light output varies with temperature, the microcontroller stabilizes the light output of LED with feed-forward compensation and reduces the color deviation in chromaticity diagram. The color deviation is measured with a miniature spectrometer and the calibration of white balance is executed based on the chromaticity coordinates of the used red, green and blue LEDs. Some color points inside the chromaticity diagram and along the blackbody locus are tested to verify the performance of the RGB LED light source. Test results show that an 8-bit microcontroller may effectively regulate the light colors and brightness of a RGB combinational light source. The implemented RGB LED light source can be a good light fixture for mood lighting in somewhere, such as, hotels, restaurants, hospitals, advertisement walls and others. [C107]

"High voltage driving circuit with negative pulse feature for tubular field emission lamp"

A high voltage driving circuit having pulse mode is proposed for driving tubular field emission lamp (FEL). The employed main circuit topology, which is a flyback converter operated in discontinuous conduction mode (DCM), will not only provide a low cost negative pulse feature, but also eliminate the arcing phenomenon caused by traditional DC driving so as to improve the system efficiency and the lamp lifespan. In this paper, an equivalent model of the FEL is constructed to exhibit its capacitive characteristics. Moreover, each operation mode in a

switching cycle is also described. And then a complete design considerations and mathematical model are detailed. All the experimental results agree with the computer simulations to verify the theoretical predictions. [C108]

"Joint LED dimming and high capacity visible light communication by overlapping PPM"

Piggybacking communication by illumination LEDs provides additional valuable functionality to LED lighting fixtures as optical communication transmitters at little cost. However, joint dimming control and high data-rate communication requires proper supporting protocols under the bandwidth limitation of LEDs. This paper applies overlapping pulse position modulation (OPPM) to achieve high capacity communication and flexible dimming. It then analyzes both illumination and communication performance in terms of dimming range, flicker severity index, cutoff data rate, and power and bandwidth efficiencies, all comparing against OOK and variable PPM modulation schemes. The results show the best performance using OPPM, making it an ideal candidate technology for emerging visible light communication. [C109]

"PWM photo-power control for light-emitting diode lighting system without photo-diode detection"

The drawback in using the light emitting diode as a light source is that its light output power is highly temperature dependent. This paper puts forth the novel idea of neglecting the photo diode as a luminance sensor and taking advantage of pulse-width modulation at the same time. A light emitting diode power controller based on automatic power control technology is introduced. The controller can reduce the power dependence of the electrical component on temperature and regulate light emitting diode brightness according to the pulse-width modulation. In this way, the current flowing through the electrical component can be switched off to reduce the power consumption and to prevent electrical component over heating. Finally, the comparisons between voltage source with ballast resistor, automatic current control and proposed photo-power control are discussed in this paper. All these three compensated mechanisms are without photodiode. The experimental results show the proposed method is effective in providing constant luminous intensity. [C110]

"A Novel High Resolution and Low Noise CMOS Vision Sensor for Portable Optical Analytical Lab-on-a-Chip System"

In this paper, the motivation is to integrated chemical and biomedical separation, analysis and assay techniques into a PCB technology-based system with LED light source, smart CMOS vision sensor and lab-on-a-chip device. One high sensitivity low noise pinned-photodiode smart CMOS vision sensor is designed and fabricated in this paper. The measurement shows that the maximum sensitivity is about 0.95V/sec.lux. The chip operates in the normal condition of 30fps@54M clock and its noise level is low to below the 0.8mV level due to the pinned pixel technology, noise reduction circuit and design optimization. Based on the smart CMOS vision sensor, one PCB technology-based optical analytical system has been built up for lab-on-a-chip. This proposed printed circuit board (PCB) technology system has small size, low power consumption, low cost and real hand-held device and can avoid possible human errors with automation and low labor. [C111]

"High-speed-camera image processing based LED traffic light detection for road-to-vehicle visible light communication"

As one of ITS technique, a new visible light road-to-vehicle communication system at intersections is proposed. In this system, the communication between a vehicle and an LED traffic light is conducted using an LED traffic light as a transmitter, and an on-vehicle high-speed camera as a receiver. The LEDs in the transmitter emit light in high frequency and those emitting LEDs are captured by the high-speed camera for making communication. Here, the luminance value of LEDs in the transmitter should be captured in consecutive frames to achieve effective communication. For this purpose, first the transmitter should be found, then it should be tracked in consecutive frames by processing the images from the high-speed camera. In this paper, we propose new effective algorithms for finding and tracking the transmitter, which result in a increased communication speed, compared to the previous methods. Experiments using appropriate images showed the effectiveness of the proposals. [C112]

"Automatic detectand match of LED dies basing on position relations betweenadjacent dies"

In order to improve production efficiency, inspecting and sorting of LED dies are done respectively in prober and sorter. During the inspection, dies may be broken, fragmentized, tiny moved, or deflected slightly, besides, visual scan can also lead to location deviation when the wafer is moved from prober to sorter. All of this can cause some dies mismatch in the sorting stage, which is never allowed. In order to get integrated match of dies, the position relations between adjacent dies are considered, techniques including diagnosing criterion of position

relatives, redundant visual scanning, forward and backtrack algorithm with cross priority are put forward. It is proved with experimental results that such re-index approach is more applicable than traditional index method. When dies arrange in good order, match rate is more than 99.5%, by compassion, that of traditional index method is less than 92%. When the wafer is deflected slightly or locally fragmentized, match rate of the former is more than 92.5%, by contrast, that of the latter is less than 50% in same situation. [C113]

"Multi-channel constant current LED driver with temperature and voltage compensation"

This paper proposes a new circuit for obtaining a constant current in parallel LED (Light Emitting Diodes) strings. This new technique not only achieves high invariability to temperature in each string but also reduces the internal and external resistance requirements. In this work, the LED current has a low correlation to its forward voltage (VF). Furthermore, this circuit matches the current of a multi-LED parallel string and maintains its accuracy by using only operational amplifiers to control these LEDs. In other words, it reduces the power consumption and die size considerably. The IREFobtained in this circuit is nearly independent of the temperature. This has been accomplished by the mutual compensation of mobility and threshold voltage variations. Moreover, the variations due to the temperature coefficient of resistance have been taken care of. The temperature coefficient of this circuit can achieve as low as 142ppm/°C over the range from -40-120/°C which large than 20mA. [C114]

"Au-Sn co-electroplating solution for flip chip-LED bumps"

A new non-cyanide and non-toxic stable electroplating solution for co-deposition Au-Sn alloys was investigated in this study. A stable sulfite-based electroplating solution for gold and a stable solution for tin were prepared, respectively. L-ascorbic acid was added into the Au solution and a reducing agent was added into the Sn solution, and then the two solutions were mixed to generate Au-Sn solution. The effects of additives on solution stability at room temperature and high temperatures were studied. Polarization tests of Au, Sn and Au-Sn solutions were carried out to reveal the effect of additives on Au, Sn and Au-Sn plating. Then a series of electroplating tests at different current densities were performed in order to demonstrate plating capability of Au-Sn solutions. It was shown that the species of the main salt for gold affected the stability of solution prominently. EDTA could improve the stability of Au solution at high temperature and the complexing agent for Sn was also benefit to the stability of Sn solution. Two waves in Sn solutions with the complexing agent indicated two cathode reactions occurred during Sn plating. The reducing agent was added to prevent the oxidation of Sn (II), but it turned out to affect the polarization of Sn solutions and the compositions of Au-Sn alloys during co-electroplating. Electroplating experiment results showed that co-electroplating of uniform Au-Sn deposits was feasible. [C115]

"Network solutions for the LOS problem of new indoor free space optical system"

Recent developments in solid-state light-emitting diode (LED) materials and devices is driving a resurgence into the use of free-space optics (FSO) for wireless broadband communication. This technology uses the visible spectrum provided by "white" LEDs that are becoming ubiquitous in lighting and has some desirable properties competitive with existing radio frequency (RF) communications. By leveraging the low-cost nature of LEDs and lighting units there are many opportunities to exploit this medium for widespread optical communication deployment. The optical medium, however, has particular characteristics, including directionality and susceptibility to noise sources in the visible spectrum that must be managed. In this paper we present a new indoor FSO system, also known as a visible light communication (VLC) system that addresses achieving satisfactory data rates while supporting multiple access under line of sight (LOS) constraints. A hexagonal physical device design is proposed and investigated in the context to two communication protocols designed to manage point-to-point and point-to-host cases. Theoretical analysis and simulation of the two protocols under the hexagonal transceiver device design indicate suitability for addressing high data rate communications between peer devices; or, via relay, between multiple devices using the peer-to-host model. [C116]

"An overview of indoor OFDM/DMT optical wireless communication systems"

This paper is an overview of indoor OFDM (orthogonal frequency division multiplexing)/DMT (discrete multitone) optical wireless (OW) communication systems. Indoor OW OFDM/DMT systems can be classified into two groups. One group produces half-wave symmetry time signal at the output of the OFDM modulator by special assignment of subcarriers. Thus, allowing signal clipping at the zero level and avoiding the need of DC bias at the expense of data rate reduction. ACOOFDM (asymmetrically clipped OFDM system) and PAM (pulse amplitude modulation)-DMT are two techniques from the first group. The second group assigns data to all possible subcarriers to increase the data rate. However, half-wave symmetry signals cannot be achieved and DC bias is needed to convert the bipolar signal to a unipolar signal before modulating the LED (light emitting

diode) intensity. DC-biased OFDM and a novel technique, proposed in this paper, called orthogonal PAM-DMT (OPAM-DMT) that is an extension of the proposed PAM-DMT by using discrete sine transform and discrete cosine transform to transmit two orthogonal signals at the same time, are two techniques from the second group. This paper considerers a practical LED model and studies the performance of all these systems in terms of average electrical OFDM signal power versus bit-error-ratio (BER) in the presence of additive white Gaussian noise channel (AWGN). It is shown that LED clipping has significant impact on the performance of all these systems and the performance of these systems substantially depends on the considered modulation order. [C117]

"Study on auto-path planning according to grade priority for sorting dies"

Semiconductor light-emitting diode (LED) has now become one of the most popular lighting devices. Before diodes are put into process of package, they need be inspected and graded strictly, so following waste will be saved. Cost of inspection and sort is relatively high, it is urgently needed to improve sort efficiency and reduce sort time. This is a problem needs comprehensive consideration. Sort performance is influenced by acts such as feeding, ejecting, transporting, placing, recycle bin positioning, and so on. Stochastic Petri net model of concurrent control of multi-shafts scheduling is built to analyze the performance and its influenced factors. It can be revealed that positioning of recycle bins is the major influence factor. Because of this, a path planning method according grade, the diodes with same grade should get priority to be sorted first, is put forward. Techniques about die search and merge by grade, traversal of forward and backtrack with cross priority are described in detail. With reasonable simulations, this optimization is obviously proved effective to reduce sort time and improve diodes production rate. [C118]

"Application of FEM simulation technology on thermal design of electronic packaging device"

Thermal design is necessarily to be considered for high-power electronic packaging device design. In this paper, the thermal characteristic of packaging device was studied using FEM, for example, phase shifter and LED. The model for thermal condition of phase shifter was established. The top junction temperature obtained by simulation shows tendency as tested experiment results, verifying the correctness of the simulation model and method used. The relation of relative temperature rising to different solder voids, substrate thickness and material is studied by simution. The quantitative relations of these parameters and temperature provided a theoretical basis for the thermal design, the optimization of parameters and the reliability improvement of phase shifter and LED. [C119]

"Preparation of packaging cap with binary glass microlenses for wafer level packaging of Focal Plane Arrays (FPAs)"

To improve the image resolution of thermal imagers, which image objects by uncooled Focal Plane Arrays (FPAs) made up of two-dimension Infra-red (IR) detector arrays, detector size is decreased, and this results in the reduction of detector IR absorber area . However, reduction of IR absorber area may affect IR detector's sensitivity accordingly. In order to reduce the detector size without reducing the detector's sensitivity, the microlenses which can focus the infrared ray on the IR absorber area need to be prepared. A hot forming process of fabricating binary-optics microlenses for wafer-level-packaging of IR FPAs using Pyrex7740 glass is introduced in the paper. Pyrex7740 glass is a widely-used material in the field of packaging of micro system due to its coefficient of thermal expansion is similar to that of silicon and good optical performance for optical devices. The process is based on etching stepwise structures in silicon, and binary-optics silicon-mold wafer is fabricated by a multilevel reactive-ion etching (RIE), followed by anodic bonding of a thin glass wafer to the etched silicon wafer under vacuum. The bonded wafers are then heated inside a furnace at a temperature above the softening point of the glass, and the glass is blown into the stepwise structure due to the atmospheric pressure. Besides, the filling rate of glass into the silicon cavity mold is also discussed. After the silicon mold is removed, glass packaging caps with wafer-level binary-optics microlenses for vacuum packaging are fabricated. Results show that packaging caps, which are of 620umЧ620um with focal lengths ranging from 1mm to 100 mm at 2.2 um wavelength, are prepared. While the FPAs are encapsulated by the packaging glass caps, the microlenses combined with the detector concentrate light sufficiently to increase the effective collection area, and IR detector's sensitivity is improved. Due to the excellent transmission efficiency in visible and near IR light of the Py--rex 7740 glass, the binary-optics microlenses may have potential application in the other optic devices including Light Emitting Diode (LED). [C120]

"Evaluation of GaN-based blue light emitting diodes based on temperature/humidity accelerated tests"

The degradation of high power GaN-based blue light-emitting diodes (LEDs) was investigated by considering the

electrical, optical and electroluminescence spectrum aging characteristics. The LED samples are stressed at the condition of 85°C and 85% RH using an injection current of 1000 mA. Optical output power decreases to 80% of initial value after 1000 hours of temperature/humidity accelerated tests. Changes in the series resistance can be observed from the current-voltage characteristics during the stress tests. The increase of nonradiative paths and discoloration of encapsulation materials are possibly responsible for the degradation of optical output power. The mechanisms of increasing nonradiative recombination paths may be related to the generation of defects in the active region due to the high injection current and the increase of LED chip temperature. The influence of degradation on the electroluminescence spectrum has also been analyzed. The peak position of electroluminescence spectrum under the same current showed a redshift after the temperature/humidity accelerated tests, indicating a decreased band gap. The particular humidity effects on the degradation of blue LED are investigated, and the luminous flux of the packaged blue LEDs decreased with the increasing stress time due to the prolonged humidity test. [C121]

"A novel thermal conductivity meter for thermal interface materials in optoelectronic device"

Nowadays, the light emitting diode (LED) is one of the most valuable light resources. However, it is well known that the optical output power is degraded with the heat integration. Hence, thermal management and evaluation system is required. Thermal conductivity is regarded as one of the most important properties that directly influence the thermal performance for thermal interface materials (TIMs). Different methods have been used to measure the thermal conductivity of TIM. Some testers with satisfied accuracy have also been discussed in papers. However, they are generally of high cost and complex structure design. In this paper, a novel thermal conductivity tester for optoelectronic materials with low cost was designed and built based on one-dimension heat transfer theory and the processing technology. Details of the measurement methodology and the apparatus development were introduced. The tester was designed based on ASTM D5470 which is specified to the thermal conductivity measurement of TIM. According to modular design principle, the apparatus can be divided into five parts, including frame, loading, heating and cooling units and in-situ thickness measurement. In determination of the external loads on the test samples, a force transducer was located in the loading module, which would improve the accuracy and repeatability during the tests. A circulating water cooling system and a flexible heating source were utilized to provide temperature gradient. Moreover, an in situ thickness meter was used for the specimen thickness measurement and monitoring, consequently, the error in thickness estimation could be minimized. On the other hand, by using finite element method, the structures of heating and cooling modules were optimized to achieve uniform temperature distribution and the simulated results matched well with the experiment. Thermistors were used for experimental comparison and characterization. A data acquisition system was developed via Labview software fo--r data fitting and result analysis. [C122]

"Study on automatic angle correction directed by machine vision in power LED dies sorting"

All dies are required to keep consistent angles in LED chip sorting. Generally, all chips are adhesive to wafer tape. When each die rotates, all other dies rotate and their positions change. To solve this problem, an on-line angle correction method is put forward. Techniques including reverse computing angle offset and moving displacement for die angle correction are discussed in detail. While, experimental results disclose that it is not enough for power LED die angle correction. Active visual rectification is then used for this. In this way, each correction is done by machine vision detects. Experimental results show that many deficiencies are eliminated and maximum value of die angle declination can be corrected to less than 1.25°. It can be concluded that final effects for angle correction has been better. [C123]

"Heat transfer analysis of vapor chamber heat pipe for high power LED package"

In this paper, the high power LED system dissipation equipment is analyzed, in this LED system,consisting of nine chips and each chip is 3W. The novel dissipation equipment is design and analyzed, which is composed of vapor chamber, heat pipe array and fins. Vapor chamber as the thermal diffusion layer, it is effectively reduces the spreading resistance from LED chips to heat pipe. The other two models were built as the comparison. The designs were then being calculated on its transfer behavior using simulation with professional thermal analysis software Flotherm, simulation results show that the novel design has better heat dissipation ability than the other two comparison models, and the junction temperature is 71.6°C at the natural convection condition, after optimization of the fins, it is drop to 65.6°C. [C124]

"Halftone control method in white light leds by using an embedded remote controller with ZigBee communication"

In this paper we design an automatic light controller which consists of two parts: an LED array with a control unit and an embedded remote controller with ZigBee communication. The LED array includes both an LED array and

a transmission controlled module. We use the halftone method to transform different LED array patterns into gray patterns and use those different halftone patterns to control the LED on/off which can adjust the LED light brightness, just like using PWM. We use ZigBee technology to send a brightness control signal as a distance measurement by means of an embedded remote controller. Visual Studio is used as the development software for our design of the graphic interface to provide a user-friendly operation. [C125]

"Modular dimmable light-emitting-diode driver for general illumination applications"

This paper aims to present a modular dimmable high brightness (HB) light-emitting-diode (LED) driver for retrofitting general/residential illumination systems. An improved micro-controller based pulse-width modulation dimming technique is studied and implemented for selecting the brightness of LEDs. Under universal input voltage operation, high power factor and high efficiency can be achieved by a power-factor-correction converter followed by a coupled inductor fly-back converter. The operation principles of the proposed modular HB-LED dimmer and driver will be analyzed and discussed. A laboratory prototype is also designed and tested for verification. [C126]

"Discussion on the Teaching Reform of Single-chip Computer Base on Mode CDIO at Vocational College"

The conventional teaching model is broken in Mode CDIO, in which, with the carrier of project, the educational idea based on project-learning and the principle of teaching integration are embodied, and students play main roles well, while faculty play leading rolls. Taking Principle and Application of Single-chip Computer as an example, we expatiate on the implementation of the teaching reform in Mode CDIO and get an improved teaching quality. [C127]

"Analysis of advanced resource saving technologies of information display devices and systems"

Due to a wide application of information display devices, energy consumption has become one of the key parameters. The article considers the most advanced technologies of information display devices, which have been currently put to commercial use, both in terms of energy consumption and the key parameters. [C128]

"Optimized fuzzy control for LED constant current driver design"

DC-DC boost converter in PWM switch mode is attractive for high power white LED constant current driver. The occurrence of uncertainty and coil magnetic saturation in DC-DC power converters makes their analysis and control difficult. A fuzzy logic controller (FLC) is then utilized to ensure current regulation over a wide range of parameters, which is perceived as an optimization problem. A robust controller is then obtained through evolutionary search. Extensive simulation results show the effectiveness of the proposed approach. [C129]

"Design of a multi-functional supervising terminal"

In order to watch the status of a system, a multi-functional terminal is necessary. This paper discusses the function of the terminal, the theory or principle which the design based on, the design of the hardware and the software. For the hardware, we use MCU C8051F as the controller. The peripheral circuit design includes the power module, serial port module etc. For the software, we use the idea of multi-layers design including the driver layer and application layer. [C130]

"A MATLAB-based simulation program for indoor visible light communication system"

We report a simulation program for indoor visible light communication environment based on MATLAB and Simulink. The program considers the positions of the transmitters and the reflections at each wall. For visible light communication environment, the illumination light-emitting diode is used not only as a lighting device, but also as a communication device. Using the simulation program, the distributions of illuminance and root-mean-square delay spread are analyzed at bottom surface. [C131]

"Implementation of a 84 Mbit/s visible-light link based on discrete-multitone modulation and LED room lighting"

We present an implementation of a 84 Mbit/s optical wireless link based on commercially available LED luminaries. A quasi-error-free data transmission was accomplished over typical indoor distances, e.g., between ceiling lamp and writing desk, by use of discrete-multitone modulation. [C132]

"Line-of-sight visible light communication system design and demonstration"

With the emergence of high lumen output white lighting LEDs, visible light communication has become an intriguing technology to realize low cost data transmission in conjunction with lighting. In this paper, we discuss some key issues in practical line-of-sight (LOS) visible light communication system design. They include a transmitter, channel model, and receiver front-end. A transmitter containing white LED arrays should be designed to achieve required lighting distribution and reliable data transmission at the same time. A basic LOS channel model to characterize the path loss and received optical power is also needed for optimization of the receiver under major noise sources. Finally we show a practical indoor LOS visible light communication system to demonstrate some of our analyses. [C133]

"Design and implementation of indoor environmental monitoring wireless sensor networks based on JN5139"

In order to better meet the demand of monitoring indoor environmental quality in some applications, this paper presents a scheme of design and implementation of indoor environmental monitoring system based on JN5139 SOC. The system takes full advantages of ZigBee technology of JN5139 SOC chip in wireless sensor network design and implementation to realize the hardware design of wireless sensor nodes and construct Mesh-type sensor network using JENNIC ZigBee protocol stack. Based on above design, PC monitoring control terminal is expanded so as to realize the configuration of operation mode of sensor networks and sensor nodes. The test results show that the proposed system realizes the accurate monitoring of indoor environmental quality parameters such as temperature and humidity, density of carbon dioxide. [C134]

"Design of a low-power intelligent solar controller"

Renewable energy generation, such as photovoltaic power generation, is receiving more and more attention and application. In this paper, we designed a simple solar control system with Single Chip Micyoco (SCM) as its kernel. This solar control system uses the Pulse Width Modulation (PWM) technique, and the photovoltaic array and battery pack are coupled directly, which can largely meet the requirements of low-power controllers. [C135]

"Optical polymer and polymer-clad silica fiber data buses for automotive applications"

In the last decades optical data transmission has spread from telecommunication applications to many more fields. Automobile and aviation applications are common. Like in telecommunications data rates are rapidly rising. Optical data buses in vehicles are almost exclusively used in the infotainment domain, MOST (Media Oriented Systems Transport). Current data rates are in the order of 150 MBit/s. In airplanes lightning strike protection raises new problems due to the future replacement of the metal fuselage by carbon fiber. Therefore light emitting diodes (LEDs) and polymer-optical fibers (POF) are going to reach their uttermost limit of operation. For higher data rates alternative solutions have to be found. This is achieved by replacing the LED and POF combination by vertical surface-emitting laser (VCSEL) and polymer-clad-silica (PCS) fibers. In addition the fiber core size is reduced and therefore the detector area can be reduced considerably. As a consequence data rates will be extended into the GBit/s region. This new setup enables the use of optical data transmission in automotive applications for sensors as well. Thus, safety-relevant operations like drive by wire, brake by wire and engine management can be included as well. [C136]

"Moisture diffusivity analysis of polycarbonate for LED lens"

To analyze the effect of moisture on the reliability of LED modules, diffusivity of packaging materials must be provided. Polycarbonate (PC) is an important material for LED lens. Its diffusivity measurement is usually based on the solution of one-dimensional diffusion. In this paper, the diffusivity measurement of PC was conducted. Simulation and analytical close-form solution (CFS) were also used to predict the moisture absorption process. The comparison among the results obtained by analytical solution, simulation and experiments was presented. The results show that they agree well with each other, proving that the present analytical method can be used to calculate the moisture diffusivity coefficient, which is important for LED reliability evaluation. [C137]

"Vision inspection system for holograms with mixed patterns"

We propose an vision inspection system for hologram with mixed patterns. The system hardware consists of LED illuminator, CCD camera, and vision processor. The LEDs of illuminator emit alternatively and change the incident angle to acquire each image of pattern. The system software consists of the stages of pattern generation and pattern matching. The acquired images of hologram are compared with their reference images by matching algorithm. Since the several patterns are mixed in one hologram, the reference image should be changed if the hologram is rotated. To compensate for the positioning error of hologram, reference images are

generated in on-line. We apply a frequency-transformation based CGH (computer-generated hologram) method to generate reference images. For the fast pattern matching, we also apply the matching method in the frequency domain. Experimental results using holograms attached at Korean currency are then presented to verify the usefulness of the proposed system. [C138]

"Optical properties and application of MOVPE-grown III-V nanowires"

We report on the optical properties of III-V semiconductor nanowires (NWs) grown by by selective-area matalorganic vapor phase epitaxy and its application to photonic devices. Results for NWs containing heterostructures are mainly discussed. [C139]

"Performance improvement in visible light communication by using spread spectrum coding"

A spread-spectrum modulation is applied in visible light communication (VLC). It is useful not only for multiplexing channels but also for elliminating noises from other light sources. Performance is analyzed for the case when light from fluorescent lamp is received at the VLC receiver along with signals from several channels. [C140]

"Preparation of YAG: Ce yellow phosphor by step-by-sty precipitation method"

The high-brightness LED with (Y0.98-xGdxCe0.02)3Al5O12yellow phosphor is be obtained by step-by-sty precipitation method, and used the 0.1 mol/L ammonium bicarbonate and aqueous ammonia to be precipitant. The effect of Gd3+concentration on (Y0.98-xGdxCe0.02)3Al5O12is investigated at room temperature(RT). The results show that, the relative intensity increased with increasing content of Ce,and achieve the maximum value at x = 0.06, then followed by weakening trend, the intensity of phosphors that adding flux increased by 50%, the peak wavelength changed about 5 nm to 10 nm by addition of Gd3+from 0 to 0.3 mol and optimal luminescent intensity happens at 0.1 mol Gd3+doping. The experiment results proved that the phosphors remain structure of Y3Al5O12phase when the Gd3+doping. [C141]

"Study on parallel scheduling of LED dies measurement and grading"

The light-emitting diode (LED) is the world's most efficient light source being mass produced today. However, the packaging cost is relatively high, which has been the main factor restricting widespread application of LED lighting. As the LED industry becomes prosperous, short time consumption for single die measurement is particularly concerned by semiconductor manufacturers. Parallel scheduling methods used for speed improvement are put forward. Focusing on the cooperation between tester and prober, techniques on command flow communication between up station and motion control board, simultaneous control of X/Y driven shafts and up driven dovetails, parallel scheduling between testing process and positioning process are discussed in detail. Using these methods, average speed of measurement is improved from 2.5 LED dies per second to 5.2 LED dies per second. With experimental results, it is proved effective and efficient for proposed system. Such method is available for all similar equipments. [C142]

"Evaluation system for camera shake and image stabilizers"

Various optical image stabilizers for reducing camera shake have been developed in many camera manufacturers, however, it has not been known exactly how effective they work for cancellation of the camera shake. We developed a novel system for analyzing behavior of camera shake and evaluating effectiveness of image stabilizers quantitatively. It consists of the custom-made LED display for generating a high-speed VIDEO test pattern, PC software for detecting camera shake from the camera image of video test pattern, and the vibration table for simulating various camera shake. As well as introduction of this system, some evaluation results of image stabilizers are presented. [C143]

"High-efficiency tandem white organic light-emitting diode"

We have developed high-efficiency tandem white organic light-emitting devices (OLEDs) featuring emission layers comprising a blue light-emitting host material [1, 3, 5-tris(1-pyrenyl)benzene (TPB3)]obtained by high deposition rate, doped with red light-emitting guest material [4-(dicyano-methylene)-2-tert-butyl-6-(1, 1, 7, 7 tetramethyljulolidyl-9-enyl)-4H-pyran (DCJTB)]. The device exhibited a maximum luminance of 72100 cd/m2, a maximum power efficiency of 3.44 lm/W at 8V, and a maximum external quantum efficiency of 4.72% at 20V. [C144]

"A study on the electric and optical characteristics of green OLED applied index matching film"

We applied index matching film to improve the luminance of green OLED. The structures of index matching films are Glass/TiO2/SiO2/ITO and SiO2/TiO2/ Glass/ITO and designed with Macleod simulator. The OLED luminance of Glass/TiO2/SiO2/ITO and SiO2/TiO2/Glass/ITO was 15, 400 cd/m and 13, 000 cd/m2, respectively. The luminance of each device was increased 5~6 times compared to the device without applying index matching film. [C145]

"A novel scheme to realize a power-efficient WDM passive optical network"

We propose and experimentally demonstrate a simple power efficient scheme for WDM-PON, using a LED-based monitoring signal to save the power consumption of the optical transceivers for the inactive subscribers. [C146]

"Output power enhancement of micro-gear sidewall design light emitting diode"

This study investigates the characteristics of MGS design in LEDs and makes performance comparison between MGS and ETS designs. The light intensity of the MGS LED increased about 36% at 20 mA in comparison to ETS. [C147]

"Demonstration of stable and high coupling efficiency (66%) active multi-mode interferometer superluminescent light emitting diodes"

High power superluminescent light emitting diodes, using active multi-mode interferometer, showed high coupling efficiency of 66% into single-mode fiber, which resulted in maximum coupled power of 77 mW (λcenter=1.55 μm, FWHM = 50 nm). [C148]

"Improvement the light extraction efficiencies with patterned sapphire substrates by wet and ICP etching method"

In this study, sapphire substrates patterned by a selective chemical wet and an inductively coupled plasma (ICP) etching technique was proposed to improve the performance of GaN-based light-emitting diodes (LEDs). The light output power of LEDs on ICP-etching patterned substrates was better than the LED on wet-etching patterned substrates about 17%. [C149]

"Study on adhesive reliability of low-temperature sintered high power LED modules"

Low temperature sintered nano-silver paste becomes a potential alternative in green electrical packaging because of its higher thermal and electrical conductivity than conventional solders. It can be used for connected chips that require high temperature operation, such as high power LED and power electronics modules, etc. During service, alternating shear strain, even thermal fatigue failure will occur due to thermal expansion coefficient mismatch of chip and substrate. Therefore, it is necessary to study the reliability and failure mechanism of low temperature sintered nano-silver joint. In this study, loading-control shear fatigue tests, temperature cycling and hygrothermal aging tests were conducted on sintered nano-silver paste connected LED modules, through which we made an initial exploration on the mechanical reliability and failure mechanism of this new type of interconnection material. [C150]

"Thermal performance of heatsink and thermoelectric cooler packaging designs in LED"

Active heat dissipation method plays a vital role in thermal management of high power light emitting diode (LED) packaging. As a new cooling device, thermoelectric cooler (TEC) is applied in electronic packaging, for which the extensively applied devices are the heatsink and the fan by now. In order to evaluate the cooling performance of the heatsink and TEC, three different cooling models for light emitting diode (LED) packaging, which include the heatsink model, the heatsink and fan model and the TEC, heatsink and fan model, are established and their thermal performance of packaging are investigated in present study. Junction temperatures of the chip are measured by experimental measurement method, the thermal resistances of TEC, thermal interface material (TIM) and heatsink are analyzed by thermal resistance network method in the situation of different chip power, different TEC input current and different wind speed caused by the fan. The optimal input currents of TEC in different conditions are analyzed. Based on the cooling performance of the different models, the critical chip power is 35 W between the TEC method and the heatsink method at the same time the junction temperature is 40°C. For optimizing the TEC, it's necessary to reduce the thermal resistance of TEC as same as improve its cooling capacity because the thermal resistance of TEC plays a major role in the total resistance of LED package. [C151]

"An integrated large SSL system with wireless communications"

In this paper we present our preliminary results obtained from implementing a SSL system on the facade of EWI faculty building in Delft University of Technology as shown in Figure 1. Two hundred intelligent SSL modules are planed to be deployed. All the modules are controlled via wireless links. We propose solutions for challenges such as hardware and software designs. Experiences learned are also presented. [C152]

"Reliability study on high density LED packaging with Chip On Board structures"

In this paper an improved LED (Light emitting diode) packaging structure was proposed, which is based on COB (Chip On Board) technology. This research mainly analyzed the thermal reliability of a 4Ч4 square LED die array with COB technology during temperature load. Simple intuitive for observation, two specific red glue curing profiles were compared with different curing temperature, curing time, temperature rate, and room temperature holding time, and the influences of the temperature load to LED packaging were compared with and without consideration red glue curing before the subsequent thermal cycles loaded. Last the prediction of the Silicon substrate failure was carried on referring to the Weibull distribution. The light system consists of sixteen chips that each chip is 1.2W. Every die in the LED array can be regarded as working under the same condition, the heat distribution in each die is uniform. 3D finite element model of the LED packaging was modeled. [C153]

"A verification of application specific component qualification"

Semiconductor component manufacturers supply to different product manufacturers in a wide range of market segments, for different end use applications. The goal of electronic component qualification is to demonstrate component reliability under operating conditions in the end product configuration. While a manufacturer may have successfully qualified an individual component, operating stresses due to surrounding components or the system can decrease individual component reliability. Not accounting for these operating stresses resulting from other components or the system will lead to lower life than anticipated. Using a case study, the authors demonstrate how the fatigue life of a chip component mounted on a PCB is affected by powered components on the board in close proximity. [C154]

"Thermal analysis and comparison of heat dissipation methods on high-power LEDs"

Nowadays LEDs (Light Emitting Diodes) are widely used in many fields. As the fourth generation of lighting sources, LEDs have the advantages of long lifetime, power saving and environment-friendly. In this paper, the thermal variation characteristic of some parameters for two high-power LEDs packaging modules, such as forward voltage, luminous flux, CCT and luminous efficiency, were analyzed experimentally. Moreover, the heat dissipation results of two methods (heat sink with fins and heat pipe with fins) were compared and evaluated in numerical simulation. The experiment data and simulation results demonstrated that high junction temperature of high-power LEDs would decrease luminous efficiency and have other harmful impacts, and heat pipe with fins has better cooling capability than only heat sink. But excellent heat sink design could meet general cooling need for high-power LEDs modules below 15W. [C155]

"A novel LED lamp for the middle line of the taxiway of the airport"

LED's luminous efficiency increases rapidly in recent years, many novel illumination applications with LEDs are emerging. Based on the analysis of LED's characteristics, our optimization scheme and design methods for LED taxiway lamps are proposed. A novel LED lamp using in navigation of the taxiway of the airport is designed as an example. The simulation results demonstrate that the light utilization efficiency is 35%, which is much higher than the current standard with metal halide lamps. This also provides a new design concept for the next-generational LED navigation lamps. [C156]

"A high power light emitting diode module for projection display application"

Light emitting diode (LED) has numerous advantages such as long lifetime, large color gamut, small size and the absence of mercury vapor. In recent years, there has been recognition that LED could be an alternative light source for projection display application. In this work, dielectric compound parabolic concentrators (CPCs) were designed and optimized for multiple-LED array packaging structure for projection display application. The performance of rectangular CPC was studied and compared to theoretical simulations. Rectangular CPC was fabricated as the collector and collimator. A high power green LED module combined with rectangular CPC was fabricated and its performance was characterized. More than 90% light emitted by multiple-LED array can be collected by the CPC and transmit within the designed angle. A high power of 2.09W and a high luminous flux of 800 lm were obtained. [C157]

"Numerical study on thermo-mechanical analysis of LED lighting system by using ceramic materials"

According to Solid-State Lighting Manufacturing Roadmap 2009, lower cost and higher reliability are two key necessities for LED lighting. In this paper, an optimization process of thermal design for LED lighting system is carried out from the perspective of system in packaging. Based on the three-dimensional thermo-mechanical model of LED lighting system, the thermal and mechanical performance of LED lighting system is investigated in the normal working status with different materials (ceramic and aluminum). The junction temperature of LED lighting system is 73.602°C and 77.038°C for using the ceramic and aluminum materials respectively. Compared with the ceramic packages, the higher thermo-mechanical stress in the aluminum packages is obtained because of the higher temperature gradient and CTE mismatch. The results suggest that the effective LED packaging materials can greatly improve the thermal dissipation and thermo-mechanical reliability of current high power LED lighting systems. [C158]

"Integration of phosphor printing and encapsulant dispensing processes for wafer level LED array packaging"

Phosphor converted LEDs (pc-LEDs), which employ blue LEDs with yellow phosphor deposition to generate white light illumination is a widely used solid-state lighting source. This paper presents the integration of two major processes, namely, phosphor screen printing and moldless encapsulant dispensing, for wafer level pc-LED packaging. In the present study, the processing procedures and parameters of phosphor screen printing were developed and investigated in detail. The attributes of the phosphor layer by screen printing such as packing density, thickness, uniformity and adhesive strength, which control the performance of final white light illumination, were characterized. Subsequently a moldless encapsulant dispensing process was applied at the wafer level. Optical performance of the packaged LEDs was evaluated. The prototype of 5Ч5 white light LED arrays demonstrated that a wafer level LED packaging can be achieved with the integration of the two novel processes. [C159]

"iNEMI Roadmap For Solid State Illumination"

There are several published solid state lighting roadmaps which typically focus on materials and device research. The iNEMI (International Electronics Manufacturing Initiative) Solid State Illumination (SSI) Roadmap complements these roadmaps with a supply chain focus and an industry needs assessment that is broader than that typically identified by government and university research communities. The iNEMI Roadmap, which has become an important tool for identifying technology gaps and possible solutions for the global electronics industry, looks across multiple industries for trends and directions that drive market opportunities. Highlights from the 2009 SSI Roadmap will be addressed, including: product level assembly hierarchies; gaps and showstoppers; critical infrastructure issues and paradigm shifts; technology needs and possible solutions; and recommendations on priorities. The 2009 iNEMI SSI Roadmap is the inaugural iNEMI Roadmap in this technology space. [C160]

"Enhancement of light extraction of multi-chips light-emitting diode (LED) modules with various micro-structure arrays"

Low light extraction efficiency (LEE) is one of the most challenging points for light-emitting diode (LED) array packaging. Analysis of LEE enhancement of LED array packaging with micro-structures on packaging silicone is presented. To obtain high LEE, micro-structures including inversed cone, inversed frustum of a pyramid (FP) and V-groove are introduced. Two types of LED chips consisting of conventional chip (CC) and vertical thin film chip (VTFC) are conducted. Monte Carlo ray tracing simulation results demonstrate that micro-structures are able to effectively improve the LEE of LED array packaging. Among the three structures the inversed FP structures are shown to be the most efficacious in improving the LEE with enhancement of 43.18% and 31.07% for CC and VTFC respectively. This method would be a potential way in improving the LEE of LED array packaging with low profile. [C161]

"Nanosecond infrared radiators for short-range location systems"

This paper presents the results obtained from the research of semiconductor radiators within the nanosecond range of radiated pulse time. The prospects for construction of pulsed optoelectronic devices are demonstrated. [C162]

"A floating N-DMOS switch for RGB LED control"

This paper proposes a new RGB LED control switch with enhanced characteristics in ON and OFF states. To this aim the main requirements and specifications to the circuit are defined. A well-known conventional solution of the typical floating N-DMOS switch control circuit is described and its disadvantages are analyzed. A new circuit with improved performance is proposed and discussed. The both circuits are simulated and the obtained results are compared. The comparison confirms the usefulness of the proposed circuit. [C163]

"A new algorithm of dynamic display for the large LED screen of multi-scanning-beam"

In this paper, a new algorithm of dynamic display is introduced for design of the large LED screen, it employs the image masking technology for multi-scanning-beam displaying dynamically. In order to verify the effectiveness of our new algorithm, a LED display system is designed and implemented with the microcontroller of STC12C5A60S2. The result shows that this algorithm improves the performance of dynamic display without any screen flickers, it doesn't require a large of external RAM or FLASH memory and will reduce the hardware cost of LED display system. [C164]

"Preliminary characterization of automotive LED driver chip"

The goal of the paper is to present the results from the preliminary characterization of new automotive LED driver chip of ON Semiconductor-Bulgaria. The prototype is implemented in 0.35μm CMOS I3T80 technology. The chip is intended for different customer's applications connected to the control of the lights in the cars. To achieve the goal the basic parameters of the circuit are determined and the architecture of the equipment for experimental measurement of the prototype is proposed. The measuring results are presented. They demonstrate the very good performance of the circuit. [C165]

"Metal nanoisland films for the enhancement of the chemico-physical properties of molecular adsorbates"

This contribution is aimed at describing the most recent activity carried out in the labs of ISC-CNR Florence concerning preparation and spectroscopic investigation of two dimensional silver and gold metal nanostructures (metal nanoisland films-MeNIFs), with particular focus on the role played by the morphology of the metal dielectric interfaces on the control and enhancement of the properties of different molecular adsorbates, i.e. fluorescence emission and Raman response. In particular, it shows how the fabrication procedure of Au nanoisland films permits fine tuning of the extinction spectrum of the nanostructures and controlled enhancement of the Raman response of a novel thiol-functionalized fluorophore. [C166]

"Thermal stress test for PLED"

This work presents thermal stability studies of PLEDs involving the comparison of electrical performance before and after thermal treatment. Two cycles of continuous thermal stress test from room temperature to 100 deg Celsius did not significantly affect the total photoluminescence intensity from the light-emitting polymer in the PLED suggesting that the layer of light-emitting polymer is intact. However, the rapid degradation of the electrical performance of the PLED right after the first cycle of thermal stress test suggests that the electrodes have degraded hence hindering charge injection into the polymeric layer. [C167]

"Enhanced-photoluminescence properties of CdTe quantum dots prepared from the ternary surfactant mixture system"

This paper reports the synthesis and characterization of CdTe system in the ternary surfactant mixture. The quantum dots was prepared by quick injection of tri-n-octylphosphine telluride (TOPTe) into reactor that contains a hot mixed cadmium acetate hydrate, 1-octadecene, n-octadecyl phosphoric acid (ODPA), octadecylamine (ODA) and oleic acid (OA). We found that the surfactant of ODPA, OA and ODA were very important for the enhancement at the Photoluminescence (PL) properties CdTe quantum dots. [C168]

"Progress in the growth, characterization and device performance for nonpolar and semipolar GaN-based materials"

Summary form only given. Devices grown on c-plane GaN suffer from large internal electric fields due to discontinuities in spontaneous and piezoelectric polarization effects which cause charge separation between holes and electrons in quantum wells and limits the radiative recombination efficiency. Nonpolar GaN devices, such as in the m-plane (1100), are free from polarization related electric fields since the polar c-axis is parallel to any heterointerfaces. Semipolar GaN-based devices have reduced electric fields and in some cases, such as (1122), show a high propensity for Indium update for InGaN quantum wells. In this talk, we present work on outstanding materials issues including: morphological stability with special emphasis on the role of substrate

orientation and growth conditions; new evidence for dislocation-related strain relaxation in semipolar GaN-based heterostructures; unambiguous determination of the polarization cross-over in semipolar InGaN/GaN heterostructures; new detailed atom probe analysis of high performance GaN-based LEDs and laser diodes. Additionally, we update progress on nonpolar electron devices and nonpolar and semipolar LEDs and LDs. [C169]

"InGaN/GaN nanowire green light emitting diodes on (001) Si substrates"

Progress in solid state lighting at the present time primarily involves the research and development of visible nitridebased light emitting diodes (LEDs) and perhaps lasers in the future. However, this development has been impeded due to the lack of high-quality and low-cost GaN substrate. Successful growth of GaN and InGaN nanowires on silicon and other mismatched substrates has been demonstrated recently. The nanowires exhibit significantly reduced defect density due to their large surface-to-volume ratio. A reduced strain distribution in the nanostructures also leads to a weaker piezoelectric polarization field. Other advantages include large light extraction efficiency and the compatibility with lo w-cost, large area silicon substrates. In the present study, we have conducted a detailed investigation of the molecular beam epitaxial (MBE) growth and optical properties of (In)GaN nanowires directly on (001) Si in the absence of a foreign metal catalyst. Green LEDs have been fabricated with an ensemble of nanowires and the characteristics of these devices are also presented. [C170]

"Polarization-engineered N-face III-V nitride quantum well LEDs"

In conclusion, we report the successful realization of N-face polarization-doped QW UV LEDs. Electroluminescence from AlGaN regions indicates that AlχGai.χN QWs and AlyGaı.yN barriers can now be used to obtain respectable emission intensities for deeper UV or higher energy photons. A number of advantages of N-face optoelectronic devices p-type polarization doping, and better electron and hole injection facilitated by the correct orientation of the polarization field were pointed out. [C171]

"Design of 16-bits constant-current LED driver"

A 16-bits Constant-Current LED Driver Integrated Circuit (abbreviated as "Driver") is presented in this paper. It is fabricated with 0.6-μm 2P3M CMOS process in an active area of 0.9mm Ч 0.9mm. The driver provides 16 open-drain, constant current sinking LED driver outputs. All the constant-current outputs are programmed together by a signal external resistor. Post simulation result shows that each output channel provides constant current up to 70mA within possible temperature range of -40°C to 125°C and power supply range of 3V to 5.5V. The current match between each bit is 3% and between each technical corner is less than 6% typically. More importantly, it includes the power-on reset and over-heating protection circuits, which help protect the IC against logic error and burnt up. [C172]

"An improved design of OLED display driver circuit"

In this paper, an improved design of data driver for organic light-emitting diode (OLED) displays is presented. The proposed scheme controls brightness of OLED by adjusting the amplitude using MSB data and width of the current using LSB data. The simulation results show that the uniformity of the output current is improved. The power consumption also is reduced. [C173]

"High retention-time nonvolatile amorphous silicon TFT memory for static active matrix OLED display without pixel refresh"

Existing a-Si floating gate TFT (FG-TFT) nonvolatile memory suffers from two drawbacks: (i) short retention time and (ii) strong dependence of drain saturation current (ID,SAT) on drain voltage. In this study, we present (i) a new device structure that eliminates ID,SATdependence on drain voltage; (ii) room-temperature retention time of >10 years; and (iii) the integration of this new TFT memory into AMOLED pixels, enabling displays without refresh. [C174]

"Thermal analysis of high power LEDs at different drive-in current"

This paper focuses on the thermal characterization of high power white light LED of 1W and 3W. Thermal transient method is used to measure the junction temperature and calculate the thermal resistance. The emphasis is placed upon the investigation of junction temperature in both the 1W and 3W LEDs for a limited range of drive-in current (500mA up to 1A) with the air velocity kept constant throughout the experiment. All investigations are based on the transient junction temperature measurements performed during the cooling process. The presented results include the cumulative structure functions and differential structure functions. It was found that the measured junction temperatures and thermal capacitances of both the LEDs increased with

the input power (drive-in current). However, the thermal resistance decreased with the increase of drive-in current. [C175]

"Interactive projection system based on a two-dimensional position sensitive detector"

Interactive projection systems based on CCD/CMOS have been greatly developed in recent years for their non-contact sensing type. However, the location accuracy and tracing speed are limited by the resolution and frame rate of the CCD/CMOS. In this paper, we introduced a new type of non-contact interactive projection system based on a two-dimensional position sensitive detector (PSD). By using the PSD, both high positioning accuracy and high tracing speed can be achieved. Experimental results show that the positioning error is about 2mm over a 1200mmЧ1000mm projection screen, and the sampling rate is at least 200Hz. [C176]

"Light-adaptive vision system for remote surveillance using a smart vision chip"

A vision system for remote surveillance has been proposed using a field programmable gate array (FPGA) and a smart vision chip. Because of the vision chip's characteristics, the output value is less fluctuated by illumination condition. The system based on transmission control protocol / internet protocol (TCP/IP) enables to monitor the remote place. Light emitting diode (LED) was used as an indicator which expresses the warning signal from the system. [C177]

"How to conduct a car? A design example for maneuver based driver-vehicle interaction"

Conduct-by-Wire is a vehicle guidance paradigm, which investigates the possibility of controlling an automobile by maneuver commands. The focus of this paper is to show one possible interaction strategy for maneuver-based vehicle guidance between driver and vehicle by means of discrete maneuvers. Therefore, the paper starts with a short introduction to the advantages of maneuver-based vehicle guidance and proceeds to the current design option for maneuver-based driver-vehicle interaction chosen by the TU Darmstadt. This includes the presentation of the user interface as well as the basic assumptions for maneuver-based interaction. This paper is finished by a specific example for the maneuver "Lane Change right", which includes system behavior, as well as, information displaying and some restricting facts which are presented together with possible countermeasures. [C178]

"Left behind occupant recognition in parked cars based on acceleration and pressure information using k-Nearest-Neighbor classification"

One of the major causes of lethal or serious injuries to children in non-traffic accidents with cars is founded on the unattended left behind of them in parked cars. Therefore, Delphi's safety division is interested in the development of a low cost left behind occupant recognition, so that since 2008 different approaches for a reliable detection system are evaluated. One of them is based on high sensitive analogue accelerometers that monitor vibrations occurring at the car chassis. The investigations show a recognizable signal produced by human beings seated in a parked car which provides enough information to determine the occupancy state of a car. The presented contribution describes the additional use of a second sensor (pressure signal) input to improve the classification reliability by fusing the information of both sensing elements. This is illustrated at the k-Nearest-Neighbor algorithm as preferred classifier. [C179]

"The influence of still air environment on thermal transient measurement of high power LED"

The surrounding air influence on the thermal transient measurement was studied. The measurements were carried out by setting two boundary conditions where one was measured in open air condition and another transient was captured under still air environment. The data obtained were analysed using structure function evaluation. Analysis of the experimental methods reveal that the thermal resistance of the high power LED is much lower in still air condition compared to open air condition. For the same driving current of 600mA, the total thermal resistance for open air was 8.07692K/W whereas as for still air condition the value was much lower, 7.26577K/W. [C180]

"Indoor Gigabit optical wireless communications: Challenges and possibilities"

Indoor Gigabit optical wireless communication systems have the potential to offer multiple high-speed data services that can be delivered to homes via an optical fibre cable in the near future. In this paper we will discuss the challenges involved in the design of such systems and future possible advances. Results from a recent cellular Gigabit prototype link will also be presented and discussed. [C181]

"Application of advanced communication techniques within KDPOF physical layer, to achieve a Robust and Low-Cost MOST100"

This paper presents KDPOF technology in the POF communications systems, as well as propose KDPOF simplified physical layer as the optimum upgrade of the current MOST standard to achieve the 1 Gb/s. MOST1000 has to decide whether to change the SI-POF and current LEDs and Photo-Diodes to more expensive ones, or to upgrade the physical layer using the most advanced techniques in communication theory included in the KDPOF physical layer. Detailed studies, as well as clear conclusions are presented in the paper. [C182]

"Communication in automotive systems: Principles, limits and new trends for vehicles, airplanes and vessels"

This paper deals mainly with state of the art and next-decade technologies for fiber-optic data buses in automotive applications. Nowadays, fiber-optic data buses in automotive applications are exclusively used in the infotainment domain, MOST (Media Oriented System Transport). Current data rates are in the order of 150 MBit/s. Consequently, the use of LEDs and polymer optical fibers (POF) is sufficient. For higher data rates, also alternative solutions are discussed: The LED as transmitter can be replaced by a vertical surface emitting laser (VCSEL), and the plastic fiber (POF) by a polymer-cladded silica (PCS) fiber. Due to the inherent fact that, as a result, the fiber diameter is reduced, the detector area of the well-known Silicon photo diodes can also be reduced greatly. As a consequence, data rates can be extended into the Gbit/s-region. Furthermore there are different physical layers like optical wireless and radio frequency systems (Radar) to be taken into account. [C183]

"Gigabit home networking with 1 mm PMMA fibers"

POF-PLUS is a EU project pertaining to the 7th framework program with the aim of developing high-speed communication systems based of PMMA optical fibers for home networking and data centers. In this paper we report the results of the tasks focused on 1 Gbit/s communications for home environment after two years of the project. [C184]

"Video broadcast via a lamp"

We report the implementation of a real-time visible-light link, based on discrete multitone modulation of a high-brightness LED. Parallel transmission of three high-definition video streams was also demonstrated. [C185]

"Light-emitting diodes: The unknown entities"

Light-Emitting Diodes (LEDs) constitute a low-cost choice for optical transmitters in medium-bit-rate. What differentiates such applications from, e.g., backhaul optical networks, is that for low-cost applications, the LED used is generally not as well characterised by the manufacturer as, are for example, optical fibre amplifiers. While for simple modulation formats like on-off keying (OOK) this lack of knowledge is not always an impediment, in any other situation one faces the often puzzling behaviour of commercial LEDs. In this tutorial the main electro-optical characteristics of LEDs are introduced and the models available in the literature are shown to be inadequate when designing optical links based on advanced modulation techniques or even OOK at very high data rates. As a way out of this grid lock a reverse-engineering approach is presented, enabling the introduction of a realistic model for commercially available LEDs. [C186]

"A first course in computer programming for mechanical engineers"

The first course in computer programming for Mechanical and Aerospace Engineers at San Jose State University is undergoing substantial renovation to better serve the educational needs of the students in the program. The renovated course emphasizes development of algorithmic problem solving skills and familiarity with the C programming language, Excel, and Matlab. Extensive use is made of Ch, a C interpreter, for learning the C language. A major innovation in the course is the use of a microcontroller with a custom-designed sensor/IO board as an experimental platform that the students use for several laboratory experiments. Student feedback regarding the renovations after the first two course offerings during the 2009-10 academic year has been positive. Further enhancements of the microcontroller-based experiments are expected through the use of a second generation sensor/IO board currently under development. [C187]

"PC Based Drawing Simulation Using Wiimote"

The primary controller of Nintendo's Wii console is Wii Remote. It has the motion sensor that can recognize user's motion as three dimensional coordinate. Also, it can be used as wireless pointing device on personal

computer through Bluetooth. In this study, we suggested PC based drawing system using the motion sensor and the IR sensor via Bluetooth communication. [C188]

"Simplifying and integrating experiments of hardware curriculums"

Hardware curriculums are important specialized courses not only in computer science education, but also in electronic, mechanical, automation and other related engineering professional education. As these courses request difficult theoretical knowledge, strong engineering practice and high technological application, students unable to easily grasp the knowledge. In this paper we propose the construction of a series of simple experiments for the hardware curriculums. The experiments integrate knowledge such as digital circuits, computer organization, computer interface, assembly language, EDA technology, etc. We build a toy CPU and an interface chip, which can control a light-emitting diode long light, blinking on or turn off. Experimental results reveal that our idea is feasible and efficient. The education reform can bring a positive effect on improving teaching quality, enhancing students' learning interests and training student's research ability. [C189]

"Design of the CIC decimation filter based on SOPC Builder"

This CIC (Cascaded integrator comb) decimation filter is widely applicable to reduce the data sampling rate in DDC (Digital Down Conversion). In this paper, the theory of CIC decimation filter architecture is researched. Based on the idea of software defined radio (SDR), we go forwards a new method to design CIC decimation filter. This method makes use of SOPC (System On Programmer Chip) technology. We use the tool of SOPC Builder to design the CIC decimation filter IP core. Then we design other relevant IP core resources and build a SOPC system. Finally the designed system is downloaded to the SOPC comprehensive experiment testbed. Experimental results show that the designed CIC decimation filter component can be implemented successfully based on FPGA, and the functions of CIC decimation filter component are programmable, reliable and portable. [C190]

"P1-23: Effect of ultra-violet light irradiation on electron field emission from titanium-oxide nanostructure"

Field-emission current from titanium-oxide nanostructure is increased by ultra-violet (UV) light irradiation. The enhancement factor of the UV whose wavelength is 365 nm is larger than that of 405 nm. The increased emission current did not decrease even after stopping the irradiation until the sample is exposed to the air. This suggests that the surface cleaning is the origin of the observed current enhancement. [C191]

"P1-1: Cathodoluminescence of ZnAl2 O4 phosphor for the application of UV emission devices"

Structural and luminescent properties of UV emitting ZnAl2O4powder was studied. It was found that the firing temperature above 1000oC was necessary to prepare the ZnAl2O4single phase. The CL intensity became stronger according to increase of firing temperature, because of improvement of crystallinity of the powders. The peak position of CL spectra were shifted from 235 nm to 250 nm by control of the ratio of source materials. It indicates that the energy level of the defects can be controllable. [C192]

"2.3: Field emission in air between iridium-iridium oxide diode tips"

We report on the fabrication and field emission properties of lithographic iridium-iridium oxide diodes operating in air, with gaps around 100 nm. Field emission currents of up to 1 μA were found, with signatures of Fowler-Nordhiem tunneling, space-charge limited emission, and possibly charging of the underlying oxide. Post field emission imaging showed surprisingly modest levels of damage, despite biases of around 200 V applied. [C193]

"A scalable architecture to control LED displays"

LED displays are widely employed for advertisements and they will be used in so many products in the future. Therefore, there is a need to use an efficient architecture to control LED displays. This paper presents a novel architecture for controlling LED displays which has the ability to expose monochrome movies and animations stored in a nonvolatile memory. The hardware and software of this architecture are designed and described in detail and the enhancements of the proposed system are discussed. This architecture is simply scalable to support high resolution displays. It also has low power consumption compared to previous designs. Experimental results indicate that this architecture can be implemented on FPGA Spartan3 with only using less than 15% slices. [C194]

"A Design of Simple Underwater Wireless Communication System"

This is a simple underwater wireless communication system. In this system, land-based unit send radio waves to an underwater submarine model, and the underwater submarine model send commands by infra-red to the land-based motor unit to control the floating and submerged of the submarine. This system is centering on MCU(MSP430), respectively, achieving the signal generation, processing and automatic control of the motor. After testing, 5m in the area land-based unit can accurately control the completion of the submarine model, and real-time display the model the depth and speed, of the submarine exercise, has established a good man-machine interface. [C195]

"The Communication System Constructing Image Together with Data Supervising"

This paper proposes the communication system which is constructed image monitoring together with data examined. This system is mainly applied to detect and pre-warm the hillside calamity. Firstly, set up various inducting installations on the monitored hillside. After the examined data are digital coded, these installations will reveal these data by the way of highly brightened LED lights. On the other hand, remote receiver will focus on this monitored hillside with HD CCD camera. Thus, not only the situation of the target hillside will be fetched well via the LED lights, but also the result inspected will be fully comprehended when the data is decoded. The method and device that this research institute offers will replace recent measure equipments installed in slippery district, either wired or wireless communicator will be no need any more. This communication system gathers the data surveyed in target region and passes the image figures, which are light-arranged already, to distant device. The function of Monitoring & Communication is thus finished. Is equal to this system improves the function of video camera from a simply image monitoring to materials transmitting and communicating. It will be more convenient to build the hillside measure equipment, and simplify the monitoring system, that can save more expenditure. To enable this system operating rapidly, FPGA in hardware circuit is chosen and to decode the LED light symbol to make the data among images be understood quickly. [C196]

"Design and research on the hardware of wireless oxygen saturation detection based on ARM"

A hardware proposal of wireless oxygen saturation detection device has been designed in this paper based on ARM. The proposal applied ARM process as the main control unit which simulates oxygen saturation characteristic signal extraction and detects oxygen saturation data by amplification circuits according to the Lambert-Beer law. With low-cost, high-accuracy and wireless transmission characteristics, a RF24L01 module was connected to the main control unit though SPI interface to realize wireless detected-data transmission. The design which suits for clinical observation and teleconsultation would have good application value and the market prospect obviously. [C197]

"A LED driver IC with constant current and temperature compensation"

A LED driver IC with constant current and temperature compensation is presented. The IC is trimmed to provide constant current of 20mA±5% at an input voltage of 6.0-90V. The IC can be used as a two terminal constant current source or constant current sink. And the current is well compensated, at the temperature range of -20 °C ~100°C,the temperature coefficient is 18ppm/°C when input voltage is 40V.All the temperature coefficients at all input voltage range are below 80 ppm/°C. The IC is design with SOI technology. [C198]

"Research on automatic detection for defect on bearing cylindrical surface"

At present, it is still by using manual method to detect the defects on micro bearing surface. The method is laborious and time consuming. Moreover, it has a low efficiency and high miss-detection rate. Due to the fact, an on-line automatic detection system is developed using linear CCD. The proposed system is composed of three subsystems: the detection environment setting subsystem, the automatic detection subsystem, and the data management subsystem. In order to lead the above subsystems to cooperate with each other, control software is developed with LabVIEW 8.5 as a platform. Experimental results indicate that the system realizes the predefined functions and caters to the requirements of stability, real-time performance, and accuracy. Thus it can be applied for actual production. [C199]

"High performance visual servoing for controlled µm-positioning"

The research presented in this paper focuses on high performance visual servoing for controlled positioning on micrometer scale. Visual servoing means that the positioning of a x-y table is performed with a camera instead of encoders and one camera image and image processing should determine the position in the next iteration. With a frame rate of 1000 [fps], a maximum processing time of 1 millisecond is allowed for each image (132 Ч 45 pixels). The visual servoing task is performed on an OLED substrate, which can be found in displays, with a typical size of 80 by 220 µm. The repetitive pattern of the OLED substrate itself is used as an encoder and thus closing the control loop. We present the design choices made for the image processing algorithms and the

experimental setup as well as their limitations. [C200]

"The Pu'er tea optical electromechanical integration tea stalks picking machine design and application of research"

In accordance with the requirements of high-quality pu-er tea, the use of light, mechanical, electrical and integration technology that have been fermented Pu-er tea collected analyzed and discussed issues such as stem. Combination of stalk sorting machine working principle, composition, and Pu-er tea, tea stems of the shape, color and so on, put forward a Pu-er tea color, shape and geometric size as the tea leaves, Pu-er tea stems the fundamental basis for sorting, focusing on light Mechatronics Pu-er tea picking machine design and application of stem were studied. [C201]

"Research online automatic measure method on seals parameters and ring light source design"

To realize the online automatic measure the parameter of seals inner and outer diameter, the measure technology base on machine vision was researched; the main parts of measure system were introduced. To solve the problem that the lightness of light source is deficient, which affects the result of image disposing in machine vision system, it leads to measure precision low. According to the theory of photometry, the ring light source that is composed of many LED was designed, and the luminosity of LED was calculated and analyzed; the control circuit on light source brightness was designed and analyzed, the relative parameter was calculated in circuit. Through experiment, the designed light resource can meet the need, the image that camera gather is very clear, which is favor to image disposing and analysis. The result shows that the designed measure is feasible, and the measure precision has obvious increased. [C202]

"Research on LED die geometric parameter measurement based on shape recognition and sub-pixel detection"

Existing graphic element detecting algorithms possess several drawbacks such as high complexity, low measuring accuracy and poor robustness to image degradation. A two-stage hybrid approach is proposed to solve these problems in detecting and measuring LED die geometric parameters. In the first stage, the LED die binary image is obtained by adaptive multi-threshold segmentation, and the LED die graphic elements are transferred into connected components, which are composed of some geometric primitives such as point, line, circle, arc, etc. On the basis of analysis of the connected components in LED die binary image, the shape feature parameters and the similarity measures of graphic elements are calculated to identify their affiliation and spatial topology, and the bounding boxes of target graphic elements is extracted. In the second stage, an improved random Hough Transform based on least square fitting is used to measuring LED die geometric parameter: firstly, the ranges of HT parameters for geometric primitives are assured by histogram scanning the edge points within the bounding box; secondly, by the aid of direct least square fitting to target geometric primitives, an iteration procedure of collecting the probable edge points and refitting the primitive is introduced to extract the final primitive parameters; at last, the shape and location of LED die graphic element are obtained by geometric operations. This hybrid approach is applied in LED die test experimental equipment for motion calibration and LED die geometric parameters calculation, and the result of experiments demonstrates that the proposed approach possesses high precision and robustness. [C203]

"Research of a Self-organizing Fuzzy PID Controller in LED die Source-measure System"

The Auto LED die Mapping and Sorting System is a key manufacturing Equipment in LED production. This paper chooses the LED test system as experimental platform, based on which a precise and programmable multi-range digital Source-meter System (SMS) has been developed. In the embedded control part, a Self-organizing Fuzzy PID Controller (SFPID) is designed. a normalized acceleration as the indicator of system response speed is used to build up the self-organizing mechanism, in which the integral and derivative coefficients of the fuzzy PID controller (FPID) are adjusted in an online manner according to the system error, and the phases identified with the aid of the normalized acceleration in the control process. With the coefficients tuned, the mapping relation between the fuzzy sets of the input and output variables are changeable. Compared to three-dimensional FPID, by means of the normalized acceleration rv(k), this SFPID can subtract the fuzzy rules obviously and reduce the control design complexity without decreasing the input dimensions. The results of calibration test to a red LED (STP60NF06) with the SMS show that the SMS response time is 2.88 mS, and the stable accuracy is 0.1%. [C204]

"Continuous path detection method of intelligent track-searching vehicle based on photoelectric sensor"

The detection distance and accuracy of the path are two key factors of photoelectric intelligent track-searching vehicles. Firstly, through the analysis of operating principles of photoelectric sensors, this article designs a circuit for photoelectric sensors. This circuit could make photoelectric sensors work in impulse state, enlarging their detection distance of the path. Secondly, traditional path detection algorithms could not get enough information of path conditions, which is discrete and not continuous. According to the study of characteristics of photoelectric sensor, the special feature curve of photoelectric sensor is found out. Based on this feature curve, this article puts forward a continuous detection algorithm of intelligent vehicles. Experimental result demonstrates that this algorithm not only improves intelligent vehicle's speed but also promotes its systemic stability. Therefore, the continuous path detection method proposed by this paper has high accuracy, large detection range, and high practicability. [C205]

"User centered design of context aware cell phones in human-centric systems"

User research in software development and engineering design processes has gained unprecedented popularity due to the realization that knowing about users, their preferences, characteristics, and environments is highly useful in the design of effective user and human centric systems. Current human centric systems are intelligent, responsive, emotive and aware, and their capabilities and applications continue to increase rapidly. Due to this, it has become essential to address user related issues during the design of such systems. In this paper we focus on one area in human centric system design, namely context aware systems, which could benefit tremendously from user research. We look at a case study on the design of context aware cell phones that we developed and implemented by conducting extensive user research in the process. In this paper we discuss different user research activities that were conducted to implement this case study. We feel that these activities and the ideas therein can be employed by designers planning on designing intelligent (context aware) cell phones, and context aware systems in general. The discussions presented in this paper will also be helpful to usability engineers, interaction designers, and researchers who wish to focus on cell phone design. The results presented towards the end of this paper illustrate how valuable user research is in the design of context aware systems, and human centric systems in general. [C206]

"High efficiency Single-Inductor Boost/Buck Inverting Flyback converter with hybrid energy transfer media and multi level gate driving for AM OLED panel"

A hybrid-type Single Inductor Boost/Buck Inverting Flyback(SIBBIF) DC-DC Converter is presented. To increase the converter efficiency, a flying capacitor as well as an inductor is adopted as another energy transfer medium together with multi-level gate driver (MLGD). Besides, to enhance load transient response, hybrid fast transient control (HFTC) is adopted. The proposed chip is implemented in a 0.5-μm power BCD process and operates at 1.25 MHz with a max efficiency of 87.1% at an output power of 600 mW. [C207]

"Design and implementation of multi-touch system using FTIR technique for optimization of finger touch detection"

In recent years, multi-touch screens are emerging and seem to be ubiquitous in near future. The intuitive surfaces provide collaborative workspace for users to perform natural style of multi-touch interaction simultaneously. Users can access the interactive elements such as WIMP (window, icon, menus and pointing) using their bare fingers. At the same time multi-touch screens have ambiguity in multiple finger touch detection. Users acquire the accuracy in the fingers touch detection during the selection of interactive elements. In order to optimize the multiple finger touch detection, we propose the system and its architecture using the Frustrated Total Internal Reflection (FTIR) sensing technique. The system surface is improved by superimposing the transparent layers on acrylic surface. In addition, we modify the architecture of multi-touch surface by configuring the infrared light emitting diodes against the clean edges of acrylic surface. In order to test the system we conduct the experiment by involving the subjects and investigate the quality of fingertip blobs. The proposed system may increase the image quality of fingertip blobs which may help in achieving the fidelity for sensing the multiple fingers on interactive surface. [C208]

"GaN-on-Si: A scalable material system to realize cost effective next-generation solid state lighting and power devices"

Over the last decade Gallium Nitride and its compound semiconductor derivatives that belong to the III-V system have demonstrated significant performance advantages in the area of light emitting diodes and high power devices. These have been enabled by their intrinsic wide band-gap of around 3.4 eV which manifest itself as enabling efficient light emission in the blue and green, as well as excellent transport properties (2DEG mobility of 1000-2000 cm2/Vs) enabling high power & frequency transport devices which can operate at high temperature with high breakdown voltages, enabling an entire set of devices to address power efficiency. [C209]

"Battery Lifetime Prediction Model for a WSN Platform"

Wireless Sensor Network devices have by nature limited available energy to perform a wide range of demanding tasks. In order to maximize their operation lifetime, optimal resource management is an important challenge and its success requires methodical modeling of the factors contributing to the overall power consumption. Moreover, the power consumed is not always useful on its own, but it should rather express the expected lifetime concerning the device's normal operation. To achieve such awareness, this paper contributes with a measuring methodology which involves combining power consumption of platform elementary functionalities with battery discharge characteristics, so that a practical, yet accurate battery lifetime prediction model can be formed. [C210]

"A low-cost universal reader for digital displays of medical monitors"

In present-day, the use of digital medical monitors could provide the accurate number reading and the ability of data recording than the use of analogy monitors. However, the individual medical monitor usually records and shows information by itself generally. The establishing of connections between digital medical monitors and computers could be complicated and expensive. The complexity and high-cost block the ability of medical information collecting by computer. In order to solve this problem, a low-cost universal reader for LED displays of medical monitors is proposed in this paper. This universal reader is based on a camera which could be used to recognize digital numbers. The use of general camera could leads to the features of low-cost and universality. Moreover, the information of various medical monitors could be collected with the use of a universal reader at the same time, and then be recorded by computers for future analyses. [C211]

"Temperature dependence of ZnO thin film growth and its application to self-powered fabrics"

Zinc oxide thin films are becoming increasingly popular for their wide range of properties and the ability to deposit these films on organic substrates for applications such as biotemplating, OLEDs, or deposition on fabrics for functionalization purposes including power generation from the flexing and deformation of wearable textiles. However, since many fabrics and other organic substrates can not survive the typically high temperatures of thin film growth, it is important to characterize and understand the dependence of the properties of these films as a function of temperature deposition and subsequent thermal treatments. We report on the properties of zinc oxide thin films grown by Atomic Layer Deposition (ALD) and the dependence of surface roughness, film stress, surface energy and crystalline structure on deposition temperature. [C212]

"Packaging of LED backlights for ruggedised displays"

Light emitting diodes (LEDs) can provide a number of benefits such as adaptive light control, reduced form factor and other novel techniques to ultimately improve the performance of the display. Some of the design challenges in adopting LEDs are to fully understand their effect on the thermal management, reliability, optical and viewability performance of the display. For the display designer this requires integrated modelling and analysis tools. The paper describes optical and thermal modelling techniques used to predict key design parameters such as luminance and temperature for ruggedized electronic display's using an array of LEDs as the backlight. [C213]

"LEDs' thermal management aided by infrared thermography"

Investigation deals with LED's thermal management optimization in dependence of operating condition aided by application of infrared thermography. Thermal management calculations allow estimating temperature distribution on the LEDs, metal-core printed circuit boards (MCPCB) and heat sink but often real results may be different and experimental investigations are necessary. Good results are obtained using IR thermography with IR camera for the middle IR spectral region (8-13 Г‚Вїm). Application of infrared thermography allows obtaining temperature distribution at real operating conditions. Thermal images analyzing allow obtaining real temperature distribution on the LEDs, solder points and different areas on the heat sink at different operating conditions. Results of this investigation allow adjusting proper LEDs' regime of operation in lighting system with maximum light output in dependence of ambient temperature conditions and to ensure long life (over 50000 hours) of the LEDs. [C214]

"Indoor experiment of BER performance of optical CDMA system using optical ZCZ code"

The optical ZCZ code, which is a set of pairs of binary and bi-phase sequences with zero correlation zone, can provide optical code division multiple access (CDMA) communication system without co-channel interference. We proposed the compact construction of a code generator and a bank of matched filters for this code. In this paper, we verified that this system can suppress cochannel interference and interference by shifting of optical axis by data multiplex transmission experiment of optical CDMA system using optical ZCZ codes which is called

ZCZ-CDMA system, consisting of a infrared light emitting diode (LED), an avalanche photo diode (APD) module and field programmable gate array (FPGA) boards corresponding to 400,000 logic gates. As a result of data transmission experiment, optical ZCZ-CDMA system can suppress co-channel interference, but can't remove completely co-channel interference, and interference by shifting of optical axis is suppressed from about -30 to 30 degrees. [C215]

"Estimating frame algorithm and system architecture for LED screen"

In this paper, we propose a frame prediction algorithm to eliminate the flicks and blank under the environment of the refresh rate of 240 Hz in the full color LED Screen. It is well known that the LED Display System has both Blank and Ghost Noise problems. Blank symptoms can be improved by displaying the Video Frame repeatedly in the field of LED display. However it turns out to be inefficient and cannot resolve the Ghost Noise phenomenon for LEDs that have more than 250 Г‚Вї in their response time as well. For this reason, we have focused on how to configure the optimized data video, Flicks and Ghost noise problem in the LED Screen. We develop the LED Screen Picture Control System operating on the LED chip based on the characteristics of hardware devices and then implement a Convert Board to use the VDU (Video Distribute unit) device of the conventional LED Screen designed for a DVI Interface. Finally we compare the existing system with improved one to show the performance excellence. [C216]

"Performance of double binary turbo coding for visible light communication systems"

At the ubiquitous age, applications of Wireless Personal Area Network (WPAN) technology using LEDs are in progress. However, visible light communication using LED have weakness, which deteriorates performance of communication. To reduce information losses, which is caused by optical noise, such as incandescent lamps, fluorescent lamps, sunbeam etc., proposed channel coding scheme, double binary turbo codes. In this paper, encoding and decoding scheme of the proposed system is described and simulation results are analyzed. We had expected improved performance by using double binary turbo codes. Finally, performances of the proposed system came up to our expectations. [C217]

"Multi-step three dimensional micro assembly for a flexible LED display"

This paper presents a novel multi-step three dimensional microassembly of passive-circuit-mesh, conductive beads, and LED chips to fabricate a flexible, bright, and wide viewing angle display. A novel flexible display architecture is proposed. To deliver this design, we focus our efforts on the multi-batch assembly integration. A 3-by-3 light-emitting diode array with a chip size of 610 Г‚Вїm by 610 Г‚Вїm by 90 Г‚Вїm is successfully prototyped with device fill factor up to 37.97%. It yields a 990 Г‚Вїm squared monochromatic pixel. [C218]

"Thermal analysis of high power LED array system"

It's proved that the physical meaning of the electrical average temperature rise of series LED array system tested by electrical temperature sensitive parameter (TSP) method is the arithmetic mean of the temperature rises of all sub-LEDs in the system. Based on this relationship, a novel method to evaluate the temperature distribution of series LED systems by scan measurement and recursive calculation is proposed in this paper. Transient heating response measurements of GaN based high power LED arrays are presented to provide experimental verification for this method. The results show that this method is real-time valid and package form independent. The error between the results of individual measurement and this proposed method is less than ±2°C. [C219]

"Enabling new LED designs through advanced cooling technology"

Light Emitting Diodes (LEDs) are increasingly being designed into lighting products for general illumination and are now gaining traction in the market. Several LED products are already available, but have generally been accepted only for low light level applications because of the low lumen output and poor quality of light for many of the products. Much of the reason for the low lumen output is the limited cooling capacity of natural convection which is most commonly used. Unlike incandescent, halogen based, or other traditional lighting technologies, LEDs need proper thermal management to increase the lumen output, maintain quality of light and ensure high reliability and useful life. This paper investigates synthetic jet technology as a viable option for forced convection cooling as an alternative for natural convection in LED products to enable higher lumen designs without compromising form factor, quality of light and reliability. [C220]

"Bespoke interconnect technologies for optoelectronic and biomedical products"

Two technologies of topical importance in reducing the weight and volume of portable electronic products are (1) the creation of dense interconnects on an ever reducing silicon real-estate and (2) the formation of high aspect

ratio through vias in silicon wafer and Printed Circuit Boards (PCBs) to allow interconnections across stacked devices. Whilst still important for biomedical and optoelectronic products, these interconnect technologies must take into account additional requirements which include material bio-compatibility as well as stringent deposition and assembly temperatures, making packaging and assembly highly challenging fields. This paper presents some interconnection technologies developed by the Microsystems Engineering Centre (MISEC) to address the aforementioned challenges in the area of optoelectronic biomedical devices. The use of these technologies for three prototype products, namely an integration optical encoder, a micro UV-LED array, a miniaturised ultrasonic transducer and an LED bonded onto a flexible substrate, are described and preliminary results are presented. A summary of the key findings and future work conclude this article. [C221]

"3D integration of micro optical components on flexible transparent substrate with through-hole-vias"

This study establishes the polymer-stacking and metal-electroplating processes on Si-substrate to implement a flexible and transparent substrate with alignment mesa, distributed though-hole-vias, and multi-layer electrical routings. This process is especially useful for 3D integration of micro optical components on flexible substrate. The integrated chips can be further protected and sealed by an additional parylene coating. More micro-optical components can also be vertically integrated by additional polymer molding. To demonstrate the feasibility of this approach, LED chips are bonded and sealed in flexible substrate, and the polymer microlens is further integrated with the lighting chips using molding process. The lighting of packaged LED chips is demonstrated in both air and water. [C222]

"Implementation of polymer-dispersed liquid crystal microprism array for LED radiation pattern application"

This study implements a novel lighting chip with tunable radiation pattern. The lighting chip consists of polymer-dispersed liquid crystal (PDLC) microprism array, LED, and Si-carrier. By integrating the characteristics of microprism and the scattering/transmitting modes of PDLC, the PDLC-microprism enables the tuning of radiation pattern when applying voltage. The lighting chip with PDLC-microprism has the following advantages, (1) no moving parts are required to tune the radiation pattern, (2) the shape of PDLC-microprism array can be easily changed by molding processes, and (3) the fabrication and packaging are performed at low temperature and the damage to PDLC is prevented. [C223]

"An implantable 5mW/channel dual-wavelength optogenetic stimulator for therapeutic neuromodulation research"

This paper describes an implantable system prototype capable of delivering optical intensities and modulation patterns suitable to therapeutically modulate neural networks. It leverages the emerging "optogenetic" interface paradigm for exciting or inhibiting neural activity with the advantages of genetically targeted stimulation and enhanced MRI/EMI compatibility. [C224]

"A CMOS image sensor for 10Mb/s 70m-range LED-based spatial optical communication"

A CMOS image sensor for spatial optical communication is presented. A two-transistor optical communication cell with a depleted photodiode and lateral charge overflow drain improves the light pulse response. A weighed summation of 9-point parallel analog outputs and pulse-equalizing technique greatly enhance the bit-rate and communication distance up to 10 Mb/s and 70 m, respectively. [C225]

"User Customizable Logic Paper (UCLP) with organic sea-of-transmission-gates (SOTG) architecture and ink-jet printed interconnects"

User customizable logic paper (UCLP) with a sea-of-transmission-gates (SOTG) of organic CMOS transistors is developed to enable users to fabricate custom integrated circuits by printing 200 Г‚Вїm width interconnects with at-home ink-jet printers for educational purposes. Compared with the conventional gate array, the SOTG reduces the area of the circuits by 11 to 85%. [C226]

"Universal-input single-stage PFC flyback with variable boost inductance for high-brightness LED applications"

This paper presents a single-stage flyback power-factor-correction circuit with a variable boost inductance for high-brightness light-emitting-diode applications for the universal input voltage (90-270 Vrms). The proposed circuit overcomes the limitations of the conventional single-stage PFC flyback with a constant boost inductance,

which cannot be designed to achieve a practical bulk-capacitor voltage level (i.e., less than 450 V) at high line while meeting the IEC 61000-3-2 Class C line current harmonic limits at low line. According to the proposed variable boost inductance method, the boost inductance is constant in the high-voltage range and it is reduced in the low-voltage range, resulting in discontinuous-conduction-mode operation and a low total harmonic distortion (THD) in both the high-voltage and low-voltage ranges. Measurements obtained on a 24-V/91-W experimental prototype are as follows: PF = 0.9873, THD = 12%, and efficiency = 88% at nominal low line (120 Vrms); and PF = 0.9474, THD = 10.39%, and efficiency = 91% at nominal high line (230 Vrms). The line current harmonics satisfy the IEC 61000-3-2 Class C limits with enough margin. [C227]

"Reduction of the output capacitor in Power Factor Correctors by distorting the line input current"

Active Power Factor Correctors (PFCs) are needed to design ac-dc power supplies with universal input voltage range and sinusoidal input current. The classical method to control PFCs consists in two feedback loops and an analog multiplier. Hence, the input current is sinusoidal and it is in phase with the input voltage. However, a bulk capacitor is needed to balance the input power and the output power. Due to its high capacitance, an electrolytic capacitor is traditionally used as a bulk capacitor in PFCs. As a consequence, the lifetime of the ac-dc power supply is limited by the electrolytic capacitor's, which becomes insufficient to some applications (e.g. High-Brightness Light Emitting Diodes, HB-LEDs). This paper proposes a reduction of the output voltage ripple (which allows reduction of the output capacitance) by distorting the input current, but maintaining the harmonic continent compatible with EN 61000-3-2 regulations. Also, a control strategy with a low-cost microcontroller is developed to put the proposed study into practice. Finally, the theoretical results are validated in a 500 W prototype. [C228]

"A 200MHz 300ps 0.5pJ/ns optical pulse generator array in 0.35µm CMOS"

An 8 ГґВ— 8 array of AlInGaN micro-LEDs is bump-bonded to a standard 0.35 µm CMOS driver chip. Each pixel can be independently pulsed at a rate of 200 MHz with pulsewidths down to 300 ps FWHM at optical power levels of 0.5 pJ/ns at 370 nm. Circuit techniques to minimize pulsewidths are demonstrated. Applications include chip-to-chip communications and lab-on-chip devices. [C229]

"A double-loop control LED backlight driver IC for medium-sized LCDs"

We present an LED backlight driver IC that uses a double loop control method to achieve 50 kHz PWM dimming frequency with 8 b resolution. The measured output voltage of the boost converter is 26.41 V and its maximum ripple voltage is 500 mVpp. Measured rise and fall times of the LED current are 86 ns and 7 ns, respectively. [C230]

"In situ monitoring of environmental water quality using an autonomous microfluidic sensor"

An autonomous microfluidic sensor for phosphate in environmental waters has been developed and assessed in laboratory and field trials. The sensor is based on the molybdenum yellow method for phosphate detection in which a phosphate-containing sample is mixed with a reagent containing ammonium molybdate and ammonium metavanadate in an acidic medium. The yellow-colored compound which is formed absorbs strongly below 400nm and its absorbance is proportional to the concentration of phosphate in the original sample. The sensor utilizes a microfluidic manifold where mixing, reaction and detection take place. Optical detection is performed using a LED (light emitting diode) light source and a photodiode detector. The sensor also combines pumping system, power supply, reagent and waste storage, and wireless communications into a compact and portable device. Here we report the successful use of the sensor to monitor phosphate levels in an estuarine environment. [C231]

"Functional near infrared spectroscopy for Hb and HbO2 detection using remote sensing"

This paper presents the development of a wireless, near-infrared (NIR) imaging system. The goal of the system is to provide flexibility and functionality to clinicians and researchers who require monitoring of blood profusion to tissue, muscles, or the brain. The prototype uses a single stimulus/detection unit composed of an Epitex NIR LED with three wavelength options: 730, 805, and 850 nm, and an OPT101 photodiode detector. The stimulus/detection unit is used to detect changes in the levels of oxygenated and deoxygenated hemoglobin in the body by detecting the amounts of absorbed and backscattered light at the appropriate wavelength. The backscattered light collected by the optical sensor is converted to a digital, serial bit stream for wireless transmission to a base station computer. The usefulness of this design may significantly change the way in which researchers and clinicians study the human body. Without the need to attach a subject to bulky equipment and confine them to a laboratory setting, the investigator can gather data unrestricted by the experimental setting. This advantage permits a vital metabolic indicator to be studied in many different and perhaps difficult situations. [C232]

"Stable RGBW AMOLED display with OLED degradation compensation using electrical feedback"

We present an electronic monitoring and feedback scheme for an AMOLED display that substantially reduces the appearance of image degradation and increases useful lifetime. We describe the methodology and show results on a 32-inch 1080p OLED display that establishes the benefits. We further explain how the same technique can be used as a diagnostic tool to identify and discriminate among defects introduced during the manufacturing process. [C233]

"Session 6 overview: displays & biomedical devices"

Advances in capacitive touch-sensor technology, LED dimming controllers for LCD backlight applications and an electronic compensation method to minimize OLED degradation are highlighted in the first 3 papers of this session. [C234]

"A mobile-display-driver IC embedding a capacitive-touch-screen controller system"

We present a display-driver IC embedding a capacitive-touch-screen controller. It is designed to operate with conventional overlay-type and on-cell touch display panels. The IC exhibits performance of 40 ms latency and 120 Hz update rate within Г‚B±0.5 mm jitter. It has been evaluated on a 16.7 M-color wQVGA AMOLED panel with on-cell touch screen. [C235]

"Temperature dependent thermal resistance in power LED assemblies and a way to cope with it"

Different high-end white power LEDs from different LED vendors were studied. The aim of the study was to find the optimal choice of LEDs and thermal management solutions for a street-lighting application. The primary concern was the (real) junction-to-heatsink thermal resistance of the LED or LED assembly and the real junction temperature and the actual light output of the individual LEDs under test. Since in many cases the junction-to-heatsink thermal resistance showed temperature dependence, like-with-like comparison in terms of light output characteristics was done as function of the real junction temperature instead of the reference temperature. [C236]

"Efficiency Improvement Research on Single-stage Power Factor Correction"

Taking 50 W fly-back single-stage PFC power supply as a example, this paper researched the technologies of synchronous rectification, transformer optimizing, clamp circuits and fast soft turning off technology in order to improve the power efficiency and reduce the power EMI. Experimental test results show the efficiency can reach above 90% in wide voltage range. With the addition of EMI filter, the power can well meet international standards of conducted EMI. [C237]

"Research on High-Efficiency Driving Technology for High Power LED Lighting"

High power LED (Light Emitting Diode) has a wide application in lighting for its good features. In this paper, the electrical properties of LED are first introduced, and then a series-parallel connection of LEDs with more stability and reliability is adopted on the basis of the features of parallel connection and series connection. After that, a flyback circuit for driving high power LED group with a constant-output-current is investigated, and the parameters are designed. According to the driving method, a circuit prototype with an output of 10.0 V/1.10 A is fabricated and tested in rated load and overload conditions to verify its current stability. Experimental results show that the LED drive circuit has a high accuracy, good stability and high efficiency, suggesting that the proposed method might be practical for driving high power LEDs. [C238]

"Design and Implementation of a Novel High-performance Stand-alone Photovoltaic LED Lighting System"

This paper presents a novel high-performance standalone photovoltaic (PV) lighting system which can provide functional illumination based on high power White LEDs. An improved incremental conductance Maximum Power Point Tracking (MPPT) method is proposed in PV system to maximize the photovoltaic array output power, irrespective of the temperature and irradiation conditions and of the load electrical characteristics. A novel strategy to charge the battery is designed from the analyses and comparison results. In order to provide a steady-state operating environment for high power White LEDs, a specially designed LED drive module is implemented. Further more, a self-adapting dimming control is designed to maintain a stable indoor illuminance. Experimental results show the performance of the proposed photovoltaic lighting system. [C239]

"Development of a compact high-resolution spectrometer for multi-line UV Raman spectroscopy"

We report on the development of a compact and robust instrument for multi-line ultraviolet resonant Raman spectroscopy. This instrument will be able to collect simultaneous full-range (800-4000 cm-1) high-resolution Raman spectra resulting from resonance-enhanced excitation at multiple UV laser wavelengths. The resulting matrix of spectra will allow the identification and analysis of several organic chemical compounds of interest for the detection of extraterrestrial life, including amino acids and nucleosides. This instrument is being developed under NASA's Planetary Instrument Definition and Development Program, and we will also discuss its potential contributions to future planetary exploration missions. [C240]

"Research on Porous Micro Heat Sink for Heat Dissipation of High Power LEDs"

A porous micro heat sink system is presented for cooling of high power LEDs, which has high heat transport capability. The operational principle and heat transfer characteristics of porous micro heat sink are analyzed. Numerical model for the micro heat sink is proposed to describe liquid flow and heat transfer based on the local thermal equilibrium of porous media, and it is solved with SIMPLE algorithm. The numerical results show that the heated surface temperature of porous micro heat sink is low at high heat fluxes and the maximal temperature of heated surface is only 55.2 Г‚Вї at the heat flux of 200 W/cm2. Increasing inlet fluid velocity can decrease the temperature in the micro heat sink and the heated surface temperature. [C241]

"A Novel PWM Controller IC for LED Driver with Frequency Spread"

Field=03 -An effective Pulse Width Modulation controller IC with frequency spread for LED driver is presented in this paper. Maintaining a steady current in different conditions is critical for LED systems, while in practical applications, the LED current would have a severe problem of electromagnetic interference (EMI). Therefore, a novel frequency spread module is proposed to improve the EMI performance. The driver IC adopts peak current mode as its controlling strategy. The working frequency is spread with a rate of +2~4% up and down its central frequency. The input voltage can vary from 8.5 V to 40 V and the output current would change from several mA to 1 A, according to different applications. The controller is designed and simulated by using CSMC's IГ‚Вїm 40 V standard CMOS process. [C242]

"Wearable-sensor based wireless braille natural keypad"

I have designed a computer input device for the visually challenged people using a special type of sensors known as Wearable sensors. This system is completely wireless, doesn't require a normal keyboard. My main objective is to help the blind people to type easily. This keypad will be portable and error made during typing can be easily rectified, which is not available in the older methods. [C243]

"On system-level use of BIST for programmable Input/Output buffers in FPGAs"

We describe a Built-in Self-Test (BIST) approach that was developed for the programmable Input/Output (I/O) buffers in Field Programmable Gate Arrays (FPGAs). The approach is unique when compared with previous work because the I/O buffers are tested separately from the other programmable logic in the I/O cells. The capabilities and limitations of system-level use of this I/O buffer BIST are discussed in conjunction with experimental results from the implementation and actual use of the approach in systems. [C244]

"Using the iPhone and iPod Touch for remote sensor control and data acquisition"

Apple's iPod Touch1is a powerful pocket computing platform, allowing users to play graphics-intensive games, listen to music, browse the World Wide Web, and communicate using email through a Wi-Fi internet connection. Apple's iPhone extends the iPod Touch by providing telephone service and high-speed 3G internet support when a Wi-Fi connection is unavailable. In this work, we investigate utilizing the iPhone and iPod Touch platforms for remote sensor control and data collection. Our example design interfaces a set of switches, a set of light emitting diodes, and a temperature sensor to the iPod Touch through a micro-controller and allows these devices to be controlled and monitored by a remote computer. Through this work, we show that the iPod Touch and iPhone can provide a low-cost, high-performance, and lightweight platform for remote data collection and control. [C245]

"The design and facture of a digital control DC regulated power supply based on single chip"

The digital control technique of single chip microcomputer is adopted in the design of DC voltage-stabilized power supply for a multifunctional, digitalized DC voltage-stabilized power supply with higher performance cost ratio. This power source uses the digital adjustment, the output precision is high. It also has short and over-

current protection and alarm, which is suitable especially in each kind situation of the high accuracy request. This design intellectualization direct-current power supply uses the self-restraint keyboard entry. The single-chip microcomputer receives voltage value information of keyboard input, and caries on processing. [C246]

"Review of LED based cap lamps for underground coalmines to improve energy efficiency as compared to other light sources"

This paper deals with the energy savings in cap lighting system of underground coalmines using Light-Emitting Diodes based cap lamp as compared to other light sources. The purpose of the paper is to ensure numerous complex and interrelated factors that must be considered to design and implement a LED based efficient lighting system suitable for underground coalmines which will satisfy human needs for good vision and comfort. The workers of mines are very much dependent on visual cues to recognize underground mining hazards. On the other hand, illumination plays a critical role in miners' safety. Some hazards are located in the miners' peripheral field-of-view offaxis from 10Г‚В° to about 60Г‚В° or on-axis 0Г‚В°. The objective of this paper is to enhance the visual performance using solid-state cap lamps with LEDs as compared to CFL or incandescent bulbs commonly used in miners' cap lamps. Recent research has indicated that an increased short-wavelength content of the spectral power distribution of LEDs relative to incandescent lamps improves peripheral visual performance for low-light conditions. As LED produce light at required wavelength hence less energy is consumed by the lighting fixture as compared to the white light produced by incandescent bulb or CFL. The conversion of electrical power into light power is much more in case of white and red LEDs as compare to blue one. In the present paper different issues related with incandescent bulb, CFL and solid-state LED have been discussed and their performance in respect of underground coalmines has been analyzed. Furthermore, choice of type of LED has been discussed for a lighting system designed for underground coalmines. [C247]

"Research of time-resolved spectrum measuring system in serial-bus communication technique"

To achieve low-cost, the hardware of serial-bus based fluorescence time-resolved spectrum measuring system consists of a signal module, an excitation light source, a monochromator, a digital oscilloscope, a control circuit and an upper PC. The functions of the control module and data translation are accomplished through the RS232 serial-bus. [C248]

"Time and frequency domain CCD-based thermoreflectance techniques for high-resolution transient thermal imaging"

Thermoreflectance microscopy is a well established method for the thermal imaging of (opto)electronic components and ICs. The technique combines submicron spatial resolution with excellent temperature resolution (10mK can be achieved). The dynamic thermal behavior can be studied using either a transient pulsed boxcar or frequency domain approach, the latter including homodyne and heterodyne lock-in systems. Temporal scales in the nanosecond range can be resolved. The basic principles of the various methods are reviewed, and their associated advantages and drawbacks are compared. We also propose a novel heterodyne technique as an alternative to the 'four bucket' method that has been used so far. Our approach greatly reduces the timing complexity while eliminating a major source of systematic error. Illustrative case studies present the transient and AC heat diffusion in integrated gold heaters, and separate imaging of Joule and Peltier effects in a 20Г‘В—20Г‚Вїm2thermoelectric microcooler. [C249]

"Copyright page"

The following topics are dealt with: semiconductor thermal measurement; 3D packaging; micro-scale cooling; materials; green technologies; multi-core architecture; LED thermal management. [C250]

"The influence of neutron radiation on characteristics of the LED with red and yellow emission color"

We have carried out the research of the influence of neutron radiation on the characteristics of heterostructures (AlxGa1-x)0.5In0.5P. We have calculated light strength diminution constants (Г‚Вї0КГ‚Вї) and the degradation of carrier lifetime. [C251]

"Study of an LED device with a honeycomb heat sink"

Previous studies show that the lighting quality of LED largely depends on operating temperature. LED without thermal management may fail early due to thermal runaway, epoxy degradation, and thermal stress under high-operating temperatures. In this study, the performance of a honeycomb heat sink was investigated by experimentation and three-dimensional numerical models. Two kinds of honeycomb models were proposed to

demonstrate the performance of a heat sink with single and multiple heat sources for LED thermal management. The performances of innovative honeycomb heat sinks depend on the number of cells, aspect ratio, and the rib-space ratio. The simulated results indicated that the performance varies a little when the conductivity is over 50W/mK. Compared to the simulated heat flux ratio 0.95, the measured heat flux ratio 0.93 at Г‚Вї=30Г‚В° was slightly lower. The measured performance of the lump and stack (5 pieces) honeycomb heat sink can respectively keep 13.761W and 13.338W under the dummy heater at 67Г‚В°C and the ambient temperature at 27Г‚В°C. The innovative design with nine pieces of layers that are drilled to reduce their weight can effectively dissipate the heat by natural convection in the application of a high-power LED street lamp. [C252]

"Phonon relaxation times of germanium determined by molecular dynamics at 1000 K"

Molecular dynamics simulations (MD) and the normal mode decomposition are used to determine the phonon relaxation times of acoustical and optical modes of germanium (Ge) at 1000 K and 1 atm. The relaxation times are calculated from the temporal decay of the autocorrelation function of the total energy of each normal mode in the [100] direction. Two sets of force field parameters are used to obtain the total energy of each phonon mode. We have found, under the assumption of an isotropic crystal, that the acoustic modes contribute about 90 % to the overall thermal conductivity (being the contribution of longitudinal acoustic modes 60 %), and that the behavior of the relaxation times of acoustic modes can be well represented by power functions with exponents close to 2. Both results are in agreement with previous estimations for silicon (Si) and Ge using MD and ab initio simulations, respectively. Lastly, we have found that only one parameter set is able to reproduce the experimental thermal conductivity at this temperature. [C253]

"Thermal analysis of opto-electronic packages-the Delphi-based compact thermal model and other modeling practices in the industry"

The current work presents a comparative study of industry-wide practice of modeling opto-electronic packages for their thermal analysis, with a focus on the DELPHI-type model. A single opto-electronic package that has a representative construction of other types of opto-electronic packages is chosen for this study. This package is Small-Form Factor Pluggable device, commonly referred to as the SFP. Based on the required level of accuracy and computational resources consumed, the SFP is modeled using one of the following techniques; a lumped system of fixed thermal conductivity, a two-resistor network model, a multi-resistor DELPHI-type network model and a detailed geometrical model. In the current study, these modeling techniques are studied in a comparative mode. The performances of the different models are compared to a validated detailed model. Boundary conditions used for comparing the different models with the detailed model is decided based on practical situations commonly encountered by SFPs in system-level models. The practical situations also include cage-level installation of the SFPs. In addition to presenting the performance of each modeling technique with respect to the detailed model, discussion on their advantages and limitations are also included in this paper. [C254]

"Descriptions of optoelectronic elements are for control of changes of optical properties of blood after the photopherez"

In this paper the experimental results for determination of perspective and possibility of method and capacity of the offered structure of control, consonant with existent technology of photospheres are given. [C255]

"Using Light-Emitting Diodes for intersatellite links"

We examine the utility of Light-Emitting Diodes (LEDs) for short-range intersatellite links (ISLs), and compare and contrast LEDs with existing laser technologies used for long-distance ISLs. A hypothetical low-end LED ISL link is described, and applications are suggested. [C256]

"Near the ground laser communication system: Fried parameter estimation from the WFS measurements"

Near the ground laser communication systems must operate in the presence of strong atmospheric turbulence. The effects of atmospheric turbulence on the laser beam which are relevant to optical communications are a broadening of the laser footprint, random jitter of the laser beam, and high spatial frequency intensity fluctuations referred to as scintillation. The overall goal of our program is to improve the performance and extend the range of optical communications systems by exploring the use of adaptive optics and channel coding. Knowledge of the turbulence conditions and the ability to describe its properties are the key aspects to make these improvements effective. The multi-phase approach described here is directed to statistically describe atmospheric turbulence based on results derived from experimentally collected data. To model the performance of a real world system, we have developed an outdoor path partially over water, spanning 3 km turbulence measurement and monitoring

system. The system described in this paper has two transmitters and two receivers. The transmitter side is equipped with a laser and a bank of 14 horizontally, in-line mounted LEDs. The laser transmitter and LED operate at 808 nm with laser power of 2 mW. The receiver side consists of two channels. The WFS channel captures the signal from the laser transmitter and is specifically designated for the wavefront sensing. The wavefront sensor channel consists of relay optics, a Hartmann WFS, and a CCD camera. The PSF channel is designed to capture the signal from LED bar and consists of relay optics and a CCD camera. The data collected from the PSF channel is used for measurements of anisoplanetic effects. In this paper we emphasize the data collection and consecutive analysis from the WFS channel only. Statistics of the Fried parameter r0are derived from 6 TB of data collected over 50 days under various day and night atmospheric conditions. Significant fluctuations of r0are found with the values ranging from 2 mm and up to 15 cm. [C257]

"About expediency of use of the reemission of photons for increasing light intensity of multilayer LEDs that can be exposed to radiation"

On the basis of the obtained experimental regular dependences the probable causes of the degradation of emission of multilayer GaAlAs-LEDs after gamma irradiation are considered. [C258]

"Degradation of light-emitting diodes on the basis of semiconductors of A3B5 by influence γ-irradiation"

Influence of γ-irradiation on characteristics of the light-emitting diodes is considered. [C259]

"Influence research of photostimuls with human biorhythm frequencies on an organism"

The results of experimental researches of contactless action are Presented through the human receptors of the photostimulation programs with frequencies of biorhythms of human on its psychophisic condition and biophysical parameters. [C260]

"Symmetric current balancing circuit for multiple DC loads"

One of the key challenges in driving multiple parallel loads using a single circuit is to ensure that each load share the same current. Current imbalance occurs because these loads have varying individual characteristics, which surface due to inevitable deviations in mass production. Lighting is one representative application where multiple lamps such as LED (light-emitting diode) arrays need some sort of current balancing mechanism. While resistive balancing technique can be highly inefficient, current balancing using dedicated control IC for each channel significantly increases the cost and circuit complexity. In this paper, a novel current balancing circuit for multiple DC loads is proposed. A smart combination of an inherent symmetry of circuit and capacitive balancing mechanism enables an efficient and cost-effective current balancing. The operating principle of the proposed balancing method is analyzed in detail and an appealing generalization is made. The feasibility of the proposed balancing scheme is verified by developing a hardware prototype to drive a 100 W system, having six LED arrays. [C261]

"High-efficiency and color stable deep-blue organic light-emitting diodes"

We have demonstrated high-efficiency and color stable deep-blue organic light emitting diodes (OLED) using 4,4'-bis (9-ethyl-3-carbazovinylene)-1,1' -biphenyl doped in new blue host material as emitting layer. As host change of the doped blue emitter, blue OLED improved efficiency and exhibited color stability. The optimized blue OLED showed the peak external quantum efficiency of 4.72%, luminous efficiency of 5.12 cd/A at 0.08 mA/cm2, and Commission Internationale de l'Eclairage coordinates of (0.15, 0.12) at 1000cd/m2. This result showed higher efficiency of 1.6 times than control device. [C262]

"Diarylamino-substituted stilbene derivatives for blue organic light-emitting diodes"

A series of bis(diarylamino)stilbene derivatives with various aromatic system were synthesized via the Buchwald-Hartwig cross-coupling reaction. Multilayer devices with the configuration of ITO / NPB (700 Г,Вї) / ADN: blue dopants 1-5 (300 Г,Вї: 2 %) / Alq3(300 Г,Вї) / Liq (10 Г,Вї) / Al were fabricated. Among the molecules, the devices using 4,4'-bis (9,9-diethylfluoren-2-yl-3,5-di-tertbutylphenylamino) stilbene (4) as dopant exhibited blue emission with the luminance of 12590 cd/m2, the luminous efficiency of 9.10 cd/A at 20 mA/cm2, the power efficiency of 3.73 lm/W at 20 mA/cm2, and the CIE coordinates of (0.155, 0.195) at 12.0 V. [C263]

"Turbidity detection of shrimp Taura Syndrome Virus by loop-mediated isothermal amplification reaction"

Reverse transcription loop-mediated isothermal amplification (RT-LAMP) assay is a novel method of gene amplification that amplifies nucleic acid, which can be applied for disease diagnosis in shrimp aquaculture. During the LAMP reaction, the white precipitate of magnesium pyrophosphate (Mg2P2O7) is formed correlates with the amount of synthesized DNA. So, the turbidity can be measured. In this study, a portable turbidimeter has been developed for field to detection of Taura Syndrome Virus (TSV) that causes large economic losses to most major shrimp-producing countries including Thailand. The device could maintain an optimal temperature (63 Г‚В°C) for 25 Г‚Вїl of LAMP sample solution contained in a 0.2 ml commercial PCR tube. We also applied the spectroscopic measurement technique to monitor a by-product of LAMP reaction, light emitting diode (LED) was used as a light source. Light dependent resistance (LDR) was used as detector. The results obtained from turbidity measurement revealed the same detection limit to those from agarose gel electrophoresis method. [C264]

"High efficient self-assembly CdSe/ZnS quantum dots light-emitting devices in organic matrix"

We have fabricated and investigated the effect of CdSe/ZnS quantum dot (QD) concentrations on self-assembly hybrid organic/inorganic light emitting diodes (QD-OLEDs). The uniform distribution of QDs with controllable density was achieved using the conventional spin-coating method. There was a QD threshold concentration below which there was no emission from the QDs. The estimated QD concentration was around 9 Г‚ВЂ— 1011cm-2for the best performance of QD-OLED. The QD emission was increased about three times by annealing of QD-OLED. [C265]

"Highly efficient red phosphorescent Ir(III) complexes for oleds based on carbonylated arylpyridine ligands"

A new series of the carbonylated arylpyridine derived iridium complexes were synthesized and their photophysical and electroluminescent properties were characterized. Multilayer devices with the configuration of ITO/2-TNATA (60 nm)/NPB(20 nm)/Ir complexes doped in CBP(30 nm)/BCP(10 nm)/Alq3(20 nm)/Liq(2 nm)/Al(100 nm) were fabricated. In the device employing complex 2 as dopant, the maximum luminance, luminanous efficiency, and power efficiency were 16200 cd/m2at 14 V, 12.20 cd/A at 20 mA/cm2and 4.26 lm/W at 20 mA/cm2, respectively, at the CIE coordinates of (0.626, 0.373) at 12.0 V. [C266]

"Highly efficient organic light-emitting diodes based on the red phosphorescent emitter sensitized by the green emitting iridium complex"

We demonstrated the red phosphorescent organic light-emitting diodes with sensitizer, iridium(III) tris(2-phenylpyridine) [Ir(ppy)3]. The devices with sensitizer showed a significant improvement in a luminance and efficiency compared to those without sensitizer. Moreover, the electroluminescent (EL) spectra of devices with sensitizer show a similar emission peak with photoluminescent (PL) spectra of iridium(III) bis(2-phenylquinoline)(acetylaceton) [Ir(pq)2(acac)] under the optimized doping ratio of Ir(pq)2(acac) and Ir(ppy)3. It is because that the triplet metal-to-ligand charge transfer (3MLCT) state of Ir(ppy)3is higher than that of Ir(pq)2(acac) and the intra-molecular energy transfer (IMET) time (within ns time scale) from the ppy-centered 3MLCT state to the pq-centered 3MLCT state is shorter than the radiative lifetime (within Г‚Вїs time scale) of Ir(ppy)3. [C267]

"Organic-inorganic hybrid circuit with organic memory and MOSFET"

In this paper, the organic-inorganic hybrid circuit is demonstrated with the sandwiched structure of Au/poly(3,4-ethylene-dioxythiophene): polystyrenesulfonate/Au organic memory device and N-type MOSFET for nonvolatile memory application. The MOSFET is fabricated with 0.13-Г‚Вїm CMOS technology. One transistor and one resistor (1T-1R) structure is fabricated in this hybrid circuit, in which the transistor is used as a select cell to limit the compliance current. The compliance current is determined by the transistor's gate voltage, resulting in the control of electrical resistance of the filamentary conductive paths in the low resistive state. The resistive ratio between the ON- and OFF-state is on the order of 103. [C268]

"Polarization symmetry of photoluminescence from PbS quantum dots"

To fabricate the dispersed and uniformed PbS QDs, mercaptoacetic acid and centrifugation were investigated in the process of reaction which was to synthesize QDs. The TEM and PL experiments showed that we succeeded in chemical synthesis of PbS QDs which generate photoluminescence (PL) with very weak polarization dependence. Emission wavelength range of the QDs covered 1.3 Г‚Вїm. Influence of the synthetic conditions on PL polarization characteristics and the QD structure was investigated. [C269]

"Improving the efficiency of organic light emitting diodes using quantum well structure"

The luminous efficiency of OLEDs with a MQW structure have been investigated and improved. The efficiency of OLEDs with the quantum well structure is 90% higher than the standard device. We suggested that the improvement due to the MQW structure confine carrier in each well without decreasing the mobility of electrons. [C270]

"A study on the simple structural phosphorescent organic light-emitting diodes"

The recombination dynamic of hole and electron and carrier transport mechanism were studied. We demonstrated a efficient green phosphorescent organic light-emitting diodes (OLEDs) as the doping concentration are varied without hole blocking layer (HBL) and electron transport layer (ETL). In spite of device without HBL and ETL, it is possible to inject the electron from the cathode into the emission layer (EML). It is practicable under the high doping ratio of the dopant in host. The high concentrated doping leads to the direct injection of hole and electron from both electrodes into iridium(III) tris(2-phenylpyridine) [Ir(ppy)3] used as dopant because the workfunction of Al and the highest occupied molecular orbital (HOMO) state of 4,4'-bis[N-(naphthyl)-N-phenyl-amino]biphenyl 4,4'-bis[N-(naphthyl)-N-phenyl-amino]biphenyl (NPB) are nearly aligned with the lowest unoccupied molecular orbital (LUMO) and HOMO energy state of Ir(ppy)3, respectively. [C271]

"A stable red organic light-emitting diode based on a pentacene derivative"

This work presents red organic light-emitting diodes based on tris-(8-hydroxy-quinolinato) aluminum (Alq3) co-doped with a new pentacene derivative, 6,13-di-(3,5-diphenyl)phenylpentacene(PDT), and 5,6,11,12-tetraphenylnaphthacene(rubrene). The experimental results suggest that rubrene is doped as an assist dopant to enhance energy transfer from Alq3to PDT in Alq3:PDT:rubrene, which results in good color purity of red emission. For the device with the emitting layer of [Alq3:3mol%PDT:1 mol%rubrene(60nm)], a stable red emission (chromaticity coordinate: x=0.61, y=0.37) is obtained within the driving current density range of 12 to 120mA/cm2. The luminance is 4400cd/m2at 21V. And a maximum luminance efficiency of 2.4cd/A is measured at current density of 120mA/cm2. [C272]

"Anthrylenes with end-capping diphenyl moiety for blue organic light-emitting diodes"

A series of new blue emitting materials; 9,10-diotolylanthracene (1), 2-tert-butyl-9,10-diphenylanthracene (2), 10,10'-diphenyl-9,9'-bianthracene (3), and 1,4-bis(10-phenylanthracen-9-yl)benzene (4) were designed and synthesized for organic light-emitting diodes (OLEDs). In order to test the electroluminescent properties of 1-4, those were used as the host materials for the blue dopant materials, PFVtPh and PCVtPh. Using 2 as host material for PFVtPh blue dopant material, the device shows high EL efficiencies with 5.63 cd/A, 4.13 lm/W, and 4.49 % (3.92 cd/A, 1.50 lm/W, and 3.04 % at 20 mA/cm2) with the CIE coordinate of (0.152, 0.154). [C273]

"Approaches for electrical injection into photonic crystal nanocavities"

We discuss two approaches for current injected photonic crystal defect membrane emitters. A vertical pn junction using spatially selective gain is reported as well transverse pn junctions created using selective ion implantation. [C274]

"Single photon sources based on semiconductor quantum dots"

Efficient generation of single polarized photons or entangled photon pairs will be based on semiconductor quantum dots (QDs). Using submicron oxide current apertures, we were able to realize single InAs/GaAs QD based LEDs. [C275]

"Multi-angle lensless holography for depth resolved high-throughput imaging of cells on a chip"

A multi-angle lensfree holographic imaging platform capable of resolving the depth location of cells or microparticles on a chip, with an accuracy much greater than that allowed by the detection numerical aperture is presented. This multi-angle holographic imaging approach could be especially useful for improving the throughput of on-chip imaging and characterization of cells within microfluidic systems. [C276]

"Design of power-aware LED light enabler with location-aware adaptive middleware and user living pattern"

Recent advances in ubiquitous technologies facilitate location-aware and power-aware systems that can provide predefined services. However, due to their architectural limitations, the recent systems are not so flexible with respect to LED light control for power reduction. Our power-aware LED light enabler with adaptive middleware

dynamically reconfigures the energy-aware services. Our enabler reduces power consumption up to 52% in comparison to the previous basic light at the real office testbed. [C277]

"New approach on multi-axial analysis of camera shake"

A new measurement on camera shakes featuring a combination of a gyro sensor and signal processing is reported. For higher accuracy, shake movements are separated into rotational and translational motions. Advanced quantitative analysis on image quality is also presented considering the effect from translation which was not discussed previously. [C278]

"Fast and Energy-Efficient Link Recovery in Visible Light Communications"

This paper provides mechanisms to support fast and energy-efficient link recovery for optical communication using visible light spectrum. Visible light communication (VLC) is becoming increasingly important to support low power, Gbps data rate communications due to the recent advances in LED technology and high power consumption needed for sampling and processing Gbps data in baseband for RF communication systems. In VLC, the line of sight and high directional feature make the fast link recovery a key issue. Fast link recovery is a new challenge for reliable VLC. This paper presents fast and energy-efficient link recovery approaches for VLC local area network and peer-to-peer communications, with further enhancements for multiple communication directions and color bands. The proposed approaches can achieve link recovery timely, and save the battery life of VLC devices. [C279]

"Efficient luminescence from nanostructured aggregates of organic luminogens"

It has been a textbook knowledge that chromophore aggregation generally quenches light emission. Here, we present an opposite phenomenon termed aggregation-induced emission (AIE) and identified the restriction of intramolecular rotation as a main cause for the AIE effect. Based on the mechanistic understanding, we explored the technological applications of the AIE luminogens as light-emitting and sensoric materials. [C280]

"Performance enhancements in optoelectrical properties of InGaN/GaN light-emitting diodes with micro-hole arrayed indium-tin-oxide layer"

We demonstrated that the InGaN/GaN multiple quantum wells (MQWs) light-emitting diodes (LEDs) with micro-hole arrays exhibit better performance in optoelectrical properties than do the conventional LEDs. With injection current of 20 mA, by employing the micro-hole array on top surface of the LED structure, the room-temperature output power conversion efficiency and external quantum efficiency were increased 28.7% and 14.3%, respectively, compared with the conventional broad area devices. From room temperature I-V characteristics of the LEDs, it has found that series resistance and leakage current were related with hole dimensions and etching depths, respectively. Interestingly, the leakage current of the transparent conductive layer (TCL) was dominated by the contribution of the micro-hole side-wall, the number of the etching micro-holes, and the wet-etched depths. We conclude that a well-designed micro-hole array structure can indeed significantly not only inhibit the leakage current of ITO transparent conductive layer, but also enhance external quantum efficiency and extraction efficiency by using wet etching process, over a broad temperature ranges. [C281]

"Junction temperature of high-power LED packages with diamond film"

A simple, fast, and reliable characterization of thermal properties method to determine junction temperature (Tj) in high power GaN-based light emitting diodes (LED) was presented in this study. Thermal characteristics of high power light-emitting-diode have been analyzed by using a three-dimensional thermal conduction model. Maximum operation temperature has also been calculated. The induced thermal behaviours of the best package processes for LED device with diamond film were investigated by finite element analysis (FEA) and by experimental measurement. The large change of forward operation voltage with temperature in light emitting diodes is advantageously used to measure junction temperature. Using this method, junction temperatures (Tj) of a LED under various structures and chip mounting methods were measured. It was found that the junction temperature can be reduced considerably by diamond film substrates. For diamond film substrates LED, as much as two-fold reduction in junction temperature can be achieved compared to other structures. In this study, we will report how we can achieve the junction temperature had to decrease about 10 percent for more than 1.5W-power dissipation for 1mm square die. It was found that the thermal resistance using diamond film structure is measured to be 17Г‚В°C/W which is the lowest than other structures. [C282]

"Design and realization sensorial system on detection obstacle"

This article deals with a miniature infrared and ultrasonic sensors to avoid collisions with obstacles of mobile

devices. At the beginning of the work I focused on the infrared sensor. Infrared sensor is used to detect over short distances. The impact of the infrared sensor is several tens of centimetres. It was therefore necessary to propose the ultrasonic sensor to make sure the shooting at greater distances. The key advantages of these sensors is a simple structure, high accuracy, possibility of integration, and their relatively low price compared to commercial prices. Sensors and their properties. [C283]

"Semiconductor nanowires as a bottom-up approach to realize nanoelectronic and nanophotonic devices"

In this presentation will be given an up-date of the status of epitaxially grown III-V nanowires, from the perspective of growth, processing, physics and applications in the areas of nanoelectronics and nanophotonics. [C284]

"Aqueous synthesis of thiol-capped water-soluble Fe-doped ZnS nanocrystals"

Fe-doped ZnS (Fe:ZnS) nanocrystals were prepared by a liquid-solid-solution (LSS) method. The XRD results show that Fe:ZnS nanocrystals is crystallized with zinc-blende structure. The PL peaks of Fe:ZnS nanocrystals have a red-shift behavior as a Fe concentration increased. These results indicate that the tuning range of emission wavelength is approximately between 440 and 464 nm in the Fe:ZnS nanocrystals by changing the Fe concentration. The PL bands of Fe:ZnS nanocrystals may be due to the surface trap states. [C285]

"Luminous efficiency enhancement of organic light-emitting diodes by an external electron source"

The external electron source is used to enhance the luminous efficiency of organic light-emitting diodes (OLEDs). Based on the electrons emission characteristics of carbon nanotubes (CNTs), an OLED combined with a CNTs template is proposed. Electrons emitted from the CNTs template impact the Al cathode layer of an OLED device and transport arriving at the emission layer. Balanced recombination of electrons and holes occurs in the OLED and the luminous efficiency can be enhanced by 50%. [C286]

"Realization of a general LED lighting system based on a novel Power Line Communication technology"

LED is regarded as one of the best potential light sources for next-generation lighting. In LED applications, Power Line Communication (PLC) is one of the popular communication techniques, which is used to control the complex lighting system. In this paper, a general LED lighting system based on a novel PLC technology, which is named as P-BUS, is presented. It is made up of four main parts: the master controller, the slave controller which controls the LED module, the DC-DC module and ancillary devices. The communication mode, protocol architecture, circuit structure and frame definition of P-BUS technique are covered and discussed. The control method of the system is introduced. Compared with other communication methods, the proposed P-BUS has many advantages such as fewer communication wires and components, simpler circuit topology and strong interference rejection. A prototype is given to show the advantages of the proposed solution and global system performance is also analyzed. [C287]

"A 0.9 PF LED driver with small LED current ripple based on series-input digitally-controlled converter modules"

This paper introduces a digitally-controlled off-line LED driver based on low-voltage series-input converter modules. The series-input connected modular architecture is adopted to utilize low-voltage high-frequency circuits and low-profile components in off-line applications. Input current is regulated to be constant using a simple controller to achieve 0.9 power factor (PF) without a traditional power factor correction (PFC) stage. Additionally, a bidirectional buck second stage is used to reduce 120 Hz current ripple in the LEDs with minimal energy storage requirements and high efficiency. Experimental results are presented for a series-input system with three modules that drive 6, 8 and 7 LEDs with less than 15% line-frequency current ripple using small filter capacitors. [C288]

"High frequency PWM dimming technique for high power factor converters in LED lighting"

This paper deals with the capability of dimming operation added to the Integrated Buck-Flyback Converter (IBFC) topology developed in previous works. Firstly, the three main dimming methods that have been identified by the authors such as enable dimming, shunt dimming and series dimming will be briefly commented. Afterwards, the IBFC topology will be tested performing enable dimming at 100 Hz and 200 Hz. Secondly, besides the main dimming methods, a new proposal is introduced: high frequency series PWM dimming, which overcomes the main issues faced when developing series PWM dimming in constant-current fixed-frequency

controlled converters. The dimming control loop of this technique will be presented, as well as the laboratory tests performed, obtaining good results in terms of dimming ratio, harmonic content of the input current and power factor. [C289]

"Reverse conduction of a 100 A SiC DMOSFET module in high-power applications"

Numerous research efforts over the past few years have documented the enhanced capabilities that Silicon Carbide (SiC) offers over Silicon based power electronic devices. Additional research work has led to vast improvements in the manufacturing of SiC based components. As a result, SiC power electronic components, primarily diodes, are now readily available and this technology promises to have widespread market impact as more complex device structures are commercially realized. Recently, the development of a 1200 V 50 A SiC DMOSFET device and its use in a 100 A power module has been documented. This paper extends that research work to report on the reverse conduction characteristics of the SiC DMOSFET and the system-level benefits for high-power applications that can be achieved by operating these devices in this manner. Experimental data is presented on the 100 A module consisting of two, 50 A SiC DMOSFETs and two, 50 A SiC JBS anti-parallel free-wheeling diodes used in a high-power bi-directional DC-DC converter during buck mode operation. [C290]

"A method to analysis and design for long life power converter"

Engineers are always looking for more reliable or longer life power converters. Electrolytic capacitor is the critical component to be considered. Using the powerful calculation tools like Mathcad and Matlab and allowable life model, this paper aims at proposing a method to optimize the circuit design to lower the current ripple through the electrolytic capacitor in order to reach for longer capacitor life. Comparison between two modes of operation and the two converter topologies, Forward and Flyback, are made as well. This work provides a guideline to design power converters for long life application like LED driver. [C291]

"Proposal of a dc-dc converter with wide conversion range used in photovoltaic systems and utility power grid for the universal voltage range"

This paper describes the design and implementation of a Boost connected in cascade with a Quadratic Buck converter, with just one active switch, used to drive a LED string for public and private lighting purposes. The proposed converter supports a wide input voltage range that makes it possible to be supplied from 12 VDCto 340 VDC(240 VAC), without any additional adjustment. It can be used in hybrid electrical systems supplied by photovoltaic systems or 110/220 VACfrom the utility power grid. Experimental results from an 11 W prototype are also presented. [C292]

"A novel passive off-line light-emitting diode (LED) driver with long lifetime"

This paper describes a patent-pending passive offline LED driver that has no semiconductor switches, electrolytic capacitors, auxiliary power supply and control board. It can provide a fairly smooth current from the ac mains to drive LED strings. The new circuit has the advantages of high input power factor, high energy efficiency and luminous efficacy, long lifetime, stable luminous output and high robustness against extreme weather conditions. In addition, over 90% of the driver material is recyclable, leading to reduction of electronic waste. It is particularly suitable public LED lighting systems such as road lighting systems. Experimental results based on a 50W system are included in the paper to confirm the validity of the proposal. Due to the circuit simplicity, an energy efficiency exceeding 93.6% has been achieved. [C293]

"Improving current regulation for offline LED driver"

A buck converter is a very common choice for non-isolated offline LED applications, using peak current regulation. The problem for peak current regulation is that the average current of the LED string will vary with different numbers of LEDs. This paper presents two simple and cost effective ways to compensate the average current variation without losing the simplicity of peak current regulation. [C294]

"Edison revisited: Impact of DC distribution on the cost of LED lighting and distributed generation"

This paper models the case of a new construction 277 V commercial lighting system, one of the many possible applications of a DC distribution system, using fluorescent and LED fixtures in a conventional AC circuit and in a DC lighting circuit. The levelized cost of lighting for the AC fluorescent, DC fluorescent, AC LED, and DC LED cases are calculated for projected LED and solar PV performance parameters, and a variety of DC bus voltages incorporating its impact on fluorescent ballast and LED driver efficiencies. Results show that with present fluorescent and LED efficacies, fluorescent lighting systems are the lowest annualized cost lighting option. However, if one has decided to install a DC distributed generation technology such as solar PV due to

environmental policy, new-construction DC LEDs will be the lowest (annualized) cost lighting option by about 2012. [C295]

"A RGB-driver for LED display panels"

Red-Green-Blue (RGB) light-emitting diodes display panels are finding widespread use due to recent advances in the light-emitting diodes (LEDs) and their driver technology. This paper investigates a digital microcontroller based RGB-driver for application in display panels. The RGB-driver uses three different voltage sources from switch-mode power converters (SMPCs) as each RGB color requires different drive voltages. The proposed driver selects the minimum drain voltage of the MOSFETs of the current controllers for each color and uses this voltage to control the duty cycle of the SMPCs, and thus, maintains the minimum output voltages required to keep the MOSFETs in the current controllers in regulation. With a 5-V supply voltage, the efficiencies of the RGB LEDs are 91.5%, 95.7%, and 95.7%, respectively. Even though the driver was experimentally verified in a 3 Гґ— 3 RGB pixels, the concept can be extended to a larger display matrix. [C296]

"Applying one-comparator counter-based sampling to current sharing control of multi-channel LED strings"

In this paper, a fully-digitalized current sharing strategy without any analog-to-digital converter (ADC) is presented and applied to light-emitting diode (LED) lighting. By doing so, the cost for digital control is reduced significantly. Above all, the proposed current sharing method has the capability of resisting variations in input voltage and component parameter. And this is verified by experiments and very suitable for LED street lighting. [C297]

"LED driver circuit with inherent PFC"

A buck-boost topology operating in discontinuous conduction mode (DCM) is used as an off line LED driver for lighting applications. Operating from a full wave rectified ac-voltage with minimum input capacitance, with a constant switching frequency and constant on-time, the utility current has near unity power factor. This LED driver is suitable for cost sensitive applications because this circuit has a minimal parts count and a very simple control circuit. Disadvantages are that the LED drive current is modulated at twice the utility frequency and DCM operation increases component stress levels. [C298]

"The study on the carrier mobility of organic light-emitting diodes"

We study the carrier mobility of organic light-emitting diodes. Carrier mobility is the important parameter to the research on the electrical characteristic of semiconductor devices. It has been demonstrated that the carrier mobility is constant for charge carrier densities typically <1023m-3. The hole or electron density has an effect on the carrier mobility and increases with a power law with the charge carrier density >1023m-3. and the carrier mobility increases with the temperature up. [C299]

"Optimization of electro-luminescence performance of silicon quantum dots based light-emitting-diode"

Silicon quantum dots based light-emitting-diode are prepared using SiOx~1film as active layer and different materials as transparent electrode. SiOxfilm is deposited onto p-type Si substrate by e-beam evaporation and then annealed to obtain Si nano-crystals (nc-Si) embedded in SiO2. TCO materials, such as indium-tin-oxide (ITO), aluminum doped zinc oxide (AZO), and gallium doped zinc oxide (GZO), are evaporated on to the annealed SiOxfilm and used to be transparent electrode layer as well as n-type semiconductor of the LED. The I-V measurements and electro-luminescence are performed. The LED using 100 nm SiOx~1.1 as active layer shows a low turn-on voltage (<5 V). The increase of the thickness of SiOxlayer leads to an augmentation of turn-on voltage which is possibly related to the tunneling effect. EL spectrum of the sample using ITO as electrode is centered at about 600 nm (orange light). Influences of the TCO layer including thickness, material, and thermal treatment are investigated. [C300]

"Mixed spacer effect of hybrid white organic light-emitting diodes for reduced efficiency roll-off"

The authors have demonstrated mixed spacer (MS) effect of hybrid white organic light-emitting diodes (HWOLEDs) for reduced efficiency roll-off using fluorescent blue emitter and phosphorescent red emitter. The optimized HWOLED with MS ratio (1:3) which was 4,4',4"tris (N-carbazolyl) triphenylamine and bis-(2-methyl-8-quinolinolate)-4-(phenylphenolato)aluminium exhibited a maximum luminance of 42200 cd/m2at 8.5 V, external quantum and power efficiencies of 10.3% and 19.0 lm/W, and Commission Internationale de l'Eclairage coordinates of (0.40, 0.41) at 1 000 cd/m2. [C301]

"Characterization of Er-doped ZnO nanorod arrays for broadband antireflection"

We demonstrate a practical optoelectronic application of of Er-doped ZnO nanorod arrays (NRAs) synthesized by hydrothermal method serving as an antireflection (AR) coating. Er-doped ZnO NRAs exhibits broadband AR characteristics for unpolarized, TE-polarized, and TM-polarized lights. Due to growth on any surface of devices/substrates with ease, broadband AR characteristics, Er-doped ZnO NRAs can benefit greatly the performance of optoelectronic devices, such as light emitting diodes and solar cells. [C302]

"Photoelectric Properties of Novel Conjugated Copolymers Based on 3, 4-Ethylenedioxythiophene and π-deficient aromatic rings"

Four novel donor-accepter (D-A) conjugated polymers based on 3, 4- ethylenedioxythiophene and electron-deficient heterocycle rings were prepared, they have strong tendency to form self-assembled structure in the solid state, which is revealed by X-ray diffraction (XRD) patterns of them in powder. The UV-vis absorption spectroscopy, fluorescence emission spectroscopy and cyclic voltammertry studies suggest that the copolymers are expected to provide enhanced charge-transporting properties for the development of efficient electroluminescent materials. Furthermore, the third-order NLO measurements made with the single-beam Z-scan technique indicate that the copolymers have good third-order NLO response and are desired materials for fabricating nonlinear photonic devices. [C303]

"Miniaturized large-grating-clearance linear encoder based on beam-splitting optical system with MOEMS LD and wireless moving part for rebound nondestructive testing"

One factor that limits use of grating linear encoders in rebound hammers for concrete nondestructive testing (NDT) is the lack of a sufficiently compact, dustproof and antiseismic structure. We investigate a miniaturized, large clearance and antiseismic beam-splitting-optical-system (BSOS) linear encoder using a wireless scanning unit and a scale unit. The scanning unit contains a scanning reticle and a total-reflection mirror. The scale unit contains a micro-opto-electro-mechanical systems (MOEMS) laser diode (LD), a photocell and a high strength steel tape scale. The BSOS reduces the linear encoder thickness to 1 cm, almost half that of the traditional one; the MOEMS LD enlarges the grating pair clearance by 1.4~2.4 times, improving durability and scratch resistance; and the wireless moving part enhances antiseismic performance. The linear encoder is integrated into a photoelectric digital rebound hammer to record, transform and digitize rebound displacement for NDT. [C304]

"High power LED lighting for CNN based image processing at frame rates of 10 kHz"

CNN based cameras are able to process images in the kHz range in machine vision systems, as demonstrated for the closed loop control of laser welding processes. Other applications do not benefit from a comparable light source. This paper reports the current state of a LED based lighting for the inspection of cylindrical metallic surfaces on aluminum wires. Frame rates of 10 kHz and exposure times of 20 Г‚Вїs have been achieved so far. [C305]

"Incomplete Homoclinic Scenarios in Semiconductor Devices with Optoelectronic Feedback: Generation and Synchronization"

We demonstrate experimentally and theoretically the existence of slow chaotic spiking sequences in the dynamics of semiconductor devices (lasers and LED) with ac-coupled optoelectronic feedback. We eventually show that this regime is the result of an incomplete homoclinic scenario to a saddle-focus, where an exact homoclinic connection does not occur. The synchronization scenarios have been fully investigated. [C306]

"Simple triac dimmable Compact Fluorescent Lamp ballast and Light Emitting Diode driver"

Compact Fluorescent Lamp (CFL) and Light Emitting Diode (LED) are energy efficient light sources. However, they have a disadvantage that they cannot be directly dimmed with a triac dimmer. This article briefly explains the incompatibility issues, and suggests a CFL ballast circuit to overcome this disadvantage. The ballast is based on resonant mode topology, with additional circuitry for triac interface and dimming control. Furthermore, this article also presents, with few modifications to the CFL ballast circuit, an LED driver circuit that is dimmable with triac dimmer. Experimental results show that both proposed circuits are able to be dimmed down close to 10% of the light output. [C307]

"Epitaxial growth and characterisation of nonpolar m-plane GaN on LaAlO3 substrate"

GaN and related group III nitrides have been attracting enormous attention due to their successful applications in

light-emitting diodes (LEDs), laser diodes (LDs), field effect transistors (FETs), photo-detectors (PDs), high power devices, etc. This work reports on the epitaxial growth of high quality m-plane GaN films on LaAlO3(001) substrates by pulsed laser deposition. In situ reflection high-energy electron diffraction (RHEED) is used to monitor the growth condition during the whole course. X-ray diffraction rocking curves are used to determine crystallinity of as-grown GaN films and atomic force microscopy are utilized for surface morphology. The interface between GaN films and the substrates as well as the films' microstructure are characterized by transmission electron microscopy. [C308]

"Improved efficiency and adhesion property between the PEDOT: PSS and ITO in solution-processed organic light-emitting diodes"

We demonstrated the organic light-emitting diodes (OLED) with additive such as 2-propanol (IPA) in poly(3,4-ethylenedioxythiophene): polystyrene sulphonate (PEDOT:PSS). IPA mixed PEDOT: PSS showed a significantly decreased contact angle on ITO compared to those without IPA. On the other hand, the luminous efficiency of the devices using PEDOT: PSS mixed with 10% and 20% IPA were decreased due to the diluted solution of PEDOT: PSS. However, it solved by increasing the conductivity of PEDOT: PSS film with addition of dimethyl sulfoxide (DMSO). [C309]

"CNN computational abilities of large infrared proximity arrays"

In this paper we introduce a new hardware-software system, which applies some special modification on the original local connection attributes. The cells of this device has reflective type infrared distance sensors, each cell containing a LED and a phototransistor. The mapped surface can be not only the input of the computational system, but can form the local weights of the connections of adjacent cells. In this way, the locally adapted weightening is accomplished by the reflectance feature, which feature can modify the light of the neighboring cells. It has an important meaning: the physical environment take a part (and probably the control) of the processing. With this method, instead of using "distance image" as an input only, we can achieve more complex processing. [C310]

"Component-Based Architecture for e-Gov Web Systems Development"

In spite of the wide coverage of Internet and the need for Web systems to support various governmental tasks, the Brazilian state of Mato Grosso do Sul (Central West region) did not have a technological infrastructure which was sufficient to meet these needs in 2001. This led to setting up the Laboratory of Software Engineering (LEDES) at the Department of Computing and Statistics (DCT), the current Computing Faculty (FACOM), at the Federal University of Mato Grosso do Sul (UFMS), which is now collaborating effectively with the state government providing technological solutions, especially in Web sites and Web applications (WebApps). Developing these solutions has made it possible to capture patterns, define flexible architecture and subsequently set up a process of a Software Product Line (SPL) to develop WebApps in e-gov domain, as well as create computational support tools which automatize this process. This paper presents such computational support tools, lessons learnt during the most relevant projects which have been developed since the creation of LEDES, and the architecture for e-gov web systems development, resultant from early experience. [C311]

"Feasible lighting system with light emitting diode(LED)"

This paper describes the emergence of Solid State lighting technology at the forefront of general lighting domain. The Light Emitting Diode (LED) has the potential to replace present lighting technologies in future because of its superior efficiency. We present our work on a LED fixture as a general light source which includes experimental determination of tolerance level of different types of LEDs when put to optimum level of forward current for longer period of time. Finally, the lumen value produced by the light fixture for a given watt value was measured and compared to those of standard technologies. [C312]

"Demonstration of visible light communications using RGB LEDs in an indoor environment"

We develop a prototype to demonstrate indoor wireless visible light communications (VLC) in which a panel of red, green, and blue (RGB) light-emitting diodes (LEDs) is used as a transmitter as well as a light source. Digital transmissions of text messages are carried out from the LED panel mounted on top of the room ceiling to the receiver located on the table top 2 m vertically below. Using low-cost and widely available off-the-shelf components, a small 4 Ч 10 RGB LED panel is constructed as a transmitter. Light intensity is then measured at various receiver locations. With only the red color modulated, it is demonstrated that the developed system can support transmission rates of 19.2 kbps to the receiver located directly below the panel, and 4.8 kbps to the receiver located on the table top 1.4 m horizontally away from the center location. [C313]

"A project-oriented integral curriculum on Electronics for Telecommunication Engineers"

This paper describes the Electronics curriculum in the Telecommunication Engineer degree at Rey Juan Carlos University (URJC) in Spain. Telecommunication Engineering started in the 2003-2004 academic year. In these years, all the electronic courses have been set up with a main practical orientation and with Project Based Learning (PBL) activities, both compulsory and voluntary. Once these courses have been successfully implemented we have reoriented some of the practical activities to be more interlaced. In this sense, projects involving students of different courses have been developed, as well as projects involving students from different years. All these activities fit in the principles promulgated by the Declaration of Bologna, which results in the actual updating of the university degree structure in Spain. [C314]

"Copyright page"

The following topics are dealt with: flip chip packaging; 3D-TSV interconnection; Pb-free solder; intermetallic compounds; optical interconnect; fiber optics; wafer level packaging; wire bonding; bonding interconnect; solder joint reliability; TSV based RF devices; filter; high-power laser; LED; RF packaging; 3D packaging; MEMS technology; nanotechnology; bioelectronics; 3D manufacturing; nanoelectronics; BGA; and chip package interaction. [C315]

"Development of CMOS-process-compatible interconnect technology for 3D-stacking of NAND flash memory chips"

Through-silicon-via (TSV) technology has been demonstrated to be capable of being applied into many microelectronics products, e.g., CMOS image sensor (CIS), DRAM, flash memory, 3D-MEMS, RF-SiP, logic-SiP, LED, etc. However, new IC design is needed to implement the TSV interconnect into a chip and the specific TSV line is required for TSV fabrication, the facts of long time needed for new IC design qualification and implementation plus big facility investment required for setting-up a full functional TSV line result in high manufacturing cost which further hinders the applications of TSV interconnect technology into many products, e.g., DRAM and flash memory. In this paper, a new TSV-based interconnect technology, named under-pad interconnect (UPI), has been developed for 3D-stacking of NAND flash memory chips using existing CMOS-compatible processes. The basic idea is to use the existing wire-bonding (WB) based NAND flash memory wafer to fabricate blind-via interconnect under bond pad from the backside of a wafer, followed by stacking the chips with UPIs onto the substrate to build a 3D-module. The details of the fabrication process development and the NAND flash memory 3D-stacking methodology will be reviewed and discussed. [C316]

"Packaging and AC powering of LED array"

High power LEDs for lighting application can be implemented with dies. Multiple LEDs are usually connected in series to sustain high power supply voltage like AC 110V due to low LED forward voltage. AC-DC converter is often required for LED arrays working under an AC power supply. But the AC-DC converter brings power consumption overhead and degrades the overall system efficiency as much as 15%. In this work, a high power ceramic COB (Chip On Board) LED array packaging technology capable of working under AC 110V is developed. A total of 40 LEDs are used in the ceramic COB LEDs array to allow it work directly under AC 110V power supply. A special powering method is designed and dedicated to the COB LED array. The special powering method ensures both high light output and high LEDs array reliability especially under supply voltage variations. The measured COB LEDs current vs. AC supply voltage variation is shown in Fig.1 An extremely high driving efficiency (>98%) at the max power and a high power factor are achieved due to the elimination of the AC-DC converter. The electrical efficiency over LEDs forward current is plotted in Fig.2. The structure and top view of COB LED packaging is shown in Fig.3 and Fig.4. The COB package dimension is 68mm by 28mm. With 150mA LEDs forward current, the measured total power is 20W. The max LEDs forward current for this design is 700mA and the max power is 95W. The cross section of the PCB design is shown in Fig.5. Since AC-DC converter reliability is becoming the bottleneck of the high power LED lighting system, the presented ceramic COB LEDs array package with the special powering circuit reliability is enhanced due to the elimination of AC-DC converter. The system reliability is performed and shown in Fig.6. There is no performance degradation of both the ceramic COB LED and control circuit for 1000 hours. Long term reliability test of the system is still under testing and will be presented. [C317]

"Simulation of Random dynamic changes of soil organic matter based on fuzzy Markov chain model"

In response to the random change features of soil organic matter content and limited monitoring data in practice, a fuzzy Markov chain model is put forward in this paper to be used in simulating and forecasting the dynamic

change of the region soil organic matter content. Firstly, the content of organic matter is divided into four levels by using grey clustering method in order to establish the grading model and fuzzy membership function of the sample classification which can make the change of organic matter state more smooth, continuous and reasonable; Secondly, in view of the limited monitoring data of soil nutrient, Marko transition matrix is simplified, and a new method based on Hybrid Particle Swarm Optimization (HPSO) is proposed to optimize the transition matrix; Finally, taking a county in Hebei province as the sample area, the simulation and forecast of dynamic change of soil organic matter are achieved. Analysis result shows that the simulation result suits well with the practical change trend. [C318]

"Excitation wavelength dependence of time-resolved photoluminescence in deep-UV MQW LEDs on bulk AlN"

Photoluminescence lifetimes of nearly dislocation free high Al content AlGaN MQW LEDs on bulk AlN are presented as a function of temperature and excitation power for both direct photo-excitation of the wells and barriers. [C319]

"Deep ultraviolet LEDs based on AlGaN alloys by plasma-assisted molecular beam epitaxy"

We report the development of AlGaN-based deep UV LEDs by plasma-assisted molecular beam epitaxy, which at bare-die configuration have an output power of 1.3 mW at 200 mA and external quantum efficiency of 0.16%. [C320]

"Improved Decoding Methods of Visible Light Communication System for ITS Using LED Array and High-Speed Camera"

In this paper, we consider visible light communication systems using LED array as a transmitter and high-speed camera as a receiver for Intelligent Transport System (ITS). Previously, we have proposed the hierarchical coding scheme which allocates data to spatial frequency components of the image depending on the priority. This scheme is possible to receive information of the high-priority even if communication distance is long. However, we need to distinguish multi-valued data from the received image by using a hierarchical coding. In this paper, we propose two improved decoding methods, and demonstrate to distinguish multi-valued data more correctly in the experiment. [C321]

"Parameter estimation of multiple pulse trains for illumination sensing"

We consider illumination sensing in a light emitting diode (LED) lighting system based on frequency division multiplexing (FDM). In the FDM scheme, LEDs render periodical illumination pulses at different frequencies with prescribed duty cycles. The purpose of illumination sensing is to identify the illumination contributions of different LEDs at a target location, within a limited response time. With the use of a photosensor at the target location, the problem of interest is to estimate the amplitude of the sensor signal component due to each LED. In this paper, we propose a successive estimation approach exploiting higher order harmonics of the sensor signal. We show that a larger number of LEDs can be supported using the proposed approach, as compared to our previous approach using only the fundamental frequency component, at the same estimation error. [C322]

"Design of wireless embedded thin web server based on zigbee"

This paper introduce the hardware and software structure of an embedded thin web server. Different from other wired embed web servers, this embedded thin web server is build on zigbee, a wireless ad hoc network communication technology. An application-layer message format is proposed and a mapping table is built in this paper. Since it has no wire to connect with the remote nodes, this web sever is very flexible and has wide range of adaptability. [C323]

"Thermal design of a 16W LED bulb based on thermal analysis of a 4W LED bulb"

Simple experiments were conducted to obtain surface and lamp hold temperatures of a main-stream 4W LED bulb, which is on sale in the market. Two kinds of thermal calculations were also done based on the data from measurements. The total heat dissipation rates in those two thermal calculations are close to each other, which demonstrate that the thermal calculation is feasible for thermal analysis of LED bulb. A thermal design of a 16W LED bulb was proposed based on the proposed thermal analysis method. Meanwhile, simulation done by commercial software COMSOL was used to check the design. The results show that thermal performance of the 16W LED bulb is as good as expected and can maintain low junction temperature in general environments. [C324]

"Comprehensive design guidance for PTH via stub in board-level high speed differential interconnects"

A plated-through-hole (PTH) via is commonly used to route vertical signal transitions between layers of a multi-layered PCB. It is well known that a via stub, the portion of the PTH via not directly involved in the layer transition, can have a significant impact on signal integrity, effectively acting as a bandpass filter, degrading the design margin or even potentially causing failures. This paper discusses via stub design issues and provides comprehensive design guidance based on both frequency and time domain results. The design guidance results were generated using a commercially available 3D FEM simulation tool and results. Data showing good correlation between simulation and measurement are provided to lend credence to the simulated results. A simple rule of thumb for estimating an operating frequency range safe from via stub effects is presented. [C325]

"Realization of high spatial color uniformity for white light-emitting diodes by remote hemispherical YAG: Ce phosphor film"

High spatial color uniformity is realized by fabricating high power white light-emitting diodes (LEDs) with hemispherical YAG: Ce phosphor film. An injection molding process is developed to produce the phosphor film. By better control of the process, homogenous distribution of the phosphor particles is achieved. The color uniformity can be as high as 80%-90%. Comparing with white LEDs fabricated by traditional phosphor dispensing method and commercial samples with conformal phosphor coating, improvements of spatial color uniformity are around 36%-43% and 6%-8%, respectively, by the hemispherical phosphor. [C326]

"Effect of die-attach material on performance and reliability of high-power light-emitting diode modules"

Heat dissipation for packaging high-power light-emitting diodes is critically important to performance and reliability of LED lighting modules. The first thermal interface encountered by the heat flow is a die-attach material between the diode chip and its substrate. In this study, three different types of die-attach materials were used to construct 1-Watt GaN LED single-chip modules: a silver epoxy processed by curing; a lead-free solder paste by reflowing; and a nanosilver paste by low-temperature sintering. The modules were aged in an 85°C/85% relative humidity chamber and temperature-cycled between −40°C and 150°C. Luminous fluxes of the aged and cycled modules were measured to determine the effect of die-attach material. Results showed that the LED modules with chips joined by the low-temperature sintered nanosilver paste gave the best performance and long-term stability. This is attributed to high thermal conductivity of the sintered silver joint for improved heat dissipation. [C327]

"Low thermal resistance LED light source with vapor chamber coupled fin heat sink"

This paper provided a new type vapor chamber coupled fin heat sink, which is applied to high power LED light source. It shows good performance for the heat dissipation of high power LED devices. To compare its performance, the same LED light source with only fin heat sink was also fabricated and tested. Experimental tests, numerical simulation and thermal resistance analysis were conducted on the two prototypes. The basic principle of vapor chamber, the experiment set-up and the detailed comparisons between the simulated results and the tests results were also presented in this paper. The results showed that the vapor chamber coupled fin heat sink could make the temperature of the fin base plate uniform, the thermal resistance of vapor chamber was as low as 0.05K/W. The fin heat sink assembled on vapor chamber demonstrated good heat removal capacity, indicating an overall thermal resistance of 0.654K/W at the ambient temperature of 27 °C. [C328]

"Active-matrix OLED display backplanes using transfer-printed microscale integrated circuits"

Active-matrix organic light-emitting diode (AMOLED) displays have been fabricated using backplanes with transfer-printed microscale silicon integrated circuits (ICs) in place of conventional thin-film transistors (TFTs). The ICs were fabricated using a commercial semiconductor foundry process, and the wafers were subsequently processed to prepare the ICs for transfer-printing. The microscale integrated circuits were transfer printed onto a glass substrate and interconnected using a single-level, thin-film metallization process. The resulting OLED display exhibited good pixel-to-pixel luminance uniformity, high luminance, excellent controllability, and high switching speed. The transfer-printing process achieved good positional accuracy and high yield. [C329]

"Thermal management of mid-infrared (IR) quantum cascade lasers"

Semiconductor quantum cascade lasers that emit mid-infrared light in the wavelength range of 4 to 9 μm are unipolar and the laser emission is due to intersubband transitions in a repeated stack of multiple quantum wells.

The thermal management of these devices is a challenge. The overheating of the active region (referred to as `core' throughout this paper) in these lasers decreases the optical power and ultimately results in laser failure. In this work, we present a detailed finite element (FE) based numerical modeling of the thermal behavior of these devices and the measurements performed to validate the models. The studies include the effect of submount material, mounting schemes such as epi-side down or epi-side up mounting and finally, the effect of core geometry on the thermal impedance. We have also looked at various core designs such as split core. We conducted various experiments to correlate the results with the numerical modeling by measuring the thermal impedance between the laser diode's core and the bottom of the substrate and measuring the temperature change within a pulse of a distributed-feedback (DFB) QCL which emits in a single longitudinal mode of narrow linewidth. The temperature of the active core of a DFB QCL can be determined by measuring the lasing frequency, which changes with the temperature of the active core as: $v=v0+\beta vTcore=v0+\beta vTsubmount+\beta vRthPdec$, where v is the lasing wavenumber, Rthis the thermal resistance, Pelecis the electric power loading, and β is the thermal tuning coefficient. By measuring the lasing frequency as a function of time within a pump current pulse, we can determine the temperature change, and the thermal conductance of a laser structure. In the conclusion, we provide various recommendations for efficient thermal performance of these quantum cascade lasers. [C330]

"Solid state light tube with periodic units of lateral-emitting LEDs"

In this paper, the design and analysis of a novel solid state light tube is presented. The tube is constructed with periodic units of lateral-emitting LEDs. In each unit, two LEDs are mounted on two metal plates, respectively, which are installed at the two ends of a light guide, facing inward to each other. The light emitted from the LEDs firstly transmits in the light guide and then gets outside after reflection and refraction. This light tube structure can provide a more uniform optical field distribution and eliminate the "spotty effect" of commercial LED light tubes. In order to optimize the design, different dimensions of the light guide were studied. A prototype of LED desk lamp using the developed light tube was manufactured. The illumination performance of the lamp was investigated. In addition, an analytical model was developed to facilitate the design of the light guide. Analytical modeling results and experimental data showed reasonable agreement. [C331]

"High power UV-LED-clusters on ceramic substrates"

We present a high power density UV-LED module for a wavelength of 395 nm with an optical power density of 13.1 W/cm2. The module consists of 98 densely packed LED chips adhesively bonded to an Al2O3-ceramic board. Thermal simulations and measurements as well as optical measurements were conducted. The module was cooled by a forced air heat sink for the characterization experiments. A surface micro cooler with water as a coolant is proposed to improve thermal performance of the module. To drive the LED module, we developed an efficient current source powered directly from AC mains supply with integrated power factor correction using a single switching component. [C332]

"High thermal stability of high-power phosphor based white-light-emitting diodes employing Ce:YAG-doped glass"

High thermal stability of high-power phosphor-converted white-light-emitting diodes (PC-WLEDs) incorporating a Ce:YAG-doped glass as the phosphor layer is demonstrated. An exploring study of lumen loss, chromaticity shift, and transmittance loss of high-power PC-WLEDs with Ce:YAG-doped glass and Ce:YAG-doped silicone under thermal aging at 150°C for 500 hours was performed and compared. The results showed that the high-power PC-WLEDs with 6 wt% of Ce:YAG-doped glass exhibited 60% less lumen loss, 50% lower chromaticity (CIE) shift, and 20% smaller transmittance loss than with the Ce:YAG-doped silicone. This clearly indicates that the Ce:YAG-doped glass exhibits higher thermal stability than the Ce:YAG-doped silicone after thermal aging. A better thermal stability of glass phosphor layer may be beneficial to the many applications where the LEDs with high-power and high reliability are demanded. [C333]

"Through silicon via-hole-based thin-film light emitting diodes"

A thin film GaN-based LEDs has been fabricated on a silicon substrate with periodic via holes formed by a laser drilling process. GaN-based LEDs grown on sapphire substrate are successfully bonded and transferred onto Si substrate with periodic via holes using Au-Sn wafer bonding followed by grinding, chemical mechanical polishing (CMP) and dry etching. The bonding medium comprises Au-Sn multilayer composite deposited directly on the object to be bonded. Sapphire substrate is detached from GaN-based LEDs epi-layer by using mechanical grinding, CMP and dry etching process. The indium-tin-oxide (ITO)/Al are deposited to improve contact resistance with p-GaN and optical reflectivity. Using the reflective metal Al layer, the light emanating from the active region towards through-silicon vias (TSVs) substrate could be reflected and escaped from the

semiconductor through the top surface. The periodic via holes are formed by a laser drilling technique; p-contact metals are deposited onto the backside of silicon substrate to form vertical electrical interconnections between silicon substrate and p-GaN layer. The through silicon via-holes-based thin film LED can achieve better electrical performance, and sustain a higher input current level than the conventional GaN/Sapphire LED due to the formed vertical electrical interconnections and the higher thermal conductivity of TSVs substrate. [C334]

"An application specific LED packaging module integrated with optical, cooling and powering functions"

Light-emitting diodes (LEDs) modules integrated with multi-functions are essential to LED luminaires manufacturers. We demonstrated a 16W application specific LED packaging (ASLP) module integrated with optical, cooling and powering functions for road lighting. A lens design method for extended source was introduced briefly and a borosilicate glass freeform lens for the module was designed according to this method. Simulation results demonstrated that lighting performance of the ASLP module could meet requirements of road lighting very well. Moreover, system optical efficiency of the LED road lamp based on the ASLP modules was 19.4% higher than that of traditional LED road lamp. Y shape fins were designed for the heat dissipation of the ASLP module. Thermal performance of the module was checked and verified by thermal calculation and simulation. The junction temperature of LEDs was <90°C when ambient temperature was 35°C. Special designed structure made this ASLP module replaceable and easy to assembly. [C335]

"High power 245 nm deep UV LEDs"

We report large area, 245 nm to 250 nm deep UV LEDs with output power more than 5 mW in CW operation and above 30 mW for 200 µs pulses at 10 % duty cycle. [C336]

"Polarity-controlled visible/IR electroluminescence in Si-nanocrystal/Si light-emitting diodes"

We report the demonstration of room-temperature two-color Si-nanocrystal/Si light-emitting diodes, which emit infrared light from silicon and visible emission from the Si-nanocrystal film when Si substrate is forward and reverse biased, respectively. [C337]

"Hole shape effect of photonic crystals on the guided resonance modes in GaN-based ultra-thin film-transferred light-emitting diodes"

The guided resonance mode affected the different hole shapes of photonic crystals in GaN ultra-thin film-transferred light-emitting diodes. The ellipse-hole PhC extracted a fewer modes than the regular PhC due to the lattice symmetry break. [C338]

"Characterization of a-plane green light-emitting diodes using nanorod lateral overgrowth"

We have demonstrated nanorod lateral overgrowth to reduce dislocation density in a-plane GaN. Subsequently, we grow green a-plane light-emitting diodes using nanorod lateral overgrowth. Output power of 0.5 mW was measured at 20 mA. [C339]

"Contact printing of quantum dot light emitting diode on silicon probe tip"

A novel quantum dot based LED is fabricated directly on a micromachined silicon probe. Monolayers of quantum dots are precisely deposited at the probe tip through microcontact printing and electrically excited to show successful electroluminescence. [C340]

"Quantum efficiency enhancement optimization in colloidal semiconductor quantum dot solids using nonradiative energy transfer"

We investigate quantum efficiency (QE) enhancement via recycling of trapped excitons in energy-gradient of quantum dot solids using nonradiative energy transfer. The maximum QE increase of 17% is achieved when the donor-acceptor ratio is 1 1. [C341]

"Nanophosphors based on CdSe/ZnS and CdSe/SiO2 colloidal quantum dots for daylight-quality white LEDs"

Properly mixed combination of CdSe/ZnS and CdSe/SiO2colloidal quantum dots of different sizes is suggested as a nanophosphor material to be combined with blue InGaN/GaN LEDs for well-balanced color content of white light emission. [C342]

"High speed true random number generation using chaotic light"

Using chaotic light, we propose a new method for true random number generation, which is promising, high speed, convenient and low cost. A prototype has been built up with a generation rate of 192 Mbits/s. [C343]

"An electrically driven entangled light source"

We demonstrate electrically-driven entangled photon generation using a semiconductor quantum dot embedded in a light emitting diode structure. The entanglement is shown to be of sufficient fidelity for applications such as quantum key distribution. [C344]

"Investigation of efficiency droop in blue InGaN/GaN light-emitting diodes with different well widths"

Temperature-dependent electroluminescence efficiency of blue light-emitting diodes with different well widths is investigated. The efficiency droop phenomenon for LEDs at low temperature is dependent with electron overflow and non-uniform hole distribution within MQW region. [C345]

"Investigating non-radiative energy transfer in quantum-dot-based white light emitting diodes"

We fabricated an InGaN based nanorod LED structure with colloidal quantum-dot (QD) phosphors deposited in between the nanorods, creating side-wall coupling between QD phosphors and InGaN multiple-quantum-well (MQW) emitters. Time-resolved photoluminescence measurements for nanorod structures with and without colloidal QD coating were performed to study the direct MQW-to-QD non-radiative energy transfer. [C346]

"Enhanced surface plasmon coupling effect with a metal/SiO2 /GaN structure for further improving the emission efficiency of a light-emitting diode"

Further enhancement of the efficiency of an InGaN/GaN quantum well (QW) light-emitting diode (LED) through QW coupling with surface plasmons generated on Ag nano-gratings by inserting a SiO2layer between semiconductor and metal is demonstrated. [C347]

"Nanostructured semipolar LEDs for solid-state lighting"

We analyzed the electrical characteristics of nanostructured semipolar InGaN light-emitting diodes and showed that they exhibited superior optical and electrical properties to the polar light-emitting diodes. A large scale fabrication strategy is proposed. [C348]

"Internal quantum efficiency measurement in InGaN/GaN UV LEDs with patterned sapphire substrate by photoluminescence and electroluminescence method"

Internal quantum efficiency (IQE) of InGaN-based ultraviolet light emitting diodes (LED) grown on patterned sapphire substrate (PSS) and flat sapphire were measured by photoluminescence and electroluminescence methods. The IQE improvement of PSS LED is significant. [C349]

"III-Nitride UV emitters and their applications"

III-Nitride UV light emitting diodes (LEDs) have an enormous applications potential for air & water purification, food disinfection, polymer curing and bio-medical instrumentation. However the growth and processing of these devices is very challenging due to the high Al-fraction AlGaN layers needed for deep UV emission. Since early 2000, our research group has developed III-N deep UV LEDs (emission wavelength < 300 nm) over sapphire substrates. The key to our success was the use of a new pulsed epitaxy procedure and new device designs to mitigate junction heating issues. In this paper we will review the progress to date which has led to large area deep UV LED lamps with cw-powers approaching 100 mW. [C350]

"Growths of ultra high density InGaN-based quantum dots on self-assembled diblock copolymer nanopatterns"

Selective area growths of highly-uniform InGaN quantum dots (QDs) on dielectric nanopatterns defined by self-assembled diblock copolymer were demonstrated with ultra-high QDs density of 8Ч1010cm-2, which represents the highest QDs density reported for nitride-based QDs. [C351]

"Evanescent-wave cavity enhanced spectroscopy as a tool in label-free biosensing"

A variety of evanescent-wave cavity-enhanced techniques is used in studying interfacial kinetics as well as the performance of anti-biofouling coatings, demonstrating the potential of these techniques in label-free biosensing. [C352]

"Fluidic lens laparoscopic zoom camera for minimally invasive surgery"

We developed a miniaturized laparoscopic zoom camera that is 17 mm long, has >4X optical zoom, and works under 300 lux. This camera is suitable for advancing minimally invasive surgery. Demonstration surgery (cholecystectomy) was performed. [C353]

"Simulation of three-fold symmetric photonic crystal structures on top of GaN LEDs"

A 3-fold symmetric photonic-crystal grating is simulated using improved FDTD-model. Transmission gratings are optimized. Then, the best cases are simulated in GaN-LED models. The maximum extraction efficiency improvement is 40Ч greater compared to conventional LEDs. [C354]

"InGaAs QW nanopillar light emitting diodes monolithically grown on a Si substrate"

Room-temperature operation of InGaAs/GaAs QW nanopillar light emitting diodes grown on a (111) Si substrate by low temperature MOCVD (400°C) and fabricated using conventional lithography and processing techniques are reported for the first time. [C355]

"Towards the implementation of an organic inorganic laser for next generation optical applications"

Authors report simulations and experimental results on the engineering of a small molecule-on-silica based waveguide grating implementation for next generation optical lasing applications. [C356]

"Light extraction enhancement of a light-emitting diode by fabricating surface gratings around the mesa with patterned photoelectrochemical wet etching"

The >43% enhancement of light extraction by fabricating a surface grating structure around the mesa of a light-emitting diode with an approach combining photoelectrochemical wet etching and phase mask interferometry is demonstrated. [C357]

"Growth evolution and time-resolved photoluminescence studies of III-nitride light-emitting diodes grown by abbreviated growth mode on patterned AGOG substrate"

Abbreviated growth mode of InGaN-based light-emitting diodes on nano-patterned sapphire leads to reduction in dislocation density and non-radiative recombination rate, and 37% increase in internal quantum efficiency. [C358]

"Reliability and performance of pseudomorphic ultraviolet light emitting diodes on bulk aluminum nitride substrates"

The development of pseudomorphic layers on low dislocation density AlN substrates is leading to improvements in reliability and performance of devices operating in the UVC range. [C359]

"Recent progress in high efficiency InGaN LEDs"

InGaN LED efficiency depends significantly on current density, emission wavelength and junction temperature. Phosphor-converted blue LEDs are still more efficient than RGB multi-LED solutions despite inevitable Stokes losses: 104 lm/W at 350 mA have been demonstrated for a warm-white (TC= 2950 K) phosphor-converted blue InGaN LED with 1 mm2chip size. [C360]

"High resolution hemoglobin oxygen saturation level imaging using Morlet wavelet transformed spectroscopic Optical Coherence Tomography"

In this work, we use Spectroscopic Optical Coherence Tomography and Morlet wavelet transformation to deduce hemoglobin oxygen saturation in blood sample. The technique makes use of the different absorption properties of hemoglobin and oxyhemoglobin around 800 nm. In order to test the technique, we combined three superluminescent light emitting diodes together in a Fourier Domain Common Path OCT set-up. The result shows that this technique is promising in differentiating blood oxygenation status. [C361]

"Fully utilizing the IED capability to reduce wiring"

Each wired termination in a substation represents a cost associated with engineering, installing and testing that wired point. These costs include the obvious financial labor costs, but also include intangible costs such as installation and commissioning time, potential for human error, panel space, increased resistive burden in circuits, and larger raceways. Additionally, each wired termination represents stranded engineering time that is used design these terminations rather than allowing the engineering staff to solve problems. Most utility wiring design practices are taken for granted without thought as to the true cost and reliability of the practice and whether or not the function can be implemented with less wiring. Some standard utility practices have evolved that seek to minimize wiring. An example of this practice is the use of multifunction microprocessor based relays that can logically develop a trip bus from protective elements rather than having to wire individual elements to create the same trip bus. This paper seeks to expose some of the hidden financial costs and reliability costs associated with copper process wiring. Additionally this paper will discuss ways in which modern IEDs can be fully implemented to further reduce wiring. The cost and reliability benefits associated with the reduced wiring will be discussed and quantified. Some of the solutions to be addressed include the use of breaker IEDs as an interface for breaker control, IED to SCADA communications, IED to IED communications, internal lockout Relays, IED pushbutton control, and process bus. Each of these solutions are currently available in today's market place and have varying degrees of acceptance within the industry. The benefits and liabilities of each solution using traditional IED implementation versus maximized IED implementation shall be discussed. [C362]

"Smart lighting using LED luminaries"

The target of a smart lighting system is to control light sources in an environment (e.g. home, office) adaptively according to user contexts and preferences. Literature work in this area focuses on traditional light sources such as incandescent and fluorescent lights, whereas this paper takes a step towards adopting LED luminaries. A novel illumination model for distributed LED luminary control is presented. A prototype system is designed and implemented using several LED luminaries and light sensors. Experiments carried out on the reading space use case show that the desired illumination can be achieved based on user preferences, irrespective of the existence of external light sources. [C363]

"Autonomous street lighting system based on solar energy and LEDs"

This work presents an autonomous street lighting system based on solar energy as primary source, batteries as secondary source, and lighting emitting diodes (LEDs) as lighting source. This system is being presented as an alternative for remote localities, like roads and crossroads. Besides, it presents high efficiency, because all power stages are implemented in DC current. The design of LEDs fixture, in order to replace a 70W high pressure sodium (HPS) lamp, is performed. This design takes into account the human eye response in scotopic conditions. LEDs driver and battery charger experimental results are presented. The battery charger presents three control modes: maximum power point tracker (MPPT) mode; constant current mode; and constant voltage mode. The control mode depends on the battery state (charged/discharged), and solar irradiance level. The battery charger input impedance is analyzed in order to ensure that the MPPT is obtained for any solar irradiance and panel temperature. [C364]

"230 Mbit/s via a wireless visible-light link based on OOK modulation of phosphorescent white LEDs"

We report a first indoor wireless visible-light link operating up to 230 Mbit/s by use of on-off-keying and with bit-error-ratios below 2Г,В·10-3. The results were achieved for illuminance levels recommended by lighting standards. [C365]

"Very-high temperature (200°C) operation of GaN-based cascade green light emitting diode for plastic optical fiber communication"

We demonstrate cascade green light-emitting-diodes, which greatly release trade-off between output-power and speed and exhibits strong modulation-speed enhancement with negligible output-power degradation from room-temperature to 200Г,В°C operation. 200 Mbit/sec error-free transmission at 200Г,В°C can be achieved. [C366]

"Interrelation profile analysis method for alignment of polarization-maintaining fiber"

A new method for alignment of polarization-maintaining (PM) fibers has been developed that solves alignment problems with low-contrast PM fibers. It provides a fast and accurate universal method for PM fiber alignment. [C367]

"EMC challenges and mitigation methodologies for contemporary mobile phones"

Challenges in today's mobile phone design are analyzed, and typical mitigation methodologies that can effectively surmount those challenges are presented. [C368]

"Electromagnetic interference shielding effectiveness of carbon-nanotubes based coatings"

Electromagnetic interference shielding coatings based on multi-walled carbon nanotubes are prepared and studied. The electromagnetic shielding effectiveness (SE) from 10 MHz to 3 GHz is measured using frequency and time domain methods. The results show that MWCNT coatings are more effective in providing EMI shielding in broad-band frequency range at thin coating layer. [C369]

"Design and calibration for gaze tracking system"

This paper presents a system for eye gaze tracking. The system consists of two CCD cameras and two novel light sources for stereovision. We propose a method for system calibration of gaze tracking system, in which camera is not directly facing the screen and light sources. A planar mirror is used to make them visible to the camera. Using planar calibration patterns, we can uniquely identify the reflection of each screen and light sources pixel on the imaged planar mirror. Using stereo camera parameters, we can obtain three-dimensional locations of mirror and screen's reflection. This allows us to compute three-dimensional locations of screen and light sources. This result shows a consistent improvement in accuracy, which we illustrate with experiments on real data. [C370]

"The Virtual Experiment Design of Arithmetic Unit Based on Object-Oriented Technology"

In order to improve the effect of experimental teaching of the course "computer organization principle", a design method of "computer organization principle" virtual experiment based upon object-oriented idea is put forward, in which the virtual experiment of ALU part is designed and debugged. Utilizing VC++ and Photoshop, arithmetic unit experiment in Tec-xp of the course computer organization principle is realized simulately, and the function of Am2901 is validated in the experiment. The result displays dynamic and in real-time effect, which acts just the same as the real hardware equipment. The virtual platform provides the students their own experimental environment freely, and a practical way for virtual experiment of computer hardware courses is supplied in the paper. [C371]

"Preliminary research of standard for electrostatic discharge test method for LED chips"

In this paper, the LED chips static characteristics and anti-static technology has been analyzed. Methods for researching anti-static standards of LED chips are proposed that establish a set of test equipment, configuration and procedure in assessing the electrostatic discharge performance of LED chips and even form semiconductor lighting LED chips anti-static testing standards. These four avenues outlined here as conducting internal analysis and description of ESD characteristics of LED chips made of different materials, researching the relationship between LED's ESD performance and the growth process, studying the changes in the thermal resistance, luminous flux as well as in life expectancy of LED chips before ESD and after ESD and establishing typical discharge current waveform, testing range of grades, test equipment configuration, test procedure of LED chips. [C372]

"Enhanced thermal measurements of high power LEDs by junction characteristic"

The measurements of junction temperature rise and thermal resistance of power LEDs by junction characteristic are proposed in this paper. The measured thermal resistance is corrected by the light-absorbing method. It is also proved that the physical meaning of the electrical average temperature rise of series LED array system is the arithmetic mean of the temperature rise of all sub-LEDs in the system. Therefore, a novel method to extract the temperature distribution of series LED systems is presented. [C373]

"The Design and Implementation of a C8051F-Based Embedded Platform for Experiment Teaching"

A simplified embedded experiment platform is designed and implemented to facilitate learners. The platform is powered by a C8051F microprocessor, which is also equipped with a USB interface, a RS-232 interface, two 10-base T Ethernet interfaces, a 4*6 keyboard as well as a 6-bit LED display. Debugging can be achieved through the JTAG interface. Both the RS-232 interface and the Ethernet interfaces can be used to transmit data. Keyboard operation can be received through the keyboard interface. The tests show that the platform is running in good condition and it has been put into use. [C374]

"Multiphysics modeling and design of ultralarge multiwafer MOVPE reactor for group III-nitride light emitting diodes"

A multiphysics modeling and design has been performed for the world's largest Metal Organic Vapor Phase Epitaxy (MOVPE) reactor by combining Theory of Inventive Problem Solving (TRIZ) for concept design, Design for Six Sigma (DFSS) for shape optimization, and Computer-Aided Engineering (CAE) simulations of multi-scale from atomic to macro scales. Numerical simulations considering gas phase chemical reactions and surface chemistry have been thoroughly verified by comparing with experimental measurements from various MOVPE reactors. As a preliminary study, two transparent mock-up models for the ultra-large MOVPE reactor were made in real scale and their internal flow fields were measured by laser Doppler velocimetry (LDV). A RF induction heater was also simulated by coupling the thermo-fluid field and electro-magnetic field together. Since the MOVPE reactor was manufactured, numerous tests for high-temperature reliability and temperature uniformity have repeatedly been conducted. Consequently, these multidisciplinary approaches have been successfully applied to develop the ultralarge MOVPE reactor for group III-nitride light emitting diode (LED). [C375]

"Bond wire design for eXtreme Switch devices"

Freescale's third-generation eXtreme Switch devices set performance standards for automotive lighting. They are tailored to drive high-intensity discharge (HID) xenon, halogen and light-emitting diode (LED) lamps. For example, a halogen lamp draws high levels of current when first turned on, but much less once it has stabilized. The ICs therefor allow the lamps to draw high levels of current when needed at turn-on but less during operation. Hence, these devices have to withstand the event of an inrush current each time a lamp is switched on. Package and wire bond design have to consider the transient characteristics of Joule heating and heat transfer. The authors developed an approach for the current carrying analysis of bond wires in power packages. It is based on closed form solutions of the heat equation at single current pulse, repeated current pulses or arbitrary inrush current profiles. This paper focuses on the analysis of Joule heating in bond wires. We will solve the initial and boundary value problem for the Joule heating at an inrush current pulse. The solution will be validated with thermo-electric finite element simulation. We will then draw conclusions for the wire bond design. [C376]

"Head motion controlled power wheelchair"

Quadriplegics rely on power wheelchairs for mobility, but the hands-free controller systems currently available are obtrusive and expensive. The objective of this project was to design a power wheelchair with a novel control system for quadriplegics with head and neck mobility. The control system translates the position of the user's head into speed and directional control of the wheelchair. Head movement was measured using camera-based motion-tracking of an infrared LED array on the back of the user's head. The control system included a standby mode that was activated by pressing the head back against the headrest, which activated the braking system while deactivating the drive train, allowing for manual control of the wheelchair via a rear support system. [C377]

"Adaptive real-time interfaces for wheelchair-mounted manipulators in unstructured environments"

Independence in the development of daily tasks, such as grasping and moving objects, play a key role in the well being of people who are physically challenged due to impartment in their upper extremities. New technologies in the form of robotic manipulators resembling human-scale arms may present a promising future, provided that they can be controlled in ways that resemble human movements. Our work addresses the multi-degree control of a wheelchair-mounted manipulator that provides the user with increased independence in unstructured environments by the implementation and developing of customized human-machine interfaces. [C378]

"Saccade correlation to adaptation of progressive lens amongst presbyopes"

This study's aim is to ascertain whether the amount of saccades during convergence has any relation to a person's preference of progressive additive lenses (PALs). Since patients who are better adapters to PALs have faster vergence dynamics, we presume those who do not adapt well must have an alternative to compensate for their slower vergence system. The goal of this experiment is to compare the eye movements of those who adapt and those who do not adapt when performing a double-step stimulus experiment. Of the presbyopes studied, eight subjects wear PALs daily, while the other seven could not adapt to PALs. Results concluded that presbyopes who could not adapt to PALs have an increased amount of saccades when performing the convergence experiment as compared to that of those who could adapt. [C379]

"Electromigration modeling with consideration of hillock formation"

This paper investigates the electromigration induced hillock generation in a wafer level interconnect structure through numerical approach. The electronic migration formulation that considers the effects of the electron wind force, stress gradients, temperature gradients, as well as the atomic density gradient has been developed. The parameter study for the Al line geometry with different width and thickness of a SWEAT structure is investigated. The comparison of void/hillock formation and the time to failure (TTF) life through numerical example of the SWEAT structure with the measurement result are studied and discussed. Finally, the TTF life of a hillock is defined and discussed. [C380]

"Light degradation prediction of high-power light-emitting diode lighting modules"

Light-emitting diode (LED), generally used for indicator light, has been developed for the past 50 years. Recently, LED has attracted many industries in the research and design of their products. However, its low electro-optical conversion efficiency causes redundant heat leading to increased junction temperature and decreased LED luminosity. In this research, a detailed finite element method (FEM) model of a LED module with a proper estimated thermal power and boundary conditions is established using an ANSYSГ‚В®finite element analysis software. Electrical test method (ETM) and thermocouple measurement are utilized to estimate junction temperature and heat sink temperature, as well as to validate the simulation results. Results from simulation agree with experiment results at a 5% deviation. In the life test of high-power LED modules, the six tested devices had different junction temperatures were conducted in this experiment. Luminosity variations are measured by the integral sphere measurement system. Experiment results show different junction temperatures will influence the light degradation mode. Therefore, it is important to predict and control the junction temperature to improve the LED performance. A detailed FEM model of a LED module is established to simulate the junction temperature. Then, the light degradation mode of this LED module is predicted by the simulation result. This method could rapidly predict the light degradation mode of high power LED lighting modules. [C381]

"Progress of visible light communication"

This article introduces Г‚Вїvisible light communicationГ‚Вї using visible light sources as transmitters and discusses its applications and standardization activities. [C382]

"High-speed mechanical impact reliability of solder interconnections in high-power LEDs"

Light Emitting Diodes (LED) are being implemented more and more into demanding applications like automotive and high-brightness general lighting. From the reliability point of view, the automotive environment is extremely harsh and challenging. Automotive electronics have to withstand exposure to high temperature fluctuations, mechanical shock impacts and vibration. The cyclic thermal load of solder interconnections can be up to 150Г‚В °C for several thousand cycles. For harsh environments, high-Pb and eutectic AuSn solders are currently being used as the interconnection material. Recent developments of SAC-based solders provide alternative lead-free solutions with lower processing temperature. However, little is known about the reliability and failure mechanism of these solder interconnections, especially under mechanical impact loadings. For a successful reliability test of the solder interconnection under the impact, it is important to find a widely accepted mechanical test method of measuring the degradation of the interconnection. In this study a newly designed high-speed impact tester that is based on the use of a pendulum was used to achieve this target. The purpose was to investigate the mechanical behaviour of lead-free solder interconnections under different loading conditions. The studied carrier had multi dies mounted onto a ceramic sub-mount, which was soldered to a Cu substrate. In total 60 samples were tested with five different test velocities (0.7, 1.0, 1.4, 1.8 and 2.2 m/s). The test results showed that the primary failure mode was the ductile failure in the solder bulk and only some local fractures at the solder interfaces were observed. This indicates that there was no dependency of the test velocity, since all the test velocities induced similar failures in the bulk solder of the solder joints. [C383]

"Modeling the residual shrinkage during lithographic processing on flexible polymer substrates"

The challenge of lithographic production of electronic circuitry on polymer foil is that deformations approaching the feature sizes of the circuitry can cause considerable overlay problems and thereby malfunctioning of the devices. The substrate foil is susceptible to several types of deformations. Accurate prediction of these deformations is of great importance, as it will help to improve the production process and thereby improve the quality of the electronic devices. One of the deformations is the residual shrinkage, a deformation that occurs after application of a heat step to a polymer foil. This study presents an experimental investigation of residual shrinkage combined with a modeling approach in which the temperature dependent visco-elastic material properties of the foil are used. The model enables us to more accurately predict overlay errors. [C384]

"Analytical and FEM simulations of the thermal spreading effect in LED modules and IR thermography validation"

Thermal management is a key issue in LED packaging. To keep the LED junction temperature as low as possible, one has to address the spreading effect from a localised heat source into a bigger substrate as it is the case in the Chip On Board configuration (COB). We performed a benchmark of the existing analytical models for the spreading effect and derived a new model that allows a better prediction of the thermal resistance in such LED COB modules. This new analytical model, implemented in a Scilab application, was first assessed in different cases with the Finite Element Method (FEM) software AnsysГ‚В®. Besides, IR thermography was performed on different kind of modules allowing a direct comparison with the analytical and FEM predictions. In addition to correctly fit the the predictions, IR thermography measurements enabled to give rise to the important thermal effect of the die attach material used to bond the LED to the substrate. We demonstrated that AuSn solder exhibit higher performances than other low melting point solders and Ag-based adhesive. [C385]

"Optics detection performance analysis and line light source design on sky-screen"

The sky-screen is an instrument that works in field to detect the information of projectile; its principle is when the projectile passing through detection screen, it output a pulse signal to time. However, the sky-screen cannot work at night. It is necessary that study optics detection performance and design appropriate light source to satisfy the need. In this paper, the detector was selected to improve the sensitivity of sky-screen; and analyze the optics detection performances. The infrared LED that its wavelength is 680 n in was selected to design the line light source, which can improve sky-screen can work under low illumination; the design principle of line light source was introduced. Through experimentation in shooting range, it is proved that the line light source can satisfy the demand, and can improve the detection sensitivity of sky-screen. The detection distance reach 1800 multiple projectile diameters, the detection view up to about 800, the performance of light source is more stably in work. [C386]

"High resolution led-spectroscopy for sensor application in harsh environment"

The usage of novel LED-light sources for spectrometric application is shown and described in this paper. The utilization of fiber optical linkage to a simple open path absorption cell and a proper control of the light sources is the key to a robust and high resolved measurement system. A novel optical sensor system based on this approach is realized to measure the concentration of nitrogen dioxide, sulfur dioxide with a resolution below 1 ppm and ozone down to 30 ppb at a 4 cm single reflection cell in a fraction of a second measurement time. In this setup the emitted light from Light Emitting Diodes in the ultraviolet to the visible wavelength range was used. The optoelectronics and the control electronics are separated from the optical sensor head where the pure optical sensor effect takes place. Therefore the sensor can be used in harsh environment for instance in an exhaust tailpipe system or close to discharge plasma in strong electromagnetic fields or at high temperature. Furthermore the sensor design is potentially low cost, quite small, long life and well suited for a large number of applications-from small battery powered hand held devices to industrial process control implementation. An LED-based sensor does not compete to laboratory chemical analytical devices but in many cases it is well suited for high resolved and fast online concentration measurements. [C387]

"Analysis of IP-based control networks for LED lighting fixture communication"

The control of an LED lighting fixture using networks converges recently with the lighting control system using the IP (Internet Protocol) networks. IP-based LED lighting control is becoming a more common feature in not only simple dimming mechanism but also media facade lighting systems with Kinetic ART. In this paper, we present and analyze the four methods based on IP networks for controlling an LED lighting fixture. We show the simulation results as that the delay decreases over 32% less than the transmission of unicast event by event compared with the multicast-multiplexing transmission method. The large-scale control networks having more than 10,000 channels do not influence a delay-throughput when the number of channels is increased. [C388]

"A study of the failure of GaN-based LEDs submitted to reverse-bias stress and ESD events"

This paper describes an extensive analysis of the degradation of InGaN-based LEDs submitted to reverse-bias stress and Electrostatic Discharge events. Results described within the paper indicate that: (i) reverse-bias current flows through localized leakage paths, related to the presence of structural defects; (ii) the position of these paths can be identified by means of emission microscopy; (iii) reverse-bias stress can induce a degradation of the electrical characteristics of the devices (decrease in breakdown voltage); (iv) degradation is due to the injection of highly accelerated carriers through the active region of the LEDs, with the subsequent generation/propagation of point defects; (v) the localized leakage paths responsible for reverse-current

conduction can constitute weak regions with respect to reverse-bias ESD events. [C389]

"Research of LED and computer processing synchronous display"

LED large screen is widely used in modern metropolis advertisements and building brightening and so on fields. In view of the display synchronization of upper computer and the lower computer, this article gives a plan for synchronous display of LED large screen and the VGA, and at the same time it shows the overall design of the system, design of display card information display real-time extraction circuit, and design of LED circuit board. [C390]

"A luminance inspector used for in-line backlight module quality assurance"

In this paper, we propose a luminance inspector which uses a CCD camera and neural network models to inspect multiple backlight modules at once. The proposed inspector can display the results at predetermined checked points in real time which is important for in-line quality check. The proposed inspector is more efficient compared to the traditional inspector which examines checked points one by one. Experiments show that the proposed inspector yields satisfactory results. [C391]

"A test set for LEDs life model estimation"

Life models relate the time to failure to the applied stress. They can be derived starting from knowledge of chemical/physical phenomena involved in the ageing process caused by the stress or by means of regressive techniques on data acquired in ALT-based procedure. Anyway, experimental tests are needed. This paper deals with a test system implemented to estimate a life model for LEDs where the forward current is considered as stress. [C392]

"A Study on Optimization of the Wireless Power Transfer Using the Half-Bridge Flyback Converter"

We considered about a wireless power transfer for breaking inconvenience of wiring power sources. The best way how to supply electric power through wireless system is using the electromagnetic coupled resonance phenomena. It can be supplied the electric power to the load. It is analyzed the transfer characteristics through the basic experiment with variable LED load. And we could apply protection circuit to find the accurate resonance point that can get the high efficiency result of wireless power transfer. [C393]

"Extraction of Electronic Parameters of PEDOT:PSS-PVA/n-Si Heterojunction Diode"

Using spin coating, a PEDOT:PSS-PVA/n-Si device has been fabricated by depositing the composite of conducting polymer PEDOTrPSS and poly(vinyl alcohol) on n-Si substrate. The current-voltage measurements of the device have been evaluated at room temperature in dark. The PEDOT:PSSPVA/n-Si structure demonstrated the rectifying behavior. The various electronic parameters such as rectification ratio, turn on voltage, ideality factor, reverse saturation current, barrier height, series and shunt resistances were extracted from the IV characteristics of this diode. The values of ideality factor and series resistance were also verified by using Cheung functions. In addition, the conduction mechanism in the device was also investigated by I-V curves. [C394]

"Self-excited electronic ballast for cold cathode fluorescent lamps"

This study implements a driver circuit for a liquid crystal display backlight source to develop a dc-ac converter with few components, which is then connected to a cold cathode fluorescent lamp as the load. The circuit configuration includes a push-pull circuit, which provides parallel resonance and acts as a transformer that generates a sinusoidal waveform across the secondary winding. The circuit provides sufficiently high ac voltage to drive the lamps. Additionally, the impedance characteristics of the resonance circuit can be modified to set the dimming frequency. The work describes in detail the operating principles and design of the parameters of the resonance circuit. Experimental results demonstrate the theoretical effectiveness of the developed circuit. [C395]

"Non-uniform threshold voltage and non-saturating drain current in amorphous-Si TFT after saturation-mode bias temperature stress"

We investigated the degradation effects on a-Si:H thin film transistors under a saturation-mode bias temperature stress. The simulated I-V characteristics using a non-uniform channel profile of Vt, with a maximum at source and minimum at drain, agreed very well with the measured data. The C-V characteristics were simulated using ATLAS based on this non-uniform Vtprofile, which agreed well with data. The non-saturating reverse configuration Id-Vdscharacteristics was explained using the channel length modulation effect. Moreover, the

device Vt extracted from linear Id-Vgscharacteristics can be modeled as a weighted average of the non-uniform Vtchannel-profile. For short-channel devices, the experimental C-V data and ATLAS simulation show that the channel profiles of Vt, deep (NGA) and tail (NTA) state densities are affected significantly by the self heating effect during stress, where NGA (NTA) shows a flat maximum (minimum) level from source to mid channel. [C396]

"Reliability aspects of organic light emitting diodes"

Various functional elements in organic optoelectronics devices are sensitive to oxygen an moisture. Thus, without an encapsulation the lifetime of organic light emitting diodes or organic solar cells does not meet the requirements of a serious application. We will discuss the particular challenges to form reliable, dense, pin-hole free thin-film barriers on top of organic devices. Specifically, atomic layer deposition (ALD) will be shown to be a highly attractive technique, that allows to operate at temperatures below 100°C. Particularly, the use of nanolaminates-multilayer structures of two alternating oxide materials-have evolved as a promising candidate to seal organic devices with a powerful moisture barrier. We will discuss the preparation technology of these barrier layers, the characterization of their gas permeation rate as well as their performance in real OLED devices. With a proper ALD barrier, the lifetime of an OLED operated at 1 000 cd/m2can be increased to be well in excess of 20 000 h. For top-emitting or transparent OLEDs, the optical properties of the thin-film encapsulation layer can be used to concomitantly tune the light extraction efficiency of the devices. [C397]

"Experimental Testing of IEEE801.15.4/ZigBee Sensor Networks in Confined Area"

The IEEE 802.15.4/ZigBee standard is considered as a potential candidate for wireless sensor and actuators networks. Several commercial platforms with IEEE 802.15.4/ZigBee support have been made available in the last few years, and an increasing number of operating systems specifically designed for sensor and actuator networks are evolving. Underground mining is considered to be one of most hazardous industrial activity. The industrial automation applications in the mining galleries can benefit from the recent technological advances. In fact, many approaches to reduce costs and improve performance have been examined. The main objective of this paper is the implementation and evaluation of wireless sensor networks for environmental data measurements in a real underground mine. Therefore, the nodes were evaluated in real operating conditions. [C398]

"Designing 3 language talkative system of heart beater"

Today, the increasing contribution of biomedical devices is well known for diagnosis and treatment of common diseases. The heart rate is an important parameter among this diagnosis. The heart rate is the total number performed heart beats in a minute. In this study, the heart rate is detected proportionally to the intensity oxyhemoglobin inside the finger. Oxygen is greatly carried with the hemoglobin units in the blood. When oxygen-rich blood reaches the finger tissues, the absorption against light of the tissue will change. To detect this difference, finger is illuminated with the help of a red LED and to detect this information a probe is designed with the help of a fotoresistor. A system design have been made announcing the heart rate obtained from the designed probe in three different languages. [C399]

"A method for liquid cryogen level measurement in cryopreservation containers"

A simple liquid sensing and measurement system for determining the level of cryogen in a tissue cryopreservation container is described. Liquid-gas boundary determination is made by detecting a thermal transient of the series-connected light emitting diodes. An electronic control and display unit located on the outer wall of the container indicates the level of cryogenic liquid, and alarms the operator if it reaches a pre-determined critical level. [C400]

"A Novel Design of Solid-State Lighting Control System"

A novel control system design used for Solid-state lighting is presented, which is based on ARM embedded system and Zigbee wireless network. The hardware and software design is introduced in detail. The test results showed that the control system can not only achieve 255 luminance levels but also 255 kinds of colors. [C401]

"The study of cueing devices by using visual, auditory and somatosensory stimuli for improving gait in Parkinson patients"

The purpose of this study is to examine the effect of cueing device by using visual, auditory or somatosensory stimuli during walking in Parkinson's disease patients. Parkinson's disease is the neurodegenerative disorders that results in characteristic motor abnormalities including impairment of gait and postural instability. The use of

cueing device can improve gait of the patients by paying attention to the stimuli during walking. External rhythmical cueing is defined as 'applying temporal (rhythmical) or spatial stimuli associated with the initiation and ongoing facilitation of motor activity. Nine Parkinson's disease patients are recruited in this study. Stride length, Step length and Velocity of all patients are significantly increased and Cadence is significantly decreased in all stimuli when compared to without using stimuli. The results from this study can be useful for the patients in the future. [C402]

"Continuous cuffless blood pressure monitoring based on PTT"

Blood pressure (BP) is one of the important vital signs that need to be monitored for personal healthcare. This paper describes the method developed by the authors to measure systolic blood pressure from pulse transit time (PTT) Pulse transit time is the time taken for the arterial pulse pressure wave to travel from the aortic valve to a peripheral site. It is usually measured from the R wave on the electrocardiogram to a photoplethysmography signal. PTT is inversely proportional to blood pressure. This method does not require an air cuff and only a minimal inconvenience of attaching electrodes and LED/photo detector sensors on a subject. Twenty three healthy subjects (age 18-60 yrs) were studied. Blood pressure measurement is carried out using pulse transit time and is compared with sphygmomanometry, the reference standard and the oscillometric based automatic BP measuring machine. The results show that the standard deviation of their differences was around 3 mmHg. The developed pulse transit time based method can be used as a noninvasive and cuffless alternative to the conventional occluding-cuff approaches for long-term and continuous monitoring of blood pressure. [C403]

"Revised NMF with LDA based color face recognition"

Color face is composed of information of different channels and provides more cues for recognition than grey scale one. A revised NMF with LDA based color face recognition approach is proposed in this paper. Block diagonal matrix is exploited to encode color information of different channels. And block diagonal constraint is imposed on NMF to factorize matrix. Class information of face samples is integrated into the approach through LDA on factorization coefficients. Experimental results on CVL and CMU PIE databases verify the effectiveness of the proposed approach. [C404]

"The study of energy storage and temperature-controlled for the packaging plate with Microencapsulated Phase Change Materials"

Due to the development of high power density and high heat flux of MEMS, IC and LED components and devices, the thermal management of microelectronics has become a very critical issue in Microsystems and optoelectronic industries. This has lead to the requirement of high thermal performance materials. To enhance the thermal performance of current thermal modules, it is very important to develop advanced thermal management materials to replace the conventional monolithic materials. Materials possess the characteristics of energy storage during the phase change process, which is used to control a constant temperature to achieve the result of energy-conservation. Microencapsulation is a technique to enclose phase change materials with high polymer shell wall to form the micro-capsules, which call Microencapsulated Phase Change Materials (MPCM). By mixing MPCM into matrix materials, it can be applied to the temperature control for systems. In this study, the MPCM was manufactured as powder with 10-30 μm size. Composite materials with MPCM were explored. The study found that the structure of MPCM was not destroyed during the process of manufacturing. In addition, the thermal behavior of the composite materials was explored. The study found that the time to reach the thermal steady state of the composite materials with MPCM was delayed compared the material without MPCM. It also found that the more percentage of MPCM, the longer time to reach steady state. In addition, the heat transfer efficient at the solid state of MPCM was lower than that at liquid state. This is quite different heat transfer behavior compare with bulk size of the material. Such results give potential applications for thermal control of microelectronics packaging, thermal managements for modern microsystems technologies and green house energy conservation. [C405]

"New high fill-factor dual-curvature microlens array fabrication using UV proximity printing"

A new method to fabricate a high fill-factor dual-curvature microlens array using the proximity printing in lithography process is reported. The technology utilized the UV proximity printing by controlling a printing gap between the mask and substrate. The designed high density microlens array pattern can produce high fill-factor dual-curvature microlens array in photoresist. It is due to the UV light diffraction to deflect away from the aperture edges and produce a certain exposure in photoresist material outside the aperture edges. This method can precisely control the geometric profile of high fill factor dual-curvature microlens array. The experimental results showed that the dual-curvature micro-lens array in photoresist could be formed automatically when the printing gap ranged from 360 to 600 μm. The gapless dual-curvature microlens array will be used to enhance of

luminance and uniformity for light-emitting diodes. [C406]

"Influence of deposition temperature of ZnO thin films for self powered wearable fabrics using ALD"

Zinc oxide thin films are becoming increasingly popular for their wide range of properties and the ability to deposit these films on organic substrates for applications such as biotemplating, OLEDs, or deposition on fabrics for functionalization purposes including power generation from the flexing and deformation of wearable textiles. However, since many fabrics and other organic substrates can not survive the typically high temperatures of thin film growth, it is important to characterize and understand the dependence of the properties of these films as a function of temperature deposition and subsequent thermal treatments. We report on the properties of zinc oxide thin films grown by Atomic Layer Deposition (ALD) and the dependence of, surface roughness, film stress, surface energy and crystalline structure on deposition temperature. [C407]

"A Solution of LED Large Screen Display Based on Wireless Communication"

Display information of some LED large screen displays such as mobile offline LED display, bus LED display, can not be transmitted easily or directly from control PC for the limitation, inconvenient installation of communication wire. The paper gives methods for the combination of LED large screen display control technology and wireless data transmission technology, laying emphasis on the realization method of wireless display data transmission, presenting dual RAM buffer structure and ping-pong control circuit to realize the storage of display data, presenting display data scanning interface to enhance the driver capability of scanning signals. The solution makes display information configuration flexible and reduce the inconvenience due to the reasons such as inconvenient installation of communication wire. [C408]

"The relay effect on wireless power transfer using witricity"

Witricity is a recent technology for wireless power transfer over a limited distance. In this paper, we investigate a relay effect to extend the distance. The concept of magnetic resonance in strongly coupled regime with more than two resonators is presented. Theoretical analysis is performed based on a set of differential equations and experiments are conducted to demonstrate its effectiveness. Our results show that the efficiency of power transfer can be improved significantly using one or more relay resonators. This approach enhances the performance of the present two-resonator witricity systems and allows transmitting power over a longer range, following a curved path, and using smaller resonators. [C409]

"A mesh-candidate-based 3D reconstruction system for online depth recovery"

A 3D measurement method based on mesh candidate and structured light is proposed for online measurement of cement clinker in the grate cooler. The laser beam was projected on the surface of the clinker and the stereo cameras acquired the images from different angles. By establishing the depth candidates in the world coordinate system, the depth was recovered according to intersection of the candidates and the laser stripe in the images. Our method has advantages such as simple structure, low computational cost, high accuracy, etc. The experiment proved the validity and it can meet the demand of the online 3D reconstruction of the cement clinker. With recovered depth of the clinker, the cooling air can be distributed reasonably, which plays an active role in energy-saving and ejection-decreasing. [C410]

"Study on path-optimization by grade for sorting dies"

Semiconductor light-emitting die (LED) has now become one of the most popular lighting devices. Before dies are put into process of package, they need be inspected and sorted strictly, so following waste will be saved. Cost of inspection and sort is relatively high, it is urgently needed to improve sort efficiency and reduce sort time. To get efficient solution, detailed view of working flow is presented to make analysis on performance and its influenced factors. It can be revealed that positioning of recycle bins is the major influence factor. Performance may decrease by 3.2 to 0.9 dies per second. Because of this, a path optimization method according grade priority is put forward. In this way, the dies with same grade should get priority to be sorted first. Techniques about die search and merge by grade, traversal of forward and backtrack with cross priority are described in detail. With results of reasonable simulations and a case experiment, this optimization is proved highly effective to reduce sort time and improve dies production rate. [C411]

"Optical design and analysis of high efficiency organic green light emitting devices with light extraction structure"

Light extraction efficiency has been enhanced by using weak micro-cavity structure and high refractive index substrate coupled with micro-lens array. Phosphorescent green light emitting device designed by wave optics

showed external quantum efficiencies more than 50% and power efficiencies of 200-lm/W. [C412]

"The mesopic effect of different color temperature LED light sources on road lighting"

A equation, Emes= B·Ep, to deduce from the Ep(photopic illumination) to Emes(mesopic equivalent illumination) is proposed, where B is instant for modified coefficient. The equation is used to calculate the mesopic equivalent illumination of the different color temperature LED light sources under mesopic light levels. [C413]

"High color rendering index WLED based on YAG: Ce3+, Gd3+ nano-phosphor"

YAG: Ce3+, Gd3+nano-phosphor were synthesized by glycothermal method. Red-shift of emission peak wavelength from 532 nm to 568 nm has been achieved as doping Gd3+ions into the YAG:Ce3+to substitute some Y3+ions. White LED with good color-rendering-index of 86 was obtained by combining blue LED chip with (Y2.14Ce0.06Gd0.8)Al5O12phosphor. [C414]

"A study on the thermal performance of a chip-in-substrate-type LED package structure"

Light emitting diode (LED) has been widely applied in many products because of its low power consumption, low poluttion, and long operation lifetime. However, its low electron-optical conversion efficiency can induce a high percentage of input power that transforms into redundant heat, increasing the junction temperature. Based on the finite element (FE) analysis, we propose an effective methodology validated through the forward voltage method to design a new type of LED packaging structure. A chip-in-substrate-type structure is established by ANSYS®. This structure is one of the possible solutions that can be employed in LED packaging, and it can be completed in a batch process. Using an effective methodology, the thermal performance of the chip-in-substrate-type structure under a specific power loading is realized. Furthermore, with regard to the design concepts of LED packaging, various parameters of the chip-in-substrate-type structure are investigated. The size of the heat sink has a significant influence on thermal performance. [C415]

"Research on evaluation system of user-centered LED garden lamp design"

Besides the appearance design of lamps themselves, the lighting should meet the basic distribution requirements. Additionally, the resource consumption and the influence of LED lamps on the environment should be considered. The big change in the system of the concept and evaluation of LED garden lamp design is turned out accordingly. It means that landscape lighting lamp design should be based on people's requirements and the lamp design should be considered as a whole. The focus on the lamp design gradually transfers from the pursuit of lamp functions and appearance to humanized pursuit of user-centered LED garden lighting lamp design. How to extent the concept of functional design of LED garden lighting, and how to comprehensively design user-centered LED garden lighting lamps are the key issues that LED garden lighting design should solve firstly. According to users' real needs, factors of quantity, appearance and impression in the evaluation system of LED garden lamp design are discussed in this paper. Good LED garden lamp design should equip with good light distribution curve, and additionally design proper lamp structure which integrates into the environment as a whole. [C416]

"Entertainment products design research based on ice-snow culture"

Ice-snow culture is one of Harbin's unique regional culture. With the rapid development of cold region tourism, there is a huge potential value in the development of ice-snow entertainment products. In this paper, Tourists' demands for ice-snow products is analyzed by three types of survey, of which the interactive and participant recreational activities are the most popular. Then the design elements are extracted from the characteristics of Harbin's ice-snow culture, and the design direction of ice-snow entertainment products are positioned. Finally our design concepts and methods are shown through the creative design examples as Ice Dancer and Ice Slide, which are able to provide an exciting way for participants closely touching the ice-snow environment. The tourists' emotional experience is very important for ice-snow products design. The design concepts and methods are expected to help the ice-snow entertainment product innovation design. [C417]

"InGaN-based nanocolumns for green light emitters"

Uniform arrays of GaN nanocolumns periodically arranged in triangular-lattice, at the top regions of which InGaN/GaN multiple quantum wells (MQWs) were integrated, were grown on GaN templates by rf-MBE using Ti-mask selective area growth (SAG) technique. Here the lattice constant of array L and nanocolumn diameter D were controlled from 200 to 300 nm and from 0.7L to 0.9L, respectively. the paper shows top and bird's-eye SEM views of a nanocolumn array with L = 275 nm and D = 210 nm; excellent uniformity in shape and position was attained. [C418]

"Effect of phosphor geometry on luminous flux of phosphor-converted LED"

This paper systematically analyzes first the effect of phosphor geometry on luminous flux of phosphor-converted LED. Five phosphor geometries are investigated based on Mie-theory calculations. Results show that phosphor geometry has impact on luminous flux, and pcLED with a phosphor layer of spherically top surface achieve an improvement of 12%. [C419]

"Study of the GaInP quantum dots in the AlGaInP-based light emitting diodes"

Recently, AlGaInP-based light emitting diodes (LEDs) have experienced an impressive evolution in both device performance and market volume. However, development of new applications is required in order to realize their full potential in areas such as use as a light source for auto focusing in digital cameras, special illumination for particular functions in agriculture, and in full color displays. To enlarge their utility in these applications, it is necessary to fabricate and understand a new structure capable of emitting longer wavelengths of around 700 nm. In particular, AlGaInP heterostructure LEDs are lattice-matched with respect to the GaAs substrate, which limits the emitting spectrum to around 650 nm at the longer peak wavelength side. To fabricate an LED structure capable of emitting at a 700 nm peak wavelength, the composition (x) of GaxIn1-xP material in the active layer requires a compressive strain of larger than 1 %. This large lattice mismatch, however, causes significant problems in terms of both growth and device properties due to the formation of defects. To overcome these problems, it is necessary to relieve the well strain via the formation of islands, referred to as a Stranski-Krastanow (S-K) growth mode, in order to prevent the generation of dislocations. However, in AlGaInP-based LEDs emitting at a 700 nm peak wavelength, the effects of well strain on the epitaxial growth and the realization of device performance has yet to be extensively studied. In this study, we investigate the behaviors of morphological and optical characteristics on the composition of Ga0.33In0.67P material and demonstrate the performance of a device emitting at around 700 nm using quantum dot (QD)-based LEDs. [C420]

"Characteristics of indium-tin-oxide thin films deposited by e-beam evaporator at high-temperature"

Transparent electrically conducting thin films are particularly attractive and are receiving increased interest in applications such as liquid crystal displays, transparent electrodes for solar cells, and light-emitting diodes(LED). In particular, Indium tin oxide (ITO) films have been studied in view of the practical performance of their electrical and optical properties to meet the increasing requirements of advanced technologies. However, most of blue LED ITO film for transmittance electrodes was being researched expensive sputtering method. [C421]

"Improvement of spatial color uniformity in white light-emitting diodes with self-positioned phosphor layer"

To reduce the variance of color temperature among packages and the spatial color temperature variance in the package, we adopted a unique phosphor conformal coating technique in the packaging process, thereby fabricating the self-positioned phosphor layer. Additionally, to acquire the spatial color uniformity without considerable shrinkage of luminous efficacy, we applied sub-micrometer scale titanium dioxide particles as diffuser in the phosphor layer of white LED with a vertical type chip and investigated the effects of diffuser on the spatial color uniformity and optical performance. Regardless of the diffuser content, spatial color uniformity improved and luminous efficacy decreased with the increase of the diffuser content. At the optimum of particle content, spatial color uniformity is reduced by 50% but luminous efficacy decreased only by 3%. [C422]

"Advances of AlGaN-based high-efficiency deep-UV LEDs"

We demonstrated AlGaN-based multi-quantum-well (MQW) deep-ultraviolet (UV) light-emitting diodes (LEDs) with wavelengths in the range of 222-351 nm, fabricated on low threading dislocation density (TDD) AlN template on sapphire. A high internal quantum efficiency (IQE) of 50-80% was achieved from AlGaN or quaternary InAlGaN MQWs by fabricating them on low TDD AlN templates. Also, an electron injection efficiency (EIE) was markedly improved by using multi-quantum barrier (MQB). Over 20 mW cw output power was obtained for 256-275 nm LEDs, which will be useful for sterilization applications. The maximum external quantum efficiencies (EQEs) were 1.8 and 2.75% for 247 and 270 nm AlGaN-LEDs, respectively. [C423]

"Transparent encapsulating resin for automotive applications"

In this paper, a transparent encapsulating technology for automotive optical semiconductor devices is presented in terms of keeping higher reliability requirement for this market. This is transparent epoxy based encapsulation material that is using thermo set curing system. In compared with standard consumer application, automotive applications include those requiring materials with a high degree of purity, strong surface adhesion, or

transparent fillers that are required to handle extremes of heat and humidity condition. LEDs have been used for many years in the displays of car audio systems and instrument panels. In addition to using LEDs for stoplights, future applications include various automotive optical sensors. [C424]

"Off-line constant current LEDs driver using the HVLED primary controller"

The article introduces an off-line constant current LEDs driver controller, using the HVLED, an innovative all-primary controller, by STMicroelectronics. Using the proprietary patented technique, the IC is able of providing a constant output current using primary sensing feedback, thus eliminating the need for the optocoupler, secondary voltage reference and current sensor, still maintaining quite accurate current regulation. The power supply is able to drive up to 4 LEDs in the European range, i.e. 185-265VAC, even if the same configuration can be also used in U.S. range and for a different numbers of LEDs, only limited from the maximum IC power capability. The proposed driver can be suitably used in all the applications where the tight regulation tolerance, efficiency performances and low component count are decisive to meet the LED's market requirements. [C425]

"A dimmable light-emitting diode (LED) driver with cascaded mag-amp postregulators for multistring applications"

A dimmable LED driver with cascaded magnetic amplifiers is proposed for multistring applications. A master power converter is used to provide the major part of the voltage for a plurality of slave converter modules with magnetic amplifier control. The magnetic amplifiers are used to regulate only the varying part of the LED string voltage and therefore greatly reduce the power losses in parallel converter modules. Good current balance among the parallel LED strings and a high energy efficiency in the range of 86-88% has been achieved for a 21W practical prototype formed with 3 parallel strings. [C426]

"Mechanism Analysis of Smart Film for Crack Monitoring of Concrete Bridges"

In the field of structural health monitoring of concrete bridges, one of the most important problems is the crack identification. In previous studies, sensitive skin for bionic crack monitoring of concrete bridges had been used to monitor the crack initiation and development in a concrete structure, and it was visualized by computer. But there are several problems that prevented this method from being widely applied. In this paper, smart film is proposed for crack monitoring of large scale concrete structures. To monitor the crack of concrete bridge by smart film, the mechanical and electrical mechanism of smart film were analyzed separately based on fracture mechanics and a LED (light emitting diode) circuit designed. The results showed that smart film can monitor the crack initiation and development in concrete bridges effectively. [C427]

"Scalable optical relay for LED-ID systems"

LED-ID (light emitting diode-identification) system typically uses line of sight (LOS) channels to achieve high data rate and bright illumination. In LOS channel, however, the LED-ID system has very narrow coverage. In cellular networks, the relay station has been introduced to improve system throughput and coverage. Accordingly, new optical relay scheme is essential to support multi-hop transmission in relay-assisted LED-ID networks. In this paper, effects of shadow region problem are investigated for LED identification (LED-ID) system in a non-line of sight (NLOS) environment. A scenario on shadow region problem is proposed, and nominal interrogation range of a desired reader is derived from this model. In order to expand the coverage of LED-ID networks, an efficient optical relay scheme is proposed and simulated by employing cooperative communication methodology. It is confirmed that the proposed technique performs well both in terms of throughput and fairness by simulation results. Also, the proposed scheme is very effective to expand coverage of LED-ID communication networks. [C428]

"Analysis and design of the quadratic buck-boost converter as a high-power-factor driver for power-LED lamps"

In this paper the quadratic buck-boost (QBB) converter is proposed as a high-power-factor off-line power supply for power-LED lamps. The QBB converter features just one controlled switch and two inductors and is able to supply a solid-state lamp from the mains providing high power factor and good efficiency. In the paper, the QBB converter is analyzed and a design methodology is proposed. It is demonstrated that with a careful design of the converter, the filter capacitances can be made small enough so that film capacitors may be used. In this way, the converter mean time between failures (MTBF) can be made as high as that of the solid-state lamp. A design example for a 70 W converter supplied from a 230 V/50 Hz mains for street lighting applications is shown. Finally, experimental results from a laboratory prototype are also presented. [C429]

"Integrated driver for power LEDs"

This paper presents an off-line integrated full ballast to supply a 35W assembly of Power LEDs. The proposed solution is based in an input PFC stage and a DC to DC converter which provides a constant current through the assembly independently from the DC link voltage. The full ballast has full dimming capability, and all the analysis and design steps are presented, thus guaranteeing the fulfilling of the existing regulations. The novelty of the final solution comes from the simplicity and robustness of the control scheme in a compact power stage. A final prototype of the ballast has been built and tested, and experimental results are shown in the last part of the paper. Finally, conclusions and future developments are shown. [C430]

"Non-line-of-sight serial relayed link for optical wireless communications"

Ultraviolet (UV) is a promising enabling technology for non-line-of-sight (NLOS) optical wireless communication. However, the communication range is limited due to large path loss and low transmitted power from the light source. We thus consider end-to-end communication through a serial relayed link. Each pair of the relay nodes shares information via a NLOS UV channel whose path loss was measured through a test campaign. Considering possible interference from neighboring nodes and spatial reuse, we propose cooperative reception at the relay node to achieve performance close to the quantum limited case. The benefits in range extension and power savings of the UV relay network are demonstrated through error performance and data rate analysis, as well as numerical simulation. Light weight nodes with low power consumption are shown to be feasible to implement and deploy. [C431]

"Polymeric multi/demultiplexers using light-induced self-written waveguides for cost-effective optical interconnection"

Light-induced self-written (LISW) waveguides provide us with a simple method of forming low-loss 3-dimensional optical waveguide components in photopolymers using irradiation from optical fibers. Using simultaneous irradiation from optical fibers fixed to three I/O sockets, onto which VCSELs (vertical surface emitting laser) and PDs (photo diode) can be mounted, we successfully fabricated a polymeric multi/demultiplexer, consisting of a WDM filter and a branching waveguide suitable for a PCS (polymer cladding silica) fiber. A 1 Gbit/s bidirectional full-duplex WDM transceiver module with dual wavelength multimode VCSELs (780 nm and 850 nm) was demonstrated. The typical insertion losses of the module were 4.1 dB for the 780 nm VCSEL and 3.4 dB for the 850 nm VCSEL at room temperature. The receiver sensitivities were -11.8 dBm and -13.6 dBm at 850 nm and 780 nm, respectively. [C432]

"Study on the application of thermal interface materials for integration of HP-LEDs"

Contact thermal resistance existed in the contact face between light emitting diode (LED) substrate and heat sink, which could hinder thermal conducting from PN junction to heat sinks, when mounting high power LEDs (HP-LEDs) devices on the heat sinks. Thermal interface materials (TIMs) were filled in the contact face to reduce contact thermal resistance. This paper studied the application of TIMs used in cooling LEDs, and three types of TIMs were studied by thermal test and optical-electro test. The experiment results presented that when select TIMs for LED mounting, thermal conductivity, thickness, and the volume of fillers should be considered. [C433]

"A Kind of Improved Drive Interface Circuit for AMOLED"

This paper presents an improved Drive Interface Circuit (DIC) of signal transformation for Active-matrix Organic Light Emitting Diode (AMOLED) display. The proposed circuit consists of a multi-format signal interface, a power management, and a signal decoder controlled by a MCU. A novel method of display parameters real-time correction is applied to keep the consistency of display parameters throughout the temperature range. The proposed circuit has the following features. The circuit can directly transform analog signal into Low-Voltage Differential Signaling (LVDS) level instead into TTL level then into LVDS level. Secondly, the circuit can acquire the environment temperature in real-time status and adjust the display parameters (e.g. brightness, color temperature) accordingly. Besides, built-in software with On Screen Display (OSD) function is designed to get the circuit to work well. It also adds a switch circuit to solve the problem of enable control of voltage between AMOLED's anode and cathode. Some problems are discussed at the end. [C434]

"LED Display Screen Design and Proteus Simulation Based on Single-Chip Microcomputer"

This paper designs a LED display system controlled by AT89C52 MCU (Microcomputer Controller Unit). The AT89C52 controls the external circuit formed by 74HC154 and 74HC595 in order to display characters, Chinese characters and figures. DS1302 is used to control the real time display. Language C is applied to compile

program in Keil uVision3 programming environment. The display system is simulated through Proteus software. In Proteus environment, the schematic diagram is drawn. Through stimulation, it achieves real-time display, static display and dynamic display of Chinese characters. It has switch keys to change display state of details. Through the actual simulation, the biggest controllable screen size of the AT89C52 MCU is 64Ч32. The AT89C52 controls the entire screen display of Chinese characters of 16Ч16 dot matrix, a total of eight characters. And the key function can be extended. [C435]

"JavaScript virtual web page for wireless sensor node under AVR microcontroller architecture"

This paper presents a developed wireless sensor node with an embedded JavaScript virtual web page implemented in the AVR microcontroller architecture. The presented design is capable of operating in real-time environment and has an improved performance with respect to the previously developed HTML virtual page. The major advantage of the presented system over the existing ones is the fact that the remote monitoring and control system is fully integrated in the microcontroller. The microcontroller is accessible over the Ethernet and with an integrated virtual web page it can replace the web server commonly used in similar systems. This feature makes the presented design extremely cost effective. [C436]

"A relative-story displacement sensor resolving the angular error problem"

A relative-story displacement sensor for measuring the ceiling-floor displacement and the floor inclination angle was developed. Three pairs of position-sensitive detector (PSD) units and light emitting diode (LED) arrays were utilized for the measurement. The measurement accuracy of the sensor was evaluated using a shaking table and a θ-stage. The outputs from the developed sensor agreed well with the reference, and the accuracy was evaluated to be approximately 0.15 mm in the displacement and 0.1 mrad in the local inclination angle. These results indicate that the developed sensor resolves the angular error problem on the relative-story displacement measurement and is applicable for assessing the safety of actual buildings. [C437]

"Novel optical absorbance-based multi-analytes detection module using a tri-chromatic LED, PDs and plastic optical fibers and its application to a palm-sized urine test strip reader"

We have designed, fabricated and characterized a new palm-sized urine test strip reader (9.5 Ч 6.5 Ч 1.8 cm3) using a novel optical absorbance-based multi-analytes detecting module, consisting of a three-chromatic light-emitting diode (LED) component, photodiodes, and optical waveguide for digital readouts. The instrument is a handheld, simple but powerful in obtaining reliably a numerical analog output compatible with urine-based test strips. The proposed optical module demonstrated the excellent reading out of signal levels of proteins, glucose, blood cells, respectively, in the test urine strip kits, with low fabrication cost, rapidness, precision and reproducibility. [C438]

"Optical hydrogen sensing with metallic photonic crystals and plasmonic metamaterials"

In this contribution, we are going to present two plasmonic concepts for hydrogen sensing. Our first concept is based on metallic photonic crystals, where a gold grating together with a thin layer of Pd in combination with a waveguide of WO3can give a strong resonance in the extinction or reflection spectrum. Upon hydrogen exposure, the WO3undergoes a refractive index change, which will shift the spectral resonance. A suitably tuned laser or LED can interrogate this change and give an optical signal. Our second concept is based on a plasmonic metamaterial which comprises a perfect absorber. A layer made from Pd wires as placed on a spacer layer and a gold mirror. Suitable design parameters lead to a zero transmittance as well as zero reflectance for a given wavelength. Upon hydrogen exposure, this perfect absorption is distorted and reflected light can be detected. [C439]

"Remote control of an electrical car with SSVEP-Based BCI"

Brain-computer interfaces (BCI) based on Steady State Visual Evoked Potential (SSVEP) can provide higher information transfer rates with minimal user training and require fewer EEG channels than other types of BCIs. The proposed remote control electrical car with SSVEP-Based BCI system combines a customized visual stimulation interface, a brainwave-acquisition platform NeuroScan SynAmps2, a computer for real-time signal processor, RF command transmitter/receiver, handmade remote control electrical car and allows users to use their brainwave to remote control electrical car. In this study, a method combining average and FFT is proposed. The frequency features of the electroencephalogram (EEG) were computed and used in the intention detection. Five healthy subjects participated in the experiment, and the results demonstrated that all the five subjects can successfully control the electrical car with high identification accuracy. [C440]

"GaN-based lamb-wave mass-sensors on silicon substrates"

Lamb-wave mass-sensors were fabricated with MOCVD-grown GaN-based thin films on silicon substrates. Crystalline GaN provides an alternative choice of material for fabricating Lamb-wave sensors. The advantageous properties of this material include high acoustic velocity, high chemical, mechanical and thermal stability, and the potential to integrate with a wide range of GaN-based devices such as high electron mobility transistor (HEMT) circuits, light emitting diodes (LED) and other photonic devices. We successfully developed GaN based Lamb-wave mass-sensors in small size (membrane size of ~1mm Ч 1mm). The sensors showed good signal strength and mass sensitivity, comparable to other mass-sensors using conventional materials. This novel approach not only allows robust low-cost sensors to be fabricated, but also enables future integration with generic GaN-based devices on the same chip (i.e. lab-on-a-chip). [C441]

"Towards self-powering touch-sensitive OLED systems"

In this paper, we present a novel design of an OLED system that is integrated with a mechanical energy harvesting polymer film and energy storage polymer film (patent pending). The system is configured in multiple stacked layers to form a thin, flexible, and light-weight assembly, for applications in energy harvesting displays, electronic papers, touch-input-pads, novel packaging, and much more. Initial results on the energy storage characteristics of the polymer film, the performance of a polyfluorene based OLED, and discussions on the mechanical energy transduction are presented. [C442]

"A novel 3D optical proximity sensor panel and its readout circuit"

This study presents a novel 3D optical proximity sensor (3D OPS) array panel. The panel is capable of detecting the objectives centimeters away from the panel surface. This device is composed of light-emitting diodes and home-made polymer photo-detectors (PPDs). The novel design of the circuit is the operation principle through active pixel circuit, sampling circuit, amplifier circuit and the decision of proposed chip parameters is determined by circuit simulation. The circuit is regarded low power and low cost as the design principle. The control sequence of the aforementioned circuit module is generated by an FPGA board to realize the operation of the whole circuit. The readout circuit is able to remove background current, and to detect the corresponding output voltage of photocurrent that is received by the PPD via reflections of the measured object. A human machine interface is built by LABVIEW to create 3D vision tracing of sensed object, validating the effectiveness of the 3D OPS. [C443]

"CSA redesign of the Mobile Robotics Test-bed (MRT)"

The Canadian Space Agency (CSA) Mobile Robotics Test-bed (MRT) underwent a major redesign during the Winter 2009. This paper reports on the mechatronics design of the rover. Two rugged laptops are integrated onto the redesigned rover along with an infrared camera and three network devices. A custom-made mechanism is developed in order to move out of the LIght Detection And Ranging (LIDAR) field of view the rover antenna during the scan. A custom-designed bumper module is also developed. Finally a proof of concept prototype is provided. The redesigned rover was controlled from the International Space Station (ISS) during the operations of the Avatar EXPLORE Mission that took place in the Summer 2009. [C444]

"Blood glucose sensor implant using NIR spectroscopy: Preliminary design study"

We previously proposed in [1] a novel standalone fluorescence measurement device that can identify fluorophore substances in a light conducting environment. In this paper, we adapt this work to the particular problem of predicting blood glucose levels based on near-infrared (NIR) absorption spectroscopy. We have focused this investigation on the combination (5000-4000 cm-1) and first-overtone (6500-5500 cm-1) spectral bands known to be dominated by glucose absorption information. An array of electrically pumped vertical-cavity surface-emitting lasers (VCSELs) is used to cover the two selected spectral bands; with each laser diode emitting light at a specific wavelength. A Quantum well infrared (QWI) photodetector operating in the 1.2-2.5 μm range is used for optical power detection. Then, an artificial neural network (ANN) based model is used to determine the glucose concentrations from the obtained blood absorption spectra. [C445]

"A simulation study of fuzzy control system of Triadic Heating Furnace"

The paper is introduced structures and characteristics of Triadic Heating Furnace, and designed a two-dimensional fuzzy controller to carry on the control to the heating furnace and draws support in the MATLAB software conducts the simulation research. The simulation result has confirmed that the paper designs the two-dimensional fuzzy controller for temperature control of the heating furnace is extremely effective. [C446]

"Theoretical base of alcoholic-intake detection using blood-pulse signals and new findings"

We spectroscopically investigate the impact of alcohol intake on the blood-pulse waveform and confirm that alcohol intake can be discerned by opto-electronic sensors. This paper focuses on specific spectra in the blood-pulse waveform and demonstrates the importance of observing the harmonics ratio of the blood-pulse waveform. In contrast to past studies, it is strongly suggested that the best light source for detecting alcohol intake is a green-LED. An analysis of the time evolution of the harmonic ratio shows that it includes important information from which the intake of alcohol can be discerned despite the complexity involved. This analysis is verified by mathematical modeling. [C447]

"Platform for all-polymer-based pulse-oximetry sensor"

The high risk of fatal infections via inappropriately disinfected medical equipment in operative scenarios are progressively prompting for better sterilization procedures in reusable equipment. The cost for thoroughly decontaminating skin-contact medical equipment such as finger-tip pulse oximeters after each use can cost hospitals several dollars per use per device; however, disposable pulse oximeter sensors at appropriately low cost can significantly alleviate healthcare expenses while virtually eliminating the risk of infections. A polymer-based pulse oximeter sensor unit that can replace traditional reusable finger-tip sensors is proposed. The unit consists of an organic photosensor module co-fabricated with an organic light-emitting-diode module under a single process on a polymer substrate. The platform is lightweight, flexible, robust, and potentially recyclable. The design considerations, architecture, and preliminary device performance results are presented. The all-polymer nature of the system promises opportunity to manufacture disposable pulse oximeter sensors at favorably low costs to replace traditional sensor clips. [C448]

"Design of wireless communication nodes based on AT86RF230"

According to the shortcomings of existing forest monitoring method and the short communication distance of existing wireless sensor node for forest environmental monitoring, a new-style node based on AT86RF230 was designed. In this design, micro-controller is ATMega128L, radio frequency chip is AT86RF230, and a folded dipole is used. The effective communication distance of wireless sensor nodes in open field is 200m, and that is 85m in the planted forest, fully satisfying the needs of forest environmental monitoring. [C449]

"Three dimensional OLED displays with depth-sensitive multi-touch"

OLED displays are thin by nature and can be made transparent. Stacking several layers of the same, one over the other, would make it possible to show a three-dimensional display that carries all the advantages of OLEDs as opposed to traditional LCD and Plasma Displays. These OLEDs are made using the Triplet Triplet Annihilation (TTA) method a.k.a Annihilation-assisted Up-conversion. Such displays are transparent and use less power (20mW per cm2). The creation of such a 3D display would be revolutionary in the field of display technology. This paper aims to compare proposed solution to existing technologies. [C450]

"A ZigBee network application in emergency exit guiding"

The emergency exit lights are important devices for fire alarm fighting. Most of the emergency exit lights are illuminated for 24 hours and then waste much energies. This paper proposed a wireless alarm system with multi-functional power-saving emergency exit indicating lights. A ZigBee network is constructed for the alarm system. The gas and the smoke sensors are used to report the emergency events in the system. A human body infrared sensor is mounted on the emergency exit indicating light. When the alarm system is operated in the normal mode, the emergency exit indicating lights illuminate at a low lighting level if there are nobody nearby. The lighting level is raised to high as an assistant illumination if somebody entered the infrared sense region. When an emergency state is reported by the sensors, the alarm system is switched into the emergency mode. All the emergency exit indicating lights are flashed synchronously in the emergency mode in order to distinguish from the normal illumination lights. The synchronously flashed emergency exit lights are helpful to identify the direction for people to escape from the danger spot. [C451]

"A high efficiency driver for high-brightness white LED lamp"

A high efficiency driver is proposed for the high-brightness white LED lamp. The driver consists of a dc power source in series with a current regulator. The current regulation is accomplished by partially processing the power from the dc power source. The dimming feature of the LED lamp can be made by regulating the current. The detailed circuit operation stages and analysis are provided. A laboratory circuit is designed for an LED lamp which is composed of eight high-brightness LEDs. Experimental results demonstrate that a high efficiency can be achieved even at a dimmed lamp power. [C452]

"Light extraction behavior of GaN-based light-emitting diodes with different substrate conditions; nano-size and micro-sized sapphire substrates??"

We fabricated InxGa1-xN multiple quantum well (MQW) light-emitting diodes (LEDs) on patterned sapphire substrates (PSSs); the nano-sized PSS (NPSS) and the micro-sized PSS (MPSS), and investigated to enhance the light extraction efficiency (LEE) of LEDs. Furthermore, the micro-Raman and ER spectroscopy were used to compare the strain and piezoelectric fields in the InxGa1-xN MQWs grown on the different substrate conditions. The light output power (at 20 mA) of the MPSS and NPSS are 11.4 mW and 11.6 mW, which are enhanced by 39% and 41% compared with that of the conventional LED, respectively. [C453]

"Influence of the thickness variation of the SiOx layer on the Si quantum dots based MOSLED"

The SiOxthickness affects the Si -QDs based MOSLED. The EL wavelength redshifts from 430 nm to 510 nm when the SiOxthickness increasing from 125 nm to 385 nm. The Si-QDs based MOSLED with the SiOxthickness of 385 nm has the maximum EL power of 469 nW. [C454]

"Computational analysis of daylight harvesting scheme in an office building in Mumbai"

Designing a building with maximum utilization of daylight and use of energy efficient luminaires will reduce the cost of energy use. In the present study, by means of computer simulations using RELUX software, the interaction between natural and artificial light and the related illumination conditions expected in a commercial office building in Mumbai, India have been simulated and analyzed. In this way, it was possible to evaluate the relevant loads for artificial illumination that has been considered not as the principal but a complementary light source. The main goal of this study is to show the potential of drastically reducing the electrical energy consumptions for illumination, by adopting day lighting harvesting solutions. Comparison were done using two different lighting schemes one with Fluorescent Luminaires and without daylight harvesting and other one with LED fixtures with daylight harvesting using combined occupancy and daylight dimming sensors. With the latter scheme a saving of 80% can be achieved on energy and operating costs for a period over 25 years. [C455]

"Finite difference modeling of bipolar OLED"

Simulation of Organic Light Emitting Diodes (OLEDs) can be helpful for improving the performance and optimization of the device. In this study Finite Difference (FD) method was employed for the discretization of the governing equations, i.e., continuity, drift-diffusion and Poisson's equations. Hole and electron mobilities were considered to be electric field dependent of Poole-Frenkel form and electron-hole recombination of a Langevin type. The results of this paper give a detailed knowledge about the operation mechanism of OLEDs, charge, field and exciton formation distributions. Also the effects of various parameters changes in OLED response were analyzed. [C456]

"Detection of touch event with a camera-based user interface"

Three-dimensional coordinates of multiple fingers are acquired by a camera equipped with a fisheye lens and LEDs covered by a transparent hemispherical shell. Finger deformation induced by touch events is identified from the captured images, making the device compatible with the conventional mouse. [C457]

"Fitness monitoring system based on heart rate and SpO2 level"

The paper presents CaszOxiSys, a real-time system for monitoring and analyzing physiological signals during fitness activity. CaszOxiSys consists of non-invasive pair of physiological sensor (light-emitting diode & photodiode) wirelessly connected through Bluetooth to a netbook or laptop which analyses physiological data and presents it to the user in an intelligible and informative way. This paper focuses on an implementation of CaszOxiSys using a pulse oximeter to monitor the user's heart rate and oxygen saturation. This paper also describes, the Karvonen formula which calculates the target heart rate zone based on age, gender, resting heart rate, maximum heart rate, and fitness intensity level. The Karvonen formula acts as a guideline for fitness workout sessions. The proposed system works in a client-server architecture, where the clients system is used by the fitness center users and the server system is the central monitoring system(s) used by the fitness trainers. The paper also explains how physiological data is transmitted and describes the structure of the transmitted data between the pulse oximeter, client system and server system. CaszOxiSys provides a complete monitoring solution for fitness centers, allowing fitness trainers to monitor the fitness center users from a central or mobile location. [C458]

"Novel fabrication method for oxide semiconductors via atomic-additive mediated crystallization"

We report here a novel method of fabricating oxide semiconductors via a solid-phase crystallization from amorphous phase. By introducing a large amount of nitrogen atoms to the sputtering atmosphere, the amorphous phase is obtained, where the resultant films are amorphous oxynitride. Since the bonding energy is different between metal-oxygen and metal-nitrogen, solid-phase crystallization is achieved by annealing of amorphous oxynitride films in the oxidization atmosphere at adequate temperatures. The resultant oxide films are highly orientated even on quartz glass substrates and the crystallinity is higher than the films prepared by conventional sputtering deposition. The fabrication method proposed here is very promising for oxide films, especially for the oxide such as zinc oxide and indium (tin) oxide whose amorphous phase is difficult to be obtained. [C459]

"Shape measurement by light-stepping method using LEDs"

A new shape measurement method using whole-space tabulation method and light-stepping method is proposed. A grating projector using five LED line light sources is also proposed for the light-stepping method. It will be a very fast, low-cost and accurate measurement system. The theory and experiment are introduced. [C460]

"2-D Mechanically resonating fiberoptic scanning display system"

A micro-display system based on optical fiber driven by a 2-D piezoelectric actuator is presented. An optical fiber is extended from the free end of a 2-D piezoelectric actuator (free length: 4.3mm). A field programmable gate array (FPGA) drives the actuator using a triangular waveform to deflect the optical fiber in orthogonal directions. The FPGA also controls a LED light source and the light is coupled into a chemically tapered SMF-28 fiber (core diameter: 10μm). At a pre-set pairing of ne ar-resonance frequencies (Horizontal: 22Hz; Vertical:5070Hz), the deflected optical fiber in combination with controlled light pr oduces an output image with an approximate dimension of 0.3 Ч 0.3 mm2, and a potential resolution of 400 lines per scan. This pa per details the design and fabrication of the micro-display system. The mechanical and optical design for the microresonating scanner will be discussed. In addition, the mechanical and optical performance and the resulting output of the 2-D scanner will be presented. [C461]

"Arm-band type textile-MP3 player with multi-layer Planar Fashionable Circuit Board (P-FCB) techniques"

Arm-band type textile-MP3 player using direct chip integration technique into textile named Planar Fashionable Circuit Board (P-FCB) is designed. The multi-layered board manufacturing technique improves the integration level so that more complex system can be implemented using P-FCB. Also, wearable user input-output (I/O) interface makes people control the system freely without any disturbance. Finally, Arm-band type textile-MP3 player system is developed and demonstrated to show the possibility of using P-FCB in wearable entertainment system. [C462]

"Enhanced boundary of body image-perception & fashion"

This paper describes novel perceptual experiences, which are achieved by media technologies, from the viewpoint of in-betweenness. In addition, we extended the viewpoint of analysis to the fields of communication and fashion. [C463]

"A performative user interface for the control of responsive character"

Performance animation is becoming an appealing solution for character control. With the development of lightweight computing devices, low-cost and portable user interface is required and preferable in entertainment. This paper proposes a performative user interface that allows the user to control the character using his or her body. This interface only employs two IR cameras and a few IR leds, which will be used to track and estimate the positions. And positions can be used to synthesize the puppetry's final pose using an improved geostatistical interpolation model. The cost of computation of this model is inexpensive and it utilizes only a few motion samples and achieves some generality beyond the motion database. [C464]

"Analysis on Time-effectiveness of Early Warning System of Combine Harvester"

Jam fault of combine harvester is a typical failure, which often leads to damages of mechanical transmission system. Jam fault alarm system has been used as an assistant means to warn the operator in traditional way, but the jam fault has always occurred while alarming. The ideal solution to jam fault, thus, is early warning so

that proper operation can be made by the operator before it takes place. In that case, high time-effectiveness of early warning system is essential for jam fault diagnosis and decision-making. In this paper, the feasibility of early warning of jam fault is researched and the devices aiming at improving the time-effectiveness are designed. Experimental results both in laboratory and field harvesting with BILANG harvester show that an early warning decision can be made within 200ms, which satisfies the requirement of early warning. [C465]

"Stick-slip motion control of a cartesian-type robot"

Friction known as friction heat, friction noise, friction wear and friction force and so on is an undesirable physical phenomenon in almost all machine systems. In this paper, however, a friction force generated by a stick-slip motion is introduced to improve the lapping quality of small LED lens molds. Here, the lapping means the finishing or polishing of metallic molds by using diamond paste. A novel desktop Cartesian-type robot, which has abilities of compliant motion and stick-slip motion, is first presented for lapping small metallic molds with a curved surface such as an LED lens mold. The robot consists of three single-axis devices with a high position resolution of 1 μm built in Cartesian-space. A thin wood stick tool is attached to the tip of the z-axis. The tool tip has a small ball-end shape with a diameter of 1 mm. The control system is composed of a force feedback loop, position feedback loop and position feedforward loop. The force feedback loop controls the polishing force consisting of contact force in normal direction and kinetic friction forces in tangent direction. It is assumed that the kinetic friction forces are generated by Coulomb friction and viscous friction. In order to improve the lapping performance, a stick-slip motion control method is further added to the control system. The small stick-slip motion is orthogonally generated to the tool moving direction, so that the polishing energy can be finely changed to partially improve the lapping quality. The effectiveness is examined through an actual lapping test of an LED lens mould with a diameter of 4 mm. [C466]

"Rebo: A life-like universal remote control"

This paper describes a novel remote control operational with stroking its surface. There are lots of remote controls in our houses for TVs, air conditioners, and so on. However, when we use a remote control, we need to look at both our fingers and the target appliance that we would like to control. It may be not significantly problematic for young people, but elderly people have a difficulty in manipulating remote controls with many buttons. We consider it will be comfortable for various people to use a remote control without looking at their fingers and pushing buttons. Also we consider a remote control should have life-like appearance to become a more familiar artifact to users. In this study, we propose a life-like remote control, Rebo, operational only with stroking its surface and apply to a TV system. The developed remote control has three advantages; familiarity, function awareness, and stroke manipulation in contrast with conventional remote controls with many buttons. These advantages enable users to feel much familiarity by using it, to easily notice its implemented functions, and to use it without looking at the fingers and buttons. [C467]

"Reliability of solder joints in High-power LED package in power cycling tests"

In this paper, an improved method to investigate the reliability of solder joint between High-power LED chip and heat sink is presented. The power cycling is carried out through the switching on and off of the current stress. The optical and electrical characteristics do not degrade apparently. Electrical method is used to measure the thermal resistance of high-power LED which increases from 15.81°C/W to 43.95°C/W for typical one of three samples before and after power cycling. Furthermore, some voids are observed in solder joint after power cycling according to the result of scanning acoustic microscope (SAM). That is, the solder joint degrade significantly after power cycling. Our results indicate that this method can effectually evaluate the reliability of solder joint. [C468]

"A highly efficient switched-capacitor LED driver with switching frequency hopping technique"

A novel frequency hopping technique is proposed to increase the efficiency in a switched-capacitor LED driver, based on analyzing the dependence of power loss on switching frequency. LEDs' load current is featured uniquely by jumping periodically from a constant value (20mA) to zero for dimming function. Developed on an improved VCO, the hopping technique makes the switching frequency vary discretely at pre-defined levels in accordance with load current, whose basic principle is that heavier the load, higher the frequency (200KHz to 1MHz). By elimination of current-sensing resistors and other optimization measures, the efficiency is further improved. The circuit is designed and simulated in TSMC 0.35μm CMOS process. Simulation results show the overall efficiency is increased by 5% on average in comparison with fixed high frequency ones. [C469]

"Research and design of a white LED driver chip applied in backlight"

A white LED driver chip applied in backlight is proposed, which is based on pulse width modulator. The design

of modules such as current reference, oscillator and dynamic slope compensation are discussed in detail. The simulation results, based on CSMC 0.5μm BCD technology, show that the input voltage is in the range of 3.3~5.5V, the output voltage is up to 20V when the output current is between 15 ~ 60mA, which can drive 2~6 white LEDs in series with the conversion efficiency 88%. Characteristics such as the overall circuit loop stability, dynamic characteristics, load capacity are well satisfied the design requirements. [C470]

"Design, preparation and properties of spin-LED structures based on InMnAs"

Great advances in the development of III-V diluted magnetic semiconductors materials (DMS) allow for the incorporation of ferromagnetic epitaxial layers into advanced structures. In this contribution, we report on the growth of GaAs/InMnAs layers by metalorganic vapour phase epitaxy (MOVPE) over an AlGaAs/GaAs MQW light-emitting diode structure. In particular, results of electrical and structural characterization of structures are presented. We prepared a single-phase ferromagnetic In1-xMnxAs ternary with x close to 0.075 on (100) GaAs substrates using MOVPE. The material exhibited room temperature ferromagnetic behavior with a Curie temperature close to 330K. In addition, all InMnAs ternary samples showed p-type conductivity. The ferromagnetic material was incorporated into four different AlGaAs/GaAs LED structure. [C471]

"Light emitting diode with 2D PhC structure in the surface analysed by NSOM"

We present light emitting diode with two-dimensional photonic crystal structure prepared by interference lithography in the light emitting diode surface with an emission maximum at 845 nm. Applied two-dimensional photonic crystal structure improved light extraction efficiency for more than 30 %. The photonic crystal light emitting diode surface morphology was analyzed by atomic force microscope. The enhanced extraction efficiency of the photonic crystal diode was documented from L(I) dependencies from the near-field studies. [C472]

"GeeAir: Waving in the Air to Control Home Appliances"

This video is a demonstration of our previous work, where we presented a handheld mobile device Gee Air, a gesture-based universal controller for home appliances. Combining the speech, gesture, joystick, button, and light, Gee Air allows the users to interact with the appliances via a multi-modal means. The users can control varied home appliances just by waving the Gee Air in the air. The design of Gee Air is better than the existing universal remote controllers in that it satisfies the requirement of different users group, e.g. physically disabled and vision-impaired users. [C473]

"Development of agriculture machinery aided guidance system based on GPS and GIS"

The agriculture machinery guidance technology is one of precision agricultural important technologies. Based on GPS and GIS, it can raise working efficiency and improve the quality, reduce production costs, reduce driver working difficulty. This research's general goals realize the aided guidance function for agriculture machinery driving on road and straight line operation in the field by lightbar. The system uses Visual Basic 6.0 and MapObjects 2.2, uses the RS232 serial port communication, uses the AgGPS 332 receiver, uses the DGPS signal offered by Satellite Based Augmentation Systems, uses touch-screen vehicle carries computer for the superior computer, applies the existing area electronic map, develops region's farmland and path's geographic information system, enables the farm machinery to obtain the guidance information for transportation between the fields. When farm machinery works in field without guidance line, system can make guidance straight line at first traveling schedule according to the A and B points, uses light-bar guidance. Lightbar's hardware circuit uses the 89S52 Single chip micro-processor and outside expands two piece of 74HC245 to actuate the LED. The system has realized to agriculture machinery's guidance function and could record operating course and calculate area and review operation that is convenient for agricultural production and information management. [C474]

"Research on Intelligent Control of Tunnel Lighting System Based on LED"

The LED is used for the tunnel lighting. And a tunnel lighting system is presented based on 485 bus. While a variant illumination curve is constructed through inference rules of expert system according to the out illumination of the tunnel, car flow in traffic and car speed. And the tunnel illumination is controlled by the given illumination curve. Under the control of the method, the illumination in tunnel made the bright and dark adaptation process more natural and safeguarded the driving in tunnel. Also the variant curve based on the real illumination of the out of a tunnel, car flow and car speed, meets the real driving demand. Finally, a feedforward and feedback control strategy based on the relationship between light flux and brightness in tunnel is presented. As well as the power energy of tunnel lighting system is saved. [C475]

"Electrical and Mechanical Character of Smart Film for Crack Monitoring of Concrete Bridges"

In the field of structural health monitoring of concrete bridges, one of the most important problems is the crack identification. In previous studies, sensitive skin for bionic crack monitoring of concrete bridges had been used to monitor the crack initiation and development in a concrete structure, and it was visualized by computer. But there are several problems that prevented this method from being widely applied. In this paper, smart film is proposed for crack monitoring of large scale concrete structures. To monitor the crack of concrete bridge by smart film, the electrical and mechanical characters of smart film were analyzed separately based on a LED (light emitting diode) circuit designed and Fracture Mechanics. The results showed that smart film can monitor cracks of concrete bridges effectively. [C476]

"A Fluorescence Optic Fiber Temperature Sensor Using Visible Wavelengths"

The optic-fiber temperature measurement probe based on ruby is developed. This system is particularly adapt to the temperature measurement in the rang of 0°C to 130. The calibration graph was shown to be highly reproducible when the probe is temperature cycled. A change in drive current from 5 to 30mA yields a spectral shift of the peak emission of only a few nanometers. The drive current to the LED can easily be kept within the required narrowly defined bounds through the control circuitry. [C477]

"The relevant research of CoE protocol in EtherCAT Industrial Ethernet"

This document explains and demonstrates how the CoE protocol works in the application layer of EtherCAT, and its function. Using the PIC24H series MCU as the application controller, the FB1111-0142 as the ESC and TwinCAT as the master, the experiment results show the CoE work mechanism and function exactly. [C478]

"Design and Implementation of a Wireless Multimedia Advertising Vehicle Terminal System"

A new extensible multi-function vehicle terminal system for multimedia advertising is designed, and the software and hardware design and realization method are also introduced. The terminal support remote release of text advertisement and audio advertisement and which was combined with the master server, vehicle LED screen, microphone, empty-car indicator light, taximeter to make up a multimedia advertising remote release system. It was verified by experiments that the terminal and the whole system meet the needs of the advertisement release of a media city(about 2000 terminals). [C479]

"Research on High-Resolution Color OLED Display Technology"

In this paper, a new OLED(Organic Light Emitting Diode) color display method is introduced. Unlike the most commonly used technique-RGB-polymer emitters, there are four colors. That is in addition to red, green and blue (RGB) tri-color light-emitting materials, there is a white light-emitting materials. First the impact of the brightness stability and life factors of various materials are analyzed, than its drive circuit is discussed in detail. Through the control of the current for each RGB, improved its color and life context, achieved the color balance of high-resolution OLED panels, and reduced the total power consumption. [C480]

"Design and implementation of the high efficiency photovoltaic system with solid state lighting"

Photovoltaic application of LED lighting has been a hot trend in residential illumination, for it integrates the advantages of both the PV systems and LED lights. However, it has a series of problems, such as high thermal loss, poor reliability, and a short life span. To address these problems, this paper presents a deep research on the whole system from a low-cost, high-efficiency and long-life point of view. A main circuit integrating maximum power point tracing (MPPT) control and battery management, as well as a double-loop control for LED load is developed. A set of protection system is applied to ensure high reliability of the system. The control strategies are tested on the demonstrator and prove to be effective. [C481]

"A novel interleaved single-stage AC/DC converter with high power factor and ZVS characteristic"

A novel single-stage AC/DC converter is proposed here, which is integrated by an interleaving cell and LLC cell. Because the components of system are reduced by integrating, the cost decreases. And since interleaving technology is adopted, the converter can work in high voltage input state. And LLC resonant converter chosen here makes sure that the switches in the primary side can work in zero-voltage-switching (ZVS) condition and the diodes in the secondary side can work in zero-current-switching (ZCS) condition, which decreases the switching loss of the system, a 100W prototype is proposed, throughout the experiment, the power factor(PF) of the converter is as high as 0.99, the total harmonics distortion(THD) is lower than 10%, and the efficiency is as high as 91.1%. [C482]

"Base station layout support system for indoor visible light communication"

In this paper, we propose a base station layout support system for indoor visible light communication using LED for general indoor lighting. Recently, LED comes into practical use and visible light communications using LED have been proposed. However, a method which provides an optimal base station layout for visible light communications based on some environments and conditions has not been proposed yet. The environments and conditions include room arrangements, room usages, any photo detectors, and so on. We therefore propose a base station layout support system which considers requirements of both lighting and communication and provides an appropriate base station layout satisfying all conditions given by a user. Moreover, we construct a user-interface implementing the proposed system and demonstrate the validity through some simulation results. [C483]

"Constant current controller design for power LEDs using parameter adaptive law"

In this paper, the constant current controller will be designed to regulate the driving current of the power LEDs. The adaptive controller will also be designed to estimate the varying parameters of the power LEDs with the driving circuits. The mathematical model of the power LEDs driving system will be introduced to design the current controller. The buck type converter will also be presented to control the driving current of LEDs. The robustness of the proposed power LEDs system with adaptive control law will be experiment on the parameters variation. [C484]

"Pose estimation with radio-controlled visual markers"

Camera pose estimation (i.e. determining the position and orientation of a camera) found its applications, traditionally, in the field of virtual/augmented reality, gaming and robotics. In this paper we propose an inside-out system that uses LED sightings gathered from wireless sensor nodes (WSN) to estimate the pose of the camera. The LEDs act as (visual) markers for our pose estimation algorithm, which is based on Extended Kaiman filtering (EKF). We compare the performance of our EKF algorithm against an algorithm based on Discrete Linear Transform (DLT). We also consider the effectiveness of the presented algorithm for different camera frame rates, varying noise levels and varying LED visibility conditions using a mix of simulated and experimental data. Our initial results are promising and show that the EKF algorithm gives an accuracy of a few millimetres in position and few degrees in orientation, even under sparse LED conditions, low frame rates and high noise levels. [C485]

"A LEDs light system based on color coordinates feedback for the projector"

A novel solution for projector light source was proposed. With this solution, the light splitting sets was cancelled, the excessive light loss can be avoided. In the proposal method, three kinds of LEDs placed in front of the different incident face of the X prism were driven by different current with the purpose of obtaining the mixed white light for liquid crystal board (LCD). Three buck converters were used to adjust the drive current for each channel of LEDs according to the control signal from the coordinate's feedback. The designed LEDs driving system for projector has been verified by the experiment. [C486]

"Impact of LED nonlinearities on optical wireless OFDM systems"

Nonlinearities can drastically degrade the performance of optical communication systems based on intensity modulation (IM) of the optical carrier using the time domain orthogonal frequency division multiplexing (OFDM) electrical signal variations. The light emitting diode (LED) transfer function distorts the signal amplitude and forces the lower signal peaks to be clipped at the LED turn-on voltage (TOV). Additionally, the upper signal peaks are purposely clipped before modulating the LED to avoid chip overheating. The induced distortion can be controlled by optimizing the bias point and/or backing-off the signal power. In this paper, a model that incorporates amplitude distortion and that provides a parameterized upper clipping to control nonlinearity induced distortion is proposed. Through Monte Carlo simulations, the model can be used to determine the optimum bias point and to optimize the signal power to obtain best performance. In this context, an analytical approach to evaluate symbol error probability is proposed. A comparison with Monte Carlo simulation results is carried out to verify the accuracy of this approach. [C487]

"On the performance of coded optical spatial modulation"

The performance of hard and soft convolutional channel coding techniques for optical spatial modulation (OSM) are analyzed in this paper. OSM is a recently proposed multiple-input multiple-output (MIMO) technique for indoor optical wireless (OW) communication. In OSM only one transmitter is active at a time and the others are turned off. The spatially separated transmit units are considered as spatial constellation points, i.e. the incoming bit sequence activates one of the transmit units. The active transmitter radiates a certain intensity level at a

particular time instance. At the receiver side, optimal detection techniques are used to estimate the active transmitter index and retrieve the original information bits. In this paper, channel coding is applied to OSM and the performance of hard and soft detections are analyzed analytically and validated through Monte Carlo simulations. It is shown that the performance can be significantly enhanced by applying channel coding techniques and a gain in signal-to-noise-ratio (SNR) of about 5 dB and 7 dB at a bit-error-ratio (BER) of 10-4are achieved for hard and soft decisions, respectively. [C488]

"Preparation of anodic aluminum oxide nano-template using Al/Si substrate for large area LED applications"

Anodic aluminum oxide (AAO) nano-templates were prepared using the Al/Si substrates with the thickness of the aluminum films of about 500 nm. The pores of various sizes and depths were fabricated electrochemically through anodic oxidation. The optimum morphological structure for large area InGaN LED applications was formed by adjusting the applied potential, temperature, types of acid solution and their concentration. Scanning electron microscopy (SEM) investigations showed that hexagonal-close-packed nanopore arrays have smooth wall morphologies and well-defined diameters corresponding to the diameter of the applied template. [C489]

"Detection of multi-active markers and pose for formation control"

This paper represents a part of outdoor localization method based on relative information: heading angle and distance to apply to formation control for multi-agent robots. Well known are the researches about formation control for multi-agent robots using various sensors: window GPSs, ultra-sonic sensors and a camera with color markers, but those methods mostly could be applied on special environment and have restrictions or much expensive. The proposed method would be expected to overcome those problems. To avoid electronic or natural illumination disturbance in the image-processing, we used active markers (four bright LED arrays) and considered only their ON/OFF time period to obtain the pose. In this paper, experimental results will show that the algorithm is possible to be applied. [C490]

"Development of high precision linear transfer module using air floating system for flat panel display"

Recently, there is an increasing requirement for high precision linear transfer platform using for flat panel display (FPD) production and inspection process such as liquid crystal display (LCD), plasma display panel (PDP), and organic light-emitting diode (OLED). As next generation technology in the area of transfer platform, precision positioning and transfer flatness control under the 10μm is required for inline process such as automatic optical inspection (AOI), surface treatment, and marking. As magnetic roller conveyer type is used as transfer platform for FPD, there are many problems such as contamination of panel by contact between roller and panel, deterioration of quality, and uncontrollable flatness. The requirements of the high precision linear transfer module are high positioning accuracy and high transfer flatness. To satisfy these requirements, it has to be designed with the direct drive linear motion system and air floating system. In this work, linear transfer module having air floating system is proposed, where moving system using linear motor is mounted at the inside of the air floating system, and air floating system is used for floating the FPD panel, control system are used for performance requirement. The developed high precision linear transfer module is verified by performance test. [C491]

"Neural Network Rule Extraction and the LED Display Recognition Problem"

This paper presents the results from a neural network rule extraction algorithm applied to the LED display recognition problem. We show that pruned neural networks with small number of hidden nodes and connections are able to recognize all the 10 digits from 0 to 9. Earlier work by other researchers demonstrated how symbolic fuzzy rules can be extracted from trained neural networks to solve this problem. Our rules in contrast are crisp rules, and they are obtained from smaller networks. As a result, simpler and easier to understand rules are obtained. These rules give us an insight of how neural networks differentiate one digit from the rest in LED display recognition problem. [C492]

"Lab kits using the Arduino prototyping platform"

We present a lab kit platform based on an Arduino microcontroller board and open hardware that enables students to use low-cost, course specific hardware to complete lab exercises at home. The platform is designed to be accessible to a wide range of students and easily adapted for other applications. Careful hardware selection allows existing laboratory exercises to be modified for use with the platform, and the platform enables new exercises that would not be possible in a traditional lab. We describe the adoption of these kits in a course designed for on-campus and remote students that teaches the science and technology of modern display

systems. We find that the platform delivers a consistent, high quality laboratory experience for both on-campus and remote students. [C493]

"Evaluation of production yield for process selection"

Process evaluation is a common yet important problem in industry. Among the key measurements such as quality, processing time, cost, and robustness, production yield is one of the fundamental criteria frequently adopted to evaluate the quality level of a process. A process with high yield is better capable of producing products meeting the requirements preset by customers. However, general evaluation procedures that count the number of defectives become inefficient especially when yield rates are high. This paper considers the processes evaluation problem by comparing the yield index Spkof two production lines with high quality. An effective and efficient approach is proposed to solve the problem. The analytical method examines the difference of two yields. The approach requires small sample sizes but sensitively distinguishes production yields. The results provide useful information to practitioners. [C494]

"A design of automatic current limit block for OLED display driver IC"

The content in terms of ACL function which adjusts the brightness automatically as a function related to an OLED driver IC design of QVGA(320Ч240) is presented in this paper. ACL function adjusts luminance automatically as the brightness of adjacent circumstance and unnecessary power consumption of display panel can be reduced. Verification method is that original image is applied to ACL function and compare original image and result image. [C495]

"Fabrication of LED based Ultra Slim Optical Pointing Device"

The Ultra Slim Optical Pointing Device (USOPD) is a slim optical mouse as an input device for the application of wireless portable personnel communication device like a smart phone. In this paper, we have fabricated optical components of GaN LED based USOPD. The USOPD consist of illumination optical components and imaging lens. LED beam shaping lens consisting of both aspheric lens and Fresnel facet successfully machined by Diamond Turning Machine (DTM). Additional V-shaped groove with refractive-reflective surfaces (VGRRS) for beam path banding was fabricated by bulk micromachining of silicon and the shadow effect in thermal evaporation. Fabrications of imaging lens, arrayed multilevel Fresnel lenses, were fabricated on electron beam lithography, FAB etching. The proposed optical components are extreme compactness as well as high optical efficiency, thereby applicable to the ultra slim optical system like USOPD. [C496]

"Fluorometric bio-sniffer (biochemical gas sensor) with UV-LED light for fomaldehyde vapor as VOC (volatile organic chemical)"

A fibre-optic biochemical gas sensor (bio-sniffer) for gaseous formaldehyde (FA) was developed and applied for on-site assessment of FA detoxification. The bio-sniffer measures FA as a fluorescence of reduced nicotinamide adenine dinucleotide (NADH) which is the product of formaldehyde dehydrogenase reaction. The detection limit of the bio-sniffer for gaseous FA was 2.5 ppb, which is enough lower for the purpose of evaluating FA detoxification. The bio-sniffer was then applied to measure phytoremediation with N. E. "Bostoniensis". The FA level in the measurement chamber decreased down to the detection limit (2.5 ppb), which is lower level than FA level of room air (12 ppb), within 95 min and the value increased to FA level when the chamber was vented. [C497]

"Learning and practicing fundamentals of electrical and computer engineering through building and programming a microcontroller with multiple peripherals"

A required sophomore course on microcontrollers and computer architecture was designed and offered for the first time in 2009 to expose our electrical engineering (EE) sophomore students to microcontroller-based applications so that they could appreciate and be exposed to fundamentals of electrical and computer engineering (ECE) through hardware and software design and interfacing. The course also helps students to obtain a broad view of various subjects of ECE from circuits, signals, digital logic, microcontrollers, C and assembly language programming to system design, implementation and measurement so that they can make a well informed decision on whether to continue to major in EE. The course builds a foundation for future classes that may require instrumentation or microcontroller-based applications such as those on communications, control, power electronics as well as junior and senior design courses. In addition, the students are required to purchase most of the hardware components for the course so that they can use the components for future projects. [C498]

"Application of multi-wall carbon nanotube/SiC composite to thermal dissipation of high-bright light

emitting diode"

A novel CNT/SiC/epoxy composite was proposed and demonstrated as adhesive joining element and heat dissipation media for HB-LEDs. Junction temperature, luminous intensity and forward voltage were measured for varied combinations in the composites. The experimental results showed that the epoxy with 30 wt% of SiC and 5 wt% of MWCNTs had the best thermal properties. Comparing to commercial epoxy, the CNT/SiC/ epoxy could decrease junction temperature from 123°C to 93°C and thermal resistance from 81°C /W to 65°C/W. [C499]

"The EL properties of well-aligned n-ZnO nanorods / p-GaN structure"

Well-aligned ZnO nanorods were grown on the p-GaN substrate by a hydrothermal method and n-ZnO nanorods/p-GaN heterojunction LED structures were formed. The electroluminescence (EL) properties of this structure were studied under both forward and reverse bias. The nanorod LED device only has light output under reverse bias. The I-V characteristic results show that the nanosized junction can increase the carrier injection efficiency of the n-ZnO nanorods/p-GaN LED device. [C500]

"Stretchable large-area electronics using organic transistor integrated circuits"

We have successfully manufactured rubber-like large-area stretchable integrated circuits comprising printed elastic conductors and organic active components including transistors, and developed two applications; One is stretchable active matrix organic light-emitting diodes displays and the other is stretchable electromagnetic interference (EMI) measurement sheet that can detect EMI distribution on the surface of electronic devices by wrapping the devices in the sheet. The stretchable devices can spread over arbitrary surfaces including free-formed curvatures and movable parts, thereby significantly increasing the applications of electrical circuits. [C501]

"InGaN/GaN multi-quantum-well nanowires and light emitting"

InGaN/GaN multi-quantum-well (MQW) nanowires and accordingly light-emitting-diodes (LEDs) were fabricated on the n-GaN/sapphire substrate with a nano-patterned SiO2film as growth mask. The structural characteristics, optical and electrical properties were investigated. the observed results show that a InGaN/GaN MQW nanowire has smooth surface morphologies and triangular cross sectional structure. A strong cathodoluminescence emission peak related to InGaN/GaN MQW is observed located at 461 nm. In addition, InGaN/GaN MQW nanowire LED shows typical p-n junction characteristics with a low turn-on voltage, and its electroluminescence displays purplish. [C502]

"Study of humidity reliability of high power LEDs"

High power Light-emitting Diode (LED) as Solid-state Lighting (SSL) is a promising light source, and one of the crucial factors for its wide acceptance is its reliability. However, humidity reliability study of the high power LED reliability is rare despite that they are also susceptible to high humidity environments in many of their applications. In this work, we present the various humidity reliability of the high power LEDs, and we found that there are several failure mechanisms that render LED failure under humid conditions. These mechanisms do not cause a sudden black out of the LED, and the mechanisms that cause a continuous degradation of the lumen output are also changing with time. Furthermore, the mechanisms are distinctly different from that for integrated circuit (ICs), and thus the humidity models used for the extrapolation of the lifetime of IC under different humid condition cannot be applied to the high power LEDs, and new model that also account for the changing failure mechanisms must be developed if the time to failure of LED under humid condition is to be predicted as an important reliability index for the LEDs. [C503]

"A new four-transistor poly-si pixel circuit for AMOLED"

This paper presents a new poly-Si thin film transistor (TFT) pixel circuit for active-matrix organic light-emitting diode (AMOLED) displays. The pixel circuit has a simple four-transistor configuration and is controlled by two adjacent gate scan pulses, allowing a small circuit area and simple driving scheme. Simulation results show that this pixel circuit can provide the OLED with a current non-uniformity of less than 3% under ±0.5V threshold voltage (VTH) variation. [C504]

"Carbon nanotube nanoelectronics and macroelectronics"

Nanotube electronics still faces significant challenges such as integration/assembly, co-existence of metallic and semiconducting nanotubes, and air-stable n-type nanotube transistor for complementary circuit operation. Here we report our solutions to these major obstacles, which may eventually lead to realistic and scalable nanotube integrated circuits. We report the wafer-scale synthesis, transfer of horizontally aligned high-density nanotubes

and the application of the high performance aligned nanotube transistors in CMOS integrated circuits. To solve the problem of coexistence of metallic and semiconducting nanotubes, we report a scalable method of fabricating thin-film transistors using pre-separated, semiconducting enriched nanotubes, and have further looked into their application in display electronics. The techniques reported here could serve as critical foundation for future nanotube-based integrated circuits and display electronics. [C505]

"The Method to Acquire the Mine Shaft Coal Bin"

When using the pattern recognition technology to monitor the mine shaft coal bin coal level, we must use the effective image acquiring method. In view of complex, the bad working conditions, this article firstly proposed the assistance photo source illumination method to acquire the mine shaft coal bin coal level image. First introduced examination principle to acquire the coal level image, then we have given the establishment and the choice definition condition of the assistance photo source and the CCD(Charge Coupled Device is charge-coupled device) camera. Through the theoretical analysis and the computation, finally we indicated acts according to these definition condition choice and establishment of the photo source and the CCD camera. It shows that may acquire coal level image effectively. [C506]

"A high efficiency boost white LED driver for portable electronics applications"

Power efficiency is a very important issue for portable electronic devices since it determines the battery life. The backlight module usually accounts for the major part of power dissipation in a portable device. Thus, to extend the operation time of a portable device, a high efficiency backlight module should be employed. White light-emitting diodes (WLEDs) have replaced cold cathode fluorescent lamps as backlight modules in portable electronics in recently years due to their superior power efficiency. This paper presents a high efficiency WLED driver with an integrated boost DC-DC converter that can drive a series of WLEDs using a single lithium-ion battery, which is the most popular power source for portable devices. As unexpected operation conditions can result in the failure of the driver, battery, or inductor, the driver integrates protection circuits for over current, over voltage, and under voltage. The driver was fabricated in the TSMC 0.25-μm 60-V bipolar-CMOS-DMOS process. The over current protection level is set to 2 A. The over voltage protection is set to 50 V, allowing the boost converter to drive 12 WLEDs in series connection. The under voltage protection circuit turns off the converter when it detects an input voltage below 2.5 V to protect the battery. [C507]

"Copyright page"

The following topics are dealt with: body network application; near-field telemetry; LED driver; MOSFET devices; SRAM circuit; light emitting diode; on-chip reference oscillators; CMOS optical receiver; ring oscillator delay; CMOS inverter; NMOS driver; digital DC-DC converter; low power switched capacitor; low power dual-mode pulse triggered flip-flop; VLSI architecture; and thin film transistor. [C508]

"Reducing OLED driving chip's simultaneous switch noise by coding"

Inductance effects couldn't be neglected in circuits with increasing of clock frequency and decreasing of process scale. In this paper, firstly it analyzes the theory related to simultaneous switch noise, describes a new method to reduce simultaneous switch noise by Bus coding. Then use this method to add a circuit to an OLED driving chip, the SSN testing result shows that Bus coding could reduce chip's SSN effectively, and protect signal's integrity. [C509]

"Design and experimental test of a novel surface blackbody with honeycombs"

With the development of IR technology, there are increasing needs for surface BB. A novel surface blackbody (BB) with honeycombs for calibrating infrared (IR) imaging ranging 240~450K in the long IR wavelength bands of 3~15μm is developed and its features are experimental tested. Traditional radiant source of BB cavities are often with simple axisymmetrical structure, such as cylinder, cone, cylinder-cone, double cones, cylinder-inner cone etc. and possess small apertures which fit high temperature range application. As to middle-low temperature range, these radiant sources are not satisfied with the requirement of Minimum Resolvable Temperature Difference (MRTD). The honeycombed surface can provide consistent radiant flux with high effective emissivity more than 0.98 estimated theoretically. A circular area in diameter Φ100 mm of the surface is adopted for making surface BB. Around the circumference of the radiant surface, a short cylinder is added as a shield to eliminate the edge effect. Pt100 A resistors are used as temperature measuring sensors, and controlling system with PIC16F876 microprocessor embedded is designed. Since the requirement of temperature controlling precision is high and the system works at temperature near to environment, it is difficult to control the temperature of the system with high heat inertia and being easily interfered by environment. Fuzzy-PID switch control algorithm has been adopted to overcome the issue and to make the system manipulated continuously

over large scope of temperature with high precision, stable, robust and convenient to communicate with computer. The process of fuzzy controller is design by using of Matlab fuzzy logic toolbox and the control program is compiled under CCS C compiler. The testing results show the system works well and can satisfy practical requirements. [C510]

"Characteristics of plant bioelectric potential and purification function under LED light"

Recently, plant factory has been establishing and takes off in world wide countries. In the plant factory, the growing environment can be controlled and the crop can also be controlled. The products are growing in an enclosed environment, therefore agricultural chemicals has no use. Secure and safe food producing system can be constructed. However, efficient production formula for the plant (for example vegetable) is not defined well. It is an effective way to control the growing environmental factors using physiology information which are directly obtained from the vegetable. Light plays a key role in plant growth. There is a difference in the amount of production due to light frequency. In this study, plant bioelectric potential is examined under light emitting diode (LED) which is used in plant factory. In future, plant physiological function and environmental response can be understood by directly monitoring the bioelectric potential. The relationship between the potential and air purification capability was examined as an environmental response. As for the result, it became obvious that blue and red lights had highly influence. The lights make great contribution to photosynthesis. The characteristic agrees with effective wavelength of photosynthesis. [C511]

"Improved efficiency of CMOS light emitters in punch through with field oxide manipulation"

Avalanche electroluminescence offers the opportunity for standard CMOS devices to be used as light emitters. Although inefficient, avalanche breakdown is inherently a fast process and potentially offers benefits in terms of speed when compared to emission based on forward biased junctions. Furthermore, the wide spectral characteristics of avalanche electroluminescence in the visible range also allows for some interesting applications. The main obstacle suppressing the use of these silicon light emitters in mainstream applications is inefficient radiative recombination. A number of techniques are known to improve quantum efficiency, one of which is operating the devices in punch through mode. This work focuses on improved results obtained from punch through devices, manipulation of the oxide above the radiative action and interesting results pertaining to the radiation pattern and the effects of LOCOS structures on the emission shape. This information could potentially benefit optical coupling to the light sources. [C512]

"Development of a spectrofluorometer with USB interface for in vivo measurements in surgical procedures"

In this paper we present the development of a portable spectrofluorometer with USB interface for in vivo measurements in biological tissue. The equipment consists of a mini-spectrometer HR4000CG-UV-NIR, with a working range from 200 to 1100 nm with a resolution of 0.5 nm FWHM. As the excitation source a light emitting diode at 365 nm, with maximum radiant power of 200 mW was used. A bifurcated fiber optic (R200-UV/VIS) with six 200 µm diameter irradiation fibers and one 200 µm collection fiber is used. The system is powered and controlled with a laptop, avoiding the use of an external power supply. A program to select the light source, to process and measure spectra in real time was developed using the graphic language G of LabVIEW 8.2. Also, in this issue are presented in vivo measurements of diffuse reflection and fluorescence of non-neoplastic and neoplastic cerebral tissue of patients affected with glioblastoma multiform tumors (GBM). [C513]

"Design and construction of irradiation system for photodynamic therapy with temperature control"

This paper presents the development of an irradiation system for photodynamic therapy with temperature control. The system allows the application of an optical radiation whose wavelength is 630nm, using light-emitting high power diodes. The developed system has a power control to irradiate the target tissue with an adequate power density. A temperature sensor is placed in the irradiated sample to control the temperature. And, the irradiation time is automated as well. The penetration and the scattering properties of the tissue were considered in the system design. Additionally, some partial results from irradiations performed on mice, with induced adenocarcinoma tumour will be shown. [C514]

"Miniaturized and low cost innovative detection systems for medical and environmental applications"

Innovative, simple, miniaturized, low-cost and low-power consumption devices are required in future medical applications. In our laboratory we have developed different devices in this field. Firstly, oxide aluminum-coated interdigitated (ID) Al capacitors have been successfully tested for DNA hybridization test (down to 30 pM target

concentrations), as well as for specific bacteria recognition (S. Aureus, down to 100 CFU on a sensing area of 200 Ч 200 µm2) with an appropriate anti-monoclonal antibody (MoAb) and finally for humidity detection with application in a breath rate monitoring system, an important element for preventive medical studies, which is light, non-invasive, comfortable to wear for the patient. Secondly a complete microsystem enabling the measurement of biomolecules concentration in assay tubes has been developed based on ultraviolet (UV) light absorption with miniaturized LEDs and SOI high-efficiency photodiodes. Our technologies combine high-performance CMOS integrated circuits, sensors and MEMS; operation in harsh conditions (micro power, high-temperature, remote RF link, etc.); very low power consumption; and broad applications in biomedical and environmental sectors. This opens the door to many new emerging applications into medical devices. [C515]

"Liquid electrochemiluminescent organic light emitting cell"

Investigation of liquid phase organic electroluminescence is being of special interest as a competition of "liquid" and "solid" organic light emitted diodes (OLEDs). From the electrochemical point of view, electrogenerated chemiluminescence is a self-regenerating process providing high brightness light radiation due to recombination of oppositely charged dye radicals. Electrogenerated chemiluminescence displays have a competitive suit of parameters: high light efficasy, low power consumption, low driving voltages, fast response time, high spatial resolution, very high optical transmission and wide operating temperature range. No polarizes or alignment layers are required. Samples of electrogenerated chemilumine-scence displays, including matrix microdisplay and micromechanically made ECL cell are presented; its design and parameters are discussed in details. [C516]

"Gain optimization method of a DQW superluminescent diode with broad multi-state emission"

Optimizing gain through systematic methods of varying current injection schemes analytically is significant to maximize experimentally device yield and evaluation. Various techniques are used to calculate the amplified spontaneous emission (ASE) gain for light emitting devices consisting of single-section and multiple-sections of even length. Recently double quantum well (DQW) superluminescent diodes (SLD) have shown a broad multi-state emission due to multi-electrodes of non-equal lengths and at high non-equal current densities. In this study, we adopt an improved method utilizing an ASE intensity ratio to calibrate a gain curve based on the sum of the measured ASE spectra to efficiently estimate the gain. Although the laser gain for GaAs/AlGaAs material is well studied, the ASE gain of SLD devices has not been systematically studied particular to further explain the multiple-state emission observed in fabricated devices. In addition a unique gain estimate was achieved where the excited state gain clamps prior to the ground state due to approaching saturation levels. In our results, high current densities in long sectioned active regions achieved sufficient un-truncated gain that show evidence of excited state emission has been observed. [C517]

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"Individually addressable optoelectronic arrays for optogenetic neural stimulation"

Here we demonstrate the use of a micro-Light Emitting Diode Arrays as a powerful tool for complex spatiotemporal control of photosensitized neurons. The array can generate arbitrary, 2D, excitation patterns with millisecond and micrometer resolution. In particular, we describe an active matrix control address system to allow simultaneous control of 256 individual micro light emitting diodes. We present the system optically integrated into a microscope environment and patch clamp electrophysiology. The results show that the emitters have sufficient radiance at the required wavelength to stimulate neurons expressing channelrhodopsin-2 (ChR2). [C519]

"An open-source platform for the development of microcontroller based multi-wavelength oximetry"

We present here, an open-source printed circuit board (PCB) platform for the prototyping, testing and trialing of non-invasive oximeter devices. The system is designed around a dspic33fj128gp804 microcontroller with coding in C. It can control over 100 LED and photodiode devices and has two modes, one for calibration and one for signal interrogation. At the top-level, the microcontroller has ports dedicated for LED and photodiode control, with EEPROM and SD card for storage, alphanumeric display for menu control and graphical display showing

relevant waveforms. Further the device is battery powered and rechargeable. This device was designed with consideration to robustness, power-efficient operation, expandable hardware and algorithms and cheap off the shelf components, ensuring it can be used and repaired in low-resource settings. We show a working example device calculating total Haemoglobin, which has relevance World-Wide as a non-invasive anaemia detector. Continuous operation the device consumes approx. 222 mW. Under these circumstances four AA batteries (2650 mAh) could operate for over eight hours allowing general use operation of several weeks, without charging. [C520]

"A system designed for black-spot's automatic identification"

An automatic identification system for the OLED's black-spot detection was designed in this paper. Complete approaches based on machine vision technology are proposed to get the sub-pixel location of black-spots. In this method, feature area is recognized based on the identification of spots' edge characteristics. The method of circle fitting is used to get positions of the spots' center. The experiments show that this system can realize the automatic identification for black spot's feature and center in sub-pixel. The accuracy of algorithm is better, and its self-adaptability is high. It provides an necessary condition for further research of OLED defect detection. [C521]

"Image segmentation of UV pattern for automatic paper-money inspection"

We propose an image segmentation method for automatic paper-money inspection system. The UV (ultra violet) patterns embedded in the paper money should be segmented to determine whether the money is genuine or not. We acquired the image by directional lighting system using UV LEDs. In order to segment the pattern from the background, we apply the Gaussian mixture model to consider the multi-modal characteristics of the histogram. Experimental results are presented to verify the performance of the proposed method. [C522]

"Vision-based localization using active scope camera-Accuracy evaluation for structure from motion in disaster environment"

This paper presents the evaluation results for conventional methods that can be used for vision-based localization. An Active Scope Camera is a very thin snake robot and can be used as a rescue robot for search and rescue missions. Self-position estimation of the Active Scope Camera is important for efficient search. Nevertheless, using sensors for this purpose hinders the movement and maneuvering of the camera through narrow gaps, because sensors are very big and heavy for the Active Scope Camera. Vision-based localization using a fish-eye camera is suitable technique for self-position estimation. However, the images obtained using the Active Scope Camera are not of good quality. The material of objects found in disaster environments and overexposure by light-emitting diodes embedded at the camera tip affects the matching of feature points. In this paper, properties of images of disaster sites obtained using the Active Scope Camera and the accuracy evaluation of vision-based localization are described. [C523]

"Complete microsystem using SOI photodiode for DNA concentration measurement"

In this paper, we describe a complete microsystem allowing the measurement of DNA concentration based on ultraviolet (UV) absorption. The system includes an ultraviolet light-emitting diode (LED) as light source and a silicon-on-insulator (SOI) lateral PIN diode as photodetector. After demonstrating the feasibility of the system with a quartz container, measurements are performed on DNA samples in PCR tubes by direct trans-mittance. The measurement of the sample in the tubes implies no waste neither manipulation of the samples. We study the impact of variation of the different parameters of the system, i.e. the wavelength of the LED, the light power reaching the samples and the bias of the photosensor. We are able to measure responses for DNA concentrations in the range from 400 ng/µL to 4 pg/µL and correlate bacteria concentrations to the induced photocurrent of the diode from 6.1011spores/mL to 6.107spores/mL. The system features a present precision of current measurements of 2%. In the optimal case, a limit of detection (LOD) of 0.02 ng/µL has been estimated. [C524]

"Demonstration of visible light communication link for audio and video transmission"

A visible light communication to transmit high quality video and audio signal was demonstrated by using illumination LEDs. In the transmitter, by using ultra high speed comparator, the analog video signal was modulated to 15 MHz pulse width modulation (PWM) signal. The analog audio signal was analog-to-digital converted with 192 KHz sampling rate, 24 bits resolution. The video and audio signals are transmitted using the illumination LED transmitter. In the receiver, a photodiode senses the optical signals transmitted from the LED transmitter and the received electrical signal is amplified. And then, the digital signals are recovered. The digital signals are converted into analog signal. Due to the digital transmission based on visible light from the

illumination LED, the high-quality video and audio signal transmission is performed. [C525]

"LED Lighting Control System Based on the Zigbee Wireless Network"

A method of LED intelligent lighting control based on Zigbee wireless communication technology is introduced in this paper, and the specific design scheme is presented. The system can achieve normal PWM dimming, timing dimming, self-adaptive dimming and other feature modes, with a corresponding human-computer interface. This method is more intelligent and humanized than traditional lighting control system. [C526]

"Finite element analysis of laser bonding process on organic light-emitting device"

Organic light-emitting device (OLED) is regarded as the potential application for future display. However, one of the bottlenecks is the OLED package issue, which results in short term device lifetime. Currently, a new laser bonding package process is proposed. In this paper, the investigation of transient temperature field analysis for the laser bonding process is presented. Finite element model is applied in ANSYS and compiled by subroutine of APDL. Moving heat flux and birth-death element method are both adopted in order to achieve the complicated bonding process. The laser bonding process comes to quasi-steady state after a short time of initial transient stage. Through a series parameters simulation, parameters as moving velocity, laser power and laser beam radius show a significant effect on bonding process. Furthermore, by case study, the optimization of the bonding parameters was carried out for future experimental investigation and validation. [C527]

"Band-engineered Ge-on-Si lasers"

We report optically-pumped Ge-on-Si lasers with direct gap emission near 1600 nm at room temperature. The Ge-on-Si material was band-engineered by tensile strain and n-type doping to compensate the energy difference between direct and indirect band gaps for efficient light emission. Modeling of Ge/Si double heterojunction LEDs shows that it is possible to achieve >;10% quantum efficiency even assuming an Auger coefficient 10 times larger than reports in literature. Edge-emitting Ge-on-Si waveguide LEDs have also been demonstrated at room temperature. These simulation and experimental results strongly indicate the feasibility of electrically-pumped Ge-on-Si lasers. [C528]

"Ultra-violet sensing characteristic and field emission properties of vertically aligned aluminum doped zinc oxide nanorod arrays"

Vertically aligned Zinc oxide (ZnO) nanostructures become very important and useful materials in nanodevices fabrications due to its outstanding characteristics such as high aspect ratio, high electron mobility and large surface area availability.Vertically aligned ZnO nanorod array emerges as promising functional material which suitable for various application including dye-sensitized solar cell, light emitting diode, sensors and field emission displays. This paper introduces the prepartion of aligned ZnO nanorod arrays by a novel technique of sonicated sol-gel immersion. Ultra-violet (UV) sensing behavior and field emission characteristic have been investigated on vertically aligned aluminum (Al) doped zinc oxide (ZnO) nanorod arrays. Uniform and high coverage density of ZnO nanorod arrays have been successfully deposited on seeded-catalyst coated substrates. The synthesized nanorods have diameter sizes between 50 nm to 150 nm. The XRD spectra show Al doped ZnO nanorod array has high crystallinity properties with the dominancy of crystal growth along (002) plane or c-axis. UV photoresponse measurement indicates that Al doped ZnO nanorod array sensitively detects UV light with a large conductance increment after UV illumination exposure. The nanorod array shows good field emission properties with low turn on field and threshold field at 2.1 V/μm and 5.6 V/μm, respectively. [C529]

"Nano-structured large area electronics"

Summary form only given. The evolution in materials and process fabrication technologies is posing new challenges and application areas in large area electronics. A driving force in this evolution is thin film Si technology. Interest in Si thin film technology stems from a variety of desired technological features including low temperature manufacturing with few constraints on the substrate size, material, or topology. More recently, the extension of this technology to flexible plastic substrates has received considerable attention. Interests on plastic is being driven by the need for lightweight, unbreakable, and foldable screens for a plethora of new application areas related to the human-machine interface. While the need for this technology is overwhelming, the material is intrinsically limited in speed and stability, as compared to poly-Si or crystalline-Si. Hence, the quest for improved material structure at low deposition temperatures and improved system stability through use of circuit compensation techniques. This talk will review these challenges. Specifically, it examines growth conditions for realization of nano-crystalline Si along with design considerations pertinent to thin film circuits whose integration requires non-conventional design solutions to deal with the high instability. The family of devices and circuits

presented here are applicable for a new generation of displays based on the organic light emitting diode. [C530]

"Nanotechnology for solid-state lighting"

Nanotechnology for solid-state lighting is being reported. The use of nanostructures for development of high brightness and white light LEDs for illumination application is presented. InGaN is the compound semiconductor used for the fabrication of high brightness LEDs. The zinc oxide nanorods are grown directly onto the LED surface by an inexpensive solution method. As much as 60% more light is extracted from the LED. [C531]

"LED with integrated microlens array patterned by an ultraviolet linear micro-LED array"

We report on a direct-write lithographic technique for the fabrication of micro-lens arrays with an ultraviolet (UV) micro-light-emitting diode (LED) array, serving as an exposure source. Owing to the Lambertian emission distribution of LEDs, the exposed UV sensitive coating (UV epoxy) adopts the same profile, resulting in spherical lenses being formed naturally, without further reflow. Microlens arrays of high optical quality have been fabricated and integrated with a flip-chip LED. The properties of the lenses are evaluated by optical microscopy and atomic force microscope. The far field emission pattern from this microlens-integrated LED indicated that our microlens array contributed to reduction of divergence cone significantly. [C532]

"An emissive GaN micro-LED array for visible-light multi-channel communication"

The feasibility of multi-channel visible-light communication using an arrayed 470-nm micro-sized light-emitting-diode emitter, together with a matched fiber array bundle, is demonstrated by transmitting a 250-kHz square wave and a 500-kHz pulse signal in parallel. [C533]

"CdS/ZnS quantum dots and CaAl2 Si2 O8 phosphor hybrid white LED"

Core/shell CdS/ZnS quantum dots (QDs) with the emission wavelength of 618nm, was synthesized by thermal deposition using cadmium oxide and selenium as precursors in a hot lauric acid and hexadecylamine trioctylphosphine oxide hybrid. CaAl2Si2O8:Eu2+, Mn2+phosphor was synthesized by high-temperature solid state reaction at 1290°C for 2 hours under the H2reducing atmosphere, and X-ray powder diffraction analysis confirmed the formation of it. It has two emission bands peaking at 420 nm and 580nm originated from the transition 5d to 4f of Eu2+and 4T1-6A1of Mn2+, respectively. Blends of CaAl2Si2O8:Eu2+, Mn2+phosphor and CdS/ZnS QDs exhibited the prominent spectral evolution with an increasing content of QDs. A hybrid white LED, which combines a blue LED with the blend of CaAl2Si2O8:Eu2+, Mn2+phosphor and QDs with a weight ratio of 2:1, with the CIE coordinate of (0.3183, 0.3036) and CRI of 85 was obtained. [C534]

"LED marker position detection using Walsh Functions"

In this paper, we deal with the technique for detection of the location of markers on characteristic points for motion capture, and adopt the classic LED marker technique. The reason that we adopt this technique is to perform motion capture even in places where dark and light are mixed. For tracking the markers, most on-marker techniques have problems, such as difficulty in distinguishing between markers. Therefore, we proposed a new technique in which each marker is distinguished by means of the luminescence pattern of the LED according to the Walsh Function. By using this new technique, reciprocal interference between markers is eliminated and distinguishing between markers becomes easy. To evaluate the usefulness of the proposed technique, we performed computer simulation of the motion of eight markers and experimented using a machine in a case with four markers. As a result, we were able to derive and distinguish each marker's course within a certain distance. [C535]

"Rigorous modeling for visible light wireless access based on environment friendly illuminance"

Visible light wireless access (VLWA) technique based on environment friendly illuminance is in progress. To the best of our knowledge, the efficient modeling of corresponding indoor channel including sophisticated reflection has not been proposed. In this paper, a rigorous and efficient channel modeling scheme, named independent reflection interaction characterization (IRIC), is presented which can be used to account for reflection of any order. And simulation results show that this scheme can characterize the VLWA channel model in less than 10 seconds in a medium-sized room with up to 6 order reflection considered for analyzing received optical power and illuminance function. [C536]

"Characterization of wireless optical indoor channels"

Wireless optical links with intensity modulation and direct detection are widely used for short-range

communication. For indoor applications, the main source of interference is artificial lighting. The emitted optical power of fluorescent lamps with reactive and electronic control gears as well as light emitting diodes is measured and analyzed in time and frequency domain using Welch power spectral density estimate and spectrogram with short-time Fourier transform. Driven by the need for energy efficient lighting, the optical interference environment undergoes a radical change from low-frequency incandescent lamps and conventional fluorescent lamps to fluorescent lamps with high efficient, high-frequency electronic control gears and LEDs with pulse-width modulation dimming. Based on the interference measurements, a model of the wireless optical indoor channel is presented. [C537]

"High efficiency LED driver featuring auto output-voltage tuning"

This paper presents a high efficiency LED driver that employs a current-mode buck regulator to energize four linear constant-current regulators. An auto-tuning procedure is introduced in to adjust the output voltage of buck regulator, which keeps the dropout voltage of the passive devices in linear regulators at a possible minimum level while maintaining high performance. Thus, the conversion efficiency of the linear regulator is maximized and so is the overall efficiency. A prototype of the high efficiency LED driver was designed with a standard 0.35μm CMOS process. The simulation results show that the expectant functions are well achieved. [C538]

"LED spectrum slicing for ZCC SAC-OCDMA coding system"

In this paper we propose a Zero Cross-correlation (ZCC) code in Optical Code Division Multiple Access (OCDMA) CDMA system based on amplitude spectral encoding of low-cost broadband sources such as Light Emitting Diode (LED). We also study how the sliced spectrum of LED can be used as a cost-effective light source in ZCC code. Our system requires only standard optical elements and simple direct-detection receivers. We show that for number of weight = 4, up to 100 users can transmit asynchronously with an average bit error rate equal to 10-9. This ZCC code also demonstrates that BER of 10-9can be achieved within the minimum received power of -25.5 dBm. [C539]

"Multi-wavelength laser scanning architecture for object discrimination"

A novel method for identifying and discriminating various objects using five different lasers is described. This method uses a laser combination module that allows five laser diodes of different wavelengths to sequentially emit identically polarized light beams through a common aperture, along one optical path. Each laser beam enters a custom-made curved optical cavity for multi-beam spot generation through internal partial beam reflection. The intensity of the reflected light beams from each spot is detected by a high-speed area scan image sensor. Object discrimination based on analyzing the Gaussian profile of reflected laser light at distinguishing wavelengths is demonstrated. [C540]

"High efficiency double-layer white polymer light-emitting diode"

In this presentation, efficient white polymer-light-emitting diodes have been fabricated with double emissive layers. The device structure consists of ITO/poly(ehtlenedioxythiophene): poly(styrene sulfonic acid) (PEDOT: PSS)/poly(N-vinylcarbazole) (PVK) /phenyl-substituted PPV derivative (P-PPV)/poly(9, 9-dioctylfluorene) (PFO)/Ba/Al. By tuning the thickness of the emissive layers, white light was obtained. In EL spectra of the white light, the full width at half maximum (FWHM) of the green band from P-PPV increased from 79 nm to 110 nm. Therefore, the EL spectra can cover the whole visible area. The 1931 CIE coordinates of the white light emission obtained were (0.31, 0.36). The maximum luminous efficiency is 3.8cd/A. [C541]

"Improving the performances of polymer light-emitting diode by inserting an ultrathin NiO layer"

Performances enhancements of polymer light-emitting diode (PLED) were realized by inserting an ultrathin layer of NiO between the anode and hole injection layer. For PLED, there is a large energy barrier for hole injection with commonly used indium tin oxide (ITO) as anode. With a thin layer of NiO deposited on ITO, the energy barrier was decreased because of the higher work function of NiO than ITO, which facilitated hole injection. Therefore, the balance of electron and hole current was improved and also PLED performances. Experimental results also showed that the PLED performances were very sensitive to the thickness of NiO. Thick NiO layer led to the reduction of device current density, and therefore, poor PLED performances because NiO has a higher resistivity value than that of ITO. It turns out that 1 nm is the optimal thickness of NiO among 1, 2, 4 and 8 nm to produce high efficiency PLEDs. After the insertion of 1 nm NiO, the maximum electroluminescence intensity of PLED was almost doubled. [C542]

"Fourier Spectrometer based on a wide-range and nanometer stabilized Michelson Interferometer"

A high signal-to-noise-ratio (SNR) and resolution Fourier spectrometer based on a wide-range and phase-locked Michelson interferometer is presented. A novel arrangement of a step motor, a nanometer resolution piezoelectric actuator and an active PID control loop ensures that the Michelson interferometer has a phase stabilized scanning range virtually without limit, resulting in the Fourier spectrometer's high resolution and high SNR. Several experiments demonstrate that this spectrometer, using light sources such as write LED (WLED) and femtosecond laser, can accurately acquire the spectrum information of a given sample as well as the light source itself in a resolution of nanometer order. [C543]

"Implementation of multi-channel LED driver with low inter-channel current deviation using self-optimized active current regulator"

A novel multi-channel LED driver is presented, consisting of an active current regulator and a switch mode voltage regulator for each channel. The active current regulator directly controls an LED current without any current sensing resistor and the switch-mode voltage regulator minimizes a voltage drop at the current regulator, independently for each channel. This is named self-optimization. This LED driver is designed and fabricated through a 0.35μm 2-poly 4-metal 40V high voltage process. The self-optimization is successfully achieved and the active current regulators have current deviations within about ± 2% between the individual channels. It is also confirmed that a power-conversion efficiency of the proposed LED driver is about 87% at the supply voltage of 30V and the channel current of 80mA. [C544]

"Demonstration of spectral slicing WDM system using Light Emitting Diode (LEDs) light source"

The study is reported the transmission of a spectral-sliced WDM channel at 1 Gbp/s over LAN with different channel spacing. A sliced channel designed as 1:8 slicing element is integrated, multiplexed, through SMF, and finally demultiplexed into 8 channels namely "spectral slicing" having same spacing bandwidth. The demultiplexer technique is used in WDM and the network applications can apply for Fiber-To-The-Home (FTTH) application. The system performance is characterized according to the Bit-Error-Rate (BER) against the number of bit rates of the system. The significant part of this work is to compare the channel spacing of 0.2-nm, 0.4-nm, and 0.8-nm. Consequently, the study shows that 0.4-nm channel space can transmit signal for LAN access network and the results are significant over 0.8-nm in terms of channel space usages. Therefore, the spectral slicing WDM would be the promising candidate for next generation optical Access Network. [C545]

"Lighting systems energy efficiency based on different human visual conditions"

This paper presents a lighting design analysis in scotopic and photopic conditions of different lamps types. The efficient lighting system concept is usually associated with high performance electronic circuits. However, researches related to the human eye physiology indicate that this efficiency gain can be achieved only by changing the lamp type to be used in each visual condition. Analysis suggests that changing the light spectrum incident on the eye, so that it excites most effectively the photoreceptor cells, light levels can be reduced without compromising the visual performance. On this basis, this paper presents a study comparing the power required, the lighting system investment cost, and the energy consumed cost over 10 years. Therefore, lighting systems based on high pressure sodium lamps, fluorescent lamps, metal halide lamp, and lighting emitting diodes are compared. The final results show that the most efficient lighting system for photopic conditions is based on high pressure sodium lamps. However, under scotopic conditions the best efficiency is obtained with the use of metal halide lamps. [C546]

"Application of OFDM on integrated system of visible free space optic with PLC"

Recently the indoor power line has been proposed as a competitive technology for digital systems in homes. Indoor power line integrated with other systems to distributing data inside home, such as visible free space optic (VFSO). Employing visible light generated by white LEDs for indoor optical wireless have been proposed and implemented. Since white-LED is usually distributed over the ceiling for illumination, it is possible to use the ubiquitous power line cables as a communication medium between other fixed network and LED lights. Some works have been done in this area but because power line is an unpleasantly medium in case of noise and multipath distortion the existing systems do not have good quality factor. So considerations of these parameters are very important issue to model the actual system. In this case, Orthogonal Frequency Division Multiplexing (OFDM) has been proposed to limit the effect of ISI produced by multipath propagation in power line channel. This paper attempts to investigate the performance of Orthogonal Frequency Division Multiplexing (OFDM) techniques with Binary Phase Shift Keying (BPSK) sub carriers to reducing the effects of impulsive noise and ISI for integrated between BPLC and VFSO. It has been observed that in the case of using OFDM the multipath effects and bit error rate are reduced. [C547]

"The architecture and recognition algorithm in Haibao perceptual development robot"

Haibao, demonstrated at World Expo 2010, has dense LED lights all over its body for flexible changes of its facial expressions, clothes and display of other graphic information. Its visual capability is performed by a Where-What Network (WWN), modeling the dorsal and ventral streams of the biological visual cortex. It is adapted from WWN-3, the first series of visual detection and recognition algorithms that are capable of detecting and recognizing a general object or pattern from complex backgrounds. In this paper, key issues in the architecture, detection and recognition algorithm, and the robot body are discussed with some results of experiments. [C548]

"Fuzzy equalized integrated system of visible free space optic (VFSO) and BPLC"

A new integrated system of visible free space optic (VFSO) and broadband powerline communication (BPLC) that applies the concepts of fuzzy logic for channel equalization is proposed. Having used already installed powerline cables and white LEDs as a communication channel this system has the advantage of low cost and easy implementation for data transmission. In this system the created intersymbol interference (ISI) due to nonlinear distortions over the equivalent channel of VFSO and PLC is a considerable issue hindering further increase in the attainable data rate. In this work, the equivalent channel model for integrated system is developed and in order to mitigate the influences of high power impulsive noises and multipath distortion of BPLC channel, which are the main causes of ISI, besides channel coding and choosing discrete multitone (DMT) as a robust modulation schemes in case of ISI we designed adaptive fuzzy equalizer system. Then the performance of fuzzy equalized integrated system was compared by decision feedback (DF) equalized system in case of steady state BER and convergence speed of channel equalization. The attained results have shown that by incorporating appropriate linguistic rules which can be derived from training symbols the system performance would be improved. [C549]

"High-power violet light emitting diodes with electroplating copper heat spreader"

Using self-alignment photolithography and copper electroforming techniques, we have developed a size of 1mmЧ1mm high power GaN-based violet LED embedded in a reflective cup-shaped copper heat spreader. The packaged LED chip sample with copper heat spreader driven at 1 A current yield the light output power of 310 mW, about 1.55 times to the conventional LED. Moreover, the power efficiency is remarkably increased from 4.21% to 6.61% at the same driven current. These results indicate that the novel heat dissipation, a direct Cu heat spreader by a metal connection to the device, did efficiently extract the heat from the chip. The result exhibit a new solution to thermal management of high power GaN-based violet LED samples. [C550]

"Wireless/mobile communication Aegis taciturn"

"Technology does not drive change, it enables change." The primary purpose of Technology is its implementation in day-to-day life wherein it could enhance the lifestyle as well as provide better safety and performance to its end users. The government has enforced stringent laws against usage of mobile phones while driving a vehicle. Yet, there seems to be a sense of casualness amongst our citizens towards abiding it, coupled with a belief that they can get by easily without ever being caught. This project facilitates the government to take adequate action against those who are violating these laws. An ingenious and innovative technique is required to detect the persons who are not abiding this code of conduct. Due concern must be given for both inebriated as well as cell phone usage while driving. Aegis taciturn is a device used especially for people who cling to mobile phones even while driving and bilk from laws easily. It is used to prevent texting and calling of mobile phones while driving vehicles. Also, it indicates to cops that a person is using his mobile while driving. In case of countries where there is a peccadillo for this kind of pernicious activities it would be an utilitarian device. It receives the mobile frequencies and the received signal is used to trigger the micro-controller with a glowing LED. As a result of this slightest voltage fluctuation cops would be intimated by a message with the vehicle's number plate along with the location of the vehicle with the help of GPS System. [C551]

"Temperature characteristics of the red Resonant Cavity light emitting diodes"

In this paper, InGaP/AlGaInP 640nm Resonant-Cavity light-emitting diodes (RCLEDs) with stable temperature characteristics have been achieved and compared them with 630nm InGaP/AlGaInP red light-emitting diodes which don't include the top and bottom DBRs. We mainly focus on the temperature characteristics of these two kinds of devices as operation temperature increasing. When the operation temperature increases from 10□ to 47.5□, the optical and electrical characteristics variations of RCLEDs at 20mA is changed more subtly. The red shift of RCLEDs is 2nm, while the red LEDs' is 4nm. The light efficiency degrades less severely. According to the experimental results, we confirm that the temperature characteristics of RCLEDs are more insensitive. In order to interpret the temperature dependent experimental results, theoretical analysis is further carried to

investigate the physical mechanism. [C552]

"Light collection systems for multiple LED arrays"

Light emitting diode (LED) has numerous advantages such as long lifetime, large color gamut, small size and the absence of mercury vapor and thus there has been recognition that LED could be an alternative light source for projection display application. Due to its compact size, LED is a very attractive RGB light source for portable projectors. To improve the brightness of the projector, it is very critical to improve the light collection efficiency of the RGB LED light sources. In this work, traditional compound parabolic concentrator (CPC) was designed and its performance was studied. The CPC has a high collection efficiency, but its size is too bulky to be used in the portable projectors. Hence, a freeform collection system was designed and optimized to gain a compact size which can be used in the portable projectors. After optimization, it has a collection efficiency of 85%, slightly lower than that of the traditional CPC. But its diameter of the output aperture is 13.4 mm, 36% smaller than that of the traditional CPC and its length is 25 mm, 58% shorter than that of the traditional CPC. Meanwhile, the divergence angle of the freeform collection system is ±10° which is smaller than that of the designed traditional CPC. Hence, the freeform collection system may be used as the collimator in the portable projection display application. [C553]

"Development of player-owned golf GPS system powered by solar cell"

Our system provides 4 essential functions on the golf courses. First, using real time GPS satellite information, it will tell you how far away from the center of green the players are at any given moment by audible sound. Second, it replaces the player's paper scorecard with an easy to use electronic version. Third, it can track each on a given round, for later statistical analysis. Lastly it can give players live data such as the longest drive distance, average drive distance, the total scores, and many other interesting facts. Our system gives the player an eagle's eye view of the hole to provide the information the player need to play a game confidently and to get lower scores. All the information you need is presented clearly on a brilliant white OLED display, powered by a rechargeable lithium-ion battery designed to last up to 14 hours on a single solar cell charge. [C554]

"A novel modulation scheme for visible light communication"

In this paper a novel modulation scheme for visible light communication (VLC) using bright white LEDs (Light Emitting Diode) is introduced. Pulse Dual Slope Modulation (PDSM), an extension of Pulse Slope Modulation (PSM), is presented along with its properties. This modulation scheme attempts to addresses the three major issues in Physical Layer for VLC which are Intra-frame flicker compensation, Interframe flicker compensation and Light dimming. [C555]

"A low cost vein detection system using integrable mobile camera devices"

There has been a lot of discussion and research recently on mobile heath solution equipment. This paper presents such a solution in form of a vein detection system using an infrared light emitting diode [LED] illumination array and a cellphone camera. [C556]

"Polarization effect's impact on luminous efficiency in InGaN/AlGaN MQWs LED"

Polarization effect would form built-in polarization electric filed, leading to the bend of energy band, which influences the radiative recombination rate of the carries. Taking account of the difference of piezoelectric polarization effect of heterogeneous materials in the stress, we used the APSYS module of crosslig to simulate the impact of different polarization charges on luminous efficiency of InGaN/AlGaN MQWs LED, and compared the difference of quantum wells with different heights of energy band in the same proportion of the polarization charges by regulating the component of In. Besides, the paper combined output power, Internal Efficiency, I-V curve, and carrier distribution to discuss the luminous efficiency of InGaN/AlGaN MQWs LED under heterogeneous polarization filed respectively, and the influence of different injection currents on the LED performance. [C557]

"Using anti-membrane and TIP to improve power LEDs quantum efficiency"

The paper studies the technologies to improve the quantum efficiency of light-emitting diodes (LEDs), and designs new LED structures from the theory and software simulation. Including new LEDs with anti-membrane and truncated-inverted-pyramid (TIP) chip. Then we try to design a new kind LEDs with the two ways together. Their relative improvements of luminous efficiency are 16.8%, 26.933% and 47.198 %.These studies provide effective data and design methods to improve the efficiency of quantum LED. [C558]

"High efficiency single-doped white phosphorescent light-emitting diodes"

Efficient polymer white-light-emitting diodes (WPLEDs) have been fabricated with a single emissive layer, blue-green fluorescence polymer doped with a red phosphorescent dye. The device structure consists of ITO/poly(ehtlenedioxythiophene):poly(styrene sulfonic acid) (PEDOT:PSS)/poly(N-vinylcarbazole) (PVK) /poly(9,9-dioctylfluorene) (PFO): Ir-complex (Ir(DMFPQ)2pbm) /CsF/Al. Energy transfer occurred from PFO to Ir(DMFPQ)2pbm, leading to electroluminescence quench of PFO. Pure and efficient white light emission was realized by tuning the weight ratio of PFO:Ir(DMFPQ)2pbm to 99.7: 0.3. The maximum current efficiency and luminance of WPLEDs were 9.6cd/A at 7.8V and 13491cd/m2at 11.4V, respectively. [C559]

"Thermal resistance analysis of high power light emitting diodes"

Thermal characteristic of light emitting diodes is one of primary reliability parameters. In this paper, the thermal resistances of different kinds of blue and white high power LEDs are measured by the forward voltage based method. The relationships between thermal resistance and heat time at measurement currents 1mA, 5mA and 10mA are obtained respectively. The results show that there is optimum heat balance time of 300~1200s to measure the thermal resistances at room temperature. The influence of current crowding, the phosphor and heat sink to the thermal resistance has been demonstrated. [C560]

"The influence of the growth temperature on the doping characteristics of P-GaP layers in AlGaInP red LED"

The doping characteristics of P-GaP layer in AlGaInP red LED has been studied, by changing the low pressure metal organic chemical vapor deposition (LP-MOCVD) system's growth temperature. Several epitaxial samples, which grown at different temperatures of LP-MOCVD, have been tested by ECV system. The results have been shown,that the doping density and the surface of GaP layer and the characteristics of the LED changed with the growth temperature of GaP layers. This experience can be used for the fabrication of high-performance AlGaInP red LED. [C561]

"Thermal and optical properties of power LEDs"

With the increased efficiency of high power LED, the thermal design of the device used LEDs become more important. In this paper, four kinds of white power LEDs were selected, and the aim of this study was to compare the thermal and optical properties of the white power LEDs from different LED vendors, and to find LEDs with the optimal properties. Moreover, each group of LEDs was made into bulbs of different watts, respectively. The characteristics of these bulbs are also tested, and the relationship between the temperature and the luminous efficiency is obtained. [C562]

"Hybrid organic/inorganic nanocrystal-based composite for color-conversion and visible light communications"

A novel colloidal quantum dot-polyimide nanocomposite system aimed for integration with GaN-optoelectronics for color-conversion and visible light communications is reported. The nanocomposites' static and dynamic optical properties, including modulation responses, are assessed. [C563]

"Compact ozone photometer based on UV LEDs"

In this paper we have demonstrated the feasibility of a compact autonomous sensor for continuous, in-situ monitoring of ambient ozone (O3) from UAVs. The primary innovation in this sensor is the combination of newly available light emitting diodes (LEDs) operating in the ultraviolet (UV) spectral region with compact, low-power, sensitive data acquisition electronics. The advent of LEDs operating in the UV region overlapping the Hartley band (255-260 nm) [1] of absorption for ozone enables the development of a very compact and highly sensitive optical sensor that can monitor O3concentration with good precision. A UV LED-based ozone sensor has many advantages over currently available technologies, which use the 254 nm emission line from mercury discharge lamps as sources. Attractive LED features include: (1) low beam divergence, allowing collimation for propagation over long distances, (2) high brightness, allowing for shorter optical path length and higher measurement rates than lamp-based sensors, (3) stable power output over long lifetime, (4) amplitude modulation by current, and (5) passive wavelength stabilization. Furthermore, the mercury lamp requires ~1 kV to initiate the discharge and exhibits power degradation over time. [C564]

"Silicon nanocrystal microcavity light emitting diodes"

A silicon-based resonant cavity light emitting diode is presented in this paper. Via the microcavity effect, the

electroluminescence spectrum is significantly reduced and the emission intensity is enhanced, showing the potential of silicon lighting devices. [C565]

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"Miniaturised optoelectronic tweezers controlled by GaN micro light emitting diode arrays"

CMOS-controlled GaN micropixel light emitting diode arrays have been used to create light patterned electrodes in a miniaturized optoelectronic tweezers device. We present this micro-system's capabilities for manipulating micro-particles including beads and cells. [C567]

"Non-radiative energy-transfer-driven quantum dot LEDs"

Semiconductor nanocrystal quantum dots with their tunable optical properties, narrow photoluminescence, and high photostability have generated great interest in light-emitting device applications. [1, 2] Such colloidal quantum dots that are directly electrically driven in light-emitting diode (LED) structures have been extensively studied in the last decade. However, these LEDs unfortunately suffer from the fundamental problem of poor charge injection into these nanocrystals, which have high potential barriers due to their ligands surrounding them. This problem has been investigated and attempted to be minimized through various optimization methods. [3, 4] As a result, although today the device external quantum efficiencies can now reach ca 2.7 % [5], the main problem with charge injection still exists. On the other hand, conjugated conductive polymers are being used for organic based LEDs for several decades. These LEDs can reach higher quantum efficiencies over 20 % [6]. But these devices suffer in most of the cases from instabilities and degradation of the polymer active layers. To combine the advantages of each material system, hybrid organic-inorganic structures have also previously been investigated to obtain more ingenious devices. However, in all of these hybrid devices, the basic operation has mainly been based on the same mechanism of conventional charge injection into the nanocrystal active material. [C568]

"High efficient solution processed yellow phosphorescent iridium emitters"

A new small molecular yellow iridium complex was synthesized (PO-01-TB). A solution process OLED prepared using 6% of PO-01-TB as dopant in blend of PVK exhibits yellow emission with current efficiency of 35 cd/A. [C569]

"High efficient yellow-green electroluminescence from polymer light-emitting diode on flexible substrate"

A highly efficient yellow-green flexible polymer light-emitting diode (PLED) is reported in the study. Poly(ethylene terephthalate) (PET) is used as the flexible substrate. The maximum luminance was 38478 cd/m2The maximum efficiency of PLED was 11.32 cd/A. The electroluminescent peak was at 561.56 nm. [C570]

"Au-silica core/shell hybrid nanoparticles furnished with CdTe nanocrystals for enhanced plasmon-exciton interactions"

To date extensive research efforts have confirmed that optical properties of bulk semiconductors and metals are substantially modified when they are transformed into nano-dimensions. For example, metal nanoparticles with dimensions less than hundred nanometers strongly oscillate at a specific resonance frequency to generate localized surface plasmons depending on their size. This creates strongly localized electric fields in the close proximity of the metal nanoparticles under external excitation. Similarly, because of the size effect, semiconductor quantum dot nanocrystals (NCs), with dimensions less than 10 nanometers, feature highly tunable absorption and emission characteristics. High levels of brightness and photostability, and broad excitation range with sharp emission spectra make these NCs ideal candidates as active materials in light emitting diodes and solar cells, and as fluorescent labels in bioimaging. This paper presents the synthesis and characterization of a new set of CdTe NC decorated, Au-silica core/shell hybrid nanoparticles with silica shell thicknesses controlled and tuned by synthesis.This paper demonstrates that Au-silica core/shell nanoparticles can successfully assemble CdTe nanocrystals right on their silica shells for enhanced plasmon-exciton interactions, while avoiding the problems of lacking control in spacing and limited film thickness. [C571]

"Cathodoluminescence characteristics of linearly-shaped staggered InGaN quantum wells light-emitting diodes"

Growths of linearly-graded staggered InGaN quantum wells light-emitting diodes are performed, and the use of this novel active region leads to 2.5-3.5 times increase in output power. [C572]

"OLED technology scalable for television: Solution process delivers printed lifetime"

DuPont recently announced the achievement of record performance in printed organic light emitting diode (OLED) displays, sufficient to enable future adoption of OLED television. Printed devices have reliably achieved T50luminance lifetimes of 29,000 (red), 110,000 (green) and 34,000 hours (blue) at typical television brightness. [C573]

"Influences of ITO anode thickness on OLED efficiencies"

In this work, emission characteristics of OLEDs as a function of the ITO anode thickness were investigated theoretically and experimentally. The efficiency characteristics show significant variations (1.34 times in quantum efficiencies, 1.44 times in cd/A efficiencies and 1.51 times in lm/W efficiencies) vs. ITO thickness. [C574]

"Visible light positioning: Automotive use case"

The use of positioning sensors on automobiles is becoming increasingly common with the desire to facilitate utility and traffic safety by giving the driver information on the automobiles position relative to the surroundings. In this paper we introduce a positioning technique based upon automobile LED lighting-either taillights or headlights-that we believe is cost effective, low complexity, offers the promise of high accuracy while using existing automobile illumination lighting. [C575]

"2-inch full wafer nanoimprinting for GaN-based LEDs"

A rapid and cost effective method for nanostructure fabrication in a large area was proposed in this paper. The integration of conventional ultra-violate lithography and self-developed technique was adopted to fabricate 700 nm nanocasts. Polydimethysiloxane (PDMS) was used to be a flexible mold material for the 2-inch wafer area uniform imprinted structures. This rapid structure fabrication technique can be applied to commercialized light emitting diode as a texturing surface to raise the light extraction efficiency significantly. [C576]

"Enhanced light extraction of GaN-based LEDs with various shape and geometric lattice photonic crystal structures"

Photonic crystal structures with different shape air holes including triangles, squares, and circles were fabricated on top of blue GaN-based light emitting diodes using electron beam lithography and inductively coupled dry etching processes. Light extraction dependence of the patterned LEDs on shape and geometrical symmetry of two-dimensional photonic crystal structures was demonstrated. Cathodoluminescence studies reveal that the LED with a hexagonal lattice photonic crystal structure of the square air holes shows about 5-fold enhancement of luminescence intensity compared to sample without photonic crystal structure. [C577]

"White light emission from blue InGaN LED with hybrid phosphor"

In this work we fabricated white LEDs using a blue InGaN LED precoated conjugated copolymer/QDs composite (green-emitting Poly [(9,9-dioctyl-2,7-divinylenefluorenylene)-alto-co-(2-methoxy-5-(2-ethylhexyloxy)-1,4-phenylene)]/red-emitting CdSe quantum dots) as hybrid phosphor. The emission peak wavelengths of blue, green and red emissions in spectra are 462 and 618 nm respectively. Green-emitting polymer has two emission peaks (515 and 543nm). The subpeak of polymer (515 nm) is covered by absorption of QDs. Therefore the emission of first peak is decreasing as increasing the ratio of QDs while the emission of QD (618 nm) is increasing. Therefore CIE-1931 coordinate, the color temperature (Tc) and the color rendering index (Ra) were changed by the different ratio of QDs to copolymer. The white LED of the hybrid phosphor containing 20 wt% QDs has a luminous efficiency of 44.2 lm/W at 20 mA with a CIE-1931 coordinate of (0.3297, 0.3332), Tc of 5620 K and Ra of 75.3. [C578]

"A single stage SEPIC PFC converter for LED street lighting applications"

Light Emitting Diodes (LEDs) with their current performances have been proved to be the most suitable solution for street lighting applications. Nowadays, a topic of interest in this context is the design for electronic driver in order to take the advantage of LEDs performances. However, requirements such as high power factor, long life time, accurate current control and high efficiency pose challenges to the design of LED driver circuits. Single-stage power factor correction (PFC) topologies are preferred here for their advantages of lower cost and near unity power factor, while adding a separated PFC stage will surely increase the cost. This paper presents a high

efficiency single-stage LED lamp driver for street lighting applications based on SEPIC PFC converter topology operating in continuous conduction mode (CCM). This converter has achieved high efficiency and high power factor all over the operating range with low total harmonic distortion (THD). Simulation results are provided to demonstrate the effectiveness of the proposed driver. Then, a laboratory prototype is built to verify the feasibility of the proposed LED lamp driver. [C579]

"Band-level control for high-performance colloidal quantum-dot LED"

Here we report hybrid organic/inorganic quantum-dot LED with high-performance. Use of sol-gel TiO2as electron transport layer allows the device to be fabricated with all-solution process and have more efficient energy band structure for carrier injection and confinement. Quantum dot layer was crosslinked and thermally annealed to enhance the device performance. Quantum dot crosslinking not only made all-solution process feasible but also enhanced hole injection by shifting valance band of 0.3~0.6 eV, resulting in better charge balance. The degree of band-level shift depends on the asymmetric adsorption of ligand which might cause the dipole alignment of QD layer through the hole transport. The resulting device showed a high luminance (>;10,000 cd/m2), low turn on voltage (1.9 V), and the high power efficiency (2.41 lm/W). Incorporation of the technology into a display device with an active matrix drive backplane for the first time suggests that the approach is promising for high performance, easy-to-fabricate, large area displays and illumination sources. [C580]

"6 inch full field wafer size nanoimprint lithography for photonic crystals patterning"

The HB-LED market grew rapidly in the last years and will see grater than 50% growth this year. The current applications are dominated by portable device backlighting, e.g. cell phones, PDAs, GPS, laptop etc. In order to open the general lighting market doors the luminous efficiency needs to be improved significantly. Photonic crystal (PhC) structures in LEDs have been demonstrated to enhance light extraction efficiency on the wafer level by researchers. However, there is still a great challenge to fabricate PhC structures on LED wafers cost-effectively. Nanoimprint lithography (NIL) is one promising technology for manufacturing of electronic devices of low nm scale. However, the current NIL techniques with rigid stamps rely strongly on the substrate flatness and the production atmosphere. UV-NIL with flexible stamps, e.g. PDMS stamps, allows the large-area imprint in a single step and is less-sensitive to the production atmosphere. Unfortunately, the resolution is normally limited due to stamp distortion caused by imprint pressure. The NIL technique developed by Philips Research and SUSS MicroTec, substrate conformal imprint lithography (SCIL), bridges the gap between UV-NIL with rigid stamp for best resolution and soft stamp for large-area patterning. [C581]

"Growth of III-Nitride quantum structures for device applications"

Using GSMBE with ammonia on (0001) sapphire substrates, AlN/AlGaN nanostructured short period superlattices (SPSLs), with respective well and barrier thickness from 0.5 to 1 nm and from 0.75 to 1.5 nm, have been shown to have energy gaps in the deep UV suitable for light emitting diodes (LEDs) and photodetectors (PDs) operating down to 247 nm. Performance of LEDs and PDs is limited by factors including efficiency of radiative recombination and absorption in the active region and electrical resistivity of p-type wide bandgap SPSLs. Based on MOVPE, we have used selective area epitixy (SAE) to grow InGaN/GaN quantum structures. By patterning SiO2hard mask materials on planar sapphire substrates, we have grown various shapes including pyramidal stripes with InxGa1-xN multiple quantum wells. The structures at the apex are found to have very high In content with corresponding optical emission in the green wavelength range and excellent uniformity. [C582]

"Designing of a 16-bit microprocessor by using FPGA"

History has marked a large number of man endeavours towards building machines that are capable of performing arithmetic operations more efficiently than he can do himself. These started with very primitive instruments but evolved over the course of time due to the accumulative knowledge of man kind. In the recent decades, many computer architectures exhibiting various design methodologies and computation models have been developed. One of the most widely accepted of which is von-Neumann architecture. The brilliant mathematician, John Louis von-Neumann (1903-1957) proposed in-1945-a model for a general purpose computer that provides programmability and reprogrammability thanks to a memory structure that stores programs and data. This paper introduces a 16 bit microprocessor that adopts von-Neumann architecture and is implemented on FPGA (Field Programmable Gate Array) . In addition to that, the paper presents a software development environment for designed microprocessor. Microprocessor also exhibits the characteristics of a RISC (Reduced Instruction Set Computer). It has a small set of instructions and a limited number of addressing modes. [C583]

"Current regulated led tester design"

In this study, several circuit designs which provide testing LEDs with constant current were given and it was provided that the circuit model that is most useful were determined by comparison. With the implemented design, a large number of LED's light color, light intensity and radiation angle can be detected and compared, simultaneously. Also during the test, it is possible to measure LED forward voltage at 20 mA constant current. With the proposed design, the test process of round, oval and helmet type of LEDs can be easily done and it provides saving time during LED application development process. [C584]

"White emission from CdSe/ZnSe nanoparticles combining with 400, 430 and 460nm InGaN LED"

White light emitting diodes (LEDs) were fabricated combining InGaN LED chip as the excitation source and CdSe/ZnSe as the phosphor. CdSe/ZnSe nanoparticles were synthesized via wet chemical method using CdO, zinc stearate, TOP Se as precursors. 4.5 and 5.3 nm diameter CdSe/ZnSe nanoparticles with emission peak at 540 and 620nm, respectively, were obtained. CdSe nanoparticle phosphors were coated onto the 460, 430 and 400nm LED chips to fabricate white LEDs. As the shorter wavelength of LED chip was applied to excitation source, the luminous efficiency of white LED was enhanced. The luminous efficiencies of 400, 430, and 460nm excitation white LEDs were 2.15, 3.96 and 6.57 lm/W, respectively at 20 mA. The corresponding CIE-1931 coordinates were (0.34, 0.30), (0.30, 0.32), and (0.31, 0.29). The color rendering index (CRI) of white LED showed similar values ; 65.1, 65.5, and 66.2. [C585]

"Improvement of efficiency for OLED using Zn(HPB)q as electron transporting layer"

We synthesized a new material, (2-(2-hydroxy phenyl)benzo xazole)(8-hydoxyquinoline) [(Zn(HPB)q] which has low molecular compound and studied the improvement of OLED using Zn(HPB)q. The PL spectrum of Zn(HPB)q was yellowish green at a wavelength of 532 nm. Through cyclic-voltammetry, the ionization potential (IP) and the electron affinity (EA) were found to be 6.8 eV and 3.5 eV, respectively. We observed the possibility of Zn(HPB)q as electron transporting layer (ETL). Zn(HPB)q has been investigated as an ETL in the OLED and the optimal thickness of the Zn(HPB)q layer is about 10nm. We have obtained an improvement of luminance and decrease of turn-on voltage using Zn(HPB)q as ETL. [C586]

"Aqueous synthesis of n-/p-type ZnO nanorods on porous silicon for the application of p-n junction device"

Zinc oxide (ZnO) nanorods have shown very unique properties for applications such as field emission (FE), light emitting diode (LED), transparent film of solar cell. In general, as-synthesized ZnO nanorods have n-type semiconducting properties. Many researchers have tried to grow p-type ZnO naorods for making p-n junction device. The construction of p-n junction device using ZnO nanorods is limited by producing p-type ZnO nanorods. In this work, chemical bath deposition (CBD) is used to synthesize ZnO nanorods, Before CBD a seed layer is produced by atomic layer deposition (ALD) on n-type porous silicon (PS) To fabricate p-type ZnO nanorods, nitrogen (N) from NH3is used as doping material during seeding process. The ZnO nanorods are aligned vertically with uniform shape and length on the PS substrate. This approach opens the possibility of creating standard p-n junction device for applications as sensor arrays, piezoelectric antenna arrays, optoelectronic devices, and interconnects. [C587]

"Benchmark study of metal core thermal laminates"

New applications such as the use of High Brightness Light Emitting Diodes (HB-LED's) for general lighting have brought about significant demand for thin dielectric materials laminated to metal substrates such as aluminum and copper. Conventional FR-4 printed wiring laminates have limited thermal performance due to the poor thermal conductivity. To maximize thermal performance, it is necessary to minimize the thermal resistance of the laminate structure. To accomplish this, the thermal conductivity of the dielectric must be maximized and the dielectric thickness must be minimized. This paper summarizes the results of a benchmark study comparing the thermal performance of DuPont CooLam™ and three competitive structures measuring Junction-to-Case Thermal Resistance (RΘjc) and using thermal impedance as a figure of merit for comparing thermal performance of substrates, a primary metric commonly used in the LED packaging industry. To ensure uniform and unbiased results all test samples were fabricated by the same PWB fabricator and the testing was conducted by an independent laboratory. [C588]

"Junction temperature measurement on the light-emitting diodes lamp for space applications"

The LED device for illumination in space application has been well done in the past few years, including the in cabin application on bio-science satellite in 2007 and out cabin application on spacecraft in 2008 to shine on the first human step in space of Chinese astronaut. The thermal property of assembled LED lamp has been experimentally characterized by a recently developed spectroscopy method, where the LED emission peak shift

is used to indicate the junction temperature of LED device in lamp. The measurement precision on the LED junction temperature is about 1K, which could be used to check the thermal quality of LED lamp used for space application. [C589]

"Design of GaN-based light-emitting diodes with enhanced lateral light extraction"

We have investigated enhanced light extraction of GaN-based light-emitting diodes (LEDs) by design of mesa-holes.1Based on Snell's law, the geometry of mesa-holes acting as lateral exits for guided mode could be optimized. The LED fabricated with mesa-holes showed a 27% enhancement in output power as compared to reference LED, which was in agreement with optical ray-tracing calculations. [C590]

"Thermal measurements and analysis of flip-chip LED packages with and without underfills"

Flip chip technology is one of the advanced chip packaging techniques in IC packaging industry. This technology may provide a solution to enhancing heat-dissipation and optical performance of the LED when applying to the LED packaging. The goal of this study is to experimentally and numerically study the thermal performance of flip-chip (FC) LED (with the size of 1 Ч 1 mm) with and without underfills, by comparing with wire bond LED package. In test specimen fabrication, the LED was mounted on an aluminum nitride sub-mount with Au bumps (with 110 μm in diameter and 80 μm high), and such device was housed in the chip-on-plate (COP) package. Three types of the LEDs packages (including conventional wire bond LED, FCLED with and without underfills) were evaluated in term of junction temperature (Tj) and thermal resistance (Rth) experimentally by junction temperature tester and Infrared thermal imager and numerically by ANSYS simulation. After the simulation model validation, the effect of bump number and underfills thermal conductivity on Tjand Rthwas further investigated. The results show that the Tjand Rthfor these three packages from experimental measurements are reasonably consistent with those from ANSYS simulation. It is also shown that the Tjand Rthof FCLED with four Au bumps without underfills are higher than those of the wire bond LED. And a large thermal gradient was found on the surface of this FCLED and can be alleviated by increasing the number of Au bumps or applying underfills between the chip and sub-mount. Moreover, for improving the thermal performance of this FCLED package, the number of Au bumps and the underfills with different thermal conductivity were studied by the validated ANSYS model. The results indicated that the Rj-aof this FCLED can be lowered by 11% relative to wire bond LED by using either up to 20 Au bumps or--a underfills with thermal conductivity of 3.8°C/W. [C591]

"Strength determination of light-emitting diodes and chip structure design"

Light-emitting diodes (LEDs), representing a type of solid-state lighting, have been widely used as indicator lamps in the past few decades. It has attracted a great deal of attention in various illuminating applications in recent years due to its outstanding advantages, such as low power cost, long life time, and high efficiency. However, to make it possible to apply LED in daily life, a suitable package structure is necessary, which provides electrical interconnection and protection functions. Recently, the technology for a high power LED packaging that employs applied wire bonding process to achieve electrical interconnection has been widely adopted by LED packaging house. However, improper wire bonding parameters often result in LED die cracking or pad peeling. In this study, the strength of LED dies was investigated in order to improve the yielding of wire bonding. To determine its strength, point-load test associated with focusedion beam was utilized to measure the ultimate reactive force. Results of the experiment were further integrated with simulation technology based on the finite element method to evaluate its ultimate strength. In the PLT tests, direct contact pin-loading was applied to the epilayer surface of the LED dies and the ultimate force was measured. After the PLT tests, FIB was utilized to investigate fracture initiating location in the epilayer. The PLT results showed that the averaged ultimate force is about 75 g. According to the FIB results, the vertical load was validated as the driving force for pad peeling, epilayer crack, and LED die crack. Based on the experimental data, an FEM 3D contact model was utilized to analyze its detailed mechanical behaviours. Simulation results showed that stress concentration occurred near the edge of the pin and that the maximum stress took place in epilayer. In order to reduce the stress, three kinds of new LED structures that introduce the stress buffer layer between the Au pad and LED layers were evalua--ted, and the results showed good improvement of stress reduction in the epilayer. Nevertheless, the soft material applied for the stress buffer structure may cause another failure issue under thermal loading during the bonding process due to the mismatch of the coefficient of thermal expansion. Therefore, to achieve the optimal design and the best combination of design parameters, the simulation-based design methodology must be adopted to meet the design and production optimization goals, which would be impossible if done by conventional experiment-based trial-and-error design procedure. [C592]

"Numerical study on thermal management of high power LED die bonding technology"

Thermal management of high power LED packages is crucial to realize a reliable lighting performance. It is

known that the die attach materials acts as a bottleneck that impedes the heat flow from the junction to the heat sink. Bonding quality and techniques, thus, are important in thermal management of packaging and require detail study. Due to the difficulty in measurements, numerical simulation is a practical way to perform the thermal analysis. In this manuscript, a new low-temperature die bond material is studied. With low melting temperature of the die attach material, the LED can avoids the possible damages. The thermal analysis is carried out numerically by the finite element method. A standard surface mount high power LED is used as the reference model. The thermal impacts using different LED die bonding technology is investigated, including the localized laser pulse heating and the blanket heating. The influences of the spill of attach materials are also studied. The results indicate that low-temperature bonding materials in the laser bonding have low thermal impacts compared to the conventional bonding materials (Au-Sn) with high process temperature (330°C). The time revolution is also simulated for the heating process and the following diffusion process to raise the melting temperature to avoid the re-melting of the die attach material. The power of the laser pulse needs to be control to prevent the overheating. The blanket heating method is shown having larger time constant than the pulsed laser heating. This will be a drawback in mass production. To conclude, the new die bond materials are very suitable for reducing the thermal management issues for LEDs die bond in low-temperature laser attach technology applications. [C593]

"Constellation design for color-shift keying using billiards algorithms"

Light-emitting diodes (LEDs) have the potential to replace traditional devices in a variety of lighting applications, offering the possibility of simultaneous modulation for communications. One modulation method, color-shift keying (CSK), has been recently proposed specifically for red/green/blue (RGB) LEDs. We examine the design of CSK signaling constellations for an additive white Gaussian noise channel, incorporating the common requirement that the RGB LED outputs a specific, possibly time-varying, perceived color. In particular, we equate this design problem to that of disk packing and employ modified billiards algorithms that rely on the "thermodynamic" settling of the disks to obtain constellation points with good minimum distance. Simulation results are presented that illustrate the design approach. [C594]

"Smartphone-based low cost oximeter photoplethysmography"

The pulse oximeter plethysmograph waveform reflects dynamic net changes in arteriolar inflow and venous outflow of tissue bed capillaries interrogated by the oximeter light emitting diodes. In this study we have developed a simple and low cost oximeter photoplethysmograph device which has been interfaced with mobile phone through USB (Universal Serial Bus). There has been an unprecedented increase in the number of mobile phone subscribers in the developing world which has seen mobile phones used in ways not seen in the developed world. Mobile phones can be used to display the patient's blood oxygen saturation and pulse rate, thus dramatically reducing the cost, and to provide doctors stationed on site a means of diagnosis before the need for any medical evaluation. [C595]

"Electrical stability of PLEDs"

We report the impact of inserting a 10 nm thickness interlayer between the poly(3,4ethylenedioxythiophene):poly(styrenesulphonate) (PEDOT:PSS) and light-emitting layers on degradation, in particular the electrical stability of the injecting electrodes, in encapsulated polymer light emitting diodes (PLEDs). Continuous electrical stress testing is carried out to study the time evolution of dark injection hole transients for devices with and without a poly [2,7-(9,9di-n-octylfluorene)-alt-(l,4-phenylene-((4-secbutylphenyl)imino)-l,4-phenylene)] (TFB) interlayer. A Sumitomo Chemical Company dibenzothiophene phenylenediamine copolymer (SC002) was used as light emitting layer and PLED characteristics with and without the interlayer are discussed together with lifetime data. [C596]

"Demonstration of high-speed data transmission using MIMO-OFDM visible light communications"

This letter reports an experimental demonstration of high-speed indoor optical wireless Optical multiple-input multiple-output (MIMO)-orthogonal frequency division multiplexing (OFDM) system with an imaging receiver. The system consists of a 2Ч1 array of white LEDs that transmit data to a 9 channel imaging receiver that uses a 3Ч3 photodetector array. A total transmission rate of 220Mbit/s at a BER of 10-3is achieved over a range of 1m. An overview of the design specifications, optical design and experimental setup are reported in this letter, together with results and discussion of how improvements to the system may be achieved. [C597]

"A digitally-controlled, bi-level CMOS LED driver circuit combining PWM dimming and data transmission for visible light networks"

Recent breakthroughs in solid-state lighting technology has opened the door to a myriad of applications using

light-emitting diodes for both illumination and optical wireless networking. Low-power CMOS technology enables realization of mixed-mode, system-on-chip driver circuits integrating multiple functions on a single substrate to control LED device performance, luminance, and data modulation for "intelligent" visible light networking. This paper presents a novel LED driver circuit architecture incorporating digitally-controlled analog circuit blocks to deliver concurrent illumination control and serial data transmission. To achieve this goal, a bi-level pulse-width modulation (PWM) driving scheme is applied to enable data transmission during the "OFF" period of the LED drive current. With 3-bit PWM dimming resolution, the driver circuit enables linear luminous intensity control from 5% to 100%. Pseudo-random binary sequences (PRBS) are generated to compare circuit performance for various data modulation formats. The LED driver circuit is simulated in a 0.5 µm CMOS process and exhibits a worst-case power consumption of 100 mW with 33 mA peak PWM current. [C598]

"Spotlighting for visible light communications and illumination"

The trend toward solid state lighting with white LEDs has motivated much research for using these devices to provide wireless broadband data communications. Much work in this area has attempted to fit VLC into currently dominant indoor lighting modes, which broadcast the light in a wide field to achieve uniform coverage throughout a room. In this paper we explore spotlighting, which is appropriate lighting for many scenarios, as an alternative for implementing high datarate VLC. We find that spotlighting VLC has several benefits over uniform lighting implementations, including enabling higher datarate densities within a room and less channel distortion. We also introduce a hybrid scheme that combines spotlighting with uniform lighting to provide wide area data coverage as well as high-datarate "white hot spots" where needed. [C599]

"Effective thermal management of multiple electronic components"

The objective of this paper is to provide an effective and accurate analytical solution to compute the spreading thermal resistance of a vapor chamber thermal module, as well as the surface temperatures and the heat flux distributions at the heating surface. The analytical solutions are expressed in a reduced unit system with the governing parameters of the corresponding distance between heat sources, dimensionless plate thickness of the vapor chamber. This paper also presents vapor chamber temperature distribution, and it is correlation to heat source sizes, hence, spreading thermal resistance decreases with the increasing lateral length. There is the obvious difference between spreading thermal and conductive thermal resistance as lateral length is disproportion to heating area. Therefore, spreading thermal resistance is an important factor when design the thermal solution of a high density chipset power, and it caused high temperature in heat sources by embedded a thinner heat sink base. According to Fourier conductivity theorem, spreading thermal resistance is disproportion to sink base, then thermal resistance is not only parameter for vapor chamber module design, it needs to consider spreading resistance of vapor chamber and fin performance for cooling LEDs array, in order to prevent mismatch on numerical analysis and mathematical calculation. Thermal simulation is used as a design tool, and it is close to experimental data. The difference is within 5.9%, and it presents a precise result. [C600]

"Maskless fabrication of GaN-based light-emitting diodes"

A versatile maskless process flow was developed to fabricate a GaN-based individually-addressable LED array. This new fabrication approach combines CMOS-controlled micro-LED writing and silver nanoparticle inkjet printing. An array filling factor of 99% was achieved. [C601]

"Design and fabrication of metal PCB based on the patterned anodizing for improving thermal dissipation of LED lighting"

The improvement of thermal efficiency in the light emitting diode (LED) is one of challenging topics for the wide use of high brightness LED since the excessive heat generated in the LED junction may result in the thermally induced optical and mechanical failures. To enhance thermal reliability of high brightness LED lighting, it is important to not only use components with high thermal conductivity in LED package but also improve thermal flow to the heat sink through the metal print circuit board (MPCB) where bad thermal efficiency is caused by dielectric layer with lower thermal conductivity. This study focuses on the design and fabrication of the new structure of metal PCB based on the patterned anodizing to improve thermal dissipation. The patterned anodizing makes it possible to connect the lead frame of LED package to the metal substrate directly without any thermal loss through the dielectric layer. Thus, more efficient thermal management is expected in newly designed MPCB since total thermal resistance can be reduced. In this paper, we will be present the findings, which have been resulted from thermal simulation and measurement to demonstrate the thermal performance of newly designed MPCB. [C602]

"Vapor chamber in high power LEDs"

The vapor chamber has already been confirmed that its anti-gravity, high effective thermal conductivity and suited on the high heat flux of heat source as the integral heat spreader. This article describes how to evaluate the thermal-performance of LED vapor chamber-based plate with VCTM V1.0, which has existed in the thermal-module industry for a year or so especially in high power LEDs application. There are three kinds of LED based plates utilized to discuss the thermal performance and illumination. From the results, the thermal performance of the LED vapor chamber-based plate is many times than that of LED copper- and aluminum-based plate. And the LED vapor chamber-based plate works out hot-spot problem of 50 Watt high-power LEDs, successfully. The results are shown that the experimental thermal resistance values of LED copper- and vapor chamber-based plate respectively are 0.41°C/W and 0.38°C/W at 6 Watt. And the illumination of 6 Watt LED vapor chamber-based plate is larger 5 % than the 6 Watt. Thus, the LED vapor chamber-based plate has the best thermal performance above 5 Watt. [C603]

"Flexible crystalline InP nanomembrane LED arrays"

This paper reports on flexible crystalline InP nanomembrane LED arrays with transferred InGaAsP/InP QW structure on plastic PET substrate. Two types of QW heterostructures have been designed, with total cavity thickness of one λ (wavelength). The PL peak locations are around 1527 nm. An InGaAs etch stop/sacrificial layer was used for the release of top InGaAsP QW active region. Different structures were formed based on InGaAsP QW NM transfer process. The flexible InP LED devices show excellent electrical and optical performance with low turn-on voltage, low series resistance, and the spherical optical beam profile. We also analyzed the InP LED light beam by using beam profilers. Beam profiles of flexible crystalline InP LED array without bending was investigated at room temperature whereas the driving current is 0.31 mA . Similarly, the same device with bending also was measured when the driving current is 0.36 mA.. The beam profile of device without bending is almost elliptical in shape whereas that of bending device is not elliptical. [C604]

"Yellow-green and amber InGaN micro-pixellated light-emitting diode arrays"

Micro-pixel InGaN LED arrays operating at 560nm and 600nm, respectively, are demonstrated, based on new epitaxial structures. Such devices have applications in areas including bioinstrumentation, visible light communications and micro-displays. [C605]

"Image-containing InGaN LEDs for pattern-transfer applications"

We report a simple process which enables the fabrication of a single light-emitting diode with spatially patterned emission. The patterning is based on the selective passivation of the p-doped GaN with a CHF3plasma treatment. [C606]

"An instruction to high thermal conductive materials"

Along with the increase in circuit density, it becomes more difficult to dissipate heat through the surface of the components. Therefore, the designs and applications for the materials used in heat dissipation as well as high thermal conductivity and low CTE have become the focal point for discussion. In addition, as the high luminance of LEDs is increased and development for brighter LEDs continues, traditional printed circuit boards are finding it more difficult to catch up with the new thermal management need. As such, metal core PCBs are developed to improve the path of heat dissipation, to increase light emitting efficiency, and extend the service life. We had developed heat dissipation materials for the thermal management of LEDs and MCPCB. Materials are available in thermal conductivity from 1.0W/mK to 3.0W/m.K, but these are not enough to apply to electric devices which require high heat dissipation efficiency. In the next step, We proposed a novel material design to improve the the thermal conductivity of isotropic resins by controlling, high order structures. By mixing this resin with certain kinds of filter (ex. BN) it is enabled to obtain the higher thermal conductive composites, which has not reached by the conventional resin. The composites would be widely applied to the portable' multi-layered printed circuit boards for automobiles (ex. head light), and street lamp. [C607]

"High thermal dissipation and high reliability performance of wafer level high power light-emitting diodes"

In this paper we present the thermal analysis and reliability performance of high power light-emitting diodes (LEDs) with silicon carrier packages. The junction temperature of LEDs is an essential reliability parameter. Exceeding the maximum raised junction temperature could lead to light output degradation and sometimes even to destructive failure. Therefore thermal management and proper thermal characterization of high power LEDs is very important for mass production with good optical and reliability performance. Leaf-frame, ceramic and organic material are used as conventional structure. The thermal resistance is 13 20°C/W and 8 12°C/W

respectively. It will be a drawback for thermal dissipation for high power LEDs especially for outdoor lighting application. Silicon material is a widely investigation material in recently. Low thermal resistance (3 5°C/W), low cost and high current capacity are good for high power LEDs. Furthermore, the wafer form assembly method is a trend in the future for high volume mass production. Traditionally, silver paste adhesive is used as die attach material. Voids and low thermal conductive are critical issues for high power LEDs due to most of the thermal will cross the chip and raising the silicone material temperature then result in phosphor thermal decay. Here we use eutectic die attach process instead of paste to enhance the thermal dissipation. In the meantime, we use thermal simulation to predict the thermal resistance of the package and also testing the real package. The thermal resistance is 3.9°C/W and 2.77°C/W respectively. Finally, the package reliability also performed such as temperature cycling test (TCT) 1000 cycles, Temperature Humidity Test (THT) 1000Hrs, room temperature life testing and high temperature life testing. The results show the luminous flux decay ≤ 4% which is high reliability performance. And SAT also shows no delamination within th--e package. [C608]

"Spot Mura evaluation in TFT-LCDs using automatic optical inspection"

A quantitative automatic optical inspection (AOI) is developed to detect spot Mura in the green layer of the color filter for TFT-LCDs through the linear transmittance light engaged with digital imaging. It can detect a color range at 0.001 of CIE xyY, even lower than the just noticeable difference (JND). Further, a reflective spectrometer can identify the tendency of CIE y at the green layer, which is a convex profile for a thick film and concave profile for a thin film. The line scan photo sensor is capable of detection to 0.3 along with spot non-uniformity for the color difference of CIEDE 2000, and even lower. [C609]

"Some special phenomena observed from in-line sputtered aluminum doped zinc oxide films"

In-line sputtered aluminum doped zinc oxide (AZO) films with different substrate temperature have been made. Anisotropic stress of AZO films produced during in-line sputtering was proposed before. This work reports more special phenomena observed from in-line sputtered AZO films attributed to anisotropic stress effect. Three different types of AZO films' surface morphology: a. rounded grain and nearly uniform grain size, b. rounded grain and apparently non-uniform grain size and c. polygonal grain processed with increasing substrate temperature were observed. Usual reported morphology change of AZO films with increasing substrate temperature is rounded grain and uniform grain size growth. Asymmetry judgment of X-ray diffraction zinc oxide (002) peak shape was proposed by checking right part divided by left part of full width at half maximum. Asymmetry of measured X-ray diffraction peak shape was found corresponding to zinc oxide (002) crystal plane. Special AZO films' phenomena of surface morphology and the asymmetry of measured X-ray diffraction peak shape give more hints on anisotropic stress during in-line sputtering process. This work contributes to industries like thin films solar cells, touch panel, light emitting diodes if AZO films were considered to be used as transparent electrodes. [C610]

"Performance of the LED array panel in a confined enclosure"

This study performs an experimental study concerning performance of an LED array under natural convection. A total of 270 1-W LEDs having an efficiency of 75% are used to simulate a large LED panel. The size of the cooling heat sink is 348 mm Ч 558 mm having vertical plate fin configuration with a fin spacing of 9.33 mm. The effect of shrouding, including shrouding above the heat sink and the blockages being placed at the entrance and exit are investigated. For the shrouding effect above heat sink, the heat transfer coefficient is first slightly increased with the rise of shroud distance and peaks at a shroud distance of 20 mm, followed by a marginal decrease of heat transfer coefficient with the shroud distance. On the other hand, a continuous but a very small increase of the heat transfer coefficients with the inlet or outlet blockage distance is seen, yet no plateau is seen as opposed to the effect of shroud distance above heat sink. For the same blockage distance, normally the heat transfer coefficient for those being blocked at the exit is slightly higher than that of inlet blockage. The maximum temperature within the heat sink does not take place at the central position; rather it peaks at the quarter position of the heat sink due to edge effect and likely higher air flow at the center position. The average heat transfer coefficient reaches 6 W/m K as the upper shield is removed. [C611]

"Direct plated copper metallized substrate for high brightness LED applications"

First Page of the Article [C612]

"A 1.2A 2MHz tri-mode Buck-Boost LED driver with feed-forward duty cycle correction"

A flash LED Buck-Boost driver employs a dual duty cycle control and feed-forward duty cycle correction to achieve high efficiency over the entire Li-On battery voltage range of 3.0 to 5.2V. Fabricated in a 0.5μm CMOS process, the converter uses an external 1μH inductor and a 10μF capacitor and operates at 2MHz switching

frequency. The measured peak efficiency is 83% and 87% at 1.2A and 0.6A LED currents, respectively. This achieved efficiency represents an improvement of more than 10% over conventional approaches. [C613]

"High power LEDs for solid state lighting"

For solid stated lighting high light output in combination with high conversion efficacy is essential. High efficiencies are relatively easy to realize at low current densities, but efficiency tends to decline as the current is cranked up. In order to overcome the barriers for high flux LEDs, both epitaxy and chip design have to be optimized. In this paper we report on the improvement of ThinGaN®PowerLED structures in epitaxy, chip design, phosphor efficiency and package design. A key for improving LED performance is understanding the carrier loss mechanisms in blue and green epitaxy structures. Assuming an indirect Auger effect as one of the major loss mechanisms in InGaN LEDs, a reduction of the carrier density per emitting well is enabling efficiency improvement for blue/green LEDs. Along with improved epi designs the extraction efficiency had to be improved. A new chip design allows high current operation in combination with efficiencies beyond 1001m/W for white. New conversion schemes allow the fabrication of extremely efficient green light sources, which enable new generations of high flux projection applications. [C614]

"An improved control strategy based on multiplier for CRM flyback PFC to reduce line current peak distortion"

With high input voltage or light load, the peak of AC line current for critical conduction mode (CRM) flyback power factor Correctors (PFCs) appears notably distorted. In this paper, the reasons of line current distortion are investigated. Moreover, the relationship between line current peak distortion and high input voltage or light load is presented. Based on theoretical analysis, a simple improved control strategy is proposed. Finally, an experiment is carried out and the results convincingly demonstrate the effectiveness of the proposed method for reducing line current peak distortion. [C615]

"The path to volume production for CPV optics"

A crucial prerequisite for a commercial success of large-scale CPV is the capability for mass production of the manufacturing processes. For the optical components (primary and secondary lenses) there do exist various production concepts with different potential for cost efficient mass production. The most promising concept is (compression) injection molding, a process technology for optical components already proven in mature industries like Automotive or Semiconductor. While the capability of the injection molding process for a real mass production is already well established, it needs to be proven that also the high quality requirements in CPV can be met. Injection molded PMMA Fresnel lenses can be manufactured with peak-to-valley deviations less than 10 µm, showing nearly no inner stress and very low and homogeneous edge radii in the order of 5 µm. A second approach for primary Fresnel lenses, namely injection molding of Silicone on Glass allows to take advantage of the mass production capability of injection molding also for this 2 component lens. The inherent advantage of this production method is clearly the achievable lower cycle time (= lower cost) and the high quality, e.g. no bubbles or intrusions. For volume production, this process can be extended to a fully automated production line with standard production equipment. For secondary CPV lenses, the requirements for the material are significantly higher, especially for larger concentration ratios. Since the conditions are comparable to lenses for high-brightness LEDs, the materials and technologies used there can be transferred to CPV secondary lens applications. Transparent silicone lenses have been proven to withstand the radiation density as well as the high temperatures. Thus, the use of injection-moldable silicone lenses for CPV is obvious. [C616]

"Optimization of organic tandem solar cells based on small molecules"

Organic solar cells (OSC) have attracted growing attention in recent years and their development has reached a stage at which several companies are preparing to make them commercially available either as standalone products or integrated into other device. There are different production routes for OSC: one very promising approach uses thermal evaporation of small organic molecules in vacuum, i.e. the same approach that is used in all current commercial manufacturing of organic LEDs. We use vacuum processing to create an organic stack in the p-i-n concept. In this concept the intrinsic absorber layers are sandwiched between p- and n-doped wide gap transport layers which leads to a nearly ideal solar cell structure and offers a stable platform both for investigation of fundamental processes and device optimization. In recent years it was found that the device operation crucially depends on the morphology of the bulk heterojunction and that optical interference effects in the organic stack play an important role for light absorption. We show here how the morphology of the organic layers can be controlled in vacuum deposited layers, and describe the optical optimization of tandem solar cells, for which an efficient recombination contact and current matching are essential requirements. Applying these principles and subsequently combining two complementary absorbing subcells lead to a tandem organic solar

cell with an independently certified efficiency of 6.07% on 2cm2device area, i.e. the first OSC over 6% on module relevant dimensions. [C617]

"Performance measurements at varying irradiance spectrum, intensity and module temperature of amorphous silicon solar cells"

This paper demonstrates photovoltaic (PV) device performance measurements for energy rating and energy yield calculation derived indoors with an LED-based solar simulator prototype under varying irradiance (G), temperature (T) and spectrum (E), opening the possibility for much faster and more accurate energy yield prediction than previously possible from measurements acquired either indoors or outdoors, with the additional inclusion of spectral influences. The main aspects of the LED-based solar simulator used are described briefly and the measurement method with its requirements is explained in detail. Also presented are the first performance measurements made with an amorphous silicon solar cell; measuring the spectral effects reported in outdoor measurements for the first time in the laboratory. Results show a good agreement with previously reported spectral effects from outdoor measurements and underline the importance to consider all three environmental vectors (irradiance, spectrum and device temperature) for energy yield focused measurements. [C618]

"Power-transfer of isolated converter with integrated power sharing for LED-lighting system dependent on transformer coupling"

An isolated power converter topology is presented which uses an integrated passive power-sharing network for equal brightness levels in parallel LED branches. Analyses show the dependency of the power sharing quality on transformer tolerances and highlight the influence of transformer leakage inductances on the achievable power transfer of the topology. An optimum design for minimum switch current stress at given leakage inductances is presented. A full size prototype operating from the 230 V mains supply and achieving a luminous flux of above 7000 lumens has been built and tested. Experimental results of power transfer and power sharing are in good correlation with theoretical predictions. [C619]

"High efficiency DC-DC converter with twin-bus for dimmable LED lighting"

A novel twin-bus converter using n + 1 active switches is proposed for the n-string LEDs to be dimmable from true zero to the rated current level. With the proposed twin-bus structure, the n-switches that perform the current-loop regulation can operate at very high frequency because of significantly reduced voltage stresses, while achieving high efficiency over a wide load range. With operating frequency exceeding 1 MHz in the test case, the proposed LED driver demonstrates ultra compact size inductor and fast slew rates of the LED current. The dimming controlled switch, however, can operate at a low frequency to ensure high-efficiency operation without light flicker. The detailed power stage operating principle and control scheme of the individual string current for the presented converter are described. Experimental results of a 3-string 50-W LED driver hardware prototype show that the independent string current can be regulated from zero to the desired 350 mA for dimming control. A peak efficiency of 98.3% was achieved with 1.08 MHz switching frequency. [C620]

"A driving technology for retrofit LED lamp for fluorescent lighting fixtures with electronic ballasts"

A driving technique that can operate with electronic ballasts for fluorescent lamps to drive light emitting diodes (LEDs) without requiring the replacing of any electronic ballast circuitry or modifying the existing infrastructure of a lighting network is presented. This technology provides an eco-friendly and immediate solution to turn a lighting system with fluorescent lamps into the one with LED lamps. The proposed technology is based on controlling the input impedance of an ac/dc converter, which is connected to the output of the ballast, and converting the high-frequency ac power from the ballast into dc power for the LEDs. An experimental LED lamp prototype for retrofitting 36 W T8 fluorescent lamp has been built. [C621]

"Led spectral and power characteristics under hybrid PWM/AM dimming strategy"

In order to dim LEDs the pulse width modulation (PWM) or amplitude modulation (AM) dimming scheme is typically used. Previous studies show that these dimming schemes can have opposite effects on diodes peak wavelength shift. An experimental study was conducted to test the behavior of InGaN diodes and phosphor-converted white diodes under hybrid PWM/AM modulation. Feed forward control schemes that provide stable peak wavelength position during dimming and the ability to compensate the thermally induced color shifts and the decrease of the luminous flux are investigated. [C622]

"A comparative study on the circuit topologies for offline passive light-emitting diode (LED) drivers

with long lifetime & high efficiency"

In this paper, we present a practical comparison on a range of circuit topologies suitable for passive LED drivers. These circuits consist of passive components and do not require any semiconductor controlled switches, auxiliary power supply and control integrated circuits. The power loss components, the energy efficiency and the output current ripple are examined. These passive LED drivers are particularly suitable for outdoor applications such as street lighting in which extreme weather conditions including lightning and wide temperature range, and maintenance issues are major concerns but the size of the LED drivers is not critical. With extremely simple and reliable circuitry, these passive LED drivers achieve remarkably high energy efficiency. Energy efficiency of 92-94% has been achieved for LED systems of 50 W in this study. [C623]

"A low-cost AC-DC High-Brightness LED driver with Power Factor Correction based on standard Peak-Current Mode Integrated Controllers"

This paper presents a new control strategy for Power Factor Correctors (PFCs) used to drive High-Brightness Light-Emitting Diodes (HB-LEDs). This control strategy is extremely simple and is based on the use of a standard Peak Current-Mode Integrated Controllers (PCMIC) reducing its cost and complexity in comparison to traditional PFC controllers. In fact, this method is an alternative implementation of the One Cycle Control (OCC) to PFCs belonging to the Flyback family of converters, without introducing high complexity for reducing the Total Harmonic Distortion (THD). In this case, the use of a simple exponential compensation ramp instead of a linear one is the proposed solution for drawing a sinusoidal input current. Moreover, the line current is cycle-by-cycle controlled and, therefore, the input current feedback loop is extremely fast, which allows the use of this type of control with high frequency lines. The proposed idea is to apply this simple control to a single stage PFC in order to design a low-cost AC-DC HB-LED driver. Finally, an experimental prototype of this driver was developed. [C624]

"Discomfort Glare Comparison For Various LED Cap Lamps"

Researchers at the National Institute for Occupational Safety and Health (NIOSH) are investigating different lighting technologies with the objective of improving mine safety. This paper presents results from an ongoing study that compares discomfort glare for different LED cap lamps using the de Boer rating scale. The cap lamps tested included two commercially-available LED cap lamps and one NIOSH prototype LED cap lamp tested at three different illumination levels. Prior research indicated the NIOSH prototype enabled much better visual performance as compared to other LED cap lamps. It uses three LEDs that produce multiple illumination areas in comparison to commercially-available cap lamps that use one LED and project a narrow spot pattern. Across subjects and cap lamp test conditions, measured illuminances (averaged at both eyes) varied from 0.62 lux to 3.73 lux; whereas, the de Boer glare ratings varied from 4.86 to 7.71. An analysis of variance based on 15 subjects indicated a significant difference in discomfort glare due to cap lamps (F 4, 52 = 18.01, p <;0.001). Post hoc tests indicate that one of the commercially-available cap lamps exhibited lower discomfort scores, with no statistically significant differences detected between the others. Thus, the NIOSH prototype cap lamp does not cause. [C625]

"Design and application of new kind of electronic and mechanical antitheft lock using DSP"

A new kind of electronic and mechanical antitheft lock using digital code based on the technologies of DSP, serial communication and wireless data transmission is introduced. This lock has several functions with good security, identification and alarm-giving. It is simple and has wide application and high reliability. Hardware frame and software flowchart of the system are presented as its function, constitution, principle and the development of mechanism have been specified. [C626]

"Design and research of high-power LED driver power supply based on optimized PID algorithm"

High-power LED illumination system has high requirements on the LED driver power supply including conversion efficiency, dimming efficiency and constant-currency accuracy. In this paper, the design is on the basis of fly-back LED driver by SSL2101 and makes use of feedback and control theory of control system, hardware works in the closed-loop state, Meanwhile, we adopt genetic algorithm and direct search strategy to optimize PID parameters in the software design, the optimized PID algorithm can control the power better, and closed-loop control in the software is reached. We will achieve precise control of output current and improve the output current stability, load capacity and conversion efficiency of the current source. [C627]

"Implementation of a stand-alone photovoltaic lighting system with MPPT battery charging and LED current control"

This paper presents a efficient stand-alone battery photovoltaic (PV) lighting system which can provide functional illumination based on power light-emitting diodes (PLEDs). PLED with specific features of small size, long life and high-brightness light will be choices of future light sources. The PLEDs are feed using a lead acid battery that is charged with a PV panel. This paper presents an interface board with a ATMEL ATTINY861V microcontroller, a single-ended primary inductance converter (SEPIC) and input and output voltage and current measurements. The microcontroller runs the perturbation and observation (P&O) maximum power point tracker (MPPT) algorithm used in battery charging process. This algorithm makes the system more efficient. In order to control the PLEDs current, an equal interface board is used running now the proportional integral (PI) current PLED control algorithm adjusting the wanted level of light in the PLEDs array. The two identical interfaces boards based in the economic microprocessor achieved very good results in battery charging and discharge supervision improving the efficiency a life-time of the lead acid batteries (first board) and presents good current control results in the PLEDs array (second equal board) providing a constant PLEDs light even in voltage battery variations or discharges. The stand alone lighting system monitors the surround area and if it feels any movement it changes the level of light of PLEDs from signal light to illumination light. After a pre-defined time it comes back to signal light, saving energy. [C628]

"New Basis for the Development of the next-generation Flickermeters"

Flicker severity is a parameter defined in the Standard EN 50160 that involves both power quality and physiological features. Due to practical and theoretical reasons, the Flickermeter described by the relevant International Standard may lead to incorrect results when used to correlate voltage variations with annoyance caused by fluctuations of light emitted by other types of lamps different than those based on the incandescent-filament principle. Therefore, its replacement is under consideration by some international organizations given that these last type of lamps will be no more available on the marked starting from the next year. This paper is aiming at providing a contribution to the study of a new theory to be used for the design of the next generation Flickermeter that must account for a wider variety of luminous sources. In particular the research is focused on finding a new method for detecting the human being annoyance in presence of luminous flicker. It is based on the measurement of the pupil diameter under flicker conditions. First preliminary results confirm that this measurement technique can be considered for the above purpose. [C629]

"Design and simulation of LED clock circuit based on Proteus"

Based on the Proteus simulation software, the circuits of MCU controlling LED clock have been designed. The circuits include four parts: Hardware design, software programming, software simulation and physical display. Eventually, through the Proteus software simulation and physical display prove that the method of the circuit design is correct. This paper systematically introduces the design method of MCU controlling circuits and provides a complete design idea for the design of display circuit. [C630]

"Gray level correction algorithm of LED display panel based on least squares approximation"

Aiming at the problem that the linear characteristic of LED display panel is not compatible with the non-linear characteristic of image data, this leads to appear the large deviation during grayscale rendition, the gray level correction algorithm based on least squares approximation is provided. First, the necessity of gray level correction is analyzed. Then, the gray level correction algorithm model is constructed according to the principle of latest squares approximation. Next, realization steps are described in accordance with this constructed algorithm model. Finally, this algorithm is implemented in a LED display panel, whose resolution is 128Ч128. Experimental results show that this algorithm is able to reduce the deviation obviously during grayscale rendition and the problem of gray level deformation can be resolved perfectly because the linear relation between image data after correcting and gray level is good which satisfies the linear characteristic of LED display panel. [C631]

"Single-Stage Power-Factor-Correction Circuit with Flyback Converter to Drive LEDs for Lighting Applications"

White light emitting diode (LED) with high brightness has attracted a lot of attention from both industry and academia for its high efficiency, ease to drive, environmental friendliness, and long lifespan. They become possible applications to replace the incandescent bulbs and fluorescent lamps in residential, industrial and commercial lighting. The realization of this new lighting source requires both tight LED voltage regulation and high power factor as well. This paper proposed a single-stage flyback converter for the LED lighting applications and input power factor correction. A type-II compensator has been inserted in the voltage loop providing sufficient bandwidth and stable phase margin. The flyback converter is controlled with voltage mode pulse width modulation (PWM) and run in discontinuous conduction mode (DCM) so that the inductor current follows the rectified input voltage, resulting in high power factor. A prototype topology of closed-loop, single-stage flyback

converter for LED driver circuit designed for an 18W LED lighting source is constructed and tested to verify the theoretical predictions. The measured performance of the LED lighting fixture can achieve a high power factor greater than 0.998 and a low total harmonic distortion less than 5.0%. Experimental results show the functionality of the overall system and prove it to be an effective solution for the new lighting applications. [C632]

"FalconEye: Data Center Status Extraction via Vision Transformation Techniques"

In this study, a vision monitoring system that is applicable to the maintenance of data centers was developed and applied to data center status extraction. The vision monitoring system, which is intended to complement system monitoring tools, such as IPMI and Nagios, has the additional benefit of enabling continuous monitoring of the external status of data centers. This system, which is based on vision transformation techniques, involves three main steps: camera calibration, where the characterized physical point is determined in the data center by the setting of the system parameters; the development of vision transformation subroutines, which are aimed at transforming relatively large images into vertically expanded image streams; and the development of image analysis subroutines for the purpose of investigating images that are transformed for the data center status extraction. This Falcon Eye system of this work is implemented with the aid of a cloud computing platform, called iCube Cloud. [C633]

"Real-Time Testing of True Random Number Generators Through Dynamic Reconfiguration"

This paper presents the hardware implementation of the widely known NIST Statistical Test Suite-a battery of statistical tests for pseudorandom number generators (PRNGs) and true random number generators (TRNGs)-in a single Xilinx FPGA chip, using dynamic partial reconfiguration. The design offers a basic framework for easy integration of any additional randomness evaluation tests as well. Due to the integration of both the TRNG and the tests suite in a single FPGA chip, our solution offers new opportunities in the area of random number generation and testing, greatly reducing the time between the generation and the validation of the generated sequences of random bits. [C634]

"Si as an emissive optical medium for the 3-12 μm band"

The conventional methods of utilizing Si as a light-emitting medium are limited to the near-infrared band (λ<;2 μm). Here we summarize our recent studies in silicon structures that efficiently and controllably emit radiation in the 3-12 μm band, including a novel device design and concepts for LEDs, dynamic scene simulation devices, optical amplifiers, and radiative coolers. [C635]

"High efficient Si nano-textured light-emitting diodes and solar cells with obvious photonic crystal effect"

The light-emission efficiency in Si light-emitting diodes with nano-scale trench structure on the top surface can be enhanced about 10 times than it in the control device. The photonic crystal effect, the characteristics of the wavelength extraction, is also observed easily and it agrees well with the theoretical surface plasma calculation. In addition to the application of nano-scale textured surface structure for the light-emitting diode, the nano-textured surface Si solar cell is also observed and investigated to have the higher open-circuit voltage, short circuit current, and optic-electric transformation efficiency, due to the light trapping, low reflection on the nano-textured surface, and more carriers collected in the larger n/p junction area. The efficiency can successfully be improved about 2.9% (from 12% to 14.9%) by the nano-surface structure. These experimental results prove that the dimension of the surface structure on the Si photonic device is worthy to continuously scale down to the nano-meter scale; even the current device structure is in the order of the micro-meter scale level. [C636]

"A high-performance stand-alone solar PV power system for LED lighting"

The present study developed a high-performance solar PV power technology for the LED lighting of a solar home system. The nMPPO (near-Maximum-Power-Point-Operation) design is employed in system design to eliminate MPPT. A feedback control system using pulse width modulation (PWM) technique was developed for battery charging control which can increase the charging capacity by 78%. For high-efficiency lighting, the LED is directly driven by battery using a PWM discharge control to eliminate a DC/DC converter. Two solar-powered LED lighting systems (50W and 100W LED) were built. The long-term outdoor tests have shown that the loss of load probability for full-night lighting requirement is zero for 50W LED and 3.6% for 100W LED. [C637]

"White LED ceiling lights positioning systems for optical wireless indoor applications"

An indoor positioning system based on white LED communications is proposed and demonstrated. This positioning system shows that mean of distance errors is 0.651 cm in the space of 30 cm Ч 30 cm Ч 50 cm.

[C638]

"Optical wireless indoor networks: Recent implementation efforts"

The paper addresses concepts of recently implemented optical wireless transmission systems for broadband indoor applications based on infrared radiation as well as visible light. An overview of solutions and achieved performances is given. [C639]

"Investigation on dioptre meter with digital display and projection"

The basic components of optical principle, optical structure and electronic measurement principle of dioptre lens meter's are introduced. Experimental results proved that the designed lens meter features advantages of simple structure, easy operation and high measurement precision. [C640]

"Implementation of a real-time DMT-based 100 Mbit/s visible-light link"

For the first time, we show an implementation of a real-time DMT-based system operating at 100 Mbit/s over a visible-light link using a low-cost commercially available white LED devised for illumination. Additionally, we demonstrate transmission of a video signal over this link. [C641]

"Visible light communications"

Visible light communication is a novel way of indoor communication. In this scenario, we present the novel idea of location-based services such as indoor navigation systems, where users can tell where they are by detecting a signal from LED lights. [C642]

"Title: Achieving low cost gigabit connectivity using POF"

POF (plastic optical fiber) has demonstrated to be a very easy to install, cheap, and robust 100Mb/s networking technology. Keeping the current low cost fiber and optical devices KDPOF offers a low cost/power gigabit silicon for the POF networking market. [C643]

"Tracking an LED array transmitter for visible light communications in the driving situation"

In this paper, we discuss on a decoding algorithm for visible light communication systems in the driving situation using an LED array transmitter and a high-speed camera receiver. We propose an LED array detection method using M-sequence and an LED array tracking method using inverted signals. We confirm that we can distinguish LED array candidates correctly with M-sequence. We also confirm that we can suppress the flicker of the LED and improve the data rate as compared with the previous method. [C644]

"Towards the life-cycle of VMS configurations"

Variable Message Signs (VMS) are used in today's traffic control and information systems for information propagation from a higher order control unit to the traffic participant. Such signs can be switched on or off and fed with arbitrary data corresponding to the present traffic situation. As VMS are manifold in size, functionality and means to communicate with them, a certain degree of configurability is needed in order to meet project-specific demands and changing requirements in operation. Configurability has its advantages in offering a certain degree of flexibility. On the other hand additional efforts for documentation and hazards like misconfiguration might emerge. This paper focuses on configurability in the field of VMS. Possible configuration parameters are considered in regards to its importance during a VMS' life-cycle and the configurations-takeholders' demands for parameter-manipulation. Afterwards, capabilities for reconfiguration in today's protocol standards are analyzed and an outlook on future opportunities is given. [C645]

"An analysis of diversity factors applied to harmonic emission limits for energy saving lamps"

An experimental investigation of diversity factors for CFLs (compact fluorescent lamps) in combination with LED (light emitting diode) lamps is presented in this paper. Diversity factors were calculated for different configurations of lamps connected to the same feeder in one phase. It was found that the presence of LED lamps with a high apparent power input can lead to considerable damping of harmonics. If the number of CFLs is much greater, this effect was found as very low. Harmonic emission limits for lamps were also analyzed. A conclusion has been made that with a sufficient variety of energy saving lamps phasing out of incandescent lamps should not significantly impact the resultant harmonic distortion. [C646]

"The programmable haptic rhythm trainer"

Mastering rhythm and hand coordination are big challenges in piano learning. This demonstration presents a novel embedded haptic-audio device, which allows a user to enter the rhythm through the keypad, and feel the different rhythm on left hand and right hand simultaneously. Meanwhile it also produces steady beat with clicking sound and blinking LED. This device has the potential to significantly enhance at-home piano practice or online piano learning. [C647]

"Quantum dots, stars and circles in LEDs with cavity resonators"

Investigate the possibility of creating electromagnetic emitters on the basis of electrodynamic systems with quantum wires and dots. As an analogy used by the device of microwave technology, and noted that today's nanotechnology capabilities allow the use of historically experience a traditional electrodynamic systems for the optical range of wavelengths in the development of efficient light-emitting diodes and semiconductor lasers. Proposed various conceptual options for emitters based on quarter-multiresonator systems containing and stabilizing half-wave high-Q resonators. [C648]

"Led modules instead of discharge lamps in the streets and placements"

The results of calculations of illumination from the LED modules in standard roof lights and headers street lighting. It is noted that the LED modules do not require reflectors and secondary optical systems. [C649]

"Design of a domestic electrical health record system"

A domestic health record system is introduced. It includes a measuring instrument, a memorizer, and two applications. Blood pressure, heart rate, body temperature and blood oxygenation can be measured and stored automatically. Other health record can be appended into memorizer manually. All health records can be reviewed in an appropriate way. This domestic health record system provides a means to memorize people's anamnesis and routine physiological parameters, and to help making medical decisions. [C650]

"Copyright page"

The following topics are dealt with: electric machines; inverters; power system fault isolation; energy public policy; power semiconductors; active power filters; LED lighting; electric drives; power converters; renewable energy generation; digital control; PHEV transportation; EMI analysis; machine control; microgrid; wind energy systems; and power quality. [C651]

"Single Event Upset Characterization of the Virtex-5 Field Programmable Gate Array Using Proton Irradiation"

Proton induced SEU cross-sections of the SRAM which stores the logic configuration and certain functional blocks of the Virtex-5 FPGA are presented. Upset rates in the space radiation environment are estimated. [C652]

"Design and testing of a small human-powered generator for developing rural communities"

Access to reliable electricity remains unavailable to approximately one fifth of the world's population, with a disproportionate concentration of these people living in developing or rural communities. This paper describes the design, construction and testing of a small human-powered generator for electrical energy conversion in developing rural communities. The generator is designed to provide small amounts of electrical power in the range of 1-10 W so that electronic devices such as Light Emitting Diode lamps, cellular phones and radios-all of which are becoming increasingly common in rural communities-can be used. A permanent magnet axial flux generator is determined to be most suitable for this application. The designed generator is unique in that it it can be constructed using locally available materials and lay manufacturing processes. Theoretical and circuit models of the generator are developed. Laboratory test results, culminating in a proof-of-concept test on a cellular phone from Zambia, are provided. [C653]

"A general photo-electro-thermo-temporal theory for light-emitting diode (LED) systems"

This paper presents a dynamic photo-electro-thermal theory for LED systems. In addition to photometric, electrical and thermal aspects, this theory incorporates the time domain into the generalized equations. A dynamic model for a general LED system is developed for system analysis. This theory highlights the fact that the luminous output of an LED system will decrease with time from the initial operation to the steady-state due to the rising temperature of the heatsink and the LED devices. The essential thermal time constants involved in the LED systems are explained. The time factor is critical in understanding how much the luminous output will

decrease with time and is essential to the optimal designs of LED systems that are operated continuously (e.g general lighting) or momentarily (e.g. traffic lights). Experiments on several LED systems at different time frames have been conducted and the practical measurements confirm the validity of this theory. [C654]

"LED lighting flicker and potential health concerns: IEEE standard PAR1789 update"

The IEEE Standards Working Group, IEEE PAR1789 "Recommending practices for modulating current in High Brightness LEDs for mitigating health risks to viewers" has been formed to advise the lighting industry, ANSI/NEMA, IEC, EnergyStar and other standards groups about the emerging concern of flicker in LED lighting. This paper introduces power electronic designers for LED lighting to health concerns relating to flicker, demonstrates that existing technologies in LED lighting sometimes provide flicker at frequencies that may induce biological human response, and discusses a few methods to consider when trying to mitigate unintentional biological effects of LED lighting. The paper represents on-going work in IEEE PAR1789 that is vital to designing safe LED lamp drivers. [C655]

"Estimation of internal junction temperature & thermal resistance of light-emitting diodes using external luminous flux measurements"

Although critical to the lifetime of LED, the junction temperature of LED cannot be measured easily. From the general photo-electro-thermal theory for LED systems, new equations for estimating the internal junction temperature Tjand junction-case thermal resistance Rjcof LED from the luminous flux measurements, which can be obtained relatively easily, are presented and verified practically. These equations provide a valuable tool for checking Tjin LED system design without expensive equipment. [C656]

"Research and implementation of new type multi-channel data logger"

For the demand of special sensors' full test in industry scene, a small high-speed logger which can be embedded in machines appears. S3C2440A is used as main control chip, μC/OS-II as Embedded Operating System. With high-speed AD convert chip AD7899, it presents the solution to signal disturbance in multi-channel, high-speed signal sampling and storage. Its functions include the collection, the recording of data, and the data exchange between computers, and the sharing in instruments and important data encryption. All of this has passed tests. [C657]

"Study condition monitoring of construction equipment based on wireless sensor networks"

First, this paper expounded the reasons for the failure of construction equipment, and determined the main online monitoring parameters and analysis methods. Then, some construction equipment would be selected to set up a wireless sensor network. In the network, numbers of nodes are deployed for the temperature, pressure, vibration, noise, speed and other parameters monitoring to timely and continuously collect parameters information. Next, set up data management and analysis platform based on the virtual instrument to manage and analyze the data collected, acquiring the status information of construction equipment and making appropriate decisions. [C658]

"Defect detection of bearing surfaces based on machine vision technique"

Due to the high demands for productivity and quality of bearing and the shortage of traditional detection methods, this paper proposes an automatic detection system based on machine vision technique. The detection system uses digital image processing technology to process the images collected by CCD camera and finish identification for the surfaces of bearing quickly and accurately. Firstly, least squares fitting and annulus scan are used to locate the bearing and the regions which will be detected. Secondly, contrast enhancement and low-pass filtering are used to improve the quality of images. Next, object inspection is applied to determine whether defects exist. Finally, the shape feature is used to finish recognition of defects. Experiments show that the detection system has the features of high efficiency, high accuracy and ease of use. This research has a certain practical value. [C659]

"Monolithically-Integrated Digital Circuits with Light Emitting Diodes in Lattice-Matched Si/III-V-N/Si Heterostructure"

Monolithic integration of a one-bit counter circuit with a light-emitting diode as an optical output was fabricated in a structural defect-free Si/III-V-N/Si heterostructure. The generation of structural defects was well suppressed by the simultaneous use of an initial thin GaP intermediate layer and the III-V-N active layer lattice-matched to Si. The origin of relatively high residual carrier concentration was attributed to the accumulated P atoms in the Si growth chamber from sample holder. The carrier concentration of 0.8-1.2 Ч 1017cm-3was achieved by

increasing the Si-growth temperature. The one-bit counter OEIC composed of p-type metal oxide semiconductor field effect transistors (p-MOSFETs) and light-emitting diodes (LEDs) was fabricated in Si-capping layer and the embedded III-V-N layer, respectively. This one-bit counter circuit output one pulse every two input pulses, indicating its normal operation. The red light emission from the LEDs synchronized with the logical values of input and output voltages. These results imply that Si-based digital circuits and III-V-N based LEDs can be monolithically integrated in a single chip. [C660]

"Enabling multiple robotic functions in an endoscopic capsule for the entire gastrointestinal tract exploration"

Commercial endoscopic capsules are passive. Nevertheless, active capabilities such as active locomotion, drug delivery or biopsy, among others, can now be offered with the aid of robotics. New robotic functions require additional electronics for control purposes, as well as for the sensors and actuators. To avoid increasing the capsule size as a consequence, it is useful to incorporate all the electronics into the minimum number of elements, preferably in a single ASIC. This paper describes the ASIC included in a robotised capsule with the abovementioned active functions. The ASIC is a system-on-chip (SoC) integrating all the electronics needed to control the other electronic elements in the capsule. It also enables the movement of two BLDC motors, illuminates the exploration region and focuses a liquid lens used to achieve advanced vision capabilities. Details of the complete system integration are also given. [C661]

"Using solar power as an alternative source of electrical energy for street lighting in Ghana"

Streetlights in Ghana receive electrical energy from the national grid. To pay for the energy consumed, residential consumers on the grid are levied 0.0001 of their total monthly consumption. Unfortunately, these levies are inadequate to defray the cost. There is therefore the need to look at other alternative sources of electrical power, which do not depend on the national grid to light the streetlights. The findings show that most streetlights in Ghana are not metered, thus making it impossible to bill the respective District Assemblies. Again, the socio-political climate in the country complicates the design process by not allowing for ample time for a thorough design work to be done before incorporating streetlights onto the national grid. This paper discusses the use of solar power as an alternative source of electrical energy for street lighting in Ghana. It proposes the use of LED-based lighting systems that receive energy from lead-acid batteries, charged by the solar panels. The design has an auto turn-on and turn-off for the streetlights and for charging the back-up batteries. The expectation is that changing to the LED-based street lighting system will lead to an increased initial installation cost but the savings made due to the reduced maintenance cost is enormous. [C662]

"Application of LN2117 series chips in White LED driver"

The author believe that White LED will be used widely because of its low calorific value, small power consumption, long service life, fast response, and so on. Most of its driver chips use voltage mode or current mode control circuit. Current mode white LED driver circuit is studied more for its linear adjustments and good load regulation. This paper proposed a white led driver using LN2117 series chips, and experiment results verify that the chip has good performance. [C663]

"Quantum light emission from cavity enhanced LEDs"

A particularly promising approach to realize optoelectronic devices based on semiconductor nanostructures are quantum dots coupled to an optical microcavity. Those quantum dot based light emitters are ideal sources for deterministic quantum light emission with tunable photon statistics. This paper investigates the theory of InAs/GaAs quantum dots (QDs) embedded in a two dimensional wetting layer (WL).To simulate realistic operating points for devices, the interactions between electrons and holes confined in the QDs and the wetting layer must be taken into account. Coulomb interaction in the emission process as well as electron-phonon coupling are included, considering multi-phonon processes based on an effective multiphonon Hamilton operator to calculate the quantum light emission on a microscopical level. The dynamics at low carrier densities, e. g. single photon emitter limit, is studied. [C664]

"Efficiency droop in III-nitride LEDs: Overview and carrier lifetime analysis"

Gallium Nitride based light-emitting diodes (LEDs) are on the verge of enabling mainstream solid-state lighting. Their efficiency, however, is limited by a phenomenon known as droop which quenches internal quantum efficiency at high current density. We will review recent experimental results characterizing droop, and compare them to the various theories proposed these last years to explain this phenomenon. [C665]

"Numerical analysis of steady-state and transient charge transport in organic semiconductor devices"

A one-dimensional numerical model for the simulation of organic light-emitting devices (OLEDs) is presented. The model accounts for the disordered nature of organic semiconductors by a Gaussian density of states and the use of the Fermi-Dirac statistics. It includes density- and field-dependent mobilities and the generalized Einstein relation. The novel model ingredients perform well in combination with the numerical methods which solve the drift-diffusion problem. The results of three different measurement setups are reproduced by the use of different numerical techniques, i.e. we efficiently simulate current-voltage curves, dark-injection transients and impedance spectroscopy. This is crucial for model validation and parameter extraction. We compare the simulations with analytical solutions and measurements. [C666]

"Influence of polar face on optical properties of staggered 440 nm InGaN/InGaN/GaN quantum-well light-emitting diodes"

The influence of the polar plane on optical properties of staggered InGaN/InGaN/GaN quantum well (QW) light-emitting diodes was investigated using the multiband effective mass theory. The N-face staggered InGaN/InGaN/GaN QW structure has a greater spontaneous emission peak than the Ga-face staggered InGaN/InGaN/GaN QW structure because the before has a larger matrix element than the latter. On the other hand, the heavy-hole effective mass around the topmost valence band is not affected nearly by the polarity. We expect that the N-face staggered InGaN/InGaN/GaN QW structure has an improved characteristics compared to the Ga-face staggered InGaN/InGaN/GaN QW structure. [C667]

"Electron leakage effects on the efficiency droop in GaN-based light-emitting diodes"

Nitride-based light-emitting diodes suffer from a reduction (droop) of the internal quantum efficiency (IQE) with increasing injection current. Using advanced device simulation, we investigate the impact of electron leakage on the IQE droop for different properties of the electron blocker layer. We also find that the electron leakage decreases with increasing temperature, which contradicts common assumptions. [C668]

"Physics-based simulation of a core-multishell nanowire light emitting diode"

We report on the computational analysis of a triangular core-multishell nanowire light emitting diode with three joint InxGa1-xN active layers. The different crystal orientations of these layers lead to different polarization induced internal fields and transition energies. The simulation approach accounts for these effects by including the calculation of strained band edges and piezo potentials and provides a self-consistent model for the coupled 3D bulk and 2D quantized structure. The simulator is targeted to a comprehensive analysis of luminescence including the spatial variation of transition energies and carrier densities. [C669]

"Thermal optimization of high power LED arrays with a fin cooling system"

In this paper, we describe an optimization process of thermal design for the Light Emitting Diode (LED) arrays. The thermal performance of the high power LED arrays was shown to significantly improve by the optimization process of cooling system attached with it. A fin cooling system was designed for the high power LED arrays with the input power of 60 W. The effects of design parameters such as air temperature and air velocity on the thermal performance of LED lamp were investigated. [C670]

"Normalized Sum-over-Paths Edit Distances"

In this paper, normalized SoP string-edit distances, taking into account all possible alignments between two sequences, are investigated. These normalized distances are variants of the Sum-over-Paths (SoP) distances which compute the expected cost on all sequence alignments by favoring low-cost ones-therefore favoring good alignment. Such distances consider two sequences tied by many optimal or nearly-optimal alignments as more similar than two sequences sharing only one, optimal, alignment. They depend on a parameter, θ, and reduce to the standard distances-the edit-distance or the longest common subsequence-when $\theta \to 0$, while having the same time complexity. This paper puts the emphasis on applying some type of normalization of the expectation of the cost. Experimental results for clustering and classification tasks performed on four OCR data sets show that (i) the applied normalization generally improves the existing results, and (ii) as for the SoP edit-distances, the normalized SoP edit-distances clearly outperform the non-randomized measures, i.e. the standard edit distance and longest common subsequence. [C671]

"Design of a single-chip white light-emitting InGaN/GaN diode"

LED is the impressive light source in the 21st century, and the naissance of white LED is a major milestone in the lighting history of mankind, and stand for a brand-new light source. LED can not only improve the quality and efficiency of light, but also save energy and reduce environmental pollution. Developing LED industry has great significance for the national economy and the people's livelihood. In this paper, the mechanism of LED lighting is introduced. And then, main methods for fabricating white LED and recent progresses in white LED are studied. Finally, a novel single-chip white light-emitting InGaN/GaN diode is design. The single-chip white LED emits white light as the driving current is from 5mA to 60mA. The output power of the white LED is 24.4mcd at the driving current of 60mA. [C672]

"Numerical simulation of ZnO-based LEDs"

Optimizing the internal quantum efficiency (IQE) is very important for UV LEDs, since the present generation of devices has very low IQE. This is particularly important for ZnO-based LEDs that are still technologically immature. This work presents the preliminary results of an ongoing investigation intended to identify the optimization criteria for the design of ZnO-based LEDs. [C673]

"Effects of polarization charge in GaN-based blue laser diodes (LD)"

LASTIP software was applied to simulate a classical GaN-based blue laser diodes (LD) emitting at about 410 nm. Considering effects of polarization charge (PC) in this LD, theoretical simulation showed accordant results with that in experiments. On the other hand, without regard to PC, threshold voltage and current are lowered, while laser characteristic temperature is enhanced, which indicates that PC acts as a negative role for laser performance. [C674]

"Simulation for light power distribution of 3D InGaN/GaN MQW LED with textured surface"

In this paper, we introduce a full 3D simulation for light power distribution of an InGaN/GaN MQW LED with textured surface. Device simulation was performed by APSYS software to get power distribution of light source inside the LED. Based on this, ray tracing simulation was carried out to get light power distribution outside the LED. During the process of ray tracing, the textured surface was treated as a special boundary which means its reflectivity, transmittance and refraction angle are not calculated according to Fresnel equations, but obtained from data extracted from Finite-difference time-domain(FDTD) method. By comparing ray tracing result with and without textured surface, we found that textured surface not only smoothed transmitted power distribution, but also greatly improved power extraction efficiency which can be further improved by changing texture geometry. [C675]

"System for photon counting with Silicon Photomultiplier"

In the paper a system for photon counting based on Silicon Photomultiplier detector is presented. It is a novel detector for low-level light detection, composed of the matrix of avalanche photodiodes. The system is based on the programmable FPGA chip of Spartan-3 family. A Picoblaze softprocessor feature has been implemented in this device, to increase development flexibility and to simplify a data flow control. [C676]

"One-Finger Interaction for Ubiquitous Environment"

We propose a new interaction technique called "One-finger Interaction" for the ubiquitous environment in a home. One-finger Interaction is an interaction technique for performing various operations through movement of the index finger. It is possible for the user to operate from a distance. Additionally, because the user uses only a LED device and fingertip recognition is very sensitive, this method can be readily used in various environments. The user can also change the menu according to personal preferences and applications. We developed two prototype interfaces for One finger Interaction. One is an interface that allows one to execute operations by moving one's fingertip and crossing icons. The other is one in which the user selects a rough position of the menu by the general direction of movement of one's fingertip, then selects a specific position by moving one's finger in a circular fashion. These interfaces allow the user to perform various operations by movement of the fingertip. Also, because it is possible to move from the end of one operation to the next action instantaneously, the user can operate menus continuously. [C677]

"Gaze-tracking and Acoustic Vector Sensors Technologies for PTZ Camera Steering and Acoustic Event Detection"

An innovative application of gaze-tracking and acoustic vector sensors (AVS) technologies for guidance of moving pan-tilt-zoom (PTZ) monitoring camera is presented. Gaze-tracking is used to steer and to zoom the camera to the gaze focus area. Additionally, it is combined with audio processing in two scenarios. First is called

"audio slave": directional acoustic monitoring is adjusted automatically to the camera direction. Second is called "audio master": automatic detection of sound events directions is performed to take priority over user control and steer the camera towards sound source. An approach to gaze tracking is presented, utilizing new algorithmic methods for both image processing and PTZ camera steering. Then application of AVS for directional filtering of sound, and for detection of acoustic events direction is discussed. The implemented application is described, and user experience is reported. Finally, future work is discussed. [C678]

"The Layout Design of Message Sign Based on Passenger Property Leaving Hub"

The railway station is an important hub on conection of urban transportation. Message sign plays an important part in the flow and transfer of passengers in the hub. Based on passenger properties, this paper firstly made classification of the transfer message. Then the reasonable quantity of message signs was discussed and the height and spacing models were established for them. Finally, these models were applied to Wuchang railway station. It provides design reference for the layout of transfer message signs in other great stations. [C679]

"Analysis on mechanisms and performance of on-line angle correction in LED die sorting"

All dies are required to keep consistent angles in LED chip sorting. It is a problem because all chips are adhesive to wafer tape, each is rotated, and locations of all other dies change. Usually, visual rectification is used for this. While, each correction needs several adjustments, it may decrease production efficiency greatly. To solve this problem, an on-line angle correction method is put forward. Techniques including fast fitting to rotating center with machine vision, reverse seeking angle offset and translation distance for correction, approach for over-quadrant are discussed in detail. In addition, SPN model of sorting is built to analyze its influence to production rate. With experimental results, it is proved to be effective for angle correction with little loss of sort efficiency even in not too good working conditions. [C680]

"Study on pre-correction method for LED chip declination in sorting system"

Chip declination correction is a difficult problem in LED chip sorting process. Usually use real-time vision to correct chip declination. In this way, once correction may need several adjustments. It may cause great reduction for die production rate. Aiming at an effective solution of this problem, a declination pre-correcting method is proposed in this paper. Techniques including least-squares method to fit location of rotation center, computational method of positions to be corrected. Paper also proposed an iterative formula to revise the fitting rotation center position to ensure the accuracy, and discussed the over-quadrant phenomenon in chip declination pre-correction process. Experimental results show that the final deviation which includes image recognition error is less than 12μm. It is acceptable for chip sorting. By contrast with traditional method, pre-correction method needs only one adjustment in most cases, it is more effective and efficient. [C681]

"Pulse width modulation based signal format for visible light communications"

A pulse-width modulation (PWM) based modulation format is proposed for visible light communication (VLC) system using illumination light-emitting diodes (LEDs). A pulse-position modulation (PPM) data signal is employed over PWM dimming (brightness) control signal. The PPM data pulses are recovered from the received optical signal over a distance of 20 cm. [C682]

"Efficiency properties of OLED based on Zn(PQ)2 as electron transporting layer and hole blocking layer"

We have synthesized 8-hydroxy-7-propylquinoline (Zn(PQ)2) to use in OLED. Photoluminescence (PL) peak of Zn(PQ)2was observed at 555 nm which showed yellow emission. In the cyclic voltammetry (CV) experiment, the HOMO and the LUMO of the Zn(PQ)2measured to be 6.7 eV and 3.3 eV. So we expected that Zn(PQ)2could be used as electron transporting layer (ETL) and hole blocking layer (HBL). In this study, we investigated the efficiency properties of OLED based on Zn(PQ)2as ETL and HBL. Prior to film deposition, ITO substrate performed surface treatment by UV-ozone for 1 minute. Improvement of the OLED performance can be attributed to the reduction of the electron injection barrier of the Zn(PQ)2layer. [C683]

"A curriculum project integrating a series of computer experiments"

Computer courses generally describe a computer system in layered model, with each course corresponds to a layer. In actual teaching process, the teaching contents and experiments of each course are relatively independent, lacking of systematic and scientific. After learning these courses, the knowledge students acquire are scattered and independent. They can not easily comprehend the whole multilayer hardware and software knowledge. In this paper we propose a curriculum project integrating a series of computer experiments. The

project integrates knowledge such as digital circuits, computer organization, computer interface, assembly language, compilation principle etc. We build a toy CPU and an interface chip, which provides a platform for the project. Programs are compiled and executed on the CPU. Experimental results reveal that our idea is feasible and efficient. The project enables students to absorb a variety of knowledge, enhance learning interests and train research ability. [C684]

"The construction of single-chip microcomputer virtual experiment platform based on Proteus"

The paper analyzes the problems of present single-chip microcomputer experiment teaching and the features of Proteus software. Teaching reform that brings EDA technology into the experimental teaching of MCU is proposed. It discusses how to use Proteus software to construct a single-chip virtual experiment platform. Through the simulation in Proteus soft and project designing & making based on MCU development board, students master the basic knowledge and designing method. The method greatly improves the students' learning enthusiasm and better cultivates the students' MCU comprehensive application ability. [C685]

"Nano-patterned AlGaInP light-emitting diode based on UV-Kiss metal transfer technology"

This paper describes a new nano-patterning technique, the UV-Kiss Metal Transfer (UV-KMT) method, and applies it for patterning micro/nano-structures on AlGaInP light-emitting diodes (LEDs) for enhancing their light extraction efficiency. First of all, an ETFE mold with micro/nano-features is replicated from a silicon master mold. A thin metal film is then deposited on the ETFE mold which has very low surface energy. A layer of UV curable polymer solution is spin-coated on an AlGaInP LED surface. The metal-film coated EFTE mold and the UV-polymer coated LED are brought into contact with a uniformly distributed pressure of 0.1 MPa, and UV light is radiated through the ETFE mold and solidifies the UV polymer. The solidified UV polymer has stronger adhesion to the metal film in contact with, and therefore can transfer the metal pattern defined by the convex surface feature of the ETFE mold onto the AlGaInP LED surface. The transferred metal pattern is then serving as an etching mask for RIE etching on the underlying UV polymer layer. Finally, a patterned structure consisting of a metal film on top and an underlying UV polymer layer is formed on the LED surface. This metal/polymer surface structure can well serve as an etching mask again for ICP etching on the LED, and hence complete the fabrication of micro/nano-structures on the top surfaces of AlGaInP LEDs for enhancing their light extraction efficiency. The optical power measurement using an integrating sphere shows that the extraction efficiency of the patterned LED is 25% higher than that of the conventional LED. In short, we demonstrate an easily implemented, cost effective, and powerful method to pattern LED substrate. [C686]

"Synthesis and Electroluminescence properties of Polyfluorene derivatives for light-emitting diodes"

New single-polymer electroluminescent system containing three individual emission species of polyfluorenes as a blue host, 2,1,3-benzothiadiazole unit as a green dopant and phenylene derivative unit as a red dopant on the main chain were synthesized and characterized. All polymerizations were carried out by palladium(0) catalyzed Suzuki coupling reaction with equivalent molar ratio of the diboronic ester monomer to the dibromo monomers under dry argon protection. The structure and properties of these polymers were characterized using UV-vis spectroscopy, GPC, Photoluminescence (PL), and Electroluminescence (EL) spectroscopy. The synthetic polymers, Polyfluorene [PF], Poly(fluorene-benzothiadiazole-pyridine) [PF-BT-PD], were soluble in common organic solvents and easily spin-coated onto the indium-tin oxide (ITO)-coated glass substrates. The optical band gaps of polymers of 2.97 eV and 2.55 eV corresponding to PF and PF-BT-PD, respectively were calculated from the onset of UV-vis spectra. Light-emitting diodes (LEDs) with ITO/PEDOT:PSS/polymer/LiF/Al configuration were fabricated, and the devices using copolymers showed red shift EL spectra relative to that of PF. The fabricated light-emitting devices showed good performance in terms of turn on voltage and electroluminescence. The new PF-BT-PD copolymer was successfully employed as emissive polymer layer in polymer light-emitting devices (PLEDs). The turns on voltages of copolymers were lower than that of PF. By changing the molar ratios of these monomer units, the electroluminescence spectra can be adjusted to white-light emission. [C687]

"Fabrication of Organic/Inorganic LED device using nanocrystal quantum dots as active layer"

Recently, researches on nanocrystal quantum dot-based LEDs (NQD-based LEDs) have dramatically increased due to their characteristics resulting in pure and saturated colors with a narrow bandwidth. More importantly, colors can be easily tuned by varying the size or the composition of NQDs, and high quantum yields (QY) of NQDs can increase the efficiency greatly. In spite of high fluorescence QY of NQDs, the reported efficiency of QD-LEDs is still low because the carrier transport is not efficient in the fabricated device. We report efficient electroluminescence in quantum dot-based LEDs by enhancing the electronic coupling of NQDs. 2D array of NQDs formed by spin-coating showed enhanced electrical conductivity. They are incorporated into the light

emitting device as an active layer. Current-voltage characteristic and electroluminescent spectra of the device are measured. Electroluminescence efficiency of the device is improved, resulting from the facilitated carrier transport between layers by electronic coupling of NQDs. [C688]

"Copyright"

The following topics are dealt with: OCDMA network; X-ray optics; OFDM transmission; EDFA loop; FTTH network; WDM; photonic crystal fibers; optical fiber communication system; optical controllable double state switch; photoluminescence; and light emitting diodes. [C689]

"First-principle calculation for luminescent-effects of Si and Zn impurities in GaN"

Phosphor-free GaN-based white-light LED which is usually generated as a combination of the blue bandedge emission and a yellow-green broad-band emission has been approved to be more reliable than phosphor-based white-light LED. First-principle method was employed to investigate the luminescent-effects of Si and Zn impurities in phosphor-free GaN-based LED. By explicitly calculating the formation energies and defect levels, the origin of yellow-green broad-band emission in Si and Zn co-dopoed InGaN/GaN multiquantum wells(MQWs) were discussed and determined. We propose that the electron transition between Zni/ZnN-SiND-A pairs are responsible for the observed yellow-green broad-band emission. [C690]

"Design for OLED microdisplay"

In this paper, a 160Ч120 microdisplay based on organic light emitting diode (OLED) is implemented and analysed. Current driving scheme is employed due to the requirement of extremely small driving current in the microdisplay application. 16 levels gray scale is realized with a current mode digital to analog converter (DAC). The OLED microdisplay can provide compact structure and extremely low power display solutions. [C691]

"A novel MCDM combining DEMATEL technique for technology evaluation"

This research aims to propose a hybrid process concerning the complex interactive relationship between different economic and industrial prospects towards a more effective evaluation on new technology. To achieve this purpose, the integration of the Decision Making Trial and Evaluation Laboratory (DEMATEL) technique and the analytic network process (ANP) is employed to construct a technology evaluation model regarding the economic and industrial prospects. The emerging organic light emitting diode (OLED) display technology is used as a case in order to verify the applicability of proposed a novel hybrid MCDM method for the technology evaluation. The result of this hybrid process can help top managers of technology-based companies or policy makers of governments to more objectively and effectively determine future research and development direction. [C692]

"Use of technology roadmapping in selecting projects for financial support"

Russian State Corporation of Nanotechnologies (RUSNANO) was established by the Federal Law in 2007. Its main activity is selection and co-investing money of the Federal budget in nanotechnology projects that have high potential for commercial or social benefit. RUSNANO investments in selected projects are expected to reach 1,5 bln. US dollars in 2009. RUSNANO uses Foresight and roadmapping techniques to support investment process involving in the activities leading Russian scientific and business institutes. Foresight allow revealing most perspective nano-enabled product groups for implementation in Russia in the long-term perspective and estimating required resources for setting up mass production. Roadmaps allow defining priorities for investments, R&D, staff training, infrastructure advance. They help RUSNANO to define strategic goals and choose the most promising technologies. 10 roadmaps are being developed at RUSNANO: Light emitting diodes, Nuclear energy, Aircraft industry, Spacecraft industry, Medicine and Pharmacy, Water cleaning and purification, Energy saving, Halocarbon composite fibres, Catalysts for petrochemical industry, Effective cutting instruments. More than 400 experts are actively participating in developing the roadmaps. The roadmaps will be ready in first half 2010. The presentation highlights RUSNANO strategic planning approach by an example of one of the developed roadmaps. [C693]

"Two-photon photoluminescence induced defects on InGaN crystal and light emitting diodes"

Two-photon excitation techniques used in fabricating lines defects were done on a light emitting diode chip. Simultaneous detection of a quenched wide-gap semiconductor crystal has been observed using single- and two-photon photoluminescence. It was found at the quenched area, single-photon excitation gives photoluminescence read-out compared to two-photon excitation which no photoluminescence detected at the bandgap wavelength. This is due to the excitation states which the transition of electron for two-photon excitation to occur have been demolished by the annealing of the sample which involved two-photon quenching process.

The dependency of excitation power with respective photoluminescence is elaborated to confirmed the single- and two-photon excitation photoluminescence methods. [C694]

"Isolated converter topology with integrated power-sharing for driving a large number of HB-LEDs"

An isolated power converter topology is presented which uses an integrated passive power-sharing network for equal brightness levels in parallel LED branches. Analyses of discontinuous conduction mode (DCM) and continuous conduction mode (CCM) of converter operation have been performed. The DCM operation shows an improved performance and allows a reduced size of the required transformers compared to the CCM. Analyses of the power sharing quality with non ideal transformers have been performed, additionally. A prototype has been built and tested. Experimental results are in good correlation with theoretical predictions. [C695]

"Odometry-free mobile robot localization using bearing only beacons"

The paper deals with the localization of mobile robot using the bearing only beacons as the only source of sensor data. The localization is based on Extended Kalman Filter. Derivation of localization algorithm is given together with test results for both simulation and real robot equipped with low cost sensor hardware. Beacons use infrared LEDs detected by the receiver on the robot and position estimator runs on Atmega microcontroller. [C696]

"Task-driven teaching reform of MCU course"

Aiming at the shortcomings in traditional teaching of MCU course, this paper presents a task-driven teaching method. It makes the tasks as the main lines; the teacher designs the teaching content into multiple specific tasks, so that the students master the teaching content by completing tasks independently. During the process of completing the tasks, it trains students the ability of identifying, analyzing and solving problems. This paper describes the design and implementation of specific tasks, gives a comprehensive teaching evaluation, and puts forward the basic guarantee during the process of implementation of tasks. Practice shows that the method can stimulate active learning and interest of students, thus improving teaching effectiveness and teaching quality. [C697]

"An universal design of low-power processor based on LED lighting control system by using solar cells"

The lighting system posed by the combination of solar photovoltaic power generation and the white LED illumination is an optimal environmental energy-efficient lighting system and an important trend of development in the future. This paper is focusing on the solar energy and the municipal power complementary LED lighting control system, and the research based on the paper is on the processor-the core component of its controller especially in low power state. According to the structural and actual needs of the system, I proposed the synopsis for the processor, presented a reduced instruction set, and completed 5-stage pipeline processor design with peripherals. After finishing RTL design, I optimized the schematic by self clock-gating register in order to reduce the power of clock tree. Finally, I successfully achieved design features through the FPGA This design is the foundation of the controller integrated. [C698]

"Idvans intelligent defensive video-controlled automated navigation system"

The term "Simulated Intelligence" refers the science and engineering of making intelligent technology. The intelligence itself demonstrates by an artificial (man-made, nonnatural, manufactured) technique. It basically deals with the primary concept of replicating the human astuteness by a smart system. Our exclusive proposal is to design an invisible system. Our team has planned to design and develop an intelligent system that can easily disguise in any environment in a unique way. We named it as "IDVANS" stands for 'Intelligent Defensive Video-controlled Automated Navigation System'. The electronic systems are developed in such a way that it takes the signal/order from the human and acts accordingly in various circumstances. This system is semi automated and is capable of moving from one location to another. Also the system is designed for object detection, which confirms the safe and smooth transportation to achieve the target at any circumstances. The system is also featured with "OLED", which adapts the nature of the chameleon and thereby improves the" Texture changing ability". This ability helps to transforms the outlook of system according to the surface on which it is moving/interacting. So with this feature, the system can also be used as secret agent, playing toys in commercial market, mini robotics in industry for production improvements. [C699]

"Investigation of power supply methods for intelligent LED luminary"

In the context of Intelligent Lighting System various lighting devices and technologies are compared. For the

most technically beneficiary and rapidly developing LED luminaries control and power supply methods are analyzed and experimentally tested. The optimal one is chosen. Outlines of the further research are defined. [C700]

"Visualization methods of the thermal field of high power LED lighting components"

Through the analysis of the data of the infrared thermal field utilizing the histogram of the infrared thermal field based on real time, this paper studies the visualization methods of processing the data of the infrared thermal field. It uses the experiment on selecting maximum gray through histogram to establish the basis of the maximum value mathematical model. In addition, by building up the maximum value mathematical model to select the appropriate parameters, the infrared visualization which meets the actual needs can be achieved. Furthermore, the analysis of the data of the infrared thermal field of the high power LED lighting products can verify the applicability and validity of the algorithm. [C701]

"Testing the Verticality of Slow-Axis of the Dual Optical Fiber Based on Image Processing"

The polarization dual fiber collimator is one of the important passive devices, which could be used to transform divergent light from the fiber into parallel beam or focus parallel beam into the fiber so as to improve the coupling efficiency of fiber device. However, the quality of double-pigtail fiber used for assembling collimator directly impacts on the performance of fiber collimator. Therefore, it is necessary to detect the quality of double-pigtail fiber before collimators has been packaged to ensure the quality of fiber collimator. The paper has pointed out that the verticality of two slow-axis of the double-pigtail fiber is the major factor to affect the quality of fiber collimator. With "Panda"-type double-pigtail fiber as the research object, a novel method to detect the verticality of slow-axis is proposed. First, with the red light of LED as background light source, the clear images of the cross-section end surface of double-pigtail fiber has been obtained by micro-imaging systems; Then after a series of image pre-processing operations, the coordinate information of "cat's eye" light heart can been extracted with the image centroid algorithm; Finally, the angle between the two slow axes of the double-pigtail fiber can be calculated quickly and accurately according to pre-established mathematical model. The detection system mainly consists of CCD, microscopic imaging device, image board and image processing software developed with VC++. The experimental results prove that the system is both practical and effective and can satisfy the collimator assembly precision demands. [C702]

"Analysis of Power Request and Multiple-Site Techniques for Indoor Wireless Visible-Light Communication System Using LED Lights"

Expected to serve in the next generation of illumination, LED offers such advantages as high brightness, lower power consumption and long lifetime. The LED lighting system, based on high switching performance, can also be utilized in communication. So it is available that the research is processed in the LED indoor visible-light communication. In this paper, consulting the channel model of indoor infrared communication, first we calculate the power and SNR distribution in the model room according to the indoor illumination standard; then analyze the performance of the system by using the common modulations and the multiple-site technology when multiple users are sharing the channel; at last show the feasibility of the system by the data analysis. [C703]

"Arbitrary 3D image generation using a single camera and a spin mirror"

Recently, it is necessary to show the sight of a remote place as images. In this case, it is thought that free viewpoint 3D images are indispensable for rich presence. As the conventional technique, there are methods which use two or more cameras to take photographs, and some other methods which use several photography to generate a middle viewpoint. However, the former, it tends to become an expensive and complicated system, and the latter, there is a problem that information might be missing with occlusion. In this paper, we propose a system which uses one camera and a spin mirror to generate the free viewpoint 3D image. This system uses a method which called a light processing algorithm to make the free viewpoint 3D image from the obtained photography picture. The reliability of the proposed method is discussed in experimental result. [C704]

"Covers"

The following topics are dealt with: aircraft structural part; NC machining; shear flow; AWSJ glass cutting; nano structured MgO; EHV transmission line fault; pattern recognition; crack detection; turbine blade; intelligent power system; intelligent energy system; centrifugal fan; volute casing; simulated rime ice accretion; RRRP manipulator; magnetic imaging; corrosion inhibition; diesel power generating unit; vaporizing fuel droplet; gas turbine combustor; GFRP composite; multipath routing mobile ad hoc network; traffic load estimation; digital photonic switch; four beam laser interference lithography; speaker identification; DC drive speed control; neural controller based series resonant converter; city bus information integrated control system; truck suspension system

optimization; asymptotic trajectory tracking; flexible robotic arm vision system; spur gear; hydrodynamic torque effect; large size butterfly valve; touch mode MEMS capacitive pressure sensor; hydroelectricity production equipment; forestry harvesting machine connecting rod; workpiece surface roughness prediction; elastohydrodynamic line contact; subreflector feed angle calibration; doubly fed induction generator; railway wheel; acoustic vibration; MEMS based microstrip antenna; DLC coated ball bearing; electric motor mass unbalance; vibration monitoring analysis; port injection hydrogen fueled engine; wireless mobile sensor network; high-rise buildings structural vibration; perforated circular cylinder; and single chip white light-emitting InGaN/GaN diode. [C705]

"Experimental investigation on a robot-like remote control with strokes"

This paper describes user studies on a novel remote control manipulatable with stroking its surface. There are lots of remote controls in our houses such as remote controls for TV, air conditioner, and so on. However, when we use a remote control, we need to look at both our fingers and an appliance that we would like to control. It may be not significantly problematic for young people, but elderly people have a difficulty in manipulating remote controls with many buttons. We consider it will be comfortable for various people to use a remote control without looking at their fingers and pushing buttons. We also consider a remote control should have robot-like appearance to become a more familiar artifact to users. In this study, we have proposed a robot-like remote control, Rebo, manipulatable only with stroking its surface and apply to an advanced TV system. The developed remote control has three advantages; familiarity, function awareness, and stroke manipulation, in contrast with conventional remote controls with many buttons. These advantages enable users to feel much familiarity by using it, to easily notice its implemented functions, and to use it without looking at the fingers and buttons. In this paper, we focus on experimental investigation for advantages of Rebo. We conducted experiments with participants and the experimental results supported such advantages. [C706]

"Visual interface system by character handwriting gestures in the air"

A visual interface system that recognizes handwriting of Japanese katakana characters in the air has been developed. Characters written in a single stroke have both on-strokes and off-strokes. Thus, the shapes of the hand-gesture characters are different from the shapes of characters written on paper. It is difficult to trace the shapes of characters in air because the writer cannot see the trajectories. In this study, a light emission diode (LED) pen and a TV camera are used to capture the LED light trajectory, and the movements of the light are converted into direction codes correcting the slant of the handwriting character. The codes are normalized to 100 data items to eliminate the effect of writing speed. The 100 direction codes are compared with model data in which the direction codes of 46 Japanese characters are defined. Next, the system has expanded to a multi-camera system. Two of four cameras are selected and the 3-D positions of the gesture trajectories are calculated by the stereo method, and the position data are converted into front view data. In the experiments, we attained a recognition rate of 92.9% for the single-camera system. The multi-camera system has the advantage that it can recognize gestures regardless of the origin directions of the gestures. The system also has the ability to recognize the directions of the gesture commands with an accuracy of 9°. [C707]

"The design of a display device for swimming caps"

In this study, a display device for swimming cap was designed through a simple and creative idea. If a user of this device is drowned, the readable light displays of the device can alert lifeguards or other people nearby to immediately respond to the situation. This device can ensure its users' safety when doing water sports. [C708]

"Nano-level 3-D shape measurement method from analysis of interference fringes using RGB LED lightings"

Nano-level 3-D measurement is one of the key technologies for the current and next generation of production systems for semi-conductors, LCDs and nano-devices. To meet with these applications, "Wide range nano-level 3-D shape measurement method using combination of RGB laser lights" has been developed. It measure the height of nano-objects from the combination of RGB LED lights combinations. To analyze the combination of RGB lights, the color analysis method on xy-color plane has been introduced. In this method, the color changes on xy-color plane means the height changes. Experimental system to measure the three micro-meter height has been developed, and succeeded to measure the 50 nm step and 500 nm step samples. [C709]

"IR indoor localization and wireless transmission for motion control in smart building applications based on Wiimote technology"

With the implementation of sensors and actuators into buildings, spaces therefore have sensing ability, flexibility,

and interactivity. Moreover, there is also the ability of auto-transformation in space depending on weathers and habitants' needs and behaviors, which overthrows the traditional motionless building space concept. A space is considered as a huge robot, and every space cube is constituted by hundreds of small modulized robots. To be more specific, in order to fulfill the experiment of robotic buildings, this paper focuses on space walls motion unit experiments, and develops a sensing system that can achieve extremely accurate positioning. Accuracy of general indoor localization technique is about a few meters to a few centimeters. In this paper, we developed the high expandability and extremely accurate localization technique by utilizing IR LED array combined with CMOS image sensor built in Wiimote controller, and accomplishing the algorithm by LabVIEW program. We design various types of dynamic experiment on linear motor to verify the positioning performance and expandability of Wiimote system. In this paper, we will interpret and discuss thoroughly about the principle of geometry, algorithm of positioning, and the relation of CMOS image sensor resolution between IR LEDs and Wiimote camera in the actual positioning. Then will use the Wiimote controller built-in components and I/O ports for varied environmental sensing and motion control demostration, and integrated into the applications of robotic building and interactive E-Life. Not only does the IR localization system based on Wiimote can apply to position control and service of household robots, but also it can achieve the modulized vehicles of smart building surface with the idea of aggregate space robots. The modulized space robots can vary its patterns, and adjust the light, wind. It also illuminates indoor by LED modules charged from solar cells. [C710]

"Camera-based indoor navigation for service robots"

In our current research, we are developing a practical mobile vehicle navigation system which is capable of controlling multiple vehicles on the general environment. In order to realize the practical use, navigation system should have high accuracy and be low cost. Therefore, in this paper, we propose novel vehicle navigation system which realizes multiple vehicles navigation using high accuracy localization scheme by ceiling TV cameras with infrared filters and LED markers on target vehicles. Our key ideas are two topics. One topic is system integration which consists of vehicle localization system and CORBA network. Using our ideas, our system can extend navigation areas and target vehicles with low cost. The other topic is novel navigation scheme under occlusion condition. For practical use, mobile vehicles are required to continue its tasks with safety on temporary occlusion condition. Our developed system can adjust navigation path and velocity of target vehicle based on estimation odometry error. The performance of our proposed control scheme is experimented by experiments in general environment. [C711]

"Proposal of warning methods for rear obstacle warning system using sensor recognition reliability"

Driver's workload tends to be increased during driving under complicated traffic environments like a lane change. In such cases, rear collision warning is effective for reduction of cognitive workload. On the other hand, it is pointed out that false alarm or missing alarm caused by sensor errors leads to decrease of driver's trust in the warning system and it can result in low efficiency of the system. Suppose that information of the recognition reliability of the sensor is provided in real-time. In this paper, we propose new warning methods to increase driver's trust in the system even with low sensor reliability by utilizing sensor recognition reliability The effectiveness of the warning methods is shown by driving simulator experiments. [C712]

"Design and control of a RGB LED system"

This paper proposes a novel control structure for a red-green-blue (RGB) light-emitting diode (LED) lighting system, and applies multivariable robust control techniques to regulate the color and luminous intensity outputs. The most important feature for a polychromatic illuminant is color adjustability; however, for lighting applications using RGB LEDs, color is sensitive to temperature variations. Therefore, in this paper we propose a robust control system for achieving luminous intensity and color consistency for RGB LED lighting. First, we found a multivariable electrical-thermal model to describe the dynamics of RGB LED lighting system, and used a feed-forward controller to compensate temperature and power variations. Second, we applied robust control algorithms for feedback control design. Finally, the designed controllers were implemented to regulate the luminous and chromatic outputs of the system. From the experimental results, the proposed multivariable robust control structure was deemed effective in providing steady luminous intensity and color for RGB LED lighting. [C713]

"Harmonic emission before and after changing to LED and CFL-Part I: Laboratory measurements for a domestic customer"

This paper presents an investigation after the impact on a number of power-quality parameters due to the change from incandescent lamps to energy saving lamps like CFL and LED. The measurements were conducted in a full-scale laboratory model with ordinary household equipment connected, thus simulating an ordinary

domestic customer. Incandescent lamps have been replaced in stages by CFL and LED lamps. The CFL's and LED lamps will contribute to an increase in current distortion but the amplitude of the harmonics is quite low so the change of lighting will only have a minor effect on the total current harmonic distortion. It is also shown that the (total) power factor is not a good indicator to compare the impact of different loads on the system. [C714]

"Impact of printed circuit board technology on thermal performance of high-power LED assembly-experimental results"

In the last half decade LED technology has undoubtedly made its most rapid progresses leading to an enormous growth of illumination applications. Though, this advancement is based on a series of quantum steps in improvement of efficiency, removal of the remaining power loss is a major concern in further developments. In our paper we compare LED demonstrator assemblies with three different types of high-power LEDs mounted on different types of printed circuit boards. The thermal performance of the respective combination is investigated. We found that in a power loss range of a few Watts a satisfying solution can frequently be attained by application of conventional glass fiber epoxy based PCB technology with advanced thermal design (improved heat-spreading capability by thermal pads and thermal vias). For dissipating higher power loss, however, the insulated metal substrates turned out to be superior with respect to their polymer-based counterparts, particularly if the PCB itself has to fulfil cooler or heat spreader function. Moreover, some aspects of the dynamic thermal behavior of different demonstrator boards assembled with the same LED type were studied by recording temperature changes on the LED surface during the heating-up phase. [C715]

"Freeform lens for white LEDs with high angular color uniformity"

Angular color uniformity (ACU) is essential for LED general lighting. We demonstrated a freeform lens to enhance the ACU of white light-emitting diodes (LEDs) whose phosphor layers were coated by freely dispersed coating processes. The design method of the freeform lens was introduced briefly. Accurate optical models of white LEDs were built. Monte Carlo ray tracing simulation results indicated that ACU of the modified LED integrated with the freeform lens significantly increased from 0.334 to 0.957 compared with the traditional LED. Enhancement of ACU reached as high as 186.5%. In addition, ACU of the modified LED was not only at a high level but also stable when the shape of the phosphor layer changed. The freeform lens provided an effective way to achieve white LEDs with high ACU and at low costs. [C716]

"New method for head-up display realization by mean of Chip On Board and Aerosol Jet process"

A new method to fabricate transparent head-up display on glass has been developed. The method exploits the integration of the Aerosol Jet® Process in the Chip On Board technology. The Aerosol Jet® Process is an additive process, which allows the deposition of a wide variety of materials onto a wide variety of substrates without conventional masks or thin-film equipment, but driven by a CAD file (see, e.g.). The process uses aerodynamic focusing to precisely and accurately deposit nano dispersions, so called "functional inks". The process has been used for the printing of thin conductive layout on glass with Ag-nanoparticle based conductive inks. After layout deposition, the chip-LED has been mounted on the glass by means of flip chip process exploiting micro-stamping technique. The developed displays have a luminance higher than 10000 cd/m2and the visibility trough the glass substrate is fulfills requirements to guarantee the application also on windshield in automotive field. [C717]

"Effect mechanism of moisture diffusion on LED reliability"

High power light-emitting diodes (LED) are widely applied in many fields for their special advantages compared with other light sources. Many researches on LED reliability have been conducted in order to build the better LED design. However, seldom detailed reasons for the LED performance degradation are illustrated in the previous research when LED modules work under a certain thermal and moisture condition. This paper aims at studying one kind of LED failure mechanisms caused by moisture diffusion. Through the accelerated experimental test of high power LED modules, we find that the decent speeds of the optical output are different for different LED samples groups. For these tested LED samples, we detect the surfaces of LED chips by Atomic Force Microscope (AFM). The AFM micrographs show that different kinds of chips have their own characteristic surface textures. As the LED modules work under a certain condition, the thermal stress and moisture invasion may cause delaminations inside the modules. This would change the original path of light propagation and result in the degradation of optical output inevitably. For the LED modules packaged by different chips, the forms of delamination occurred at the interfaces between LED chips surface and phosphor layer are not the same. Different chip surface structure has significant impact on the optical output and reliability of LED modules. [C718]

"Determination of maximum strength and optimization of LED chip structure"

High-power light emitting diodes (LEDs) are found in a number of applications in high-volume consumer markets, such as illumination, signalling, screen backlights, automotives, and others, because of the numerous advantages of LEDs, including low power cost, long life span, and high efficiency. During the manufacturing process, the high-power LED chips are subjected to mechanical and thermal loadings. Wire bonding is one of the major processes in the LED packaging process that provide electrical interconnection between the bonding pad and the lead. However, due to bad parameter setup in a wire bonder, the LED will crack and the pad will peel after wire bonding. In this study, the strength of LED is determined for the design requirement in order to ensure good reliability of wire bonding. Point-load test (PLT) and focused ion beam (FIB) are used to determine the maximum allowable force the epilayer can withstand, which is approximately 75 g. By combining the finite element method and experimental data, a useful design tool to confirm LED die strength is provided. Finite element results of contact analysis show that the stress concentration area is located on the edge of the pin and maximum stress (227 MPa) occurs in the epilayer. Parametric study is employed to find ways to reduce stress in LED layer. The results indicate that increasing pad thickness is the major factor that can reduce stress and enhance LED die strength. PLT and FIB experiments are also performed to confirm simulation results. [C719]

"Multi-physics modelling for packaging of Liquid Crystal Displays in harsh environments"

Light emitting diodes (LEDs) can provide a number of benefits such as adaptive light control, reduced form factor and other novel techniques to ultimately improve the performance of the display. Some of the design challenges in adopting LEDs are to fully understand their effects on the thermal management, reliability, optical and viewability performance of the display. For the display designer this requires integrated modelling and analysis tools. The paper describes optical and thermal modelling techniques used to predict key design parameters such as luminance and temperature for ruggedized electronic display's using an array of LEDs as the backlight. [C720]

"Backlight illumination structure based on inorganic LED devices and laminated multilayer polymer substrate"

The dominant technology for manufacturing backlight illumination structures is typically based on use of individually packaged Surface Mount Device (SMD) Light Emitting Diodes (LEDs). The optical power from sources is coupled to the light guide having a special structure to couple light out so that uniform illumination is achieved to the illuminated component, typically LCD display. In practice the structure contains several separate diffuser films, which results to a thick and costly structure. In addition, the light coupling from LED to the light guide is sensitive to alignment errors causing nonuniform and inefficient illumination. The developed alternative packaging structure for backlighting solutions is based on inorganic LED devices and multilayer polymer substrate. Polycarbonate substrate material was used, which is highly transparent at visual band allowing low absorption and has good lamination properties in hot lamination process allowing compact integrated structures. In the manufacturing process the individual polymer sheets with an individual thickness of 100 μm were printed with conductive patterns produced by screen printing using silver-based thick film pastes. The final integrated multilayer structure containing embedded LED devices was produced in a hot lamination process. Two types of LED devices were embedded within the laminated structure, namely blue LED, type C470RT290 and green LED, type C527RT290. The bottom area of the chip was 300 μm Ч 300 μm and the thickness 115 μm. The devices were manufactured by Cree. Test samples containing 3 Ч 3, 5 Ч 5 and 5 Ч 7 LED devices were designed, implemented and characterized. The final laminated structure thickness was typically 300 μm. The performed designs verified by test structure implementations and characterizations showed that the final thickness of the backlight illumination structure depends of the required uniformity of illu--mination and allowed LED device pitch and used diffuser efficiency. The main advantages of the implemented system compared to traditional light guiding system are easy optical coupling with high efficiency in an integrated and thin package. The developed technology seems to be suitable to produce backlight illumination structures for applications in which thin, lightweight, efficient and cost-efficient backlight illumination structure is essential, such as, hand-held devices. In addition, the developed technology seems to be possible to apply in several other applications, such as, information tables, signboards and displays. [C721]

"Silicon-based LED display array in standard CMOS technology"

Silicon-based light emitting diode (LED) display arrays, the static array and the dynamic array, are designed based on silicon p-n junction in standard 0.35-μm CMOS technology. The LED optical spectrum shows main peak at 760nm. [C722]

"1.1 to 1.6 μm silicon light emitting diodes and optical gain"

We report silicon LEDs showing light emission from 1.1 to 1.6 μm and demonstrate optical gain by incorporating optically active impurities. Nano-engineering enables room temperature operation. As one exemplar, we show that erbium, with local strain engineering provides useful optical emission and gain at 1.5 μm. [C723]

"SiGeC avalanche light emitters integrated with CMOS"

A CMOS-integrated SiGeC APD is presented, which under avalanche breakdown emits white light perpendicularly to the SiGeC layers. It can be used as an optical pump for devices such as Raman or Er-based lasers. [C724]

"Injection moulded lens array for high power LED modules"

Light emitting diodes (LED) are increasingly replacing traditional light sources due to their better energy efficiency and potential for reliable operation with long lifetime. The price of LED-based luminaires is still fairly high. One way to decrease the manufacturing cost is to use single lens optics for many LEDs. Optics should provide high efficiency together with low cost and excellent reliability. This paper introduces injection moulded lens array designed for high power LED modules. The lenses were employed with a series of modules containing 4 Ч 4 white LEDs whose total luminous flux varied from 660 to 2280 lm. The lens had dimensions of 73.4 mm Ч 73.4 mm Ч 13.9 mm and it included alignment pins and sides that could be used for sealing. The lens optics gave elliptical 30° Ч 90° lighting pattern with the uniformity of the illuminance on plane surface better than 3:2. The lens was optimized for Philips Lumileds Luxeon Rebel, but it was tested also with Cree X-Lamp, Luxeon K2, OSRAM Golden Dragon Plus, OSRAM Diamond Dragon and Seoul Z-power LEDs. This paper presents goniometer measurements of the luminous intensity and compares them to the simulations. Two different lens materials, namely cyclo olefin polymer (COP) and polyamide (PA), was used. The paper lists experiences obtained using these lenses. Especially the reliability of the lens and its attachment is discussed. In total, 24 LED modules were stressed in environmental tests including thermal cycling, thermal shock, moisture and corrosion. Observations made on the lens materials as well as lens attachment materials are depicted. Moisture and corrosion was not a problem but high temperatures challenged both the lens and adhesive materials. 22 modules were subjected to a life test of 6000 h where they were driven with a constant current of 700 mA and monitored continuously. The life test revealed failures in both lens materials. The results challenge the reli--ability of the plastic lenses in high power LED modules operating in high temperature applications. [C725]

"Reality through the invisible interface"

Developments in retinal projection and contact lens display promise an eventual seamless experience of augmented and virtual realities. But as with the inception of all immersive technologies, this raises the fearful spectre of an illusionism so credible as to realise the quintessential post-modern dilemma: total uncertainty between reality and fiction. This paper explores the emerging possibilities that future AR interfaces might offer and considers the resulting implications for actual reality. Tracing a brief history of the imposturous imagery and outlining anxieties that immersive content and technologies have raised, I contend that reality has always been uncertain. Furthermore I assert that human perceptions of reality develop and adapt alongside the technologies that mimic it. [C726]

"Silicon-based light emission in ultraviolet"

Efficient UV electroluminescence from Gd-doped SiO2gate oxide was reported with quantum efficiency larger than 5%. The efficiency and stability was improved by flash lamp annealing, co-doping with F-ions and K+ions. [C727]

"The connecting of electronic modules using SMD components' package"

The article discusses the possibility of electrically connecting two or more boards or modules used in electronics and microelectronics and the first results of reliability testing of a structure connected by SMD components. The test structures were cyclically exposed to thermal load in the temperature range -20°C to +100°C, with dwell time of 10 minutes at maximum and minimum temperature. Test samples are based on alumina and mounted with SMD components with package of size 0603. Test samples are soldered to boards with immersion gold surface finish. The aim of the experiment is to determine the lifetime of a structure connected by SMD components in respect to varying coefficient of thermal expansion of base materials. [C728]

"A case study of applying regional level-set formulation to post-sawing LED wafer inspection"

With level set formulation, new contours can system that utilizes the evolution of zero-level contours for segmenting post-sawing wafer is proposed in this study. The system also utilizes a regional formulation, which

improves the level set segmentation in images with intensity inhomogeneity. With a proper configuration, the initial contour can be given in arbitrary positions in the background. Hence, a small fixed initial contour is applied to evolve the zero-level set to automatically segment the wafer. Without necessity of applying any filtering in advance, the inspection can be performed directly on the segmented results. The experimental results demonstrate the effectiveness of the proposed approach. [C729]

"Electron-Cooper-pair operated long-wavelength light emitting diodes"

In this paper, enhancement of radiative recombination processes with the Cooper-pair injection is demonstrated by the lifetime measurements under the operation with high (-100%) internal QE. [C730]

"Control electronics integration toward endoscopic capsule robot performing legged locomotion and illumination"

Miniaturization of sensors and actuators up to the point of active features in endoscopic capsules, such as locomotion or surgery, is a challenge. VECTOR endoscopic capsule has been designed to be the first endoscopic capsule with active locomotion. It is equipped with mini-legs driven by Brushless DC (BLDC) micro motors. In addition it can be also equipped with some other sensors and actuators, like a liquid lens, that permits to enable advanced functions. Those modules are managed by an ASIC specifically designed for the VECTOR capsule. The ASIC is a complete System-On-Chip (SoC) and integrates all the electronics needed to enable the legged locomotion and the sensing and actuating functions of the capsule in an unique chip. The SoC also enables other functions for endoscopic capsules such as drug delivery and a biopsy system. The size of the SoC is 5.1 mm Ч 5.2 mm in a 0.35 um high voltage CMOS technology. [C731]

"Energy efficiency testbed for wireless sensor networks"

Wireless sensor networks (WSN) consist of many small battery powered nodes with resources constraint. Low power design is a pivotal step of deploying a new platform. A typical sensor node consists of three major components: sensors, micro-controller, and transceiver. It's important to know their dynamic power consumption before optimization. Current research focuses on simulation, or integrating software probes inside the node. They are not always applicable. We proposed an energy efficiency testbed for wireless sensor nodes. It is portable and can realtime sample the data of power consumption. Our device, based on measurements of current and voltage information, enables accurate energy efficiency analysis of nodes in real world. It's useful for evaluating and modeling a new platform at design phase. Moreover, it can be used to monitor health status of sensor nodes from the aspect of power. Experimental results on WSN platform, MicaZ, show that our device can well monitor the energy efficiency of wireless sensor nodes. [C732]

"RFID based intelligent lighting system development for the convenience store"

In this paper, through the convenience store inside the refrigerated cabinet, combined with RFID control systems, intelligent production of a lighting store refrigerated display cabinets, the use of the laboratory's self-developed software interface with the energy-efficient light-emitting diode light source so the focus of the lighting, so that display focus on commodity counters so that customers can quickly prompted the choice of access to goods, to save power consumption refrigerators. And harm the human body for electromagnetic waves of doubt, the development of low-power low-electromagnetic scanning. Which used light-emitting diode light source if the source to replace the traditional fluorescent lamp, can save about 77% of energy. RFID positioning control system for self-development software, the system may be the largest reactive power consumption down to 45W maximum 25W, and more can be 92% ~ 100% of the cases to identify 20W power consumption to below the RF system to save energy for more than 44%. Two energy-saving technology combined with technology, in terms of a single overall refrigerators can save about 65.6% of lighting electricity consumption in refrigerators, the use of convenience stores in our schools can be saved within the 63.56% forecast refrigerators lighting electricity consumption in the next provide energy-saving and convenient living environment. [C733]

"Multiple people extraction using 3D range sensor"

We propose a novel system for extracting multiple people in crowded scenes by employing LED 3D range sensor. This new kind of device can capture depth image at a relatively high frame speed, which makes the extraction of dynamic objects possible. However, it suffers from the strong noise caused by the environment illumination. Here we propose a novel method for multiple people extraction by integrating an improved version of mean-shift clustering algorithm and total variation based denoising technique. When handling the depth image, it is considered both as a point cloud as well as a 2D image. In this way, different properties of the depth image are sufficiently exploited. The proposed method can fully automatically extract multiple people in a cluttered environment, even from a mobile platform. The experiment conducted at the platform of a railway station

demonstrates the effectiveness of our proposed algorithm. [C734]

"Impact of onpolar plane for deep ultraviolet laser diodes based on AlGa/AlN quantum wells"

Band structures and optical gain of nonpolar AlGaN/AlN quantum wells were investigated. It was found that nonpolar quantum wells drastically improved optical gain and anisotropy compared to those of c-plane quantum wells. [C735]

"First achievement of Deep-UV LED on Si substrate"

Deep-ultraviolet (DUV) light-emitting diodes (LEDs) have a wide range of potential applications such as sterilization, water purification, medicine and biochemistry, white light illumination, and so on. DUV-LED fabricating using silicon substrate is attractive as a low-cost DUV light-source, in near future. However, the realization of the LED on the Si substrate which is shorter than 300 nm is not reported till now. Quaternary InAlGaN alloy is attracting attention as candidate material for realizing high-efficiency DUV LEDs due to In incorporation effects. In this study, the authors demonstrated 280 nm-band InAlGaN QW DUV LEDs on Si (111) substrates. [C736]

"Die-attach for high-temperature applications using fineplacer-pressure-sintering (FPS)"

A new joining technique called "Fineplacer-Pressure-Sintering" (FPS) for die-attach of small electronic components (e.g. LEDs and photodiodes) is described. Using a modified Flip Chip Bonder, bare dies could be bonded onto substrates with high positioning accuracy. For the FPS process a 50 tons press, which is conventionally used for pressure sintering, is no longer required. Very high average shear strengths (63 MPa) were achieved on molybdenum substrates (metallization: Ni/Au). With the help of silver powder of micro-to-nanometre grain size the electrical and mechanical properties of the compound layer could be further increased. The bond strength of metalized GaN-LEDs on Al2O3substrates with a Ti/Pd/Au metallization is twice as high as with standard micro-powder and the process temperature could be reduced to 200°C. Finally the applicability of FPS was demonstrated by an optoelectronic module consisting of two commercial InGaN-LEDs and GaP-photodiodes on a metalized Al2O3substrate. Successful function was found with prototype modules at temperatures up to 250°C. [C737]

"Integrated LED modules"

An experimental and modeling study was done on the system architecture of integrated LED modules. Goal was to realize minimal footprint modules with optimized LED-to-package ratio and integrated driver aiming at maximal etendue and maximal lumens/area light output. This while staying within the boundary conditions of thermal load on the LEDs, driver ASIC and package and assembly materials. A number of multi-LED multi-color intelligent modules were designed, modeled, realized and evaluated. Lateral and vertical configurations of LEDs and ASIC in a leadless package were realized based on industrially known assembly technologies and using available LEDs and a dedicated ASIC chip. Concurrent design of module and receiving printed board was used to obtain the best thermal solution. [C738]

"Development of AlGaN-based deep-UV LEDs using high-quality AlN on sapphire"

AlGaN and quaternary InAlGaN alloys are attracting much attention as candidate material for realizing deep-ultraviolet (DUV) light-emitting diodes (LEDs) or laser diodes (LDs) [1,2]. We demonstrated 222-351 nm DUV LEDs with AlGaN and InAlGaN quantum wells (QWs) fabricated on low threading dislocation density (TDD) A1N buffer on sapphire [1-6]. [C739]

"Marked efficiency enhancement of 250 nm-band AlGaN Deep-UV LEDs using multiquantum-barrier"

In this work, we demonstrated dramatic increase of efficiency of 250 nm-band AlGaN DUV-LEDs by introducing multiquantum-barrier (MQB). [C740]

"Efficiency limitations of green InGaN LEDs and laser diodes"

The efficiency of InGaN/GaN blue-green emitters is experimentally investigated. The results provide initial evidence for an inter conduction-band Auger resonance, increasing droop in InGaN LEDs and causing the low radiative efficiency of green laser diodes. [C741]

"A LED-array-based range imaging system with Time-to-Digital Converter for 3D shape acquisition"

A LED-array-based range imaging system is presented for capturing the depth information of three-dimensional (3D) objects. The range image is obtained by time-division electronic scanning of the LED Time-of-Flight (TOF) range finders in array, and no complex mechanical scanning is needed. Millimeter ranging resolution can be reached thanks to the use of Time-to-Digital Converter (TDC) with picosecond resolution and some special analog phased-lock loop (APLL) filter techniques. By close packaging LED die array, a high spatial resolution and large pixels version of the proposed system can be achieved easily. Experimental tests for evaluation of the system performance are adequately described. The results show the depth resolution can be better than 5 mm in the range of 300-1000 mm, and a higher resolution 0.5 mm can be achieved when the measurement time of a depth pixel is extended to 5 s, which is sufficient for many applications, including computer vision, machine automation, 3D object recognition, reverse engineering and virtual reality. [C742]

"A six-DOF motion tracking system for markered environment"

In this article, we describe a system that estimates the position and orientation of a calibrated camera. For better estimation accuracy, artificial markers made up of infrared LEDs are placed in certain pattern onto the ceiling of a room. A 3D reconstruction process is first performed offline so that the coordinates of all LEDs within a unified world frame are determined. This process, based on incremental optimization, has proved to give more accurate result than the traditional global iterative optimization. During real-time tracking, the infrared lens filter of the camera helps to filter out to a large degree of the visible light, thus the system is fairly robust and does not suffer the impact of the illumination changes. To reduce the accumulated error, an inertial sensor is fused with the camera based estimation and its signal acts as the control vector in the Extended Kalman Filter. The experimental result demonstrates the speed and robustness of our proposed system. [C743]

"Production of next generation backlight units by adaptive step and repeat embossing"

Backlight units are the most relevant element in display with respect to the energy consumption. In addition, the quality of backlight units in terms of brightness, homogenous light distribution, and the angle of light radiation, dramatically influence the overall quality of a display. Within this paper a new approach for the production of complex micro optics on large surfaces is presented. The technology is being optimised within the FlexPAET project for the production of next generation backlight units which allow for more efficient display illumination. [C744]

"Small scale balance manager for household energy system management"

By the recent trends the households have a lot of intelligent, programmable electricity consumer devices and some generation units as PV too. The new network structure of the residential inhouse power systems suits to the requirement of the security, autonomy, renewable generation and economy. This suppose a parallel DC network that get directly the PV generation, stores that, supplies the LED lighting and DC drives of the heating-cooling. In normal state the loads are supplied from the utility power system or the PV generation feeds back to the utility. Some critical loads require uninterruptable supply, e.g. heating system's circulating pumps, security devices, communication and emergency lighting. In case of outage of main grid the house turns into island operation mode, where the generation, storage and loads must be managed to keep the equilibrium. A balance manager electronic has been planned that controls the load situation and the state of the storage device, makes decision about the island operation and the derogated functionality. The paper gives the structure of the electronic and simulation about its operation. This local device can contribute to the intelligent operation of the whole network, to the smarter grid. [C745]

"Application of image smoothing algorithm"

With the application of CCD image sensor, the display effect of LED display panel is greatly improved. Due to the pixel response non-uniformity of CCD, it usually brings a "center dark, surround light" defect on LED display panel. Based on image smoothing algorithm, a calibration method for this defect is proposed in this paper. After calibration, the display uniformity deviation of LED display panel can be narrowed from 12.9% to 0.73%. Experimental results show that the method overcomes the inherent defect and achieves the desired effect. [C746]

"Analysis and prospect of control system for stage lighting"

Lighting control is a key technology for theatrical performances. There are many methods for lighting control including analog, digital and networking. The current research focuses on networking and intellectualization of lighting control. During the networking construction of lighting control system, with the update of the correlative

devices, the high-tech technology and correlative devices have played a more important role in lighting control system. In this paper, analysis of lighting control system is given. The correlative technology is also talked. At last, a deep understanding and prospect of lighting control system is shown. [C747]

"Power-constrained contrast enhancement for OLED displays based on histogram equalization"

A novel power-constrained contrast enhancement algorithm for organic light-emitting diode (OLED) displays is proposed in this work. We first develop the log-modified histogram equalization (LMHE) scheme, which reduces overstretching artifacts of the conventional histogram equalization technique. Then, we model the power consumption in OLED displays, and incorporate it into LMHE to achieve the optimal tradeoff between contrast enhancement and power saving. Simulation results demonstrate that the proposed algorithm can reduce the power consumption significantly, while preserving image qualities. [C748]

"Research on consistency checking method of UML model in embedded system"

To solve the problem of consistency checking of UML model in embedded system, the model consistency was analyzed. The executable UML was put forward which was an enhanced subset of UML. The state-event table was used to express the system model from model's transformation. And the model's consistency checking was come true by dynamic emulation. Finally, a case was presented to verify the feasibility of this method. [C749]

"The research of minimum cost based on lamp design of urban planning"

With the high-speed economy development, urban construction steps has increased. With the corresponding support facilities in the development, the input has improved obviously. Lamp is a typical. How to reasonably achieve overall planning for streetlights highest efficiency? It becomes study hotspot. By analyzing examples, use mathematical knowledge to design model, and then to achieve optimization. [C750]

"A Formal Methodology for Developing Enterprise Systems Procedurally: Homotopy, Pi-Calculus and Event-Driven Programs"

A new approach for designing and modeling enterprise systems is described. The homotopy lifting property (HLP) is used to design an enterprise system in a bottom up way. As an example, task changes in a department are designed and implemented by our approach: the incrementally modular abstraction hierarchy (IMAH) starting at the most abstract level of homotopy and ending at the most concrete level of program codes. At first, the HLP is constructed as the most abstract level. Then, task changes and a state transition diagram, which constitute of two spaces of the HLP are defined from an abstract level to a concrete level. Then, agent diagrams are obtained in a bottom-up way. The agent diagrams are transformed from an abstract level to a concrete level until program codes written by the C-like programing language are implemented on an event-driven and multi-thread processor XMOS. While carrying out these procedures, invariants are preserved to avoid unnecessary testing, which usually consumes a large amount of time and cost in the traditional approaches. The established method is also effective in modeling an designing cyber worlds. [C751]

"Invisible light: Using infrared for video conference relighting"

Desktop video conferencing often suffers from bad lighting, which may be caused by harsh shadowing, saturated regions, etc. The primary reason for this is the lack of control over lighting in the user's environment. A hardware-based solution to this problem would be to place lights near the video camera, but these would be distracting to the user. We use a set of infrared lights placed around the computer monitor to gather a sequence of frames which is used to infer surface normals of the scene. These are used in combination with a visible spectrum image to create an improved relighting result. [C752]

"Modelling the optical behaviour of LED's and PD's for PSpice simulation readiness"

The paper presents a method of modelling the optical behaviour of the optoelectronic devices, such as Light Emitting Diodes and Photo Diodes, in order to handle the optical signals in the PSpice environment. [C753]

"A simple implementation of determinant decision diagram"

Determinant decision diagram (DDD) uses a Binary Decision Diagram (BDD) to represent the Laplace expansion of a determinant. It is used as the core computation engine in some modern symbolic circuit simulators. The traditional implementations rely on a BDD package for the common-data sharing operations in which symbol ordering plays an essential role. This paper proposes a simple implementation method which does not use any BDD package. Sharing is implemented by directly hashing minors, while the requirement on symbol ordering is

weakened to an expansion ordering. The basic mechanism used is a natural formulation of layered expansion which is analogous to manual expansion of a determinant, hence it is easily understood. The simplified DDD construction method not only makes the DDD implementation straightforward, but also results in greater efficiency. A simulator developed based on this new method solves the μa725 op-amp circuit in a few seconds by flat expansion. [C754]

"A fuzzy PID controller of monitoring system for construction machinery based on ARM"

Control arithmetic is the key part of monitoring system because it is difficult to formulate exact mathematical model due to nonlinear and time-varying characteristic of construction machinery. In order to improve the running efficiency, a fuzzy PID controller is designed and realized in the monitoring system based on ARM. Besides, three encapsulation functions are designed to carry out data transfer between ARM and Matlab by UART series communication. And then, the fuzzy PID can be simulated and displayed by Matlab to evaluate the control effect. In the end, the experiment is made to validate the control arithmetic. The compared results show that the fuzzy PID controller is better than conventional PID used in monitoring system for construction machinery. [C755]

"Surface plasmon enhanced electroluminescence of SiNx film based MIS device"

Electroluminescence of MIS devices consisted with an ITO/SiO2/SiNx/Ag/p-Si/Al multilayer structure, as well as the multilayer without Ag, was investigated. The enhancement of EL intensity of MIS devices by introduce an Ag islands film was observed. Due to the existence of Ag islands film in the MIS devices of SiNx films, the injected current of MIS devices was increased and the extracted EL was also enhanced by the excitons-LSPs coupling. [C756]

"A monolithic integration optoelectronic integrated circuit in standard CMOS technology"

A monolithic integration optoelectronic integrated circuit (OEIC) is realized in standard CMOS technology. It consists of LED, waveguide, photodetector and receiver circuit. The LED-emitted light transmits through the waveguide and can be detected by photodetector. [C757]

"High-performance 1550 nm polymer-based LEDs on silicon using hybrid polyfluorene-based type-II heterojunctions"

We report on the optoelectronic properties of hybrid polymer-based light-emitting diodes integrated on silicon chip. Using a hybrid polyfluorene-based type-II heterostructure host with PbS quantum dots, we achieved efficient room-temperature electroluminescence at telecommunication wavelengths. [C758]

"On the possibility of SiGeC superlattices having a broken-gap"

A CMOS-compatible SiGeC superlattice design is proposed that offers the possibility of generating a range of direct bandgaps smaller than Ge's, down to broken-gap provided that sufficient substitutional carbon content can be incorporated. [C759]

"Numerical analysis of surface-plasmon-enhanced light emission in fin silicon light-emitting diode"

We propose an ultra thin fin-shaped vertical silicon light-emitting diode with metal film deposition on each side for surface plasmonic resonance coupling, and numerically investigated its emission property. [C760]

"High efficieny and long-term stability of nanocrystalline silicon based devices"

High efficiency of silicon nanocrystal based devices is shown through energy-band gap engineering of the nanocrystal ensemble. By using bipolar tunneling, improved electrical and opto-electronic stabilities after long storage time and under aging experiments are demonstrated. [C761]

"AR Shooter: An augmented reality shooting game system"

This paper presents the features and functionalities of AR Shooter, an augmented reality shooting game system which is based on infrared marker tracking. The proposed system consists of two parts: a gun with video cameras and infrared markers composed of LED. When the gun aims on the infrared markers, some monsters will appear on the LCD equipped on the gun. Then, the user can open fire and shoot at the monsters. Figure 1 shows the diagram of the proposed system. [C762]

"Nanogenerator and nano-piezotronics"

Summary form only given. Developing wireless nanodevices and nanosystems is of critical importance for sensing, medical science, environmental/infrastructure monitoring, defense technology and even personal electronics. It is highly desirable for wireless devices to be self-powered without using battery. This is a new initiative in today's energy research for mico/nano-systems in searching for sustainable self-sufficient power sources. It is essential to explore innovative nanotechnologies for converting mechanical energy, vibration energy, and hydraulic energy into electric energy that will be used to power nanodevices. We have invented an innovative approach for converting nano-scale mechanical energy into electric energy by piezoelectric zinc oxide nanowire arrays. The operation mechanism of the nanogenerator relies on the piezoelectric potential created by an external strain; a dynamic straining of the nanowire results in a transient flow of the electrons in the external load due to the driving force of the piezopotential. We have developed the nanogenerator from fundamental science, to engineering integration and to technological scale-up. As today, a gentle straining can output 1.2 V from an integrated nanogenerator, using which a self-powered nanosensor has been demonstrated. A commercial LED has been lid up. This is a key step for developing a totally nanowire-based nanosystem. Alternatively, by substituting the gate voltage in a field effect transistor (FET) with the piezopotential creating by an external strain, we have fabricated a series of devices that rely on a coupling between semiconductor and piezoelectric properties and are controlled/tuned by externally applied force/pressure, such as diode, strain sensor and strain-gated logic unites, which are a new field called piezotronics. A three way coupling among piezoelectricity, semiconductor and photonic excitation has demonstrated the piezo-phototronic effect. [C763]

"Application of field emission as backlight unit for LCDs"

Liquid crystal displays (LCDs) have become main stream in the flat panel display industry and the use of light emitting diode (LED) array as a backlight unit (BLU) for LCDs is emerging. However, the currently used LED for the backlight unit is a point light source and due to the optomechanical limitations, the LED backlight is not an ideal rectangular backlight. Fortunately, a BLU based on field emission satisfies such demand. The point spread function (PSF) for both LED and field efect back light unit (FE BLE) are shown. The simulation results indicate that the good property of field emission (FE) as a flat light source shows its prospective feature in the application as the BLU for LCDs. [C764]

"Improved field emission property of vertically array carbon nanotube assembled with CdS QDs"

Summary form only given. CdS is a promising material for flat panel displays, light-emitting diodes, lasers, logic gates, and transistors. CdS has attracted special interest because it exhibits high photosensitivity and its band gap energy (2.41 eV) and electron affinity (4.5 eV) appear in the visible spectrum [1]. In this work, CdS deposition on surface of the vertical aligned carbon nanotube (VACNT) on silicon wafer is fabricated by chemical bath deposition (CBD) method. The field emission (FE) properties of CdS-VACNT are investigated. Silicon wafers were ultrasonically cleaned in de-ionized water, acetone, and iso-propanol alcohol, and were dried at 100 °C in an atmospheric pressure oven. VACNT arrays were grown by Plasma Enhanced Chemical Vapour Deposition (PE-CVD) at 500 oC using a magnetron sputtered, 7 nm-thick Ni catalyst with photolithographically defined 6 μm spacing. The VACNT fabrication process is described in detail elsewhere. VACNT substrate was dipped into an ethanol solution containing 0.5 M Cd(Nθ3)2 for 5 min, rinsed with ethanol and then dipped for another 5 min into 0.5 M Na2S menthol solution and rinsed again with menthol. The two step dipping procedure is termed as one CBD cycle and it repeated 5 times for VACNT covered with CdS QDs. Fig. 1(a) and (b) show the SEM image of CdS covered on VACNTs. It can be seen that the VACNTs grown in a hexagonal array with a length of 5 μm. The CdS covered on the surface of the VACNTs. Fig. 2(a) and (b) TEM image of single nanotube before and after covering with CdS. It can be seen that the CdS QDs adsorbed uniformly on the surface of single carbon nanotube. The FE measurements of VACNT and CdS-VACNTs were taken. The typical plot of the FE current density J versus the applied electric field E and the corresponding Fowler-Nordheim (F-N) plots of the VACNT and CdS-VACNTs are represent in Fig. 3(a) and (b), respectively. Here we define the turn-on field as the applied elect--ric fields required to the produce a current of 10 μA/cm . The turn-on field for VACNTs and CdS-VACNTs are 3.5 and 2.4 V/μm, respectively. Field emission properties are usually described in terms of parameters defined by the Fowler Nordheim (F-N) theory. The field emission enhancement factor β for VACNTs and CdS-VACNTs are calculated by fitting the slope value of F-N curves to be 1218 and 3998. [C765]

"Structural, and magnetic properties of Europium doped (ZnO)12 clusters"

ZnO-based dilute magnetic semiconductors (DMSs) have attracted wide interest because of their potential application in developing spintronic devices such as spin field effect transistors and spin light emitting diodes [1,2]. The DMSs are mainly manipulated via doping in bulk phase ZnO materials, which, however, has the handicaps of low composition rate and local fluctuations. Compared with bulk and film, cluster always exhibits special physical and chemical properties due to its size effect and large surface-to-volume ratio, which also

makes the doping easier to achieve. Thus, the limited impurity concentration encountered in bulk may be overcome by assembling stable doped cluster to synthesize a new class of DMS. Previous theoretical studies indicated that (ZnO)12cluster is a particularly stable cage [3-5]. Thus, this structure can be taken as a good precursor for the investigation of doped ZnO clusters [6-7]. In this paper, we have carried out a systematical theoretical investigation on the structural, electronic, and magnetic properties of (ZnO)12clusters doped with one or two Europium (Eu) atoms based on the density functional theory methods. [C766]

"The effect of PCBM doping on the electroluminescent performance of organic light-emitting diodes"

In this paper, a series devices with the structure ITO/PVK:PCBM(x wt%)/Alq3/LiF(with or without)/Al are fabricated. The effect of soluble [6, 6]-Phenyl C61 butyric acid methyl ester(PCBM) doping in the hole transport layer Poly(9-vinylcarbazole)(PVK) on the electroluminescent performance of organic light-emitting diodes is investigated by changing the PCBM content from 0% to 3%. [C767]

"Low-voltage and high-stability p-type doped blue organic light-emitting diodes with bilayer hole injection layers"

We report a low-voltage and high-stability blue OLEDs with a peak at 470 nm, which is composed of tetrafluorotetracyano-quinodimethane(F4-TCNQ) doped 2T-NATA and additional 4,4'4"-Tris(N-(2-naphthyl)-N-phenyl-amino)-triphenylamine(2T-NATA) as a hole injection layer (HIL). Compared to undoped device, the operating voltage of p-type doped blue OLEDs can decrease by 1.5 V. Furthermore, the use of 2T-NATA as a blocking layer to fluorine diffusion was found to improve device lifetime and chromatic stability greatly, the half luminance decay reach about 3800 h at the beginning luminance of 3000 cd/m2. [C768]

"Application of LED visible light communication signaling for the visually impaired"

Recent progress in barrier-free technologies is encouraging helps for supporting handicapped persons and aged persons. For visually-impaired persons, though special aids including braille are prevailing, we need to provide further support. In this paper we are proposing a system for supporting moves of visually-impaired persons. Our system is not only for totally blind but also for weak sighted persons. It is based on LED-based visible light communication technologies and ubiquitous technologies for public signs. In addition, it is pointed out that such a system as proposed one is, from the security point of view, weak against side channel attack. This attack means that someone may disclose secret key of cryptography by analyzing time for its calculation through leak radio wave, and so on. The safeness of cryptography depends on confidentialness of secret key. We also consider protection against such attacks. [C769]

"A Manual Mobile Phone Charger"

In the paper, with the interest in power generation and management, we present a Portable Hand Crank Cell Phone Charger with an LED light that can be used anywhere. Also this devise would convenient when on extended outdoor trips. This devise would come in handy when there is a power outage and you need a flash light too, it always seems like the batteries are dead in flash lights. This devise is both practical and convenient. It is obvious that a device that could charge cell phone batteries just by the use of human harvesting energy is a very appealing and marketable product. [C770]

"A Novel Integrated PWM Lighting System"

Because of the crisis of global energy resources and global warming, many nations and enterprises are enthusiastic at developing the integrated scheme about making good use of renewable energy. In this paper a power-saving lighting system supplied with solar cell is proposed. The solar cell is used for electrical energy supplement and the generated energy is stored in power storage unit. The power storage unit is charged by pulse-width modulation (PWM) method. Through the PWM signal controlled by microcontroller, regulator and capacitance array, it balances and cushions the voltage between the solar cell and the power storage unit. It is helpful to the life-time extension of power storage unit. The LED array is used in the lighting system. The lighting system can detect the environmental brightness and control the brightness of LED array by PWM signal from the microcontroller. The experimental result is presented that confirm the power-saving prediction. [C771]

"Choice of power and control hardware for smart LED luminary"

This paper analyzes the most significant details of development of a modern luminary. One of the effective ways to improve the energy efficiency of lighting systems and luminaries is to use the so called smart luminaries. This means that the luminaries turn on exactly at the place and time when the light is required, as well as with the

required intensity of light. Such approach is especially effective if LED elements are utilized. Development of the smart LED luminaries includes several tasks: elaboration of energy efficient power supply equipped with distance controllable dimming function; choice and implementation of sensors; choice and development of communications for data exchange between luminaries, sensors and overall control system. The paper briefly describes the main problems of development of the smart lighting systems with LEDs as well as their solutions. [C772]

"Reliability Analysis on Dual Power Supply Controller Based on FMEA and FTA"

This paper uses FTA (Fault Tree Analysis) with FMEA (Fault Mode Effect and Analysis) to do the study on reliability of low voltage apparatus. Establishing the fault tree is the most important step in using fault tree analysis. The validity of the tree model will have a great impact on the study result. The combination of the two analysis method can give a full-scale and detailed analysis of the product. Let FMEA get the product's fault mode and fault effect, and use Fault Tree Analysis method to build the fault tree and carry out qualitative analysis and quantitative analysis. The study result gives both theoretical and practical advices on improving the product's stability. [C773]

"Fabrication of an Aspherical Microlens for OLED with Modified Etching Process"

Study on using a process which was combined LIGA (Lithographie Galvanoformung Abformung) with etching to manufacture an optical film of an aspherical microlens array (A-MLA), which can improve the extraction efficiency of an OLED (Organic Light-Emitting Diode). The extraction efficiency of a current OLED is not high due to its total internal reflection, and the luminance is also lower because of the low extraction efficiency. How to increase the extraction efficiency is a valuable topic to discuss. This study analyzes the manufacturing and design parameters of A-MLAs such as diameter of a microlens, dry etching parameters and electroforming rates. The experimental results indicate that the variation of the diameter is about 5% after the thermal reflow and dry etching process. Electroforming process is used to make a metal mold as the first mold after PDMS (Polydimethylsiloxane) mold is replicated called the secondary mold. In addition, it has an additional effect to refine the existing defects on photoresist surface. From the measured data of the luminance of the optical film with A-MLAs, they show that the luminance of OLEDs is enhanced more than that of common spherical-microlens array. [C774]

"A Unified Standard Traffic Light Display-The Single Pedestrian Light"

The Single Pedestrian Light is an all-in-one pedestrian light, which is capable of simultaneously displaying a walk or stop sign and real time countdown information on the same screen of a pedestrian light. The main objective of the Single Pedestrian Light is to save energy, cut cost, protect the environment, reduce wastages and improve road safety. To examine the Single Pedestrian Light with different criteria such as law, safety, economization, energy saving, environmental regulations were carried out in this study. The results showed that the Single Pedestrian Light was complied with the Green Policy. Accordingly, the Single Pedestrian Light is able to replace the conventional pedestrian lights on the road. That means the era of unified standard traffic display has come. [C775]

"Device for excitation of eye retina for photon electroretinography"

Principles of construction of the light-emitting diode device for control of excitation of a retina of an eye during photon retinography are developed. Opportunities for interactive and automation control of intensity, frequency and coordinates of main direction of light-emitting diode radiation are investigated. [C776]

"Optical interconnections on basis of nanostructured silicon embedded in anodic alumina"

The design and technology of manufacturing of optical interconnections on the basis of nanostructured silicon have been developed. The optoelectronic couple with conversion coefficient of current of about 1% has been produced. The possibility of integration of optical and electron interconnections on the silicon chip is demonstrated. [C777]

"Determination of active region overheating temperature of GaN-based light emitting diodes promising for laser media pumping"

Overheating temperature of active region of LEDs made of Bridgelux chips was determined using long-wavelength shift of the EL spectra as well as the voltage reduction at constant current. It was shown that direct liquid active cooling of LED chip reduces drastically its thermal resistance that is promising for pumping of laser active media. [C778]

"Research on Up-to-Date Liquidometer Based on Hall Effect"

An up-to-date floater liquidometer based on Hall Effect is presented in this paper. It specially fits for the application of the area of petrochemical engineering where a non-contact floater liquidometer is the best choice. By using sensor constructed by Hall switch component and 74HC165 8-bit parallel in/serial output shift register matrix, transmitter constructed by AT89C2051 MCU and 4~20mA industrial general current signal transmission and secondary instrument constructed by ICL7135 A/D, AT89C52 MCU and 74HC164 group, the liquidometer is safe, steady, accurate and low-cost to measure, transmit and display every certain liquid level datum with 5 mm resolution. [C779]

"A High-Voltage LED Driver Using SOI Technology"

A high-voltage LED driver using Silicon-on-Insulator (SOI) technology is presented in this paper. The presented LED driver has a wide input range from 40V to 625V, and could be used in tens to a hundred series LED applications. This driver works in peak current control mode, which provides two dimming functions: linear dimming and PWM dimming. The output current requirement could be fulfilled by adjusting the external current sensing resistor. The prototype chip is designed and implemented using XFAB 1-μm SOI Process. [C780]

"Short range optical communication systems for vehicles and airplanes"

This paper deals mainly with state of the art and next-decade technologies for fiber-optic data buses in automotive applications. Nowadays, fiber-optic data buses in automotive applications are exclusively used in the infotainment domain, MOST (Media Oriented System Transport). Current data rates are in the order of 150 MBit/s. Consequently, the use of LEDs and polymer optical fibers (POF) is sufficient. For higher data rates, also alternative solutions are discussed: The LED as transmitter can be replaced by a vertical surface emitting laser (VCSEL) and the plastic fiber (POF) by polymer-cladded silica (PCS) fiber. Due to the inherent fact that, as a result, the fiber diameter is reduced, the detector area of the well-known Silicon photo diodes can also be reduced greatly. As a consequence, data rates can be extended into the Gbit/s-region. [C781]

"The Research of LED Display Screen Based on Embedded Technology and FPGA Technology"

Based on the technology of the high performance ARM microprocessor of embedded real-time operating system, a kind of large LED color screen display control system was designed. This Article mainly analyzes the design of LED display control. High performance 32-bit ARM9 microprocessor is used as the core control to achieve a variety of dynamic display effect. And it combined with FPGA technology to solve the problem that now the LED display screen can't satisfied with the large display area and the switched frequently display data requirement. GSM is used in this system as communication line to update the memory data wirelessly. This system can run for a long time succession, steady and reliability. [C782]

"Effects of high penetration of CFLS and LEDS on the distribution networks"

This paper shows the results of a computer simulation of two distribution feeders that supplies energy to costumers who use Compact Fluorescent Lamps and High-Power Light Emitting Diodes. An IEEE 13 node test feeder and a real distribution circuit have been used for the simulations. Voltage and current distortion is analyzed. [C783]

"Harmonic emission before and after changing to LED and CFL-Part II: Field measurements for a hotel"

This paper shows the results of measurements performed with a medium-sized hotel in the North of Sweden. The harmonic emission and other parameters were measured before, during and after a replacement of all incandescent lamps with energy saving lamps, both compact fluorescent lamps (CFL's) and light emitting diodes (LED's). it was not possible to see any major difference in harmonic spectrum before and after the replacement. The reduction in power factor that was observed was completely due to the reduction in active power. [C784]

"Design of high precision CMOS voltage reference"

A stable bandgap CMOS voltage reference is designed for LED driver by combining with self-starting circuit and multi-valued bias voltage generating circuit modules. The circuits are designed by using CSMC 0.5 μm CMOS process. Simulation results by Cadence software show that the temperature coefficient is about 10 ppm/°C, zero temperature coefficient is about at 31°C, close to room temperature. And good temperature characteristics can be achieved in practical applications. Meanwhile, power supply rejection ratio is up to 80 dB, which can meet the

requirement of LED driver IC. [C785]

"Designand realization of a high-precision numericalcontrol current souse"

It is the design and application of digital controlled DC current source with an output range between 20 mA to 2000 mA, which was realized by making use of the single-chip microcomputer system, D/A and A/D converter, constant current source electric circuit, etc. In paper the frame drawing and main circuit were introduced. This design applied degenerative feedback closed loop control system, in order to advanced the output precision. Testing results show that this DC current source have credibility performance and high precision. [C786]

"A system for monitoring cardiac vibration, respiration, and body movement in bed using an infrared"

We have developed a non-invasive system for monitoring cardiac vibrations, respiration and body movement of in-bed hospitalized patients and elderly people who need constant care. These physiological parameters are recorded by an infrared emitting diode and a photo transistor, which are attached between spring coils in bed mattress. The infrared emitting diode diffuses infrared light into the mattress. The diffusion of this energy is changed by mattress shape variations and spring coil vibrations, which modulate the intensity of the received infrared signal. The intensity is also modulated by physiological parameters such as heart pulse, respiration and body movement. The physiological parameters are detected from the received infrared intensity signal by low, high and band pass filters. [C787]

"A study of the automated logistics system of YOUNGOR's distribution center"

This paper involves a study of the automated logistics system of YOUNGOR's distribution center, which includes an integrated computer management and control system, a set of ASRS (Automated Storage and Retrieval System), a multi-story warehouse system, a sorting and conveying system, and other related auxiliary equipments. A central information system was dedicatedly designed for the logistics system of apparel industry, which was integrated with WMS, ERP and DRP system. The results of this pilot project show the good potential for promoting the use of ASRS within apparel industry in China. The study and practice will help apparel companies to assess the benefits of automated logistics system in their day to day operations. [C788]

"Walking motion analysis of intermittent claudication and its application to medical diagnosis"

There are mainly two kinds of diseases in intermittent claudication. One is lumbar spinal canal stenosis (LSS) and the other is peripheral arterial disease (PAD). Differentiating LSS and PAD is a critical issue. Wrong differentiation might cause amputation of lower extremities. At small clinics and hospitals, simple and cheap differentiation system is required. Concerning this, this paper investigated walking motions of the patients. The subject with LED markers walked on the treadmill until she or he felt pain. We recorded the walking motion by camera and tracked the LED markers. Treadmill enables to measure walking motion for a long time in a small space, and LED marker provides position of every joint in the walking. Then, we can get the information such as joint angle trajectory, hemi-foot step, stance and swing phases without any other sensors like foot switch or force plate. We compared walking motions of healthy persons, LSS patients and PAD patients, found their features and 3 factors for disease differentiation; average bending angle of knee joint at the start of stance phase, average dorsiflexion angle of ankle joint, and average hemi-foot step length. The results indicate that 2 dimensional images of walking motion for several seconds are enough for deriving the factors. Then, we can construct the simple examination system for the disease differentiation. [C789]

"Design and realization of a wireless sensor gateway for health monitoring"

This paper describes the design and realization of a wireless sensor gateway (WSG) within a wireless sensor network (WSN) for health monitoring. The WSN allows recording and wireless transmission of biosignals, namely the electrocardiogram, pulse wave and body weight, which are important parameters for cardiovascular monitoring. These can be displayed, analysed, and saved on the WSG through a user interface based on a touch screen. The proposed WSG has the distinctive feature of using two different radio transceivers, exploiting the advantages of each device. Currently, most personal computers and handhelds have standardized Bluetooth interfaces (IEEE 802.15.1) but not ZigBee interfaces (IEEE 802.15.4). Hence, the proposed gateway is designed to receive data from wireless sensors through its ZigBee interface and to forward them to a personal computer via its Bluetooth interface. This feature, combined with simple touch screen menu navigation will reach increased patient compliance and consequently increased benefit for patient in terms of healthcare and safety. [C790]

"On the Performance Gains of Cooperative Transmission Concepts in Intensity Modulated Direct

Detection Visible Light Communication Networks"

Visible light communication networks are currently constrained in range by the divergent source characteristics of the light emmiting diode (LED) and in achievable rate by the modulation bandwidth of the LED transmitter; however, as device advancements improve the limitation on rate becomes inter-symbol interference (ISI). The key contributor to ISI is the non-uniform time of arrival (TOA) of all light source transmissions. Data is conveyed using intensity modulation/direct detection, as such a time of arrival synchronization is not required of the light carrier, but rather of the baseband modulation sequence (data carrier). The concept of cooperative transmission is shown to improve achievable rate; however, communication range does not benefit as well in such networks. Cooperative transmission is a scheme in which a collection of transmission sources pool together their resources to send a commonly shared message in a manner that allows all data transmissions to arrive synchronously at the intended receiver. Although, LEDs emit incoherent light, it supposed that the a collection of LEDs can acheive time synchronization in its intensity modulated waveforms by altering the delays in which the LEDs change state. An elegant one-bit feedback procedure for RF beam-steering is adapted to acheive time of arrival synchronization of the data carrier over the visible light channel. It is assumed that all LED sources share the same clock; however, the sources and a user terminal do not. Data carrier clock synchronization between sources and a user terminal can be obtained using a Manchester line code or a mutual synchronization architecture to adapt to a master group of transmission sources fairly quickly. It is shown that cooperative transmit beamforming can lower the impact of ISI on in the visible light channel as device capability matures to require such an architecture. [C791]

"Cell micromanipulation with an active handheld micromanipulator"

The paper describes the use of an active handheld micromanipulator, known as Micron, for micromanipulation of cells. The device enables users to manipulate objects on the order of tens of microns in size, with the natural ease of use of a fully handheld tool. Micron senses its own position using a purpose-built microscale optical tracker, estimates the erroneous or undesired component of hand motion, and actively corrects it by deflecting its own tool tip using piezoelectric actuators. Benchtop experiments in tip positioning show that active compensation can reduce positioning error by up to 51% compared to unaided performance. Preliminary experiments in bisection of sea urchin embryos exhibit an increased success rate when performed with the help of Micron. [C792]

"Monolithically integrated biosensors based on Frequency-Resolved Mach-Zehnder Interferometers for multi-analyte determinations"

The application of fully monolithically-integrated Mach-Zehnder interferometer arrays fabricated by standard silicon technology to the label-free detection of analytes is introduced. Detection with the presented biosensor is based on a novel concept, the Frequency-Resolved Mach-Zehnder Interferometry (FR-MZI). In addition, a smart encapsulation based on an appropriately designed microfluidic system and performed at the wafer scale scheme for the easy delivery of the samples to be analyzed is demonstrated. Testing of the FR-MZI biosensors with model binding assays demonstrated the detection of streptavidin binding to immobilized biotin at concentrations in the sub nM range. This is the first experimental demonstration of the FR-MZI concept as well as the first demonstration of a monolithically fully-integrated MZI biosensor. [C793]

"Evaluation of a multimode photoplethysmographic sensor during cuff-induced hypoperfusion"

Photoplethysmography (PPG) is a technique widely used to monitor volumetric blood changes induced by cardiac pulsations. Pulse oximetry uses the technique of PPG to estimate arterial oxygen saturation values(SpO2). In poorly perfused tissues, SpO2readings may be compromised due to the poor quality of the PPG signals. We have developed a new multimode PPG measurement system which utilizes a reflectance PPG probe that operates in reflectance, transmittance and transreflectance mode simultaneously aiming to improve the quality of the PPG signals in cases of poor peripheral perfusion. In order to evaluate the performance of the probe, experiments were performed in healthy volunteers. A blood pressure cuff was used to induce systematic and controlled artificial hypoperfusion while PPG signals were recorded using all three modes. It was found that the amplitude of the transreflectance signal was significantly greater than the other two conventional PPG sensors at all occlusion pressures, suggesting the potential for improved signal acquisition in patients with peripheral hypoperfusion. [C794]

"Skillful stick-slip motion control of a Cartesian-type robot"

In this paper, a new desktop Cartesian-type (orthogonal-type) robot, which has abilities of compliant motion and stick-slip motion, is presented for lapping small metallic molds with curved surface. The size is 850 mm width, 645 mm depth and 700 mm height. The robot consists of three single-axis devices with a high position resolution

of 1 µm. A thin wood stick tool is attached to the tip of the z-axis. The tool tip has a small ball-end shape. In order to improve the lapping performance, a small stick-slip motion control is considered in the control system. The small stick-slip motion is orthogonally generated to tool's moving direction. The effectiveness and promise of the stick-slip motion control are examined through an actual lapping test of an LED lens mold with a diameter of 4 mm. [C795]

"Design and properties analysis of a single-chip white InGaN/GaN LED"

LED can not only improve the quality and efficiency of light, but also save energy and reduce environmental pollution. Developing LED industry has great significance for the national economy and the people's livelihood. In the paper, main methods for fabricating white LED and recent progresses in white LED are studied. And then, a novel single-chip white InGaN/GaN LED is designed. Fanally, the I-V characteristics and optical characteristics of the LEDs are analyzed. Turn-on voltage of the single-chip white light LED is 2.7V and reverse leakage current is 0.18mA at reverse-bias voltage of 15V.The single-chip white LED emits white light as the injection current is from 5mA to 60mA. [C796]

"Thermal impedance of AC LEDs"

This paper aims at providing a rigorous description of the thermal impedance of AC LEDs, especially of retrofit LED lamps which are directly driven from the mains supply. The paper gives an overview of the different representations of the thermal impedance then provides estimates of the AC power of LEDs for two extreme cases (voltage and current driven situations). The high harmonic content of the AC power is calculated for these cases and real measurement results are presented for a practical situation. Suggested setup for actual measurement of the AC thermal impedance and the junction temperature of LEDs under AC conditions is also shown. [C797]

"Diagnostics of LED-based streetlighting luminaires by means of thermal transient method"

In this paper we investigate what kind of failures are likely to happen in LED based streetlighting luminaires and what are the requirements for being able to detect these by means of thermal transient testing. Based on preliminary results of long term stability studies of LEDs done in cooperation with the Pannon University in Veszprem, Hungary one should expect degradation of different thermal interfaces. Except the die attach, the relevant thermal interfaces are likely to be detectable by relatively low resolution thermal transient measurements. The measurement hardware can be realized as an add-on to the LED driver circuitry present in the luminaire. Problems related to lack of K-factor calibration are also dealt with. [C798]

"Research on inverting control of PV grid-connected LED street lighting system"

The lighting system consisting of LED street light system, power grid, photovoltaic (PV) arrays and inverting control system of grid-connected PV was investigated. The excess power generated from PV can be transported into power grid through an inverter which changes direct current (DC) into alternating current (AC) using current hysteresis control. PLC controls when to light LED and whether the battery or power grid gives power to LED according to a preset program. The simulation results show that PLC and the inverter control is an effective and simple method to realize these functions. [C799]

"Low ripple interleaved converter for fast PWM dimming of power LEDs"

This work proposes a new interleaved converter to supply Power LEDs. As an interleaved scheme, the converter provides a very low output current ripple, which makes it suitable for this application. The low inductor values used in the device allow the ability of attaining PWM dimming of the Power LEDs at high frequencies (20 kHz and higher). The main operation concept is explained, and a full design process is shown. An experimental setup, for a full diming range assembly of 10 Power LEDs has been built and tested, and experimental results are shown and discussed. Conclusions and limitations of the proposed converter are also commented. [C800]

"Wireless power harvesting with planar rectennas for 2.45 GHz RFIDs"

This paper presents a rectenna (rectifier + antenna) design to harvest electrical energy for powering RFIDs from ambient electromagnetic radiation at the 2.45 GHz ISM band (WiFi, Bluetooth, RFID, etc.). The rectenna structure is formed by a miniaturize 2nditeration Koch fractal patch antenna and two stage Dickson charge pump voltage-doubler rectifier circuit. The proposed rectenna achieves a small size with relatively high realized gain (4 dBi) and good RF to DC conversion efficiency (up to 70%). As a result, the proposed rectenna harvests enough energy from a commercial RFID interrogator 3.1 meters away (4W EIRP at 2.45 GHz ISM band) to power up a 1.6 V LED, enough voltage to enable some RFID chips. [C801]

"Device Synchronization for the Light Control in ZigBee Networks"

Based on the master-slave transmission mode, we proposed a device synchronization method for the light control in ZigBee networks. The lighting devices are distributed over the ground of the road and synchronously flashed at night to improve safety of traffic. Each lighting device is powered by a lithium battery charged by a solar cell during the day. Timing synchronization packets of application layer are periodically sent from the master node to the slaves. When the master node is failure to work, a new master is elected from slave nodes by a free contention rule. The lighting devices still can flash synchronously visually even in the no-master mode or the multi-master mode. Experimental results show the feasibility of our work. [C802]

"Ensure product safety with hazardous locations and solid-state lighting certification"

This paper will give an overview of how hazardous locations are defined and discuss protection methods to mitigate explosion risks in hazardous locations. This paper will also identify requirements applicable to each protection concept in North America, European Union and the rest of the world. Additionally, the paper will discuss the safety requirements and standards landscape for LED lighting. [C803]

"A CMOS OLED driver with pre-charge generation"

A column driver is designed with a standard 0.35μm CMOS process to fit the application and physical properties of passive OLED panels. This paper presents design considerations to meet the requirements for the device. When pre-charge phase is applied, columns can be driven by a internal current and voltages on columns quickly reach the target level. The driver IC is designed in 0.35μm CMOS technology. [C804]

"Design of a high-sensitivity, low-power instrument for chlorophyll a measurements"

Detection of chlorophyll a is important in the protection of marine ecosystem. This paper focused on designing and developing a high-sensitivity, low-power instrument (Named HME Chlometer) for chlorophyll a measurements. Chlorophyll a samples of different concentration were measured, using HME Chlometer and Seapoint Chlorophyll Fluorometer for comparison, and the result showed HME Chlometer was of high sensitivity, great stability, and excellent linearity. And it was able to work well in seawater for at least 6 months. [C805]

"Optical investigation of InGaAsP/InP double heterostructure wafers"

Complex and informative luminescent spectra have been obtained by using visible sources for excitation of InGaAsP/InP double heterostructure diode wafers. The thin contact layer transforms the high energy exciting light to lower energy photons which can excite the active layer, although the InP confining layers are not transparent for primary exciting photon. [C806]

"Contents"

The following topics are dealt with: micro-nanophotonic device structure; optical communication; optical packet networking; tunable nonlinear metamaterials; plasmon nanofocusing; semiconductor photonic crystal device; coupled micro-ring resonator; holographic recording; photopolymers; holographic Bragg gratings; high power sum-frequency generation; quasi-continuous-wave diode-pumped Nd:YAG lasers; high power wavegude CO2lasers; vertical cavity surface emitting laser; nonlinear solitary waves; magneto-optical kerr effect; liquid crystal defects; water-cooled bimorph deformable mirror; lasing modes; metal waveguide resonator; linear polarization measurement; semiconductor optical amplifier; differential-phase measurements; semiconductor photoreceiver spectral responsivity; two-grating thin-wire bolometer; holographic Shack-Hartmann wavefront sensor; GaN-based light emitting diodes; high power Nd:glass lasers; fiber optical sensor; human tissue biochemistry; DNA; laser-induced photodissociation; hemoglobin complexes; thermosensor diagnostics; and THz-laser radiation pulse shape. [C807]

"LED panel illumination design of a control system for visual inspection of ceramic tiles"

During whole production process there is a possibility of mechanical damage of ceramic tile during transporting from one production phase to another. Because of that, last phase in ceramic tile production process is visual inspection and quality control. Today in most cases in products quality control are used human resources but because of human resources limits, this stage of process needs automatization. Regardless, if we use human resources or machined vision systems (digital cameras) for visual inspection, we need to ensure quality lighting of ceramic tile. In this paper is shown how to make quality lighting for ceramic tile quality inspection using machine vision systems. Advantage of this lighting is in using Light Emitting Diodes instead of light bulbs. [C808]

"Nonlinear electro-thermal OLED model in SUNRED field simulator"

Lighting purpose organic light-emitting devices have to be answer to high electrical and thermal requirements. Design of these devices needs special engineering. The electrical current and dissipated power distribution in an OLED needs electro-thermal field simulation. The algorithm in our simulation tool, SUNRED, had to be extended to be able to handle highly nonlinear electrical OLED characteristics, and nonlinear temperature dependence. We have created an electro-thermal model for the OLED samples given by our project partner. The nonlinear semiconductor junction model is applied in SUNRED. This article surveys the new OLED model and presents the application in electro-thermal simulations. Finally we compare the measurement, model and simulation results. [C809]

"Redirection of lateral emission using nanorod reflectors for power enhancement of GaN light emitting diodes"

We fabricate the nanorod arrays at the periphery of light-emitting mesa as the reflector. The nanorod arrays redirect the laterally propagated light. The output power is enhanced by 32.1% at 30 mA injection current. [C810]

"Confocal thermoreflectance for spatially resolved surface thermography of transparent LEDs"

We report on the use of confocal thermoreflectance for accurate surface temperature measurement of transparent LEDs. Confocal thermoreflectance effectively suppresses light from beneath the LED surface, compared to widefield measurements, for a red GaP LED. [C811]

"Performance comparison of bottom and top emitting LWIR (8 μm) LED devices"

For similar GaSb substrate thickness, flip-chip mount bottom emitting LWIR LED device has higher light intensity than top emitting device. Enhanced emission is attributed to better cooling and reflection of light from anode metal surface of the device. [C812]

"Contrast enhancement of UV absorption and improved biochip imaging"

Biochip using UV absorption for selective DNA or proteins imaging may take advantage of sensitivity enhancement thanks to either multilayer structures or grating structures. We discuss the interest of coupled angular and spectral illumination. [C813]

"Internal quantum efficiency and non-radiative recombination coefficient of GaInN/GaN multiple quantum wells with different dislocation densities"

Room-temperature photoluminescence measurements are performed on GaInN/GaN multiple quantum wells grown on GaN-on-sapphire templates with different threading-dislocation densities. The internal quantum efficiencies as a function of carrier concentration and the non-radiative coefficients are obtained. [C814]

"Surface plasmon enhanced emission from InGaN single-quantum-well light emitting diodes"

Electrically injected surface plasmon LEDs have been demonstrated for InGaN light emitting diodes with emission at 460 nm. A seven times enhancement has been observed at high currents with larger enhancements observed at lower currents. [C815]

"Near infrared optical upconverter based on i-In0.53 Ga0.47 As/C60 photovoltaic junction"

We report a near-infrared to visible-light optical upconverter by the integration of an i-In0.53Ga0.47As/C60junction and organic light emitting diode. This device shows the photovoltaic effect of i-In0.53Ga0.47As/C60junction and application in optical upconverter. [C816]

"Coupled carrier-phonon dynamics in light emitting quantum-dot heterostructures: switch on dynamics and carrier heating"

Microscopic calculations of the dynamics of electrically injected carriers, coupled to LO-phonons in Stranski-Krastanov-grown quantum-dot-emitters are presented. Even though the phonon distribution remains in equilibrium, a substantial carrier heating occurs. [C817]

"Making a direct electrical contact to InGaN/GaN nanorod LEDs: High output power density"

We realize a new scheme for making a direct contact to a two-dimensional (2D) nanorod LED array using the oblique-angle deposition. More importantly, we demonstrate highly efficient carrier injection into the nanorods. [C818]

"Shedding light on nutrition"

Supplemental ultraviolet-B radiation (280-320 nm) can increase phenolic compounds in plants and help to preserve them during storage after harvest. The nutritional significance of these compounds and the use of UV-LEDs will be discussed. [C819]

""HVPE InGaN for LEDs- State of the art and horizons""

We will discuss results of InGaN material and device growth by HVPE. Application of new device concepts for LEDs arising from new HVPE capabilities will be discussed, including all-HVPE InGaN based LEDs for SSL. [C820]

"Roadblocks to high efficiency solid-state lighting: Bridging the "green-yellow gap""

Lighting applications are presently limited by the lack of efficient LEDs across the visible spectrum. We review materials challenges that underlie the ldquogreen-yellow gaprdquo in LED efficiency and describe emerging approaches for bridging that gap. [C821]

"Application of UV LEDs to the design of low cost biological aerosol detectors"

Measuring UV-excited fluorescence from individual airborne particles is a leading technique for fast, non-specific detection of biological threat aerosols. UV-LEDs, available at several wavelengths, enable cost reduction of these detectors while presenting additional design challenges. [C822]

"Colloidal nanocrystal-based light-emitting diodes fabricated on plastic-towards flexible quantum dot optoelectronics"

We report the first demonstration of mechanically flexible quantum dot light-emitting-diodes (QD-LEDs) of all three RGB primary colors. The efficiencies of the flexible devices are high, suggesting the intrinsic flexibility of the QD-based optoelectronic devices. [C823]

"Enhancement on top emission of organic light-emitting diode via scattering surface plasmons by nano-aggregated outcoupling layer"

A stable self nano-aggregated bathocuproine film was fabricated and introduced atop of conventional organic light emitting diode for enhancing top emission leading to 2.7 times enhancement on top emission due to scattering surface plasmon energy. [C824]

"Status and prognosis for solid-state lighting technology"

Sustained improvements in epitaxial materials, device design, and packaging have positioned light-emitting diodes (LEDs) as the solution for future lighting needs worldwide. State-of-the-art LED performance is reviewed along with discussion of challenges and future outlook. [C825]

"Bias-controlled coherent acoustic phonon generation in InGaN/GaN multiple-quantum-wells light emitting diodes"

We demonstrate the control of coherent acoustic phonon generation by applying voltage across InGaN/GaN multiple-quantum-wells light emitting diodes (LEDs). The acoustic phonons oscillation can be switched off by increasing the reverse bias up to -25 V. [C826]

"Prospects and challenges for disinfection using UV light emitting diodes"

The challenges and prospects for use of UV LED's in the water disinfection industry, that treats water flows ranging from millilitres per minute to multiple millions of cubic meters per day, will be discussed. [C827]

"Time-resolved behaviors of surface plasmon coupling features with a light emitter"

The transient behaviors of the dipole coupling with surface plasmons in an Ag/dielectric grating structure for understanding the characteristics of those dipole-coupling features are demonstrated. The major decay

mechanisms of those coupling features are identified. [C828]

"Influence of guided mode absorption on the effectiveness of GaN-on-sapphire photonic crystal light-emitting diodes"

Enhanced light extraction from photonic crystal light-emitting diodes etched into the device surface is described. Finite difference time domain modeling indicates that scattering or absorption at the substrate-epilayer interface is the dominant limiting process. [C829]

"CO and CH4 sensing with single mode 2.3 μm GaSb-based VCSEL"

Successful application of recently developed GaSb-based single-mode vertical-cavity surface-emitting lasers for gas-sensing at 2.3 mum is reported. CO and CH4have been detected simultaneously using wavelength modulation spectroscopy with a multi-line curve fit concept. [C830]

"Microcontact printing of multicolor quantum dots light emitting diode on silicon"

A novel inorganic quantum dot based light emitting diode is fabricated by microcontact printing of a well defined-geometry of CdSe/ZnS nanoparticles films onto p type silicon substrate that acts as the hole transporting layer. [C831]

"Sound recording by laser interferometry"

A Fabry-Perot etalon is used to form a novel type of microphone. Refractive index dependant transmission is proportional to sound pressure over a large dynamic range. The current of the laser diode is tuned to take into account environmental influences. [C832]

"Optical wireless CDMA employing solid state lighting LEDs"

We show that optical wireless CDMA can successfully be applied for visible light communication with power LEDs. We detail how it meets the requirements of multiple access communication, particularly for positioning and illumination sensing. [C833]

"Light emission polarization properties of a-plane InGaN/GaN quantum wells light emitting diodes"

This paper discusses the optical characteristics of a nonpolar a-plane InGaN/GaN quantum well (QW) with different indium compositions, QW well widths, and injection carrier densities. We find that the larger indium composition and smaller well width make the energy separation of |Yrang-like state to |Zrang-like state larger, and as a result enhance the polarization ratio of light. However, the polarization ratio decreases as the carrier injection increases, which might be a drawback for high power applications. [C834]

"Effect of laser transfer mechanism on damage to organic semiconducting molecules during laser direct-write printing"

By employing different laser forward-transfer techniques, we probe the effects of transfer mechanism on the damage of sensitive organic molecules. Thick-film polymer absorbing layers provide the maximum optical and thermal protection for the molecules. [C835]

"GaAs-based transverse junction superluminescent diode at 1.1um wavelength region"

We report GaAs-based transverse-junction-superluminescent-diodes, characterized as transverse-carrier-flow spread in quantum wells horizontally instead of vertical well-by-well injection. These devices overcome the problem of non-uniform-carrier-distribution and operate at a bio-optical window of 1.1-mum wavelength regime. [C836]

"Power modeling of graphical user interfaces on OLED displays"

Emerging organic light emitting diode (OLED) based displays obviate external lighting; and consume drastically different power when displaying different colors, due to their emissive nature. This creates a pressing need for OLED display power models for system energy management, optimization as well as energy efficient GUI design, given the display content or even the graphical user interface (GUI) code. In this work, we present a comprehensive treatment of power modeling of OLED displays, providing models that estimate power consumption based on pixel, image, and code, respectively. These models feature various tradeoffs between

computation efficiency and accuracy so that they can be employed in different layers of a mobile system. We validate the proposed models using a commercial QVGA OLED module. For example, our statistical learning-based image-level model reduces computation by 1600 times while keeping the error below 10%, compared to the more accurate pixel-level model. [C837]

"Extreme ultraviolet (EUV) radiation and plasma diagnostics of the dense plasma focus for EUV lithography (EUVL)"

Summary form only given. We have generated the Ar plasma in the diode chamber based on the established coaxial electrode type and investigated EUV radiation and the emitted visible light for emission spectroscopy [1]. The optical emission spectrum data have been obtained for the focused plasma in the cylindrical diode chamber under the input voltage of 4.5 kV. We observed the two emission lines and their spectral broadenings for Ar I; 404.42 nm and Ar II; 487.99 nm [2]. The electron density has been measured by the Stark broadening from assumption of local thermodynamics equilibrium (LTE) [3]. The electron temperature can be determined by the relative ratio for the respective electron densities for Ar I and Ar II [2]. The EUV photo-detector (AXUV-100 Zr/C, IRD) with band pass wavelength of 6 ~ 16 nm has been installed along the side chamber set by the angle of ~30 degree with respect to diode axis. We observed the emitted EUV light along the side direction of the pinched area of focused plasma. [C838]

"Localized elecron cyclotron resonance plasma source for hyperthermal neutral beam"

Summary form only given. Hyperthermal neutral beams (HNB) have a great potential for semiconductor processes, especially, for etchings and thin film depositions for semiconductor and display fabrications as well as depositions for various thin film applications. Thermal and plasma-induced damages are serious problems for manufacturing deep submicron semiconductor devices and are also expected to be problems for future nanoscale devices. These problems can be overcome by damage-free and low-temperature processes with hyperthermal neutral beams. The HNB process is especially applicable to various thin film growings: oxidation and nitridation for gate insulators of DRAMs and flash memories, transparent conductive oxide films on organic light emitting diodes (OLEDs) or flexible displays, Si thin films for solar cells and thin film transistors (TFT), and crystal thin film growing for optoelectronic devices such as light emitting diodes (LEDs). The HNB can be produced by neutralization of ion beams extracted from an ion sources. However, the flux of the ion beams at a hyperthermal energy range is much lower than required in industrial applications due to the space charge effect. So, in order to obtain a high flux particle beam at a hyperthermal energy range, the ion beams should be neutralized before extracted from a plasma source. The plasma required for a high flux HNB sources should be operated at a lower pressure than 1 mTorr in order to reduce the HNB loss due to collisions with the background gas. The plasmas should also be so thin that the HNB cannot be lost by reionization during passing through the plasmas. We have developed a localized ECR plasma source with a racetrack magnetic field configuration in order to produce a high flux HNB. The operating pressure is 0.3 mTorr and the plasma thickness is less than 25 mm. The plasma is mainly characterized by the line ratio method of the optical emission spectroscopy (OES). [C839]

"Textile-Based Wearable Sensors for Assisting Sports Performance"

There is a need for wearable sensors to assess physiological signals and body kinematics during exercise. Such sensors need to be straightforward to use, and ideally the complete system integrated fully within a garment. This would allow wearers to monitor their progress as they undergo an exercise training programme without the need to attach external devices. This takes physiological monitoring into a more natural setting. By developing textile sensors the intelligence is integrated into a sports garment in an innocuous manner. A number of textile based sensors are presented here that have been integrated into garments for various sports applications. [C840]

"A Flexible, Low Noise Reflective PPG Sensor Platform for Ear-Worn Heart Rate Monitoring"

This paper presents a novel ear-worn reflective photoplethysmography (PPG) sensor that addresses the mechanical complexities of coupling the sensor to the surface of the skin and a detection circuit that minimises ambient noise artefacts. The flexible optoelectronic transducer structure can adapt to a variety of skin surface contours. Light emitting diode (LED) modulation and a unique integrating photocurrent demodulator reduce susceptibility to wideband noise and allow subtraction of ambient light from the desired PPG signal. Experimental results demonstrate that the sensitivity is robust to sensor location and application pressure variations. Simulations also show that the photodetection method is resilient against high levels of wideband noise. [C841]

"An Ultra Low Power Pulse Oximeter Sensor Based on Compressed Sensing"

We describe an ultra low power pulse oximeter sensor for long term, non-invasive monitoring of SpO2and heart rate in Body Area Networks (BAN). Commercial pulse oximeter sensors consume about 20-60 mW of power during continuous operation. Other researchers have shown that accurate and noise robust wireless pulse oximeter sensors can be designed to operate with as little as 1.5 mW. The LEDs consume bulk of the power budget in pulse oximeter sensors. In this work, we describe a compressed sensing approach to sample the photodetector output, so that the LEDs can be turned off for longer periods and thus save sensor power. We randomly sample Photoplethysmogram (PPG) signals with about 10-40x fewer samples than with uniform sampling and demonstrate that the accuracy of heart rate estimation and blood pressure estimation are not compromised, using MIMIC database. This provides power savings of the order of 10-40x for a pulse oximeter sensor, by reducing the duration LEDs need to be turned on. [C842]

"Recent progresses of AlGaN and InAlGaN-based deep-UV LEDs"

We demonstrated 222-282 nm AlGaN and InAlGaN-based efficient deep-ultraviolet (DUV) light-emitting diodes (LEDs) fabricated on low threading dislocation density (TDD) AlN. We achieved over 10 mW CW UV output power for 264-282 nm LEDs. [C843]

"Electro-optical properties of n-InGaN/p-GaN LED with p-side down with varying indium composition"

The negative polarization charge at the n-InGaN/p-GaN interface of single heterojunction LEDs with p-side down are investigated for various In-compositions. We demonstrate peak emission wavelength blue-shift and intensity dependence on In-composition with increasing current density. [C844]

"Ultra-thin-walled III-arsenide microtubes with embedded QW light emitters: Room temperature PL characteristics"

Arsenide-based III-V microtubes are formed by a strain-induced self-rolling process. We report room-temperature photoluminescence characteristics of such microtubes with embedded GaAs quantum-well structure that is only 38 nm in total wall thickness. [C845]

"Polarized light-emitting diode with its InGaN/GaN quantum well coupled with surface plasmons on a metal grating"

The enhanced and partially polarized output of a green light-emitting diode, in which its InGaN/GaN quantum well couples with surface plasmons on an Ag grating structure, is demonstrated by comparing with the conventionally fabricated devices. [C846]

"Reliability of deep UV LEDs"

We report on reliability of deep UV (DUV) LEDs with wavelengths ranging from 235 nm to 310 nm. For longer wavelength DUV LEDs, the operation lifetime (50% decrease of output power) exceeds 5,000 hours. The current-voltage characteristics and the emission spectrum remain nearly unchanged during the degradation process. The degradation is sensitive to the operating temperature. The low frequency noise measured at low and high currents either did not depend on aging time or decreased. Possible degradation mechanisms involve the p-cladding layers and p-type contacts being responsible for the degradation. Improvements in light extraction and packaging that should increase the wall plug efficiency are expected to result in a low operating temperature and, hence, in a longer life time. [C847]

"Time-resolved photoluminescence studies of AlGaN-based deep UV LED structures emitting down to 229 nm"

Photoluminescence lifetime and internal quantum efficiency measurements of deep ultraviolet (~230 nm) light-emitting diode structures are correlated to packaged devices and compared to measurements on more mature 280 nm structures. [C848]

"Single-mode quasi-L2 photonic crystal micro-cavity for 1.3 μm InAs quantum dots light sources"

We design and realize a single mode qL2 photonic crystal defect cavity near the 1.3 mum band. Taking advantage of its small mode volume, 1.3 mum InAs quantum dot light emitters with this cavity exhibit an emission intensity as high as 70 times over the ones without it. [C849]

"The effects of increasing AlN mole fraction on the performance of AlGaN based ultraviolet light emitting diode active regions"

Time-resolved photoluminescence and transmission electron microscopy results suggest that the density of point defects may have a more significant role than threading dislocations in the performance of UVLED AlGaN active regions emitting at shorter wavelengths. [C850]

"Progress in the growth, characterization and device performance for nonpolar and semipolar GaN-based materials"

This work provides motivation and background for work on nonpolar and semipolar GaN-based materials and then highlight UCSB work on growth of nonpolar and semipolar GaN on foreign substrates and on freestanding GaN substrates. UCSB work on nonpolar and semipolar GaN lighting emitting devices, including record 405 nm LED performance, the first nonpolar and semipolar GaN-based laser diodes, the first AlGaN clad-free GaN-based laser diodes, and progress in blue, green, and yellow emitters and report on the first demonstration of a normally-off nonpolar GaN-based transistors are summarized. [C851]

"Tight focal spot and long depth of focus by radially polarized, narrow-width annular beams from photonic-crystal lasers"

We found that tighter focal spots with longer depths of focus are achieved by radially polarized annular beams with controlled inner and outer radii, which could lead to high-tolerance, super-resolution applications in compact optical systems. [C852]

"Polarization-enhanced Mg doping in InGaN/GaN superlattice for green light-emitting diodes"

Electrical properties of low-temperature grown Mg-modulation-doped InGaN/GaN superlattice (MD-SLS) for green light-emitting diodes (LEDs) are investigated. Room-temperature Hall effect measurements indicate that the MD-SLS has conductivity comparable to that of high-temperature grown p-type GaN. The light output intensity of green LEDs with the p-InGaN/GaN MD-SLS is approximately doubled as compared with that of the LEDs with a high-temperature grown p-GaN. [C853]

"Coherently combined diode laser arrays and stacks"

We have coherently combined up to 7.2 W CW using an individually addressable 10-element-array of 960-nm slab-coupled optical waveguide lasers (SCOWLs). We are currently scaling the phase-locked output power to 100 W using SCOWL stacks. [C854]

"Growths of InGaN quantum wells light-emitting diodes on nano-patterned AGOG sapphire substrate using abbreviated growth mode"

Nanoheteroepitaxy of InGaN-based light-emitting diodes on patterned AGOG sapphire by using abbreviated growth mode, leads to significant reduction in dislocation density and 24% increase in efficiency. [C855]

"Application of simulation to the scheduling problem for a LED sorting system"

The scheduling problem of LED chip sorting workstation is a multiprocessor open shop scheduling problem which is categorized as a NP-hard problem. In practice, this problem is usually solved with finding a dispatching rule to achieve certain performance indices through simulation. To find the most effective rule from five proposed dispatching rules was considered in this study. Experimental design was applied to find significant factors, and a two-stage process was used to select the best dispatching rule. In the first stage, where make-span as the performance index, three dispatching rules are selected for the next stage comparison, and they are common in applying LPT in bottleneck machines. In the second stage, a dispatching rule with applying SPT in non-bottleneck machines has least average queuing time among those three, and this rule is recommended for practical application. [C856]

"Demo abstract: Fusion of audio and image information for efficient object detection and capture"

This abstract describes the demonstration of a tightly integrated audio-image wireless multimedia sensor network (WMSN) for object detection and capture. By making use of available multi-modal information, we are able to quickly and efficiently localize objects using relatively cheap audio and camera sensors with more success than would be possible based only on one modality alone. While similar, more complex, techniques have been considered before the novelty of the approach is in its practical implementation on a relatively low-cost,

resource-constrained WMSN. [C857]

"Auto mixed light for RGB LED backlight module"

To prevent the output white light from being experienced with color deviation due to temperature effect on the performance of light-emitting diode (LED), a mixed-light control module is developed, by integrating programmable system on chip (PSoC) with photo-diode sensor devices, to examine the ambient temperature and feedback voltage level of RGB photodiodes. Also, a mixing light color criterion of RGB LED is applied on the mixed-light control module. Through the usage of mixing light color criterion of RGB LED, the corresponding duty cycle of RGB LED can be adjusted, and the stable white light output can, consequently, be achieved. By the feedback compensation of mixed-light control module the CIE1931 xy coordinates of output light are in good agreement with the predicted results. [C858]

"High voltage pulse generator with energy recovery circuit for driving CNT field emission lamp"

A flyback converter incorporating an energy recovery circuit is proposed to generate high voltage pulses for driving carbon nanotube field emission lamp (CNT-FEL). The employed energy recovery circuit will not only eliminate the arcing phenomenon caused by traditional DC driving, but also recover the excess energy to DC bus so as to improve the system efficiency. In this paper, we construct an equivalent model of the CNT-FEL to exhibit its electric characteristics. Moreover, the mathematical models of each operation mode are also derived. And then a complete design considerations and mathematical model are detailed. All the experimental results agree with the computer simulations to verify the theoretical predictions. [C859]

"Design of Intelligent Traffic Light Controller Based on VHDL"

According to the different branches of citypsilas intersections and the traffic flow at different times, the program of intelligent traffic light controller based on VHDL is given and simulated by Quartus II by using hierarchical design thought. The simulation results show that the intelligent traffic light controller can realize the transition of 2-phase, 3-phase and 4-phase based on actual situations. The adaptability and applicability of the system can be strengthened by changing the phase. [C860]

"Designing of LED Illuminating System and Testing Notice"

With the development of LED, LED lighting has been gradually developed to commercial stage for its advantage of non-pollution, long life, easy to transport, and other advantages. Because of uneven development of LED industry in China and some engineering staff is short of professional knowledge, which result in the LED lighting was used inappropriately and unreasonable and unqualified phenomenon of the LED lighting system. This paper was based on the principles and characteristics of LED lighting, discussed the LED lighting system design process and points for attention, combined with experience in engineering practice, and provided suggestions to resolve some related problems. We hope to help the engineering staff of LED lighting system design. [C861]

"Nanostructured LED's for solid-state lighting"

A large variety of nanostructures including surface roughening, photonic crystals and plasmonics has been applied to light-emitting diodes in order to improve their performance. This paper gives an overview of the different approaches and the obtained results and compares their relevance for commercial LED applications, focussing on solid-state lighting. [C862]

"Observation of stimulated emission and lasing in quantum-wire photonic-crystal nanocavities"

Low-threshold lasing is experimentally achieved for the first time in semiconductor photonic-crystal nanocavities embedding site-controlled quantum wires. The effect is established via direct observation of the stimulated emission in the time domain. [C863]

"Polarization independent lensing and superbeaming in plasmonic crystals and applications to focal plane arrays"

Numerous novel and useful optical phenomena have been observed in perforated metal films and other related structures. These structures range from simple two dimensional hole arrays and lamellar gratings to compound gratings, crossed gratings, and more complicated hole array structures with more than one aperture per repeating unit cell. The interesting optical effects observed in these structures include anomalous transmission, absorption and reflection, superbeaming and lensing, light circulation and weaving, and light concentration and trapping. Applications of these structures and optical phenomena include high bandwidth and efficient

photodetectors, high brightness LEDs, super lenses, novel polarizers, chemical and biological sensors and high performance solar cells. This work focuses on a topic generally overlooked in research on plasmonic crystals but that greatly limits the range of applications in which these structures can be used as well as the performance enhancements in the applications for which they are currently being used; this topic is the polarization behavior of all of the aforementioned optical effects of plasmonic crystals. [C864]

"Lateral current injection photonic crystal emitters"

We report the first lateral current injected photonic crystal light emitting diodes. The devices utilize a transverse junction that is created using selective ion implantation. Electrical and spectral properties showing the influence of the photonic crystal are reported. [C865]

"Patterning of photonic quasi-crystals on GaN LEDs"

The fabrication of 2-dimensional (2D) photonic quasi crystals (PQCs) on gallium nitride (GaN) light emitting diodes (LEDs) is described. Fabrication was achieved using electron beam lithography (EBL) and, separately, by nano-imprint lithography (NIL). [C866]

"Thermal characterization of organic light emitting devices"

CCD-based thermoreflectance is applied on organic light emitting devices to investigate the temperature distribution along the device surface under different bias conditions. This technique can provide useful information on understanding the device degradation mechanism. [C867]

"InAs QDs broadband LED using double-cap procedure and selective MOVPE growth"

More than 400 nm spectrum width LED was obtained in the InAs QDs array waveguide using height changed QDs during double-cap procedure and strain controlled buffer in 3 layered QDs. [C868]

"Colloidal nanocrystal-based light-emitting diodes fabricated on plastic-Towards flexible quantum dot optoelectronics"

We report the first demonstration of mechanically flexible quantum dot light-emitting-diodes (QD-LEDs) of all three RGB primary colors. The efficiencies of the flexible devices are high, suggesting the intrinsic flexibility of the QD-based optoelectronic devices. [C869]

"Bias dependence of phonon behaviors in the InGaN/GaN multiple quantum well with multiquantum barriers"

To elucidate the unique correlations between the electrical and optical characteristics of InGaN/GaN MQW LEDs, it is necessary to examine the radiative recombinations of carriers confined from aspects of the phonon trainsitions. [C870]

"The effects of high-power LED inner structure on the radiation patterns"

This research uses optical simulation software TracePro to analyze the effects of inner lens structure on the radiation patterns. There are three inner lens geometry parameter structure: Radius of curvature(at corner)(r), Width (w) and Height (h). This research probes into the effects of radiation pattern by changing the parameters of the radiation pattern changes with inner structure. The effect of inner structure on the radiation pattern is performed by changing three geometry parameters. The results show that the geometry parameters are different and they will be impacted by the distribution of radiation pattern. [C871]

"GaN-based monolithic LED micro-arrays"

In this paper, the authors report an 8 times 8 active matrix light emitting diode (AMLED) array. The AMLED array is composed of 8 times 8 pixels, each of which has dimensions of 300 mum times 300 mum and a 50 mum pitch. A standard multiple quantum well (MQW) blue LED wafer grown on a sapphire substrate was used for fabrication of the LED micro array. [C872]

"Classical geometric optics limit of bend loss in multimode waveguides"

It is shown that pure bend loss from an LED-excited multimode slab waveguide in the classical geometric optics limit of zero wavelength has a simple analytical solution that readily exhibits all the parametric dependence of

the problem. [C873]

"Recent advances in optoelectronic technologies in ASTRI"

A brief introduction to ASTRI's work on optoelectronics is given. Some research results on power GaN LED chips, LED packaging, LED general lighting, LED backlight units for LCD TVs and projectors, and anti-shaking camera modules are presented. [C874]

"Inspection of backlight units with high luminance contrast"

Two methods to measure the luminance of backlight units with high contrast by a frame CCD camera are proposed. The measurement uncertainties are compared. [C875]

"The high mobility a-plane GaN film grown with flow-rate modulation epitaxy"

A-plane n-GaN film has been grown on r-plane sapphire substrate by MOCVD with flow-rate modulation (FME). Under the used growth conditions, the optimized FME parameters include the on/off periods at 60/80 s. With the FME technique, the n-GaN film has a high Hall mobility of 779 cm2/V-s. [C876]

"Improving the luminescence of InGaN/GaN blue LEDs through selective ring-region ion implantation"

In this study, we used the selective ring-region ion implantation technique to restrain the surface leakage current and to monitor the luminescence characteristics of InGaN/GaN multiple quantum-well blue light-emitting diodes (LEDs). The luminescence characteristics could be improved by varying the width of the highly resistive region of the current blocking area; and the leakage current also can be reduced. [C877]

"In-Situ and At-Speed Modeling and Characterization of Logic Interconnect Device Considering Front-End/Back-End Interaction"

The paper presents a logic interconnect device (LED) to model digital circuit with near back-end-of-line (BEOL) effect, and to measure system performance. It is driven by a product inverter-based logic circuit, and it is loaded with near-BEOL wiring. The LID ring oscillator is measured and analyzed in 65 nm SOI CMOS. The methodology offers in-situ characterization of near-BEOL interconnect parasitics, and dielectric constant in product circuits. It captures front-end-of-line (FEOL) and near-BEOL interactions, distinguished in deeply scaled CMOS. [C878]

"Growths of staggered InGaN quantum wells light-emitting diodes emitting at 520-525 nm employing graded-temperature profile"

The use of 3-layer staggered InGaN quantum wells light-emitting diodes at 520-525 nm, grown by metal-organic chemical vapor deposition with graded-temperature profile, resulted in increase in efficiency and output power by 2-times. [C879]

"Modulation of uniform light pattern with light extraction enhancement by GaN microlens arrays of LEDs"

The uniform light pattern with light extraction enhancement 250% of LEDs with GaN microlens arrays are demonstrated numerically and experimentally. It makes LED light source as a device of spatial-intensity uniformity integrated with GaN-LEDs structure. [C880]

"White light emission from organic diode with electroluminescent quantum dots and organic molecules"

An organic light-emitting device is used in combination with quantum dots and blue-light emitting organic molecules to produce flexible white light. Quantum dots are excited via direct electronic injection, unlike previously reported. [C881]

"Nanorod light emitting diode arrays with highly concentrated radiation profile and strain relaxed structure"

We have developed a natural lithography method to fabricate nanorod structure. The spin-on glass is used as a space layer to realize the nanorod LED. The strain is released in nanorod structured LED which is indicated by

their nearly constant electroluminescent peak wavelength at the injection current range between 25 mA and 100 mA. Furthermore, a highly concentrated radiation profile is observed from the nanorod LED array. We suggest a light guided concept to explain the narrow radiation phenomena. [C882]

"Etching depth dependence of emission properties from InGaN/GaN light emitting diodes with nanohole arrays: Analysis of strain relaxation and surface states"

The effects etching depths of nanohole arrays close to or penetrate the quantum well structures are studied. Our results suggest that when the hole depth is close to the quantum well region, the surface states pinning reduces the band bending and leads to a blue shift of the emission spectrum. When the hole penetrates the quantum well region, similar effects are observed but are due to the strain relaxation in the quantum well. [C883]

"GaN-based film-transferred light-emitting diodes with photonic crystal"

Experimental investigation of A-type and B-type guided modes was performed in GaN-based film-transferred photonic crystal light-emitting diodes. Good agreement with the band structure calculated in the limit of two-dimensional free photon was obtained. [C884]

"Enhancement in electron injection and transport of organic light emitting diodes using MnO"

An insulator MnO as an electron injecting and transporting material introduced into organic light-emitting diodes to increase electroluminescence efficiency also can eliminate the problem of the oxidation of reactive dopants to improve stability of devices. [C885]

"Future flexible OLED displays for army applications"

Organic light emitting diodes have been fabricated on an active matrix backplane from an 180C processed amorphous Si thin film transistors on polyethylene naphthalate (PEN) substrates. Organic light emitting diodes have been fabricated on the active matrix backplane. The presentation will include organic material development from ARL in the context of future Army applications. [C886]

"Beam shaping of GaN/InGaN vertical-injection light emitting diodes via high-aspect-ratio nanorod arrays"

The enhanced light extraction and collimated output beam profile from GaN/InGaN vertical-injection light emitting diodes are demonstrated utilizing high-aspect-ratio nanorod arrays. The nanorod arrays are patterned by self-assembled silica spheres, followed by inductively-coupled-plasma reactive-ion-etching. [C887]

"Compact gas sensing system based on mid-infrared LED and resonant detection with quartz tuning fork"

A Winston cone is used to concentrate the emitted radiation of a mid-infrared LED onto a small spot on the side of one prong of a quartz tuning fork acting as a detector. The Winston cone is used as an absorption cell as well, thus providing a very compact and cost efficient mid-infrared sensing system. [C888]

"The use of polydimethylsiloxane concave microstructures arrays to enhance light extraction efficiency of InGaN quantum wells light-emitting diodes"

Novel approach to improve light extraction efficiency of InGaN-based light emitting diodes with polydimethylsiloxane concave microstructures arrays was demonstrated, which leads to enhancement of extraction efficiency by 1.60-times in good agreement with simulation. [C889]

"Design of SpO/sub/2 Non-Invasive System for Oxygen Level's Measurement Purpose"

This paper describes the design of SpO2noninvasive system for oxygen level's measurement purpose. This sensor consists of three main parts, namely analog part, digital part and SpO2intelligent sensor. The raw measurement results are sending to a personal computer via RS-232 serial link. MATLAB's program running on the personal computer processes the raw measurement results and presents them by tabular user interface. [C890]

"Impedance model force control using neural networks for a desktop NC machine tool"

In manufacturing industries of metallics molds, various NC machine tools are used. We have already proposed a

desktop NC machine tool with compliance control capability to automatically cope with the finishing process of LED lens molds. The NC machine tool has an ability to control the polishing force acting between an abrasive tool and workpiece. The force control method is called impedance model force control. The most important gain is the desired damping of the impedance model. Ideally, the desired damping is calculated from the critical damping condition in consideration of the effective stiffness in force control system. However, one of the serious problems is that the effective stiffness of the NC machine tool has undesirable nonlinearity. The nonlinearity gives bad influences to the force control stability. In this paper, a fine tuning method of the desired damping is considered by using neural networks. The neural networks acquire the nonlinearity of effective stiffness. It has been observed that the desired damping generated from the learned neural networks allows the NC machine tool to achieve a stable finishing result. [C891]

"Investigation on Three Dimensional Image Measurement for Geometrical Parameters of the Cutter"

In this investigation, image measurement technology is applied for development of an image measurement system for geometrical parameters of the cutter. CCD, LED light source, servo motor and x-y bi-axial stage have been integrated in this system. It can be utilized for measuring geometrical parameters of the milling cutter and drill. The measured parameters include diameter, helix angle, arc radius and point angle. To analyze repeatability and reproducibility of the system, long form is introduced. Measurement results by the system have been compared with that by ZOLLER. The analysis results show that dimensional precision of 19 mum and the angle precision of 0.4deg can be achieved by this measurement system. There are 40 mum differences in dimensional measurement, and 0.8deg differences in angle measurement between the results of the system and ZOLLER. The advantages of this measurement system are compact, lower cost and easier operation. And with the above measurement characteristics, this system can be available for cutter manufacture and inspection. [C892]

"Improved surface plasmon coupling with an InGaN/GaN quantum well for more effective emission enhancement"

With a dielectric layer between metal and semiconductor for generating surface plasmon, the dissipation rate of metal is reduced and the evanescent-field range is increased such that surface plasmon coupling leads to stronger emission enhancement. [C893]

"A simple design and implementation of LED director with solar-power"

In this paper, a LED director based on solar-power is developed for education purpose. The solar energy is converted to fixed output voltage to charge battery and drive LED matrix. A boost converter based on PWM controller AIC1630, is used to step up solar voltage. The sign pattern of LED is set and controlled by chip EM78M447SB. Two charging modes, including constant current mode and fixed voltage mode, are applied to charge of battery. Therefore, a shorter charging time and good life-time is reachable. The LED director is useful and convenient by experiment. [C894]

"Characterizations of InGaN/GaN MQWs with different growth parameters"

We investigated the effects of the growth parameters on the microstructural, optoelectronic and low-frequency noise properties of InGaN/GaN multiple quantum well (MQW). Dc current stress was applied to the devices and their degradations were investigated as a function of the stress time. [C895]

"Energy Efficient Cooling Fan for PC Chassis"

The energy efficient cooling fan (EnCool Fan) was designed to improve the energy efficiency of the axial cooling fan used in the PC chassis. The EnCool fan has the ability to maintain the same or better heat ventilation rate as compared to ordinary axial cooling fan, and it uses less power. The EnCool fan uses embedded microcontroller with on chip temperature sensor, analog to digital converter, PWM module, universal asynchronous receiver transmitter and LED output port embedded in an 8 pin chip to control the fan. The EnCool fan is made up of a transparent axial fan installed with 4 tri-colour LEDs located at its 4 edges for visual indication. By referring to the on chip temperature sensor, the 4 tri-colour LEDs would emit 7 different colors to indicate the temperature range that it sensed and the fan would rotate with an adequate speed to exhaust the heat out of the PC chassis. A prototype of EnCool Fan has been built to demonstrate its heat ventilation performance and energy efficiency. The temperature data inside the PC chassis is acquired using LabVIEW for performance analysis. Experimental results show that EnCool Fan has slightly better heat ventilation rate and saved more then 61% of power as compared to ordinary PC fan. EnCool Fan System shows promising heat

ventilation and cooling solution in desktop and laptops PC chassis. [C896]

"Efficiency enhancement of GaN/InGaN vertical-injection light emitting diodes using distinctive indium-tin-oxide nanorods"

Distinctive indium-tin-oxide nanorods are demonstrated using glancing-angle deposition. The nanostructured material exhibit enhanced transmission and is employed to enhance the light-output-power of GaN/InGaN vertical-injection light emitting diodes by 20% at an injection current of 350 mA. [C897]

"GaN nanorod-based subwavelength optical media"

Vertically self-aligned gallium nitride nanorod arrays grown by plasma-assisted molecular-beam epitaxy are shown to behave as subwavelength optical media in both their discrete and integrated forms, which have important implications for optoelectronic applications. [C898]

"Recognition of Eye States in Real Time Video"

A composite algorithm is proposed to identify the opened and shut states of eye in real-time video. Sequentially, each frame of the video is processed first to find and separate the eye regions; then, the accumulation array of circular Hough transform is applied for detecting circles to recognize the opened state of the eye, and the upper eyelid curve is calculated to identify its bending direction to recognize the shut state; after that, if the state cannot be determined yet, judging by the standard deviation of distance between eyelids, the eye state of blinking is determined finally. An accuracy of 94% for eye state detection is obtained in our experiments by using the proposed algorithm. As an important part, the algorithm is going to be utilized in a fatigue warning system for drivers. [C899]

"An inspection system for adjusting luminance of LED backlight units"

An inspection system for adjusting luminance of LED backlight units is disclosed to provide a uniform light source of LCD. By adjusting the LED current, target uniform backlight luminance values and distribution can be obtained. [C900]

"Surface modelling of organic solar cells"

Modelling of physical phenomena in optoelectronic devices enables to define new strategies to optimize organic components (organic photovoltaic cells (OPVs), organic light emitting diodes (OLEDs), etc ....). The organic photovoltaic technology allows producing more attractive and lighter weight photovoltaic devices than silicon solar technology. Both organic small molecule based and polymer based devices are studied. These devices needs the use of two different materials in the active layer (one electron acceptor and one electron donor) in order to separate the photogenerated electron-hole pairs due to their excitonic behaviour in organic compounds. However, the power efficiencies of the organic solar cells are lower than those obtained with silicon solar cells. In our laboratory, the efforts in order to enhance the power efficiency of OPV devices are in progress. One way consists to minimise the power dissipated by the photogenerated current in the electrodes, particularly in the case of the anode which is constituted of a low conductive transparent thin layer (indium tin oxide ITO). In this communication, electromagnetic field modelling in this anode (mapping of current density obtained by numerical modelling), explains the decrease of the power conversion efficiency in the device due to its surface enhancement. To optimise the photovoltaic cell performance, we have modelized by using two powerful tools (GSMH and Shell) the electromagnetic fields and the dissipated power in different cells characterized by their electrode design: rectangle with different surface (varying length with constant width). The simulated results are then compared with photovoltaic characterizations under light illumination of organic small molecule based solar cells built with these geometries, where the device structure is ITO/PEDOT-PSS (30 nm) / CUPC (25 nm) / C60 (40 nm) / BCP (2.5 nm) / Al (100 nm). A perfect correlation between power dissipation in the electrodes and measured serial-resistance of the devices is found. [C901]

"Packaging and wired interconnections for insertion of miniaturized chips in smart fabrics"

Electronic devices are currently used in a complete system including mobile phone, television etc... Now, more and more applications need functionality as close as possible to the final system for in situ measurement and control (smart textile, automotive or medical applications) or for security. The components concerned are sensors, light emitting diodes or RFID for example. Concerning microsystem, being integrated in a material means several key properties, including a packaging form adapted to the material manufacturing process, autonomy in terms of energy means for being powered, neutrality versus the initial material properties and resilience, as materials usually get post-processed once manufactured. A particularly attractive support for such

integration is the textile way, since textile or textile-like materials are often part of composite materials and are extremely common in the design of complex objects. The "Diabolo" process aims at a direct connection from a chip assembly to external wires without using the traditional bonding / packaging stage. Through a very limited set of wafer scale operations, one or several chip dies can be assembled and connected to conductive wires directly from the chip surface. The result of a fully processed Diabolo assembly is a spool of chips connected to a flexible wire that can be used for incorporation into materials through taping, weaving, knitting, extrusion or more generally inclusion in a liquid phase before curing. The process is still in its early stage of development but our current studies make us confident that assembly throughput as high as 10 k UPH (Unit per Hour) can be reached with a relatively simple equipment. [C902]

"Compression molding solutions for various high end package and cost savings for standard package applications"

There has been great progress on compression molding technology and equipment. This technology is used not only for most advanced semiconductor package, but also regular BGA type substrate molding to reduce CoO. There is wide range of applications including LED production. The system for mass production is fully developed and is ready to support the production. Compression molding is the next Defacto standard product in mold industry. [C903]

"High luminance FED"

This paper discusses the prototype of a TFT-controlled high-luminance FED was fabricated. High luminance operation is demonstrated even at low anode voltage that is due to the built-in memory function. Ultra-high luminance operation is expected at a higher anode voltage. [C904]

"Carbon nanotube FED for high luminance character display"

High-luminance color CNT-FED character-displays were developed. One display-panel had 16xl60-pixels and the pixel-pitch was 3mm. Another panel had 32x256-pixels and the pixel-pitch was 1.8mm. The features were power consumption of ca.10W and high-reliability for out-door applications. They were driven by small battery and solar cells in out-door and no-power-line condition. The practical application is highly expected to display important message to evacuate from the disaster area, even under emergent no-power condition in such as many vending machines. This feature will significantly contribute to energy conservation when applied to ubiquitous displays. The development and practical application of this new technology is highly expected to benefit an advanced information society. [C905]

"Cathodoluminescent properties of ZnO-based phosphors for UV emission"

Cathodoluminescent properties of ZnO-based phosphor powders were investigated. Zn-Y-O and Zn-Al-O powders showed near UV emission peaked around 400 nm and 270 nm, respectively under electron beam excitation. The CL intensity were increased linearly, it indicates that the phosphors were prepared uniformly and homogeneously. There are many possibility for new phosphors which showed UV emission for new applications. [C906]

"Nanobond® assembly-a rapid, room temperature soldering process"

Reactive nanotechnologies (RNT) has commercialized a new technology that will revolutionize how manufacturers join components using solder materials. (See Figure 1) The joining process is based on the use of reactive multilayer foils as local heat sources. The foils are a new class of nano-engineered materials, in which self-propagating exothermic reactions can be ignited at room temperature through an ignition process. By inserting a multilayer foil between two solder layers and two components, heat generated by the reaction in the foil melts the solder and consequently bonds the components. The joining process can be completed at room temperature in air, argon or vacuum in approximately one second. The resulting metallic joints exhibit thermal conductivities two orders of magnitude higher, and thermal resistivities an order of magnitude lower, than current commercial TIMs. The use of reactive foils as a local heat source eliminates the need for torches, furnaces, or lasers, speeds the soldering processes, and dramatically reduces the total heat that is needed. Thus, temperature-sensitive or small components can be joined without thermal damage or excessive heating. In addition, mismatches in thermal contraction on cooling can be avoided because components see very small increases in temperature. This is particularly beneficial for joining metals to ceramics. The fabrication and characterization of the reactive foils is described, and the value proposition for nanobonding is presented. This paper also shows the applicability of this platform technology to many areas of packaging including thermal interface materials, microelectronics, optoelectronics, and light emitting diodes (LEDs). [C907]

"Infrared isolation effectiveness of car windows film tester"

This paper introduces the circuit and working principle of the infrared isolation effectiveness of car windows film tester. The circuit of the tester was constituted mainly by frequency modulating infrared light source, silicon photovoltaic cells, I/V convertor, A/D convertor and so on. The infrared wavelength range of the infrared light source is broader than the single infrared LED testing, which use two different wavelengths of infrared LED light sources to form composite wavelength light source. The methods which the circuit uses based on frequency domain is to suppress the interference of the stray light signal. When the light path is open, the actual measurement show that, the maximum difference is only 0.8% between the test result in sunlight and that in the darkroom. This paper also gives the test results and its analysis of which the 25 kinds of car windows films which are tested by the prototype machine. [C908]

"Electrical and optical characteristics of high power vertical GaN light-emitting diodes on Si substrates"

High power vertical GaN-based light-emitting diodes (LEDs) on Si substrates are fabricated by wafer bonding and laser lift-off (LLO) technique. The GaN-based LEDs are grown on sapphire (0001) substrates by metalorganic chemical vapour deposition (MOCVD). GaN-based LEDs are joined to Si receptor substrates by Sn/Au fusion bonding at the temperature of 300 degC in flowing nitrogen ambient. KrF excimer laser with 400 mJ/cm2energy density is used to irradiate GaN-based LEDs from transparent sapphire substrates to separate the samples from sapphire, forming GaN-based LEDs/Sn/Au/Si structure. Using the samples grown on the same wafer, the electrical and optical characteristics of the GaN-based LEDs on sapphire and on Si are investigated. At 20 mA, the forward voltages of GaN-based LEDs on Si and sapphire are 3.1V and 3.3 V respectively. At high operation current 110 mA, the I-V characteristic of vertical strcture GaN-based LEDs on Si can be improved much more greatly. The light output power of GaN-based LEDs on Si keeps increasing up to 560 mA without any power saturation. [C909]

"Research on drive and control technology of external modulated DFB laser diode"

We attempt to study external modulation characteristics in 1550 nm microwave over fiber links which overcome the disadvantages of light spectrum expansion and unstable optical extinction ratio because of direct modulation. The relation property between output power, threshold current and temperature is discussed at first based on physical model of a multiple quantum well-distributed feedback (MQW-DFB) laser diode (LD). This paper focuses on the corresponding power and temperature control circuits which are set up to make the optical power changing within 0.5% and temperature control precision better than 0.3degC. Experimental results show that external modulation light emitting module composed by the 1550 nm MQW-DFB laser diode and corresponding driving circuits can effectively improve output light power stability. As an application, we realize 10 GHz microwave transmission over fiber links with high linearity and low distortion. [C910]

"Development of 4-DOFs carrying robot for identifying work-piece shape and centroid based on CCD"

4-DOFs carrying robot is widely used in the automated warehouses and workshops. According to the differences of the task objects, the automatic identifying system can distinguish from the shape and centroid of the work-pieces carried by the robot. The hardware of the system includes the CCD which is fixed on the end effector of the rotor and used for collecting images, the laser diode used for measuring the thickness or height of the carried objects and the robot control system based on PC. The image is smoothed by using quadrate window medium filtering and the image edge is picked-up by method of gradient operator. The object outline is identified by the method of self-adapting straight-line fitting process. The position of the object center is calculated using the method of first and zero moment of the identified image in this system. The laser diode is used to distinguish the thickness or height of the object. The distance between surface and bottom of the object can be calculated after the light beam emitted from the laser diode passing through the triangle optical system which is made up of semi-permeable mirror and full reflector. The position on the operating plane of the robot, orientation and center of the carried object can be calculated after the image processed combining the attitude of the rotor end effector. Then the carried object is grasped accurately by adjusting the control command of the rotor end effector. The test indicates that this system has high grasping precision, good anti-jamming ability and good adaptability to field of production. [C911]

"Research on feature points positioning in non-contact eye-gaze tracking system"

The accuracy and the real time ability of positioning the feature points, including the four reference glints and the center of the eye pupil, are essential to the eye-gaze tracking system based on the cross-ratio. In the paper, in

order to handle the two issues in the images to be processed, that is, the similar gray values and the low resolution, an algorithm of feature points positioning with strong adaptability is proposed, namely, using the improved Otsu method for detecting the glints, and adopting a method combining emitting rays with ellipse fitting for positioning the center of the pupil. Some experiments are performed on the non-contact eye-gaze tracking system on a VC ++ 6.0 platform, and the results show that: when the eye is located 70cm in front of the screen (33cm times 26cm), 30 times 25 points can be distinguished, and the processing requires only 16ms on average. [C912]

"Numerical simulation on heat pipe for high power LED multi-chip module packaging"

Light emitting diode (LED) as the new light source has the advantages of power saving, environment-friendly, long lifetime and no pollution compared with fluorescent and incandescent lights. But the disadvantage of LED is low light lumen that only 10%~20% input power transform into the light, and 80%~90% into the heat. The junction temperature of LED is so high as to induce the lifetime declining rapidly, luminous decay and reliability decreasing. Therefore, the effective thermal management is very important for the LED light system. In this work, a new packaging architecture the system in package (SiP) configuration is used in the high power LED packaging. The light system consists of nine chips that each chip is 1.2W. Copper/water miniature heat pipe (mHP) is chosen to dissipate heat based on the LED packaging structure and the input power of the system. The principles of the heat pipe are investigated to design and select the structure and size of the heat pipe. Capillary limit and boiling limit of the heat pipe are calculated to determine the maximum heat transfer and verify the design of the heat pipe. The heat pipe is seen as the thermal superconductor in axial, which take the place of the process of the phase exchange in the pipe. The axial thermal resistance of mHP estimated by the net of the thermal resistance is 0.15degC/W approximately. The system level heat and temperature distribution are investigated using numerical heat flow models. In this analysis, 3D finite volume model is developed to predict the system temperature with Icepak which is the professional software to analyze the temperature field of electronics. The result shows that the junction temperature of the source is under 70degC at the natural convection which is satisfied with the requirement of the LED working at under 120degC. It shows that the heat pipe is the effective solution for the LED light application dissipation. For the lower junction temperature, three factors including the hei- ght, the thickness and the fin numbers of the heat sink, respectively, are considered to be optimized by DOE (design of experiment). With the simulation results of Icepak, the optimal scheme that the lower junction temperature is 56.7degC obtained by the combination of optimization levels. [C913]

"Packaging of light emitting diodes for display backlights: Need for multi-disciplinary design tools"

This paper discusses the modelling tools used to predict the performance of a liquid crystal display using an array of light emitting diodes (LEDs) as the backlight. LEDs can provide a number of benefits such as adaptive light control, reduced form factor and other novel techniques to ultimately improve the performance of the display. Some of the design challenges in adopting LEDs are to fully understand their effect on the thermal management, reliability, optical and viewability performance of the display. For the display designer this requires integrated modelling and analysis tools. The paper describes the current modelling efforts underway in this multi-disciplinary UK funded project that aims at identifying the intricate relationships between the optical, thermal and mechanical behaviour when developing a ruggedized electronic display using an array of LEDs as the backlight. [C914]

"First-principles based modeling for influence of epitaxy and packaging induced strains on emission properties of III-nitrides LED chips"

Undesired residual strain always exists in the epitaxial film inevitably as a result of lattice mismatch and thermal expansion mismatch between the substrate and the epitaxial film. The strain affects crystalline quality as well as optical and electrical properties of LED epitaxial film. In this paper, we report on the effects of strain on the emission properties of III-nitrides based LEDs grown on various substrates. As results, the band-gap energy of III-nitrides shows blue shift with increasing compressive strain and increases in tensile strain results in a decrease of band-gap energy. A linear relation of the band-gap of III-nitride with the biaxial strain is observed. In addition, III-nitrides materials with larger band-gap energy show a larger shift of emission energy, which means purple and ultraviolet LEDs will be more non-uniform than blue and red LEDs under the same strain states. [C915]

"High bright white LED lens formation by Vacuum Printing Encapsulation Systems (VPES) and its packaging resin"

White color LED has been investigated for lighting application with a big expectation of growth. And in terms of packaging of them in general, clear transparent epoxy resin has been mainly used in spite of problems such as

coloring of the resin due to high temperature and UV light emitted from chip itself. In order to solve this problem, we have investigated new materials such as silicon resin and specially modified epoxy resin etc. And then we would suggest that materials should be chosen depending upon LED specifications, packaging materials and also reliability test conditions etc. In addition we would like to suggest high density packaging technology using VPES, which meets very fine pitch, high density packaging designs, and meets cost effective mass production. [C916]

"Numerical study on thermal management of LED packaging by using thermoelectric cooling"

The heat generated from LED (Light-emitting Diode) keeps rising with the rapid development of LED luminous flux and brightness in recent years. So it's urgent to find effective heat dissipation ways for thermal management of LED packaging. The finite element model of LED packaging heat dissipation, based on the thermal resistance model of flip-chip LED packaging and the principle of thermoelectric refrigeration, was founded by ANSYS in this paper. Performance parameters such as LED junction temperature (T0), substrate temperature (Tsub), hot end and cold end temperature of Thermoelectric Cooler (TEC) (Th, Tc), heat sink temperature (Tsink) and coefficient of performance (COP) were investigated systematically in the situation of different chip power and different TEC input current. The optimized parameters of packaging heat dissipation in different conditions were analyzed through comparing simulation results of the thermoelectric cooling method and the natural convection cooling method with and without heat sink. [C917]

"Modeling of manufacturing processes of high power light emitting diodes: Wire bonding process"

In this paper, the wire bonding process of high power light emitting diodes (LED), which was simplified to consist of impact and vibration stages, was investigated by using a nonlinear finite element method. Parametric studies were carried out to examine the effects of the ultrasonic vibration amplitude, the friction coefficient between the free air ball (FAB) and bond pad, the incline of LED chip on stress and strain distribution in the bond pad and ohmic contact layer of both p-type and n-type electrode structure. This numerical simulation work may provide guidelines for the wire bonding process virtual window development of high power lighting emitting diodes package. [C918]

"Model for trap-assisted electron tunneling in thin insulators"

Trap-assisted charge transport has been under study for long time in connection with a wide range of problems in microelectronics: the influence on the operation of MNOS memory transistors, the capacity enhancement of electrically programmable read-only memories (EPROMs), or reliability issues of insulators with high dielectric constant. The problem of the trap-assisted tunneling in LED has been addressed at the qualitative level. Relatively few quantitative analyses are reported in the literature, of which none deals with the behavior of this phenomenon at high temperatures. Our study aims to fill this gap by introducing a quantitative model of electronic trap in a dielectric environment. [C919]

"Development of carbon nanotube field emitters in the backlight for liquid crystal display"

The carbon nanotube (CNT) field emitter based backlight unit (BLU) is highlighted as a device to improve video images for future television (TV) of liquid crystal display (LCD), especially in terms of contrast ratio and moving picture response time (MPRT). [C920]

"Process research of LTCC substrate with 3D micro-channel embedded"

Along with the development of the electrical technology, the power of the circuit rises rapidly, heat dissipation becomes a key problem in the design of the circuit. The 3D microchannel coolers made with LTCC (low temperature co-fire ceramic) technology can absorb the heat of the chip and pass it to the external environment by the liquid circulation. In this paper, the critical manufacturing processes of LTCC multilayer substrate with 3D micro-channel embedded: lamination and sintering are studied mainly. The special lamination sacrificial layer technique can prevent the 3D micro-channel from collapsing and deforming during the lamination. In addition, the sintering profile is optimized which helps avoid the crazing and delamination of the multi-layer substrate. In conclusion, the intact LTCC substrate with 3D micro-channel embedded can be fabricated using the optimized lamination and sintering process parameters, which makes the following heat dissipation experiment and design optimization more conveniently. [C921]

"Finite element thermal analysis for high power multi-chip light emitting diode"

In this paper, finite element method (FEM) numerical thermal simulation is performed on the given packaging configuration, and temperature as well as heat flux distribution are obtained. An optimal packaging configuration is obtained by simulating different materials and structures of the heat sink, submount, die attach, different die

arrangement styles and die spacing parameters. A reasonable simplification for the high power multi-chip light emitting diode packaging body is performed and a precise FE model is established, and then a high-quality meshing is carried out. A comprehensive simulation is performed to get the temperature distribution of the chip for different materials and structure parameters of certain components; the mechanism of the change of the temperature is analyzed. Simulation results show that an ideal temperature for chip junction under standard input power on the normal working conditions can be obtained through appropriate selection of heat sink structure and material, sub-mount material and structure parameter, die attach material and structure parameter, die arrangement style and spacing parameter. [C922]

"Thermal analysis and testing of multi layer ceramic-metal packaged LED"

We studied the thermal properties LED light unit composed of nine LED chips in a MLCMP (multi-layer ceramic-metal package) and compared various thermal dynamic models. We concluded that the direct measurement of forward voltage Vfis the most practical approach for in-situ testing. By calibrating the Vfto junction temperature Tjat various forward current in a temperature controlled oven, the linear relationship of Vfwith respect to Tjwas obtained and coefficient beta was accurately extracted from experimental data. [C923]

"Failure modes and failure analysis of white LEDs"

Reliability is one of primarily considered problems in white LED application. In this presentation, main failure modes in white LEDs such as ohmic contact degradation, electrode bonding defect, thermal mismatch and degradation of the encapsulation material, as well as ESD damage were analyzed, also combination with many failure analysis practices. Finally, several reliability assurance measures were discussed, which is helpful to improve reliability of LEDs in the solid state lighting applications. [C924]

"Atomic layer deposition enabled interconnect technology for vertical nanowire array devices"

In this study, we have demonstrated atomic layer deposition (ALD) enabled interconnection technology for vertical, as-grown c-axis oriented GaN nanowire (NW) arrays encapsulated by benzocyclobutene (BCB). The nano-scaled ALD multilayer is essential to provide conformal dielectric/conductor coverage and precise thickness control for NW interconnects. Cross-sectional images taken in a focused ion beam (FIB) tool and resistance measurement performed on the NW devices confirms the conformality of ALD-W films. This interconnect technology can be applied to different vertical nanowire array devices, such as nanowire light emitting diodes (LEDs), metal semiconductor field effect transistor (MESFET), resonator or solid state super-capacitors. [C925]

"Concave micropatterned complex optical surfaces for wide angular illumination"

This work presents the development of a novel single optical component for enhancing angular illumination as well as local uniformity. Unlike a conventional single curvature lens, structured micropattern arrays on a single lens curvature can help light efficiently scattered by total internal reflection or diffraction. The illumination angle and local intensity distribution can be controlled by lens curvature and refractive index of lens material as well as the shape, size, and aspect ratio of micropattern arrays on a lens curvature. Concave micropatterned complex optical surface is fabricated by a replica molding technique. The angular illumination of concave micropatterned complex optical surface with different lens curvatures under a collimated light source is captured by CCD camera. The angular illumination improves 3.7 times wider angular illumination than that of the planar micropattern arrays. [C926]

"Optofluidic packaging of silicon microchips for applications in light emitting devices"

We demonstrate optofluidic packaging of silicon microchips using image processing-based optofluidic maskless lithography (IP-OFML). Optofluidic maskless lithography (OFML) is a dynamic photopolymerization technique for free-floating microstructures within a fluidic channel using a MEMS spatial light modulator. OFML via computer vision-aided image processing enables individual polymer packaging of each microdevice for protection. Furthermore, our technology is applicable to phosphor coating of light emitting diodes (LEDs). [C927]

"Mesoporous thin films as versatile sensitive matrices on Love wave sensors for fast sub-ppm vapor detection"

Love wave gas sensors with mesoporous thin film as sensitive layers are presented. They are dedicated to volatile organic compound vapor detection. Mesoporous films of SiO2were prepared using the sol-gel process and deposited on the devices acoustic path. The obtained films have been characterized by ellipsometry resulting in the determination of porosity and pore size distribution in the film and of water adsorption isotherms. Ethanol (130-2000 ppm) and toluene (70-1000 ppm) exposures resulted in frequency shifts up to 20 kHz,

showing the high sensitivity of the mesoporous-based Love wave devices. [C928]

"Sorting microparticles by orientation using wedged-fin and railed microfluidics"

We present a new method for sorting directionally-oriented microparticles in a microfluidic channel. During the process of injecting the microparticles into a microfluidic channel, directionally-oriented microparticles are disordered, floating freely in the solution. In order to arrange microparticles where proper directional orientation is required, two sorting methods can be used with respect to the microparticle's rotation and flip. For sorting microparticles based on their rotation, we used a lean wedge shaped fin on the microparticles and a Y-shaped railed microfluidic channel containing a groove on the top of the channel. For sorting according to flip, we used two grooves on the top and bottom of the microfluidic channel, and rectangular fins on the microparticles. Thus, we have demonstrated simple direction-oriented fluidic assembly, allowing for two plane orientation of prefabricated microparticles injected into a microfluidic channel. [C929]

"Real-Time implementation of a 1.25-Gbit/s DMT transmitter for robust and Low-cost LED-based plastic optical fiber applications"

Real-time implementation of a DMT transmitter in FPGA is demonstrated for low-cost, standard 1-mm step-index plastic optical fiber applications based on commercial resonant-cavity LED and large-diameter (540 mum) photodiode. [C930]

"Photonic patterns and micro knife array on individual faces of transparent bifacial chip for in situ nir observation and biopsy"

This paper describes a transparent bifacial biopsy chip toward the functional adaptor for endoscopic operation. The device consists of an observation side and a biopsy side. The observation side has a photonic pattern array that plays the role of planar light guide, while the biopsy side has a micro-knife array. The device can be simultaneously used for in situ observations and biopsies. We demonstrate NIR (near-infrared) observations for monitoring blood vessel and a pseudo lymph vessel with PDMS fluidic channels filled with ICG (indo cyanine green, Tokyo Kasei Kogyo co.Ltd) pigment. We also demonstrate cutting and extraction of fluid from a pseudo lymph vessel. [C931]

"An organic electronic ion pump to regulate intracellular signaling at high spatiotemporal resolution"

Current technologies for cell stimulation suffer from a variety of drawbacks. Indeed, precise, localized, and minimally disruptive machine-to-cell interfacing is difficult to achieve. Here we present the organic electronic ion pump (OEIP), a polymer-based delivery system exhibiting high spatial, temporal, and dosage precision. Based on electrophoretic transport of positively charged species, the OEIP can deliver-with high precision-an array of biologically relevant substances without fluid flow, thus eliminating convective disturbance of the target system's environment. We discuss our results to date, including oscillatory delivery profiles and stimulation of neuronal cells in vitro, as well as our ongoing work. [C932]

"Organic emitting layer formation with microfluidic channel for multi-colored OLED array"

This study describes a simple, and a low-cost method for pattering organic light emitting diodes (OLEDs) on substrates using poly-dimethylsiloxane (PDMS) microfluidic channels. We simply introduced solutions of organic emitting polymer into the microfluidic channel, and successfully coated the organic emitting polymers on the hole transport layers on electrodes. Different type of organic emitting polymers can be patterned in the same plane since the PDMS microfluidic channel has some independent flow paths for the different solutions of organic emitting polymers. Hence, each pattern emits light with different colors when voltage is applied through metal layers as electrodes. This method will be applicable for a rapid fabrication of a multi-colored OLED array. [C933]

"Real-time gigabit ethernet transmission over up to 25 m Step-Index Polymer Optical Fibre using LEDs and FPGA-based signal processing"

Real-time gigabit Ethernet transmission over up to 25 m step-index polymer optical fibre is demonstrated using a commercial LED. This is enabled by use of PAM-4 modulation and receiver equalisation including clock recovery, implemented in an FPGA. [C934]

"GaN-LED grown on Si substrate by MBE/MOCVD and monolithic fabrication of a light distribution variable device"

Monolithic integration of GaN-based semiconductor with Si MEMS is demonstrated from a GaN/Si wafer, in

which GaN crystal is grown by molecular beam epitaxy (MBE). A Light emitting diode is fabricated on the grown GaN crystal and the blue electro-luminescence is obtained. The GaN crystal property of is improved by using a template grown by metal organic chemical vapor deposition (MOCVD). A light distribution variable device with Si comb actuator is monolithically fabricated. [C935]

"A novel optical encoding scheme for network node tracing in all-optical reconfigurable wavelength routing networks"

An optical prime-number-encoded tag is employed as distinct network node identifier so as to realize network node tracing in reconfigurable wavelength routing networks, via prime number multiplication. Possible network looping problem can also be identified. [C936]

"Spectrum sliced sources AMOOFDM modulated for WDM&TDM PON"

We experimentally demonstrate the use of AMOOFDM format as a cost effective solution for colorless source WDM-PONs based on spectrally sliced ASE source (SLED, RSOA and pre-selected RSOA). [C937]

"Harmonic measurements and customer loads"

Power quality topics ebb and flow like the tides at the shore-problems arise due to changes in technology, then subside as technology finds a way to overcome them. Harmonics are still a concern, even if they don't cause a particular problem for a particular customer anymore. Harmonics still cause utilities concern over capacitor installations and today, that concern reaches to distributed generation, like wind farms. A research project built the magic instrument, deployed it to sites of known and unknown distortion, and developed a method to tell that difference. Three different recognition protocols were studied to determine which gave the best results. When applied to the test results, these gave an indication of the nature of the harmonic flow detected. One method seems to be appropriate for determining the utility customer's contribution to a problem. [C938]

"Rapid detection of pesticide residues in vegetables with mini-colorimeter"

This paper describes a rapid pesticide residues detection method for vegetable samples or water samples based on a mini-colorimeter. The sensors responding signal and condition circuit of the mini-colorimeter are composed of emitting diodes, photodiode receivers and integrated circuit amplifiers. Single chip microprocessor is the core of the system. The concentration (PPM) of pesticides is displayed by 4 nixietubes. A neural network mathematic model is established to calculate the residual concentration of the pesticides. The neural network weigh matrixes are trained with supervised samples of 0-6 PPM omethoate and Chlorsalicylamide. The pesticide residues are detected for greengrocery samples. Using this meter, it takes one minute to measure the organophosphates pesticide residues in a greengrocery sample or Chlorsalicylamide in water sample. This meter can be used in other pesticides detection with the help of suitable chromogenic agents. [C939]

"The renewable energy & storage (RES) project: Summary of a panel session presentation"

The Renewable Energy & Energy Storage (RES) Project is a small-scale investigation of how two types of renewable energy sources (a PV module and a wind turbine-generator [WTG]) can be combined with two types of electric energy storage (the lead-acid battery and a supercapacitor) to power a constant load 24 hours per day. The PV module is rated at 60 W under STC; the peak wind turbine output is 400 W at a wind speed of 30 mph. Two lead-acid batteries were employed eventually, each rated at 100 amp-hours. The supercapacitor can provide 1000 Farads at 12 volts, and the constant load consists of two LED arrays drawing a total of 7 watts. This system has been in operation for five years. Lessons learned in creating, monitoring and operating the RES system will be discussed in the presentation. [C940]

"Vacant parking space detector for outdoor parking lot by using surveillance camera and FCM classifier"

The most prevailing approach now for parking lot vacancy detecting system is to use sensor-based techniques. The main impediments to the camera-based system in applying to parking lots on rooftop and outside building are the glaring sun light and dark shadows in the daytime, and low-light intensity and back-lighting in the nighttime. To date, no camera-based detecting systems for outdoor parking lots have been in practical use. A few engineering firms provide the camera-based system, which is only for underground and indoor parking lots. This paper reports on the new camera based system called ParkLotD for detecting vacancy/occupancy in parking lots. ParkLotD uses a classifier based on fuzzy c-means (FCM) clustering and hyper-parameter tuning by particle swarm optimization (PSO). The test result of the detection error rate for the indoor multi-story parking lot has improved by an order of magnitude compared to the current system based on the edge detection

approach. ParkLotD demonstrates high detection performance and enables the camera-based system to achieve the practical use in outdoor parking lots. [C941]

"Cyberworld Cybernetic Art Model for Shared Communications"

The cyberworlds concepts has started as a network of virtual worlds is rapidly increasing to interactive environments of communications. The goals in this study are to propose a semantic online model of cyberworld, based on previous definition of the metaplastic visual language codification. The project includes an example of the meta-plastic application for Web shared communications. The paper explains more precisely the theoretical and artistic background of metaplastic virtual worlds evolution, from their cybernetic archetypes to their new definition. [C942]

"Optical detection in microfluidics: From the small to the large"

Herein we discuss two broad approaches for performing high sensitivity optical detection within microfluidic environments. First, we describe recent work in which fluorescence lifetime imaging has been shown to be a sensitive probe of environmental parameters such as pH, viscosity, molecular concentration and temperature. Additionally, we demonstrate how dynamic fluorescence lifetime imaging can be used to probe mixing dynamics in segmented-flow microfluidic systems. Moreover, we describe recent work at Imperial College London in which semiconducting polymer light emitting diodes and polymer photodetectors are integrated with microfluidic systems to define a novel format for point-of-care diagnostics. [C943]

"Place and Locality in Augmented Public Space: A Case Study in the Site Specific Nature of Urban Screens"

This paper looks at the growing phenomenon of urban screens-large-scale LED screens in prominent city centre locations-and asks fundamental questions about the nature of the spaces and locations in which they are placed. In this investigation three key themes come to light that have a critical impact on the experience of urban space: namely, the mediation of place and locality, the distinction between the virtual and the real, the body as a frame for information. [C944]

"A novel low-cost current-sharing method for automotive LED-lighting systems"

A novel low cost and passive current-sharing method for parallel connected LEDs is presented. The current-balancing concept is based on discontinuous inductor currents. An analysis has been performed and a prototype converter has been built and tested. The prototype converter drives 36 high-brightness LEDs consisting of six parallel strings with six high-brightness LEDs connected in series. The converter is designed for an automotive head-light system operating directly from the 14 V electrical automotive power net. Experimental results are in good correlation with theoretical predictions and demonstrate the good current-balancing performance. [C945]

"A new low voltage detecting method for multi-string LED BLU circuit"

This paper proposes a new lowest-voltage detecting circuit for multi-channel LED backlighting units (BLUs) for LCD TVs. The proposed circuit detects the lowest voltage drop among the multi-channel LED strings with reduced number of devices. After detecting such condition the circuit provides a feedback voltage to control the output voltage of the boost converter. Therefore, it can minimize the power losses in LED driving circuit. Experimental results are presented for a 15 W boost converter driving 40 mA, 8-channel LED strings. [C946]

"Freeform lens for application-specific LED packaging"

Traditional LED packaging always adopts hemisphere lens, although which can ensure high light output efficiency, its light beam is of circular symmetry and non-uniformity. Therefore, LED by traditional packaging cannot be applied in lighting directly and bulky secondary lenses have to be used, which will make the traditional lighting companies difficult to switch to LED lighting and the lamps are heavy. In this study, an effective freeform lens design method for extended light source was presented. With this method, we designed a freeform lens for street lighting, and integrated with this freeform lens, a novel application-specific LED packaging (ASLP), whose manufacturing process can be easily integrated into current LED packaging processes, was suggested. The results of both Monte Carlo ray tracing optical numerical simulation and the experiment show that the light beam is quite in agreement with the design target and the light output efficiency of this novel LED packaging is as high as traditional one. Moreover, comparing with traditional LED module with secondary optics, this novel ASLP module has advantages of higher system light output efficiency (~9%), compact size (~1/8) and convenience for end customers. [C947]

"Design of High-Stability Driver for White LED"

The driving technology is a very important factor influencing the output performances of white LED (WLED).This paper proposes a kind of high-stability driver for WLED based on constant-current and constant-luminance. The working characteristics of WLED and the principle of driving WLED are introduced in this paper. The newly designed driver works in a mode of constant current LDO and it is feedback controlled by the output of WLED to obtain highly stable luminance. Finally, a test circuit is set up to validate the proposed scheme and some experiments are carried out. The results show that the driving current maintains nearly constant and the luminance of WLED is of high accuracy. [C948]

"Thermal Analysis of the Multi-Chip Vertical Packaged White LED"

In this paper, thermal management of the multi-chip vertical packaged (MCVP) white LED is presented. The steady state thermal resistance (RT) and thermal resistance constitution is obtained by transient response testing based on electrical method. RTis 10.37degC/W. The chips and package body contributes 2.63degC/W and 7.74degC/W respectively. The temperature distribution of the MCVP LED is obtained by 3-dimensional finite element method (FEM) simulation. By comparing heating response curves among different package forms' LED samples, the MCVP sample shares lowest steady state temperature rise with the metal alloyed substrate sample, which is lower than 18.3degC of the single flip-chip sub-mounted device (SMD) sample and 15.3degC of the multi-chip horizontal packaged (MCHP) sample. [C949]

"A White LED Driver Based on Dual Mode Switch Dimming"

A novel White Light Emitter Diodes (LED) driver based on dual mode switch dimming has been presented in this paper. The driver can automatically switch between Pulse Width Modulation (PWM) and Pulse Frequency Modulation (PFM) modes according to the dimming input signals. The PFM mode varies in a range of brightness from 0 to 50% and the PWM mode varies from 50% to 100%. In this way, the driver can achieve a high efficiency over a wide range of varied dimming and avoid color shift. At the same time, a Low Dropout Linear Voltage Regulator (LDO) is used as a compact and efficient power conversion circuit to ensure the stability of the output. The chip is simulated with CSMC 0.5 mum mixed signal models, and the results show that it possesses a 350 mA output current with the duty ratio changed from 0% to 100% to achieve constant luminance control. Its efficiency can always keep above 90% in all duty ratio of the control signals. [C950]

"A Novel Green-Emitting Phosphor BaZnP/sub 2/O/sub 7/:Tb/sup 3+/ for White Leds and the Infuence of Doping Ce/sup 3+/"

The BaZnP2O7:Tb3+phosphor was synthesized by high temperature solid state reaction and an efficient green emission under near-ultraviolet was observed. The X-ray diffraction pattern indicates that pure BaZnP2O7:Tb3+phosphor was obtained. The emission spectrum shows the most intense peak is located at 547 nm, which corresponds to the 5D4rarr7F5transition of Tb3+. The excitation spectrum is extending from 300 to 400 nm, which is coupled well with the emission of UV LED (370-420 nm). The BaZnP2O7:Tb3+is a potential green-emitting phosphor for white LEDs. The BaZnP2O7doped with Ce3+or double doped with Tb3+and Ce3+were also prepared and the effect of co-doped Ce on the emission intensity of BaZnP2O7:Tb3+phosphor was investigated. [C951]

"Detection of Ampicillin Residues with a Miniature Integrated Surface Plasmon Resonance Sensor"

Surface plasmon resonance (SPR) biosensors offer the ability to monitor binding rapidly, in real time, and without any labels, while the commercial instruments available have been large in size, high-cost, and not amenable to field applications. An SPR sensor system based on Spreeta devices was developed to detect the ampicillin residues in milk for field use. Analysis conditions, including ligand immobilization, flow-rate and regeneration have been defined. Two different mesurement formats were tested, direct detection and indirect competitive inhibition assay. Limits of detection (LOD) for ampicillin in milk were 50 ng mL-1and 2.5 ng mL-1with the direct detection and the indirect competitive inhibition assay, respectively. Results could be obtained rapidly and the test can be completed in about 20 min using a prepared sensor chip. [C952]

"Design of Cursor Signal Acquisition Module in Full Automated Intelligent Gyroscope"

The control system of full automated intelligent gyroscope is presented, in which the automatic cursor signal acquisition module is designed based on CCD sensor and digital signal process technique to get the accurate center of the moving cursor in the gyro. Using the novel light source LED instead of lamp, the CCD driver circuit is designed with CPLD. It has been proved through experiments that the module can substitute for manual measurement to recognize the cursor signal effectively. The precision of the gyroscope is improved from 20" to

8". [C953]

"Analysis of delamination and darkening in high power LED packaging"

Luminous emittance declination due to interfacial delamination and darkening is a fatal defect for the GaN-based high power light-emitting diodes (LEDs) under a long time service. This letter brought forward an accelerated aging test under 350 mA forward current, 25degC, 54% RH, 256 hours to testify and analysis the abnormal dark stain on the die surface of high power blue LEDs. SEM micrographs show that a delaminated layer exhibits between the die and the epoxy glue cap on the aging sample. EDAX results illuminates that the percentage of C and O elements is higher than normal. The thermal overstress on the epoxy along the interface owing to the high junction temperature is the main factor to degrade the epoxy gradually. As a result, a darkening area made up of carbon as well its oxide occurs on the LED die surface and depresses the luminous efficiency. [C954]

"Thermal conductivity studies of a GaN-sapphire structure by combined scanning thermal microscopy and electron backscatter diffraction"

Scanning thermal microscope (SThM) and electron backscatter diffraction (EBSD) techniques were used to investigate the local thermal-conductivity of a GaN-buffer-sapphire heterostructure. Compared with GaN epilayer, buffer layer displayed the low thermal-conductivity and the high strain state due to the lattice distortion. [C955]

"Design of Intellectualized Paper-pulp Measurement Management System"

This paper introduces a method of intellectualized design of paper pulp measurement management system, in which the monolithic microcomputer and the vortex flow-meter, Concentration Meters are used to Automatic measurement, accumulation, and printing as well. Gamma Correction and Resilience transformation is carried in Domestic made concentration meter, which satisfies the measuring accuracy of the overall system. Owing to the simultaneous measuring data as necessary by using Embedded Handset System, this method has greatly facilitated secondary level management. [C956]

"Transmission of Data Using Distinct Intensity Levels in IR Radiations"

This paper emphasizes over the usage of variation in Infrared radiations, for a multilevel logic transmission, as emitted by the Infrared LED along with the experimental analysis of the response and precision levels of the Infrared sensor (IR Photodiode). The voltage applied to the IR LED is varied over a range, fractioned into discrete levels, according to the data to be transmitted. Thus, a commensurate Infrared intensity lying in a unique margin is obtained as an output of the IR LED. The receiver employs a circuitry using the IR photodiode that detects and perceives the slightest variations in infrared radiations as falling upon it. Further, the data transmitted is recognized on the basis of voltage variations obtained across photodiode, as per the lookup table of the receiver microcontroller. As an extension, a particular amount of IR transmitted can be assigned to a specific pattern of binary data, thus augmenting the efficacy of the system. [C957]

"Touch Sensor Assembly Using Infrared Radiations and its Applications"

This paper discusses about a novel technology for introducing a touch sensor that can be applied for numerous applications, using optoelectronics. The sensor employed harnesses the attributes of an Infrared LED and an infrared photodiode. The routine touch sensor buttons can be replaced by this cost effective assembly that uses variation in amount of infrared radiations falling upon the photodiode to sense the proximity of human finger. Whenever a touch is perceived, i.e., the finger is kept at a minimum possible distance from the sensor causing maximum IR reflection, a typical amount of voltage drop is observed across the photodiode, signifying the presence of a finger. Further, the paper discusses about the variants in application of the touch sensor, as in a matrix keyboard and a household electrical appliancespsila switchboard. [C958]

"Design of an LED thermal system for automotive systems"

The paper examines the high power Light Emitted diode (LED) and the hear distribution of the heat sink. Beside we also study the relationship between temperature and the current on the LEDs luminous efficiency. The temperature rise to over the limit level that the luminous efficiency will decrease rapidly. The current increase will cause the nonequilibrium electron diffuse out of the potential wall and will increase the temperature, so as to decrease luminous efficiency and the LEDs life. Enhancing the heat manage of LEDs that can improve the luminous efficiency. Thermal design examines by using the thermal analysis. Finally we propose the electrical circuit to drive the LEDs in constant current power to maintain the temperature more constant of LEDs. [C959]

"Low Operating Voltage and High Efficiency Vertical GaN Based LEDs"

Vertical GaN based Light Emitting Diodes (VLED) on metal alloy base were realized and characterized for solid state lighting application. An operating voltage of less than 2.9 Voltage from a high efficiency and high power blue LED was achieved. And, an efficiency of more than 120 lumens/watt from a white LED was achieved also. The dissipate heat more effectively than conventional and flip-chip LEDs, thanks to the higher thermal conductivity of a copper alloy base. This increases their maximum operating current and output power and makes them more suitable for solid-state lighting applications. In addition, these VLED exhibit many advantages over those on sapphire under extreme operation conditions for general lighting application. [C960]

"LED lighting development for intelligent clothing"

LED lighting is applied to clothing. It allows a flexible method to provide illumination of lighting. A family of converter topologies is proposed to give this simply method of power conversion. Analysis for the circuits in terms of output power, efficiency and general operation are provided. Two types of LED lighting clothing are developed. One is using super-bright LED embedded on the cloth. This gives active lighting instead of passive lighting. Another one is using optical fibre with grating to form lighting pattern. [C961]

"An automated camera calibration framework for desktop vision systems"

Camera calibration is one of the fundamental problems of machine vision. There have been lots of efforts for providing autonomous calibration algorithms. One of the major problems that put up barrier toward autonomy is feature detection and extraction. In this paper, the architecture of an autonomous camera calibration framework is studied. The autonomy of calibration framework originates in its hardware setup. The applied setup makes automatic feature detection and extraction possible. It is shown that the calibration framework is accurate. [C962]

"The topologies of white LED lamps' power drivers"

This paper demonstrates power electronic drivers for white LED lamps. Due to some obvious features such as high luminous efficiency, low-loss energy, long life, safety, green, and so on, it's expected to replace conventional lamps including incandescent, halogen and fluorescent lamps at least in some general illumination application within the near future. It's always used in automotive fields. Innovative design in driver circuits of white LED lamps with respect of functionality, efficiency, cost, size and reliability enables the successful introduction of new LED based lighting products. First of all, it describes LED's characteristics briefly which include electrical character, driver requirement, luminous characteristic, thermal performance and package structure. In the second part, a series connection of single LED cells is presented in detail. For efficiency reasons, white LED lamps can not be droved via series resistor, but need PWM models with current control. In the third part, different standard DC-DC converter topologies are discussed which can be adapted to feed a constant current into a LED load. Hence, roughly, it consists of two general types which named non-isolated driver and isolated driver separately. This paper will introduce more detailed classifications. It's convenient to choose proper driver circuit and suited components through the comparison between the topologies of this paper. In addition, PFC (power factor correction) circuit is also involved in high power factor. Finally, some hot spots in white LED lamps fields are focused on. [C963]

"Investigation and Experiment of Dynamic Light Disturbance"

Dynamic obtrusive light is one of latest light pollutions. In the general situation, the human eye can correctly observe and judge the outside things, such as the size, the shape, the color and so on. If the light color is much too complicated, the color area too small or the change of multicolor light too quick, the resolving capacity and the adaptive capacity of the human eye have a decrease. The impression investigation on dynamic lighting and static lighting was performed. The experiment lays emphasis on the influence of dynamic light pollution on visual perception of the general public by measuring subjects' contrast response under different experiment conditions. The influence of background brightness on subjects' disturbance was discussed and the correlation analysis was performed by SPSS. The results indicated that the flickers from some artistic lighting, such as the LED neon light, the stroboscopic light, laser, etc., result in light pollution. The dynamic light pollution can exert influences on the people's psychology and emotion and even can cause the traffic accident and the visual damage. [C964]

"Experimental Study on Using Unsaturated Light-Induced Delayed Fluorescence to Represent Plant Photosynthetic Capacity"

Delayed fluorescence (DF) is the phenomenon of long- lived photon emission by plant after being illuminated with light and put into darkness. In Held study, the intensity of DF is reported to be a measure of photosynthetic capacity (marked as PhC). In this research, a new method was developed, which used unsaturated light-induced

DF intensity (in this research, marked as IDF) to represent plant PhC. The proposed method prolonged the sustainable working hours of DF detection system. Hence, it was more appropriate than saturated light condition for Held study. In order to examine the new method, four different species were chosen as samples to compare IDF with net photosynthetic rate (Pn) under different intensities of excitation light. The results showed that there is an excellent linear correlation between them (Rges0.947). The experimental results testified that unsaturated light-induced IDFcan represent the plant PhC. [C965]

"Simulating the Illuminance and Efficiency of Sunlight/LED Hybrid Illuminating System Used in Indoor Lighting Design"

In this study we simulate the illuminance and efficiency of sunlight/LED hybrid illuminating system for indoor illumination. According to our calculation results of the examination of simulations and real situations, we find that the sunlight/LED hybrid illumination do perform better than LED or traditional lights. We are assured of the potential advantages of sunlight/LED hybrid illuminating system in the future. [C966]

"Advanced Wavelength Tunable Quantum Dot Lasers and Broadband Quantum Dot Superluminescent Diodes Obtained by Post-Growth Intermixing"

A bandgap and intersublevel spacing tuned laser and a broadband quantum dot superluminescent diodes have been realized by using a modulation p-doped InGaAs/GaAs quantum dot structure, which utilises a post-growth annealing process. The intermixed laser exhibits comparable light-current characteristics, indicating little detrimental change to the quantum dot laser material, and show a ground-state bandgap blueshift of ~13 nm and intersublevel energy spacing reduction of ~30 nm comparing to the un-annealed device. The intermixed broadband superluminescent light emitting diodes exhibits a large and flat emission with spectral width up to 132 nm at 2 mW. [C967]

"A Novel Blue-Emitting Phosphor NaBaPO4:Eu2+ for White LEDs"

A novel blue phosphor based on phosphate host matrix, NaBaPO4doped with Eu2+was prepared by solid state reaction. The phosphor invariably emits blue luminescence with a peak wavelength at 440 nm under ultraviolet excitation. The excitation spectrum is very broad extending from 300 to 450 nm, which is coupled well with the emission of UV LED (350-410 nm). The effect of doped Eu2+concentration on the emission intensity of NaBaPO4:Eu2+phosphor was also investigated and the process of energy transfer between Eu2+ions in NaBaPO4phosphor should be controlled by multipole interaction. The measured of InGaN-based NaBaPO4:Eu2+LED shows bright blue light to the naked eye with chromatic coordinate of (0.1632, 0.1098). [C968]

"Simulation of Optical Characteristic for Multi-Active Region RCLEDs"

Although the resonant cavity light-emitting diodes (RCLEDs) have better thermal behavior comparing with vertical-cavity surface-emitting lasers (VCSELs), the emission intensity and far-field pattern of RCLEDs still depend on the temperature. A conflict exists between the requirement of high optical intensity and increased temperature. The multi-active region RCLEDs with two MQWs connected by a tunnel junction can solve this problem through the over 100% internal quantum efficiency. In this paper, simulations of the optical field and emitted pattern for multi-active region RCLEDs are calculated based on method of transfer matrix and source term, and comparison with single active region RCLEDs is made as well to give a deep insight of multi-active region RCLEDs. [C969]

"Analysis of degradation of GaN-Based light-emitting diodes"

This paper analyzes the degradation of the electrical, optical and thermal characteristics of the light-emitting diodes (LEDs). Two types of LEDs which are defined as sample A and sample B are tested. Their electrical, optical and thermal characteristics have been continuously monitored during the test. The results of our analysis demonstrate that ohmic contacts and resistivity of bulk are stable over stress time; the die attach materials of sample B get worse, but the active layer is better than sample A; the depletion region of sample A is getting worse and sample B is stable. The analysis above offers a new method to find which part degrades seriously. [C970]

"Applying patent analysis to explore the co-opetition behavior between two led manufacturers-Nichia and Osram"

This study used patent analysis to explore the co-opetition behavior between the two LED manufactures, Nichia and Osram, from the two critical technological fields in the LED industry, LED components and phosphor. The

results of patent analysis indicated that Nichia had advantages in the field of LED components, while Osram had advantages in the field of phosphor. Therefore, there existed cooperation opportunities for the two opponents in the LED industry, because their technological capabilities were partially complementary. Therefore, Nichia and Osram were willing to make a compromise to solve the patent litigations between them and further agreed to offer cross-licensing of patents for each other. Their strategic reactions were changed from full competition to co-opetition which is win-win for them. The results of this study can provide a valuable reference for managers not only in considering patent strategies of their companies, but also in formulating strategic plans. [C971]

"Analysis on failure modes and mechanisms of LED"

The reliability of LED is key to its application system. In this paper, the frequent failure modes and mechanisms such as chip failure and packaging failure were investigated through several failure analysis cases. Based on these analysis results, several methods to improve LED's reliability are reported in this paper. [C972]

"Combining scenario analysis with delphi and the technological substitution model to analyze the development of the OLED TV market"

The technological substitution model, proposed in 1971, was designed to analyze the penetration process of new-generation technologies replacing old ones. It was expanded in 1979 to consider more than two generations and the substitution process among various entities in the market. However, this expanded model is often limited by a relative lack of data on the latest-generation technology, and while it presents rich and complex portraits of possible future scenarios, it fails to provide quantifiable forecasts. Therefore, previous researchers have combined these two models to analyze the development of new technologies. The current opinions of seasoned experts should also be taken into account for accurate forecasting. However, because there is often large variation among expert opinion, a method for coming to a consensus, such as the Delphi method, is also necessary. Therefore, we combined the technological substitution model with scenario analysis and the Delphi method to analyze the development of a new technology, namely, the organic light-emitting diode (OLED) TV. We elaborate three possible scenarios, and forecast the market share of OLED TV and four other TV technologies in the global market over the next 10 years: cathode ray tube, rear projection, plasma display panel, and liquid crystal display. [C973]

"1ЧN self-made polymer optical fiber based splitter for POF-650nm-LED based application"

This research focuses on fabrication of 1 by N multimode polymethyl methacrylate based step-index polymer optical fiber (PMMA SI-POF) to be proposed on application based on POF-LED combination as a main transmission media. This self-made bundled-fiber splitters have been fabricated by a perform technique. There several systems available on the market, which able to split or couple optical signals transmitted into some different channels, which are all afflicted with certain disadvantages. But all these solutions have one main disadvantage; they are all too expensive for most of the applications. So the goal of the research is to develop an economical splitter for multipurpose application over PMMA-POF. PMMA material here can be seen as one of the best solution in achieving objectives of the research due to it flexibility and cost efficiency deployment. Characterization of the splitter was reported. Red LED with 650 nm wavelength has been injected into the splitter with the aim to analyze power efficiency of the splitter. A coupling efficiency of 80% has been demonstrated. The device performance can be improved gradually through experience and practice. Main point here is the fabrication process is simple, easy and suitable to be used for household. [C974]

"Facial Complexion Acquisition and Recognition System for Clinical Diagnosis in Traditional Chinese Medicine"

This paper introduces a standard acquisition environment and a recognition method for clinical facial complexional diagnosis in traditional Chinese medicine (TCM). Firstly, collected the information of facial complexion in an environment with different artificial light source, the color value of face was extracted and compared with diagnostic conclusion from clinical experts in natural light environment. Experiment results show that the light emitting diode (LED) met the requirement of acquisition environment well. Then, based on the theory of TCM, five-color classification of observational scale in complexion diagnosis was defined, an automatic analysis system was developed for assistant facial complexion-based diagnosis, which standardized the facial complexion-based and avoids depending on the physicianpsilas experience and environment. This study may be helpful in promoting quantitative analysis in TCM. [C975]

"Effect of [Au]/[CNa2 SO3] molar ratio on co-electroplating Au-Sn alloys in sulfite-based solution"

LEDs (light emitting diodes) that assembled using flip-chip technology are today used as long-life, energy

efficient, environmentally friendly light sources. However, the flip chip solder joints have to meet high requirements. Therefore, their performance and quality are crucial for the integrity of the assembly, which in turn is vital to the overall function of the LED. Au-30at.%Sn eutectic alloy is the generally used solder in electro-optical assemblies due to its excellent thermal and mechanical properties. Au-Sn solder bumps can be obtained by sequential electroplating of Au and Sn layers or by co-electroplating Au-Sn alloys from a single solution. In the present work, Au-Sn alloys have been co-electroplated from a non-cyanide, sulfite-based stable solution which contains Na3Au (SO3)2(gold sodium sulfite) as the source of gold and SnSO4(stannous sulfate) as the source of Sn. Na2SO3(sodium sulfite) is added as the complexing agent for gold and an additional commercial complexing agent for Sn. The effect of the [Au]/[Na2SO3] molar ratio in the plating solution on the composition of the deposits, surface morphology and plating rate has been investigated. It was shown that the [Au]/[Na2SO3] molar ratio of 1/24 proved to be the best one with respect to plating rate and surface morphology in the present experiment. When the Sn2+concentration is 0.03 mol/L, the optimum concentration for co-electroplating Au-Sn alloys is Au(I) concentration of 0.02 mol/L and Na2SO3concentration of 0.48 mol/L, corresponding to the [Au]/[Na2SO3] molar ratio of 1/24. [C976]

"Improved thermal performance of high-power LED by using low-temperature sintered chip attachment"

Chip attachment is an important step in packaging light-emitting diode (LED) chips. The attachment material provides mechanical support and heat dissipation. As high-power LED chips are targeted at general illumination applications, the thermal property of the die-attach material is critical to the light output and degradation of the lighting device. Silver epoxy, lead-free solder paste, and nanosilver paste, were evaluated as the attachment material for LED chips. The interconnected chips were tested at current-density levels up to 3times102A/cm2. We found that at high levels of current density, the chips that attached using the nanosilver paste had a significantly higher light output than the lead-free soldered chips, which in turn had a higher light output than the epoxy-glued chips. This can be explained by the higher thermal conductivity of the sintered silver than that of solder and epoxy. Higher thermal conductivity of the attachment material results in a lower junction temperature at a given level of current density, thus causing a higher light output. Our results suggest that LED performance can be significantly improved with a die-attached nanosilver paste. [C977]

"Integration of GaN thin film and dissimilar substrate material by Au-Sn wafer bonding and CMP"

GaN thin film grown on sapphire substrate of 50 mm*50 mm in size are successfully bonded and transferred onto Si substrate using Au-Sn wafer bonding followed by grinding, chemical mechanical polishing (CMP) and dry etching. The GaN/sapphire structures are integrated to receptor Si substrate by thermal pressure bonding process. The bonding medium comprises Au-Sn multilayer composite deposited directly on the object to be bonded. Sapphire substrate is detached from GaN epi-layer by combining mechanical grinding, CMP with dry etching process. The dissimilar Si substrate provides support to the GaN-based LED epitaxial layer during the CMP process, and takes the role of conducting and high heat-dissipating substrate. The CMP can remove or reduce most of the scratches produced by mechanical grinding, recovering both the mechanical strength and wafer warpage to their original status and resulting in a smoother surface. The results have been presented. [C978]

"Study on the degradation of sealed organic light-emitting diodes under constant current"

Degradation characteristics of sealed OLED devices under four different constant currents were investigated by using OLEDs aging tester. We found that the higher the applied current density was, the faster luminance decayed. There was a relationship between luminance and lifetime when the current density was within 200 mA/cm2. In addition, spectrum characterization indicated that the peak wavelength didn't shift during the aging process, which implied that the carriers recombination occurred near the NPB/Alq3interface all along even when OLEDs luminance dropped down to half of the initial value, indicating that the degradation wouldn't lead to the deviation of the carriers recombination region. Through the metallurgical microscopy observation, the number of bubbles and dark spots were noticed to increase continuously and the non-emissive area kept growing around the bubbles. It showed that bubbles would badly accelerate the formation of dark spots. By investigating luminance degradation under constant current, we draw a conclusion that OLEDs luminance degradation is not entirely coulombic. After introducing an acceleration coefficient, the formular could be applicable until the current went beyond some degree. [C979]

"Sequential non-cyanide electroplating Au/Sn/Au films for flip chip-led bumps"

LEDs (Light Emitting Diode) have a high potential to replace the conventional light bulb as the long-life, energy efficient, environmentally friendly and multi-use light source in the future. Using flip-chip (FC) technology, the

thermal dissipation and luminescence efficiency of high-power LEDs can be improved. Therefore FC packaging also attracts great research interests for high brightness LEDs (HB-LED). However, solder bumping is a critical step in FC technology. In the present article an Au-30Sn (at.%) eutectic alloy bumping process developed for high-power LED flip-chip technology has been described. Au-Sn solder bumps can be manufactured by sequential non-cyanide electroplating of Au and Sn layers. This paper focuses on the formation of Au bumps and the optimization of electroplating parameters for pure Au. The quality of the Au layers and the deposition rates were studied in terms of electroplating temperature and sodium sulfite concentration in baths. A series of electroplated tests at different sodium sulfite concentrations ranging from 0.135 mol/L to 0.675 mol/L were performed in order to study the effect of sodium sulfite concentration on the quality and depositing rate of Au layers. After the optimization of the Au plating parameters, Au/Sn/Au triple-layer films for FC-LED bumps were fabricated. [C980]

"Preparation and performance of white LED packaged YAG phosphor"

In recent years, the preparation technology of the white light LED packaged YAG phosphor develops very quickly. The preparation methods include solid-phase method, sol-gel method, precipitation method, combustion method and so on. The traditional solid-phase method is still dominant in all of them, whereas this method also has shortcomings such as a high synthesis temperature, longer reaction time, bulky grains and larger hardness. So it requires a new approach to achieve the phosphor synthesis. Using metal nitrate as raw materials and citric acid as a complexing agent, we prepared Y3A15O12:Ce3+yellow phosphor by the sol-gel method (sol-gel). The X-ray powder diffraction (XRD) shows that it has been pure yttrium aluminum garnet phase (YAG) at 900degC. The infrared absorption spectra of the powders show that YAG phase has been formed when the calcination temperature is 900degC, because there are the characteristic vibrational peaks of metal and oxygen atoms, which are in the low-frequency area at 724 cm-1, 792 cm-1peak. With scanning electron microscopy (SEM) analysis of its morphology, the result proves the grain diameter ranges from 1 to 3 mum, averaged at 2 mum. Their fluorescence spectra were studied using fluorescence spectrometer and the results show luminous intensity reach at the maximum when calcination temperature up to 1200degC. [C981]

"Nanoelectronic properties of Si and Ge: A semi-empirical approximation"

A semi-empirical nearest-neighbor tight-binding approach, that reproduces the indirect band gaps of Si and Ge crystalline, has been applied to study the electronic band dispersion relation of Si and Ge nanowires (NWs). The NWs are modeling by free standing, infinitely long and homogeneous NWs cross sections with the wire axis along the zaxis. The calculations show that Si NWs keeps the indirect bandgap while Ge NWs changes into the direct bandgap when the wire cross-section becomes smaller. Also, the band gap enhancement of Si NWs showing to quantum confinement effects is generally larger than that of similar-sized Ge NWs, confirming the larger quantum confinement effects in Si than in Ge when they are confined in two dimensions. [C982]

"Automated optical inspection of solder paste based on 2.5D visual images"

In this paper, a special technique for the inspection of solder paste using directional LED lighting is presented. Conventional optical inspection method would depend on an image acquired from a camera mounted from the top. This 2D inspection of solder paste based on images is fast but is limited to defect such as bridge or no solder. Defects related to the volume of the printed solder paste or unevenness of the paste cannot be treated from a top image. The developed technique of this paper would involve the use of special directional side lighting to acquire two-and-a-half dimensional (2.5D) images from above the solder paste block. A sequence of three images is acquired and image processing is carried out for defect detection of the printed solder paste. The acquired images would highlight the geometrical features of the solder paste block. Solder paste inspection is then carried out based on the highlighted features. The proposed method can handle other types of defects that cannot be treated by conventional top light images. [C983]

"Embedded LED lighting control system research and implementation"

In this paper, on the basis of the research on the existing LED control systems, according to the actual application requirements, a LED display control system is completely designed. Moreover, there also has detailed analysis and realization in view of the key issues, at the same time the advanced technology of embedded system is introduced into the design process of the LED display system, which can improve the cost performance of the system, shorten the development cycle, and enhance the system scalability and maintainability. [C984]

"The relationship between LED package and reliability"

Package is a key factor, and affects the reliability of LED. In this paper, the main failure modes and mechanisms

that caused by poor package process were investigated through some failure analysis cases, and some improving methods to improve the LED's reliability are put forward. [C985]

"Computational measurements of commercial GaN blue light emitting diode"

The present paper reports some computational measurements for the electrical properties of commercial Gallium Nitride blue light emitting diode (GaN blue LED). Many instruments have been used in this study to make different kinds of measurements. For example, Keithley 238 high current measure unit, Boonton 7200 capacitance meter, and wayne Kerr 6440 precision component analyzer (within frequency range from 20 Hz to 3 MHz). In this paper, the electrical properties of the selected sample are studied in details under wide range of temperatures (100-440) deg K. Analysis and discussion for the obtained results are adopted. It is known that many semiconductors are well suited for light emission, particularly the compound ones with direct band gaps. According to the excitation mechanisms of excess carriers, electroluminescence, due to forward bias, provides an important application of diodes as generators of light. The uses of LEDs in digital displays, communication, and other areas are well known. Recently, GaN blue LEDs are widely used in electronic devices in most all daily-life applications. A comprehensive measurement has been issued such as the I-V characteristic where we get ideality factor and series resistance at different temperatures. Doping concentration and built-in potential also are obtained from the C-V characteristics. The activation energy has been calculated by two methods; the I-V characteristic and admittance spectroscopy, respectively. Keithely 238 high current measure unit is used to address a wide variety of applications, including the I-V characteristics of semiconductor devices, Fig.(1). It is fully programmable to perform source measurements as a function of stepped voltage or current which can be swept linearly, logarithmically, or pulsed. Ideality factor and series resistance have been obtained as functions of temperature, Figs (2) and (3). They have approximately exponential decays with temperature within the range from 100 Kdegto 380 Kd- eg. Their corresponding values extend from 10.98 to 3 for ideality factor, and from 1000 Omega to 200 Omega for series resistance, respectively. The conduction mechanism deviates from thermionic emission theory, especially at relatively lower temperatures.n In addition, by using I-V characteristic, the activation energy ranges from 0.12 eV at forward bias of 1.4 V to 0.093 eV at 2.5 V, respectively. However, it is of the value of 0.31446 eV calculated by admittance spectroscopy. These discrepancies from thermionic emission mechanism are due to different factors such as image force lowering, tunneling, recombination within the depletion layer, and the presence of thin interfacial oxide layer. [C986]

"Heat transfer process analysis and simulation of eutectic furnace for high-power LED encapsulation"

With the development of electronic information technology, microwave products have been developing towards the trend of high-performance and high-reliability, which leads to higher requirements for the performance of eutectic devices. This paper introduces the entire heat transfer process of the heating chamber of the eutectic furnace, which is used to encapsulate high-power LED chips. And corresponding simulations have been made. It is shown with results of simulation analysis that temperature accuracy of chip substrate is about Г,В±1Г,В°С and the highest temperature of outside surface of the heated chamber is at 21Г,В°С, which is in line with the design requirements. [C987]

"Predistortion in Optical Wireless Transmission Using OFDM"

The nonlinear characteristic of an LED (light emitting diode) imposes limitations on the performance of indoor optical wireless (OW) systems when using intensity modulation in combination with OFDM (orthogonal frequency division multiplexing). First, the impact of the nonlinear characteristic on bit-error performance is analyzed using a commercially available LED (OSRAM, SFH 4230). Second, the paper proposes a predistorter to overcome the nonlinearities. Key features of the predistorter reside in the use of the LED inverse characteristics as nonlinear distortion compensator. A DC biased optical OFDM (DCO-OFDM) system is considered and the performance without compensation and after compensation is analyzed via simulations in an AWGN (additive white Gaussian noise) environment. In this context, the bit-error performance is determined for different bias points and power back-off values applied to the OFDM signal modulating the LED intensity. It is shown that LED nonlinearity can significantly degrade the performance. However, it is demonstrated that this degradation can greatly be mitigated by using the proposed predistortion technique. [C988]

"Comparative analysis of power efficiency of handmade 1Ч12 Polymer Optical Fiber-based optical splitter"

Due to wide range of advantages of polymer optical fiber (POF), POFs are now utilised as basic material to fabricate optical splitter. In order to produce the economical device, the splitter has been fabricated by the homemade fusion technique. Red LED with 650 nm wavelength has been emitted through the splitter for the

purpose of characterization to determine the power efficiency of the splitter. The parameters, such as optical output power, POFs' attenuation characteristics and power losses on the network were all observed. The goal of this study is to analyse the improvement of power efficiency of the handmade optical splitter after the homemade fusion technique has been improvised. The splitter, whose maximum power efficiency could initially be reached up to 40%, then improved increasingly with the increase of 20% through improvised fusion skills. This paper highlights that the great effectiveness of homemade fusion technique might lead to the production of low-cost POF-based optical splitter with high-efficiency. [C989]

"Efficiency improvement of organic light-emitting diodes depending on the thickness variation of BCP layer used for electron transport"

In the devices structure of ITO/N, N'-diphenyl-N, N'bis(3-methylphenyl)-1, 1'-biphenyl-4, 4'-diamine (TPD)/tris(8-hydroxyquinoline)aluminum (Alq3) electron-transport-layer (ETL) (2, 9-Dimethyl-4), 7-diphenyl-1, 10-phenanthroline (BCP))/Al, we have studied the efficiency improvement of organic light-emitting diodes depending on the thickness variation of BCP using electron transport layer. The thickness of TPD and Alq3was manufactured 40 nm, 60 nm under a base pressure of 5 times 10-6Torr using at thermal evaporation, respectively. The TPD and Alq3layer were evaporated to be deposition rate of 2.5 Aring/s. And the BCP was evaporated to be at a deposition of 1.0 Aring/s. As the experimental results, we found that the luminous efficiency and the external quantum efficiency of the device is superior to others when thickness of BCP is 5 nm. Also, operating voltage is lowest. Compared to the ones from the devices without BCP layer, the luminous efficiency and the external quantum efficiency were improved by a factor of four hundred ninety and five hundred, respectively. And operating voltage is reduced to about 2 V. [C990]

"The difference of SSVEP resulted by different pulse duty-cycle"

Objective: Assess the influence of the pulse duty cycle on the steady-state visual evoked potential (SSVEP) via the frequency spectrum. Method: A single LED was flashed at 10 Hz with varying duty cycle from 10%-90%. The maximum luminance was kept constant. The SSVEP was recorded with 128 channels and the time series was analyzed after applying a FFT. Results: the amplitude of the first harmonic depends on the duty cycle in an inverted-U fashion, with the highest value around 50%. The relationship between amplitude of the higher harmonics and duty cycle of stimulus is like that of the fundamental frequency. In some subjects, the amplitude of the second harmonic can exceed that of the first harmonic. Conclusion: The duty cycle influences the steady-state visual evoked potential. Most of this influence can be traced to the duty-cycle dependence of that of the stimulus spectrum. [C991]

"Study on four kinds of thermosetting polyimide"

Four kinds of thermosetting polyimide materials are prepared from 3,3'-diethyl-4,4'-diamino diphenyl methane (DEDADPM), pyromellitic anhydride(PMDA) and different end capping agents-maleic anhydride (MA), nadic anhydride (NA), methylnadic anhydride (MNA) or methyltetrahydro anhydride (MTHA). Fourier transform infrared spectroscopy (FI-TR) indicated that imide ring has formed. Thermal decomposition temperature (Td) has been tested, the results showed that four materials are different, the decomposition temperature are 470~500degC. Dielectric constant (epsiv) and dielectric loss (tan d) are 2.57-3.15 and 0.008-0.0100, respectively. [C992]

"Packaging and interconnect technologies for the development of GaN nanowire-based light emitting diodes"

c-axis oriented GaN nanowires (NWs) grown on Si(111) using nitrogen plasma assisted molecular beam epitaxy (MBE) offer promising new approaches for realizing efficient LED technology. The nanowires grow remarkably free of defects, suggesting that eventual LED structures may operate with high quantum efficiencies. Furthermore, the dense NW morphology offers LED configurations with high light extraction efficiency compared to conventional planar LED structures. Interconnecting these vertically aligned nanowires is challenging because of their small diameters, extremely high aspect ratios, and random distributions on the substrate. We have developed novel packaging and interconnection methods by atomic layer deposition (ALD) multilayer encapsulation of the nanowires with 50 nm thick alumina layers and 40 nm thick tungsten layers. This nano-scaled multilayer also provides efficient thermal connections that are mechanically reliable. These encapsulated NWs were used as thermal test structures and the temperature dependence of the photoluminescence peak position as recorded from the portions of the nanowire protruding from the encapsulation was used to monitor the sample temperature. In principle, the internal junction-to-substrate thermal resistance of eventual NW LED structures could be reduced by 400 times by electroplating copper into the interstitial regions between the NWs. These novel packaging and interconnect technologies developed for GaN nanowire-based LEDs can be applied to many other nanowire-based microsystems. [C993]

"Foreword"

This paper dealt with the following topics: 3D integration; flip chips; reliability; adhesives and adhesion; optical interconnection and photonic manufacturing; interfacial fracture and lead free-solder reliability; interconnects; alternative solder materials; advanced thermal solutions; embedded components; dynamic, mechanical, and thermal loading; advanced substrates and assembly technology; TSV fabrication and characterisation; lead free process; component materials; high-power laser diodes and LED; wafer level technology; bump reliability; lead free solders; bio-electronics packaging; signal and power integrity; through silicon vias; WLP; CPS materials; printable and organic electronics; thermomechanical modelling and characterization; MEMS, sensors, and embedded packaging; wafer scale assembly; filter and RF; electric modelling and metrology; optoelectronics papers; and, other paper for poster sessions. [C994]

"Chip On Board packaging of light emitting diodes and thermal characterizations"

High Brightness Light-Emitting Diodes (HB-LEDs) are key devices for the solid state lighting applications. Nowadays, thermal management in LEDs packaging is one of the bottlenecks preventing a wide use of HB-LEDs in lighting systems. Thermal conduction has to be addressed at all levels of packaging but the issue at the chip or device level is the most critical to keep the junction temperature as low as possible. Chip On Board (COB) technology is a way of integrating chips directly onto the board which is very promising since it enables achieving a better miniaturization and a design flexibility. In addition, in the case of LEDs packaging, a better and efficient thermal management is expected since the total thermal resistance can be greatly reduced. In this paper, we present a detailed study of the thermal resistances in COB package technologies. The thermal resistance is derived from thermo-electrical and optical measurements allowing determination of the junction temperature and dissipated power. The measured thermal resistance in COB technology is compared to a classical surface mounting of packaged LEDs exhibiting a peculiar behavior for the former. These measurements are supported by a computed thermal analysis using the ANSYSTM software to discuss the results. [C995]

"Application of Electroless Ni(P) Metallization to LCD Backlight Unit with Carbon Nanotube Field Emitters"

Backlight unit (BLU) is one of essential components constituting liquid crystal display (LCD). It can be fabricated with several different methods. Cold cathode fluorescent lamp (CCFL) can be made with a low cost process and has high quality of color reproducibility. But it cannot provide a high quality of brightness & contrast and can raise environmental issue since Hg is used as a law material. White light-emitting diode (WLED) has long lifetime and dynamic control feature, but it has complicated structure and needs high fabrication cost. Meanwhile, carbon nanotube based BLU (CNT-BLU) enables local dimming and impulse & scan driving, and can accomplish best quality of moving pictures by maximizing brightness & contrast functions. However, high fabrication cost is a large barrier for commercialization. In this study, we applied low-cost electroless deposition process of the metallization comprising CNT-BLU substrate. Current fabrication processes of CNT-BLU go through several times of photo patterning and firing of CNT paste, which results in complicated and high-cost processes. Metallization of backlight unit can be made either with Cr (Mo) patterning using conventional photo process or with stencil printing of Ag paste. The former uses vacuum processes using expensive semiconductor equipments such as sputter and evaporator, and the latter uses expensive law material like Ag. BLU substrates are formed by firing and activating the CNT pastes which was printed on the metallizations. Fabrication of BLU substrate can be simplified with electroless deposition method and the cost can also be much lowered. In the present study, feasibility of electroless metallization on the CNT-BLU substrate was tested. Glass substrate was pretreated with base solution and then etched with buffered oxide etch (BOE) solution, followed by seeding process by alternating dipping the substrate in Sn and Pd solution in turn. Electroless Ni(P) deposition was conducted on the sub- strate using a commercial Ni(P) bath with varying P content (4-9 wt%). Adhesion test was conducted with as-plated and fired specimens. The Ni(P) film with low P content showed better adhesion performance than those with high P content. Electrical conductivity was also high in the low P containing specimens. Sheet resistances of them, measured by four point probe, were several ohm/sq and it decreased one order of magnitude lower after firing at 460degC. Decrease of resistance results from phase transformation of metastable Ni(P) film into stable Ni & Ni3P phase. Surface roughness of the substrate was ~90 nm after BOE etching and ~200 nm after Ni(P) deposition with 2 mum thickness. [C996]

"Design and optimization of horizontally-located plate fin heat sink for high power LED street lamps"

When junction temperatures of the light emitting diode (LED) chips packaged inside LED lamps exceed their maximal limits, the optical extraction and the reliability/durability of the LED lamps will be jeopardized, therefore, thermal management is very important for high power LED street lamps. In this research, a design and

optimization method of horizontally-located plate fin heat sink was presented to improve the heat dissipation of high power LED street lamps. To prove the feasibility of the present design and optimization method, a 112-W LED street lamp was co-designed by concurrent engineering of optical, thermal, and stress requirements. The engineering prototypes were manufactured and experimentally investigated. The experimental results demonstrated that the maximal heat sink temperature remained to be stable at 45degC when the ambient temperature was 25degC, the maximal temperature difference between steady state temperature and environment temperature for the heat sink was less than 21degC. Comparing the results achieved by the design with the ones by the experiment, it is found that the design and optimization method is feasible and works well for realizing the horizontally-located heat sink of such kind of high power LED street lamp. [C997]

"Digital-imaging-based cost-efficient ball-pressure indentation measurement"

Ball-pressure test has been widely implemented as a method for testing heat endurance of non-metallic materials of electrotechnical equipments. The test result is determined by the valid diameter of indentation at the tangent points, not the complete indentation. At present most tests are based on experience, and are subjected to various problems due to personal difference. In this paper, a cost-efficient and precise digital-imaging testing system is proposed. The algorithm is based on the difference of reflection effect due to material distortion, and with automatic digital-imaging recognition, the valid diameter is calculated. The result has been proved to be in accordance with the result of 3D scanning. Based on the problems emerging in this process, some areas for further study are suggested. [C998]

"An extension of the Workflow Process Definition Language to validate time restrictions in SUBFLOW Activities and XOR SPLIT Attributes"

At present, business processes contain time requirements within their specifications. Logistics, e-commerce, are examples of these requirements, among others. The time involved in business processes is important regarding the interaction among actors. The technology involved in building these processes plays a key role in assessing the risk of implementation. A technology with the ability to express time restrictions is vital to model systems with this kind of specifications. Workflow (Wf) is a widely accepted and recognized technology that can improve business processes. Interface 1 of Wf enables to define processes by means of processes definition language (PDL), but this language does not have time elements. Our research work introduces a theoretical framework to extend the WPDL grammar to allow specifying time restrictions. Besides, it establishes a correspondence between the PD, activities kinds and transitions restrictions, and its underlying Petri net with clocks (PNwC) preserving its semantics. Here, we focus specifically in the SUBFLOW activities type and the XOR SPLIT attribute, as a strategy to study partially the WPD. The correspondence is specified through the RAISE specification language (RSL). The correlation between these formalisms allows us to define business process with temporary restrictions. The PNwC carries out the model validation. [C999]

"6 inch-flexible AM-OLED moving image display"

The electrical performance of an organic thin-film transistor (OTFT) based on pentacene was significantly improved through the control of the layer surfaces and device interfaces. A 6-inch flexible organic light-emitting diode (OLED) display consisting of OTFT and OLED devices on a thin plastic substrate was demonstrated. While operating the OTFT backplane at relatively low voltages below 15 V, a good average field-effect mobility of 0.1 cm2/Vs was exhibited. The flexible active-matrix organic light-emitting diode (AM-OLED) panel displayed distinct color moving images at a frame rate of 60 Hz. [C1000]

"Design Simulation of Top ITO Gratings to Improve Light Transmission for Gallium Nitride LEDs"

We present simulation results of the indium tin oxide (ITO) top diffraction grating using a rigorous couple wave analysis (RCWA) for GaN LEDs. We study three different nano-structure patterns: cylindrical pillar grating, conical pillar grating, and cylindrical nano-hole grating. We show the light transmission improvement with nano-grating designs and present design-charts for the nano-hole grating. [C1001]

"Indirect real-time measurement of the penpoint in an interactive projector-camera system"

Real-time interactive on documents can enhance effectiveness of learning in modern education. A pen capable of locating on a screen is one significant choice. Some products have been developed and the nib of pen is used as the emitter. However, the pen might fail to be located while our body or hand would block the light wherever the photo detector is. In this paper, we have proposed a scheme to solve the problem. It will detect the nib of pen indirectly. Meanwhile, for the realization of real time, we choose PSD(position sensitive detector) as the detector to track the light of the LEDs. And by using the method of coding, multiple light points detected by one PSD could be achieved. [C1002]

"Detection of seagrass in optical shallow water with Quickbird in Xincun Bay of Hainan province, China"

Seagrass, mainly distributed in the coastal water along South China Sea, is very important for coastal ecosystem. In order to obtain precise data about seagrass distribution in optical shallow water in Xincun Bay of Hainan province, Quickbird data was used in the paper. Radiance transfer model in optical shallow water was used to retrieve the information of bottom reflectivity, and supervise classification was used to retrieve the distribution and density of submerged seagrass; Results showed that seagrass distributed in the northeast coast of Xincun Bay with the pattern of stripe can be clearly detected. Density gradient was very clear, coverage under 20% was mainly distributed at the out range of seagrass bed and coverage greater than 80% distributed in the centre of the seagrass bed. The accuracy of seagrass retrieval was more than 80% and the density of seagrass can also be distinguished evidently. [C1003]

"Prototype Design of Variety Discriminator of Farm Products Based on Multi-color LEDs and BP-ANN"

A new optical instrument for the variety discrimination of farm products was designed and fabricated. Multi-color LEDs were used as light source, Vis/NIR spectrometer as light detector, and optic fiber as light transmission medium. In the paper, the principle of using multi-color LEDs for variety discrimination of produces was first introduced. Then, the method of using error back propagation artificial neural network (BP-ANN) in the modeling of optical data was elaborated. Reflective light intensities of Multi-color LEDs were taken as the incoming signals to BP-ANN. The structure of BP-ANN with three layers has been optimized to minimize its calibration error. In the test, total 210 samples of three varieties of fragrant mushrooms were examined. Among them, 150 samples were picked randomly out as for model-calibration and other 60 for model-verification. With 52 samples judged correctly, variety discrimination rate reaches 86.7%. Finally, a universal variety discriminator of produces based on microprocessor MSP430 CPU was illustrated. The result showed that the new kind of optical instrument integrating multi-color LEDs with BP-ANN is promising in farm products information acquisition. [C1004]

"Design and analysis of the basic parameters for traffic information transmission using VLC"

This paper discusses system design considerations concerning the use of visible light communication (VLC) concepts in road traffic control systems. A simple traffic set-up model has been analyzed in order to optimize various important design parameters. This optimization is based on the gain variation over 100 m transmission range. This approach will help to specify the needed gain for the receiver in the complete set-up in order to further increase the coverage area. It will also allow important simplifications at the front-end design level. [C1005]

"Scheduling LED Packaging and Testing Operations on Die Bonder"

Die bonder is an important process operation but also often the cause of bottlenecks in LED packaging and testing factories. Therefore, the development of an effective scheduling method to minimize makespan in this die bonder process is essential and difficult. In the LED(Light-emitting diode) packaging and testing scheduling problem (LEDPTSP), jobs are clustered by their product types, which must be processed on identical parallel die bounder machines. The setup times for two consecutive jobs between different product types in the machines are sequence-dependent. In this paper, the LEDPTSP is formulated as a integer linear programming model and use Cplex to solve the real- world case. [C1006]

"Development of a low-cost pH sensor based on plastic optical fibers"

The goal of this study is to develop the technology to achieve pH sensing using low-cost polymeric optical fibers. The tip of a low-cost plastic optical fiber is covered by a sensitive dye entrapped in an organic-inorganic hybrid matrix obtained by solgel process. The behaviors of this sensing arrangement have been investigated for a specific dye, namely Phenol Red. [C1007]

"A Case Study on the Multistage LED Packaging and Testing Scheduling Problem"

Light-emitting diode (LED) industry will play an important role in the high-tech industry. At present, around the world promote energy-saving by reducing carbon. LED bulb could save more electricity than regular bulb, so the European Union from 2009 until 2012 will gradually replace energy-consuming bulbs and then be completely banned. A wide range of LED application, such as: the automotive industry, communications, information industry, with the signal display billboards and so on. LED industry is expected to be the next emerging industries. This study would focus on machine scheduling problem for LED packaging and testing factory. The

light-emitting diodes packaging and testing scheduling problem (LEDPTSP) is a variation of the complex flow-shop scheduling problem, which is also a generalization of the classical flow batch process problem, and the identical parallel machine problem. In this paper, we present a case study on the LEDPTSP, which is taken from a final packaging and testing shop floor in an LED factory. For the LEDPTSP case investigated, the jobs are clustered by their product types, which are processed on groups of parallel machines at various process stages following the manufacturing sequence, which must be completed before the due dates. The job processing time depends on the product type, and the machine setup time is sequentially dependent on the orders of jobs processed. The objective in the case is to seek a LEDPTS with minimum total machine workload. The LEDPTSP involves serial-processing stage, job clusters, due dates, machine capacity, and sequence dependent setup time, it is more difficult to solve than the classical flow-shop scheduling problem. The LEDPTSP is formulated as in integer programming problem and the problem solved using the powerful CPLEX with effective implementation strategies. [C1008]

"Human-powered small-scale generation system for a sustainable dance club"

Most human powered energy harvesting systems are used to power ubiquitously deployed sensor networks and mobile electronics. These systems scavenge power from human activity or derive limited energy from ambient heat, light, or vibrations. In most of these conventional methods users must focus their attention on power generation at the expense of other activities. However, for sustainable electrical power generation, energy could be harvested from everyday activities such as walking, running or even dancing. In this paper systems are analyzed that use human power by walking, or running, where an alternative system has been designed and implemented that generates energy from people dancing in a club environment. It will be shown that power's exceeding walking can be extracted from the system, i.e., maximum 80-100 W or an average of 20-30 W over a time period of 10 s. [C1009]

"Thermal analysis and optimization of multiple LED packaging based on a general analytical solution"

Multiple-chip packaging becomes common in LEDs packaging community. For such types of packaging, thermal spreading resistance is an important factor to impact the total thermal performance of LEDs. In this paper, a general analytical solution based on the method of variable separation for thermal spreading resistances of eccentric heat sources on a rectangular flux channel is used to calculate the whole temperature field of LED packaging substrate. The feasibility of the analytical method used in LEDs packaging has been proven by the temperature comparison with existing experimental results of an 80 W LED street lamp. According to the analytical solution, optimization analysis is presented in order to obtain more uniform temperature distribution on the substrate of the multi-chip LEDs packaging. The optimization results can effectively instruct the LED packaging design and reduce the system thermal resistance. [C1010]

"Optimization of flexible substrate for COF (chip on flexible) LED packaging"

The poor thermal design of high brightness light-emitting diodes (HB-LEDs) package for the automotive exterior lighting system causes the degradation of the optical and reliability performance, also the deterioration of the cost-effectiveness. We design the flexible package substrate with the thick heat-spreading layer and thermal via-hole fully filled with the copper (FFC) for the conventional process of flexible printed circuit board (FPCB) and the extraction methodology of the heat flow is presented. Effective heat flow for thermal simulation is compensated for the optical loss between the internal and external quantum efficiency. The vertical blue LED is attached on metal core printed circuit board (MCPCB) without the molding process, and then heat distribution and optical power is, respectively, measured by using infrared camera and optical LED tester as increasing the magnitude of the input power. Detailed thermal performance of FPCB and MCPCB is verified with the heat distribution and the thermal resistance. The effects of the main factors of FPCB with filled via-holes are discussed using design of experiment (DOE) methodology. The thermal resistance and junction temperature of FPCB is, respectively, over two times and 10 degC lower than that of MCPCB. [C1011]

"Improved 2nd harmonic rise-time in a thermal-lens-dominated extended-cavity micro-laser"

Many commercially available compact, micro-cavity diode-pumped solid-state lasers achieve a stable resonator condition following the formation of an intra-cavity thermal lens. Typically, this thermal lens forms as a result of localized thermal expansion in the host material due to the very high optical power of the infrared pump beam. Additionally, most common DPSS host media, such as Nd:YAG and Nd:YVO4 exhibit high dn/dT, change in refractive index with temperature. Thermal lens formation time dominates stable resonator establishment and, thus, the rise-time of the intra-cavity-generated visible second-harmonic output light. Thermal lens formation time may range from 10's of microseconds to several milliseconds, depending on pump power, the host material

dn/dT, and the volume and length of the host material. This paper describes a unique approach that improves the second-harmonic rise-time-and, thus, the modulation bandwidth-for high-power VECSELs by several orders of magnitude. This approach, while typically used in some laser systems for other purposes, allows direct modulation of high-power VECSELs to greater than 100 megahertz with second-harmonic rise-time of a few nanoseconds. [C1012]

"Process development and prototyping for the assembly of LED arrays on flexible printed circuit tape for general solid state lighting"

The objective of the present study is to develop a robust high-throughput assembly process of light emitting diode arrays for wide area general lighting. Topics to be covered in this paper include the conceptual design, the flexible printed circuit substrate, flip chip assembly, yellow phosphor coating, and encapsulation. All these are integrated into one reel-to-reel assembly process. A prototype with the proposed process has been developed. A sample strip of packaged LED array has been produced as well to validate the developed assembly process. [C1013]

"Novel application-specific LED packaging with compact freeform lens"

High power white light emitting diodes (LEDs) have begun to play an important role in many illumination applications due to their excellent performance. In this paper, an effective freeform lens design method for extended light source was suggested briefly for the first time and two compact LED packaging freeform lenses, with the material of polycarbonate (PC) and silicone respectively, were designed based on this method. Two novel application-specific LED packages, whose manufacturing processes are compatible with current LED packaging processes, were also presented for street lighting. By comparing with the traditional LED illumination module consisting of an LED and a secondary optical element, the novel application-specific LED package has the advantages of low profile, small volume, high light output efficiency, low cost and convenience for customers to use. Since the application-specific LED packages provide effective solutions to high performance and low cost LED fixtures, they will probably become the trend of LED packages. [C1014]

"Full color flexible displays on thin metal foil with reduced bending radius"

We have developed Full color flexible AM-OLED and AM-EPD displays using a thin metal foil, allowing them to recover their original shape after being bent as well as to produce vivid color images. The key development technologies including a-Si TFT fabrication on thin stainless steel foil and integrated driver electronics in the display panel are described along with improved display performance in a curvature of 5 cm bending radius. [C1015]

"Motor learning discerning progressive lens acceptability in presbyopes"

The objective of this study is to determine whether the magnitude of a subject's peak velocity is related to a subject's ability to adapt to progressive lenses. Our presumption is that patients fully adapted to progressive additive lenses (PALs) are better motor learners, allowing them to modify their vergence dynamics more readily than patients who could not adapt to PALs. The experiment aims to compare the eye movement dynamic behavior from a 4deg double step stimulus which is a 4deg step followed by a subsequent 4deg step after a 200 msec delay. Eight presbyopes who wear PALs daily and seven presbyopes who could not adapt to PALs participated. The results show that presbyopes adapted to PALs have a significantly greater dynamic ratio of the first to second peak velocity from the two high velocity components stimulated from the double step. This behavior may in part be due to better motor learning abilities. [C1016]

"A food portion size measurement system for image-based dietary assessment"

A novel system consisting of a camera and a light emitting diode (LED) is presented for measuring food portion size. The LED is positioned at a fixed distance besides the camera with its optical axis parallel to the optical axis of the camera. The distance to and oblique angle of the object plane are calculated according to the deformation of the projected spotlight pattern. Experimental results show that satisfactory measurements of food portion size can be obtained with this simple system. [C1017]

"A miniature CMOS optoelectronic biosensor for screening skin-whitening agents"

A miniature CMOS optoelectronic biosensor is proposed for screening whitening agents. Based on the principle of absorption photometry, this biosensor is mainly composed of a green LED, a CMOS phototransistor, and a slide for performing the biochemical reactions. The requirement of the sample volume is only 10 mul, much less than those in commercial instruments. Melanin assay and MTT assay were performed to evaluate the whitening

mechanisms. Experimental results demonstrated that the density of 5times104cells/ml can be successfully detected for both assays. This portable biosensor has great potential toward personalized diagnostic kits for further applications. [C1018]

"A digital driving technique for an 8b QVGA AMOLED display using ΔΣ modulation"

Active-matrix organic LED (AMOLED) is one of the most promising contenders for next-generation displays. However, the VT-shift issue in thin-film transistors (TFT) has to be addressed to enable wide deployment. Voltage programming and current programming are well-known VT-shift-compensation techniques for analog driving. However, they all need more than 4 TFTs per pixel, which increases the panel complexity and decreases yield and aperture ratio. Recently, a VT-shift compensation technique that uses a 2TFT-1C pixel in an analog driving AMOLED has been reported. However, it requires OLED supply voltage programming, and shows a 14% variation in OLED current after VT-shift compensation, which is not enough for high-definition applications. Digital driving has been proposed as an alternative to mitigate the VT-shift issue with a simple pixel structure and to provide flexibility to the driver design. In this paper shows the pixel structures for voltage programming, current programming and digital driving. While the gate of the driving TFT (M2) is in the high state, the voltage across M2 is very small due to the large current-driving capability of a TFT as compared with an OLED. Hence, the current through the OLED is dominated by the supply voltage (PVDD), and minimally affected by the variations in TFT characteristics. Digital driving is also useful for true dark-level expression since the OLED can be completely turned off for black gray levels. [C1019]

"Design of microcontroller based circuitry for use in the multi-tesla field strength environments found in functional Magnetic Resonance Imaging"

As MRI (magnetic resonance imaging)-a harmless, efficient and noninvasive medical tissue imaging system-constitutes an ever increasing part of general practice medical diagnostics, there arises a need for diagnostic equipment which may coexist in the near field of their powerfully magnetic periphery. The design of such devices must begin with the elimination of all components containing ferrous materials-save the most austenitic of stainless steels-as any such component might well become a mortal projectile. Furthermore, as the field strengths of imagers' superconducting magnets increase to the 3 to 5 Tesla range such as those found in fMRI (functional magnetic resonance imaging)-a high speed and resolution form of MRI used for real-time (functional) analyses such as in brain protonation (activity) localization and in cardiac function imaging,- so increases the need to eliminate all ferromagnetic materials which would otherwise introduce unacceptable noise into the imagers' highly sensitive receivers. The approach contained herein chronicles the construction of a novel flexible visual stimulator consisting of a microcontroller driven array of 512 LEDs (light emitting diodes) used to stimulate optical vergence response in human test subjects whilst localizing correlated brain activity in the study of VI (vergence impaired) individuals such as those with TBIs (traumatic brain injuries). [C1020]

"A filter bank approach for LED illumination sensing based on frequency division multiplexing"

In this work, we consider illumination sensing in a light emitting diode (LED) based illumination system that normally consists of a large number of LEDs. Illumination sensing is used in order to facilitate the control of such system whose complexity, due to the large number of LEDs, can be quite high. In this paper, key requirements, i.e. accuracy and speed, on illumination sensing are described. Furthermore, we present a filter bank sensor structure based on frequency division multiplexing. The design of the filter response is discussed in the context of supporting maximum number of LEDs, while the key requirements on illumination sensing are satisfied. In particular, it is shown that, through the use of the filter with a triangular filter response, a large number of LEDs can be supported in the presence of frequency offsets in a practical range. [C1021]

"Challenges in LED thermal characterisation"

The paper discusses the increasing need for a more sophisticated thermal characterisation of LEDs (Light Emitting Diodes) and LED-based products. It goes without saying that the LED-business is growing exponentially, in fact, much faster than analysts predicted five years ago. Unfortunately, the progress in thermal characterisation has not kept pace. The situation is becoming a serious problem for leading manufacturers who are focussing on a sustainable business for the future and are willing to publish reliable thermal data. Unfortunately, due to the lack of worldwide-accepted standards a manufacturer can publish whatever thermal information he wants. It also becomes a problem for the experienced user because the thermal data that are published are often rather useless in practice when accuracy is at stake, and accuracy is needed for an educated guess of expected performance and lifetime. Remarkably, the situation is not much different from the one the IC-world was facing almost 20 years ago. Provided the manufacturers want to cooperate, it is relatively easy to build upon the experience gained in the IC-business and their standard protocols that are in use

worldwide. The authors propose to establish a consortium consisting of manufacturers, system designers, software developers and test people. [C1022]

"The electro-thermal-mechanical performance of an OLED: A multi-physics model study"

In order to study the electrical-thermo-mechanical interaction in OLEDs, finite element based simulation models were developed. Two dimensional models were used to study detailed design effects, such as the location of the bus bars, while a three dimensional model was used to study the effect of differences between the two and three dimensional models, as well as bus bar designs. [C1023]

"Several modeling issues in LED, 3D-SiP, and nano interconnects"

Multi-physics multi-scale modeling issues in various stages of the LED manufacturing, 3D-SiP, and nano interconnects have been discussed. Molecular dynamics (MD) and finite element method (FEM) have been used to study the scale effect of the material properties and the prediction of the module behaviors which are critical to LED fabrication. We propose a new concept to integrate multi-physics/multi-scale modeling as a simulation platform to assist LED design and fabrication. For 3D-SIP, nonlinear thermal stresses and strains at the interfaces between copper/dielectric layer and dielectric layer/silicon of copper filled and polymer filled through silicon via have been studied by finite element simulation. The effects of different configurations including different diameters of copper via and polymer filled, aspect ratios (the thickness of silicon vs. the diameter of copper via) and different thickness of the dielectric layer on the stresses and strains state were analyzed. For nano interconnects, classic molecular dynamics are used to modeling the process of carbon nanotube bonding onto the metal electrodes, both local heating and wetting process are modeled. It is indicated that the simulation that relies on multi-physics/multi-scale modeling has the potential to significantly reduce development costs and optimize the fabrication processes of LED, SIP and nano interconnects. [C1024]

"InFoRMS-Interactive FM Radio Messaging System"

This paper describes the design of a prototype system that uses HD Radiotrade technology: Interactive FM radio messaging system (InFoRMS). The InFoRMS system can send real-time digital messages to remote and mobile LED marquees. In addition to its broadcasting capabilities, InFoRMS uses an addressing scheme that enables the display of messages in selected offices, floors, or rooms in a building. Thus, not only can the InFoRMS system be helpful in emergency situations, it can also be highly valuable as a method of informing people of everyday news. [C1025]

"3D geometry reconstruction using Large Infrared Proximity Array for robotic applications"

In this paper, we propose a novel large infrared proximity array (LIPA), which is capable of reproducing 3D images of the target object. An IPA uses infrared sensors and infrared emitters to accurately measure distance and thus, creates 3D monographic geometry of the sensed objects in real time. In the current setup infrared emitters (LEDs) and photo transistors are used, placed in one package. In many applications determining an obstacle's height, orientation, or distance with a very high resolution is not needed (less than 1-2 mm is enough) but the sensor often should have a big sensing area. Contrary to nowadays techniques we tried to form a rather large but sparse sensor array to cover as big part of the surrounding area as possible. In addition it has the detection range of 1cm to 15 cm (it can be increased depending on the application requirements). 64 LED and photo transistor pairs were used and placed in an 8 times 8 matrix order creating a 9 cm times 9 cm sensor array. We also demonstrate how the resolution of these kind of systems can be increased. The concept of the proposed sensor array spans a wide range of potential applications, i.e. in robotics. [C1026]

"EU project POF-PLUS: Gigabit transmission over 50 m of step-index plastic optical fibre for home networking"

We demonstrated a Gigabit/s system for 1mm POF. Optimized Discrete Multi-tone Modulation techniques enabled 1 Gbit/s using LEDs, and 1.5 Gbit/s using VCSELs, a capability that encourages POF's use for next generation home networking. [C1027]

"5 GHz 200 Mbit/s radio over polymer fiber link with envelope detection at 650 nm wavelength"

All-optical envelope detection of a 5 GHz 200 Mbit/s modulated RF signal and error free transmission over 50 m POF link is achieved by using a 650 nm RCLED. [C1028]

"S-diode with optical control"

New optoelectronic switching device was developed. Avalanche GaAs-diode and light-emitting diode are integrated in the single crystal. It is present main static characteristics of the device. [C1029]

"Plenary lecture 2: "Nanoscale field-effect transistors for flexible displays""

Nanoscale field-effect transistors are of interest not only for ultra-scale integrated circuits, but also for next-generation active-matrix flat-panel displays. High-resolution flat-panel displays are typically composed of several million individual picture elements (pixels), and in active-matrix displays each pixel contains one or more field-effect transistors that precisely control the pixel brightness during the frame time. For large-area displays on glass substrates, the transistors must be manufactured without the use of high process temperatures, so hydrogenated amorphous silicon or laser-crystallized polycrystalline silicon are often utilized as the semiconductor. If the trend towards increased display resolution, higher frame rates, and greater color fidelity is to continue, field-effect transistors with improved high-frequency performance that can be manufactured on glass substrates will be required. In addition, for the realization of flexible and rollable active-matrix displays, the transistor manufacturing process must be compatible with heat-sensitive polymeric substrates. Finally, the true potential of active-matrix displays will be realized by integrating low-voltage, high-efficiency organic light-emitting diodes with low-voltage, high-frequency nanoscale field-effect transistors on flexible, transparent polymeric substrates. [C1030]

"Investigation of InGaN/GaN multiple quantum wells with strain relief behavior for light-emitting diodes"

In this paper, we studied a method to reduce the compressive strain in the InGaN/GaN multiple quantum well (MQW) structures by inserting a strain relief layer between n-GaN and MQWs. The improvements in the interface quality and the optical properties were investigated by photoluminescence (PL) and high-resolution X-ray diffraction (HRXRD) analysis. The samples showed S-shaped emission energy peak and stronger band filling effect in the band tail model. It exhibited the higher activation energy and reduced localization effect. In addition, we have characterized the interface quality and optical properties by strain relief in InGaN/GaN multiple quantum wells based on the temperature-dependent PL analysis. The experimental results would be discussed with supporting models. [C1031]

"The impact of LED transfer function nonlinearity on high-speed optical wireless communications based on discrete-multitone modulation"

The nonlinear dependence of the optical power from white LEDs on the applied driving current and its impact on discrete-multitone modulation was investigated by use of numerical simulations for the case of optical wireless communications. [C1032]

"An electrically driven quasi-L2 photonic crystal nano-cavity with a small mode volume"

In recent years, the theories and technologies of optically pump photonic crystal (PC) devices, such as PC lasers and single photon sources, have been investigated extensively. However, progress on electrically driven PC devices has not been as successful. In 2004, Park et al. demonstrate an electrically driven PC laser, which has a sub-micrometer semiconductor post at the center of the single cell PC cavity [1]. The central post acts as an electrical conduction channel as well as a heat sinker nicely. On the other hand, to achieve efficient PC devices, such as lasers and single photon sources, PC cavities with not only high Q values but also small mode-volumes (Vm) are necessary. Among the reported PC cavities, L3 cavity, modified-H1 cavity, and quasi-L2 (qL2) cavity are good candidates for realizing high efficiency PC devices [2~4]. Both the L3 and modified-H1 cavities provide a central mode with very high Q values while the qL2 cavity has a dipole mode with an extremely small mode-volume (~0.019mum3) at the central region. Therefore, the characteristics of the aforementioned PC cavities would suffer from the presence of the central post in terms of mode confinement and integrity. In this work, we propose an oxygen-ion implantation method to replace the central post. An electrically driven InAs quantum dot (QDs) light-emitting diode with qL2 PC cavity is demonstrated. [C1033]

"A study of LED nonlinearity effects on optical wireless transmission using OFDM"

Orthogonal frequency division multiplexing (OFDM) is a promising technique to realize high-speed indoor optical wireless (OW) links through the exploitation of the high peak-to-average power ratio (PAPR) for intensity modulation (IM). However, non-linear distortions in the transmission chain can significantly compromise the performance of OFDM as they incur inter-channel interference. The light emitting diode (LED) is the main source for such distortions due to its nonlinear behavior. Distortion levels can be controlled when the LED operates in a quasi-linear segment of its characteristic around a bias point. The severity of non-linear distortions and the

dependence of the bias point on the chosen digital modulation scheme are analyzed in this paper. In this context, the bit-error performance is determined as a function of the bias point and the applied power back-offs. [C1034]

"Photonic crystal band edge diode light emitters"

We report electrically injected photonic crystal band edge light emitting diodes. The InP-based membrane light emitters utilize a transverse junction that is created using selective ion implantation. Spectral properties showing the influence of the photonic crystal are reported. [C1035]

"Temporal wavelength multiplexing of a Quantum Cascade laser"

A bi-directional and multi-wavelength Quantum Cascade (QC) laser based system is presented that is both time and wavelength multiplexed, that is, it can emit two widely different wavelengths, at two alternate time slots. The QC laser source emits at 10.8 mum wavelength for positive polarity current and 8.6 mum for negative polarity current. A diode based adder circuit was designed to drive the QC laser such that it added the two opposite polarity current pulses with a variable time delay. Versatile multi-wavelength and time multiplexed QC laser light signals with time delays of 0.5 s to 2.5 mus were obtained. [C1036]

"Device performance of light emitting transistors with C-doped and Zn-doped base layers"

N-InP/p-InAlGaAs/N-InAlAs light emitting transistors (LETs) operating at ~1.55 mum were investigated. Both carbon (C) and zinc (Zn) were used as the p-type dopant of the base layers. It was found that C stays in place while Zn diffuses into the emitter and the base active region, resulting in compromised electrical performance and light output intensity. On the other hand, due to a short minority carrier lifetime, LETs with the C-doped base have a much smaller current gain than LETs with the Zn-doped base. [C1037]

"Packet Loss Based Real Time Network Condition Estimation"

Packet loss behaviors have been studied for many years. Traditional packet loss evaluation criteria are not sufficient to describe characteristics of losses: the loss rate is too simple while traditional loss episodes sometimes are not stable due to the randomness of loss events. In this paper, we propose an extended loss episode approach, merged loss episode based on the traditional definition, to estimate the network condition. Also we presented the corresponding algorithm for calculation. Simulation results show that compared with traditional loss episodes, the merged version could be more stable and effective to measure network performance on loss issues. [C1038]

"Templates for CPLD and FPGA designs"

The paper brings information about the way how the laboratory kits are used in laboratory exercises given in the Department of Radio Electronics (DREL) without need to burden the students too much with details of the kit blocks that require drivers and similar software service modules that are implemented into the target device along with the design. Examples of a template for the Spartan-3 Starter Kit and for the PicoBlaze processor are demonstrated. [C1039]

"Response of chlorophyll fluorescence to salinity stress on the early growth stage of the soybean plants (Glycine max L.)"

The chlorophyll fluorescence in response to salinity stress of soybean plants in spectral range 650-850 nm and slow transient fluorescence kinetics were investigated using remote sensing techniques. The soybean plants were grown under controlled conditions as water cultures on nutrient solution of Helrigel. Salinity was performed at the stage of 2ndto 4thtrifoliate expanded leaves by adding of NaCl in the nutrient solution at concentrations 40 mM and 80 mM. The chlorophyll fluorescence was registered by a multichannel fiber optic spectrometer USB2000 working in time-acquisition mode. As a source of actinic light, a light emitting diode with the maximum of the light output at 470 nm was used. The fluorescence spectra were registered subsequently in time at every 2 second. At least 40 spectra from each soybean leaf were obtained; the leaves being taken from 20 control plants and 20 plants treated with two NaCl concentrations. Measurements were conducted on the 14thday after treatment. Several indices such as fluorescence spectra area, halfwidth of the fluorescence spectral curve, and wavelength of spectrum maximum were used to characterize the differences between the normalized fluorescence spectra of leaves of control and treated plants. The Student t-criterion, discriminant analysis and derivative analysis were applied to estimate the statistical significance of the differences between the average values of the indices. The results revealed that the low NaCl concentration led to salinity tolerance while the high NaCl concentration caused salinity stress in the soybean plants. [C1040]

"Measurement of wavelength-modulation frequency response in a self-mixing interferometer"

This work describes the measurement of the frequency response of the wavelength modulation in a laser diode, for application in a closed-loop interferometer. The wavelength modulation is derived by the measurement of the interferometric phase, while the frequency response is estimated by means of frequency-domain model identification techniques. [C1041]

"Comparative Investigation of Two Modified QUICK Schemes for Advection-Diffusion Equation of Pollutants on Unstructured Grids"

In this paper, two modified QUICK schemes, namely Q-QUICK and UQ-QUICK for improving the precision of convective flux approximation are verified in advection-diffusion equation of pollutants on unstructured grids. The constructed auxiliary nodes for Q-QUICK/UQ-QUICK are composed of two neighboring nodes plus the next upwind node, the later node is generated from intersection of the line of current neighboring nodes and their corresponding interfaces. 2D unsteady advection- diffusion equation of pollutants is conducted for their verifications on unstructured grids. The numerical results show that Q-QUICK and UQ-QUICK have similar computational accuracy to the central difference scheme and similar numerical stability to upwind difference scheme after applying the deferred correction method. In addition, their corresponding CPU times are approximately equivalent to those of traditional difference schemes and their abilities for adapting high grid deformation are robust. [C1042]

"Electroluminescent organic light emitting micro/nanofibers fabricated using three-fluid coaxial electrospinning"

This paper presents the development of three-fluid coaxial electrospinning technology and its application in electroluminescent organic light emitting micro/nanofibers (OLEFs). It is demonstrated that one-dimensional micro/nano-scale light sources can be realized using a single-step, substrate-free fabrication process-three-fluid coaxial electrospinning. The OLEF devices are formed in air rather than on a substrate before coming to the object surface of interest, and do not require any thin-film deposition and high-resolution lithography processes that are generally used in current light emitting device technologies. Such micro/nano-scale OLEFs could be beneficial in applications ranging from bio-imaging to chemical and biological sensing to other nano-scale luminescence in general. [C1043]

"A model to design light emitting diodes matrix driven by constant current source"

It is always desirable to operate LEDs within its designed maximum temperature for maximized life. For LEDs driven by a constant current source it is possible to improve LED life by putting more LEDs in parallel to share current and reduce temperature, but the cost would increase. This paper proposes a general LED model to estimate the relationship between temperature, operating current, luminous flux, life and reliability of light emitting diodes. This model can direct LED matrix design with respect to the required parameters. The model would help lighting designers to consider the driving current and number of LED in a lamp matrix in order to achieve the desired light flux, efficacy and life with desired cost. A method involved power electronic technique is proposed to form a dynamic matrix that can response to the changing ambient temperature. This allows the engineer to build the real desired matrix flexibly. [C1044]

"Human-display MTF model with display screen detail and human vision characteristics"

This paper proposes a human-display relationship model consisting of the MTF of the pixels arrangement, the pixel aperture, the luminance intensity, the light distribution and human visual characteristics. The results of the proposed model and subjective experiments using existing displays agreed with each other well. [C1045]

"Computation of minimal RGB LED backlight intensity for RGBW LCD displays"

In the article we address the problem of RGB LED backlight power minimization in RGBW LCD displays. The problem is formalized as the determination of the minimal LEDs currents (and/or duty cycle) that allows the picture content rendering without clipping artifacts. We will write this problem in mathematical language and show that it has a unique solution. Then we propose an efficient algorithm that finds the minimal LEDs drive values according to the input content. The algorithm is stable and relatively simple. It gives temporally consistent solutions and converges to the minimal gamut in two-three iterations. When used in an RGBW display the method significantly reduces power consumption without clipping in the content. [C1046]

"Development of simplified PAM chlorophyll fluorometer for vegetation condition monitoring"

Environmental issues are getting widespread international attention. The damage to the plant is immeasurable, too. For monitoring the vegetation conditions, a non-destructive, simplified and low-cost chlorophyll fluorometer was developed. Pulse amplification modulation method and control using programmable logic controller has been employed for that purpose. By measuring the fluorescence from spinach leaf, the performance of the system was checked. It was found that the system was provided empirical data to support theory. [C1047]

"Design of Boost-Flyback Single-Stage PFC converter for LED power supply without electrolytic capacitor for energy-storage"

Light emitting diodes (LEDs) are likely to be used for general lighting applications due to their high efficiency and longer life. This paper presents the concept of applying large voltage ripple for energy storage into the Boost-Flyback Single-Stage PFC converter for the elimination of the electrical capacitor. Following proposed design procedure, the single stage PFC circuit with small energy storage capacitance can still achieve good output voltage regulation while preserving desired input power factor. The detailed theoretical analysis and design procedure of the Single-Stage PFC converter is presented. The experimental results obtained on a 60 W prototype converter along with waveforms are presented. [C1048]

"A stability issue with current mode control flyback converter driving LEDs"

Use of LED lamp for lighting becomes common and power converter for LEDs is critical. This paper is about the design of stable power converter for LED lamp. In the construction of the converter, flyback topology is used together with current-controlled current mode control. LED is a current driven device with low dynamic resistance. This introduces instability to output feedback. Current mode control model with more accurate LED equivalent circuit is built on MATLAB Simulink to analysis the control aspect. A solution is figured out by adding additional resistor to output feedback loop. The proposed method is verified by experimental results. [C1049]

"Design and Implementation of Encrypted Card Reader"

The memory cards are widely used in several applications. This paper is intended to design and construct of the encrypted card reader. The basic building block in this design is the card reader, amplifier, multiplexer, and PC parallel port. This card can be used in license, passport, credit card, ID card, bank card, health care, travel and entertainment cards and etc. In this paper, data on a card can be protected against unauthorized viewing. [C1050]

"New solid state technologies and light emission diodes as a mean of control and lighting source applicable to explosion proof equipment, with the scope to reduce maintenance, to limit the risk of bad maintenance and to expand the plants' life"

As time goes by, the safety in classified areas at risk of explosion in electrical plants highly depends on maintenance; especially, depending on how often and how accurate it is performed. Maintenance costs affect significantly plant operating costs. The application of electronic devices in the process control, and the use of solid state lighting, instead of common electromechanical equipment and traditional lamps, may reduce maintenance operations or even, in some cases, avoid them for the whole equipment life time. We carried out a case-study, an empirical inquiry to investigate the phenomenon within its real-life context (i.e. in plants) and came to the conclusion that such devices may extend ordinary maintenance interventions and even reduce maintenance significantly. As a result, plant operating costs are reduced and higher safety levels achieved, less human intervention means less human maintenance errors. This paper is meant to identify which equipment can be replaced by solid state equipment and LED, to calculate the costs reduction and to define the consequent achievable safety level, all analyzed through FMECA (failure modes effect and criticality analysis). [C1051]

"Double Activated X-ray and LED Phosphors with Improved Properties"

In this paper, the current status of applied luminescent materials is reviewed together with its implication for the performance of devices based on them. Our approach is based on a consideration of fundamental aspects how to improve the luminescent properties of perspective X-ray and LED phosphors. [C1052]

"InGaN light-emitting diodes with the strained AlGaN/InGaN multiple quantum barriers"

In this article, we propose to use the strained Al0.03Ga0.97N/In0.01Ga0.99N superlattice as the quantum barrier of the InGaN LEDs. The advantage of doing this could be thought of relieving the biaxial strain for the normal InGaN/AlGaN MQWs, and improving the crystalline quality. Experimentally, high-resolution X-ray diffraction

(HRXRD) was used to clarify the structural properties of the as-grown samples. As a result, the crystalline quality of the proposed LEDs does not degrade even incorporated an AlGaN into the barrier layer. For the LEDs with a strained-layer superlattice (SLS) quantum barrier, the observed PL intensity at 300 K becomes intense together with a blue shift of the emission peak that may be attributed to the alleviation of quantum-confined Stark effect (QCSE) as evaluated from the biased PL analysis. [C1053]

"Proposal of ZnSe/GaAs digital alloys for high band gap solar cells and true green LEDs"

Solar cells tuned for high energy photon absorption and light emitting diodes tuned for true green wavelength emission are proposed using the ZnSe/GaAs (001) superlattice. The effective band gap of this superlattice as a function of monolayers of ZnSe and GaAs within the range of 1.5 to 2.3 eV is shown. A discussion is given on the application of this particular superlattice in multijunction solar cells and solid-state lighting. [C1054]

"On-vehicle receiver for distant visible light road-to-vehicle communication"

In this paper, we propose a road-to-vehicle visible communication system for ITS. In this system, a LED traffic light is used as transmitter and a photodiode is used as receiver. There are several problems associated with applying visible light communication to the field of ITS. It is necessary to receive information from long distance. And tracking the transmitter for a certain moving distance of the vehicle is also important. We applied an imaging optics to receive information over long distance, and two cameras are used to solve the relationship between the transmitter and the receiver position changes with time, and vibrational correction technique is also fixed to the system to minimize vibrational affections. We developed algorithms to track the transmitter. The experiments were conducted to confirm the proposals. [C1055]

"Response of Microbial Community to Long-Term Fertilization and Land Management in a Chinese Mollisol"

Effects of long-term fertilization and land management on the microbial communities in a Chinese Mollisol were investigated by the determination of phospholipid fatty acids (PLFAs), soil microbial biomass C or N (Cmicor Nmic) and soil respiration. Compared to CK and NPK, farmyard manure (FYM) application and fallow constantly maintained high Cmic-to-Corgratios, high Cmic(Nmic) and PLFAs contents, and low qCO2value. Mere chemical NPK did not improve the nutrition status but promoted Corgloss and inhibited microbial growth. PCA of PLFAs showed that the microbial community structure in arable fields (with FYM or not) and fallow were significantly different from each other. The loading values for the individual PLFA showed that fungal PLFAs were mainly affected by fallow management, while most bacterial PLFAs were affected by FYM application. [C1056]

"Determination of Organic Chlorinated Pesticides in the Surface Water by Continuous Flow Solid-Phase Microextraction Combined with Gas Chromatography Method"

In this paper, an apparatus of continuous flow solid-phase microextraction is described. Based on this apparatus, a method for the determination of 20 trace level organic chlorinated pesticides in the water was developed. The influence of various experiment conditions on the extraction efficiency of continuous flow solid phase microextraction for the organic chlorinated pesticides was studied. The linearity in the detecting range is good (R>0. 991) with the detection limits of 0.01-0.5 mugL-1, and the quantification limits of 0.02-1 mug/L. The RSDs were lower than 1% and the recoveries were 86%-118%. The method had been used to determine the organic chlorinated pesticides in the surface water with satisfactory results. [C1057]

"Improving explosives detection using fiber-optic sensing technology"

The combination of thin-film-fluorescence (TFF) quenching with fiber-optic sensing technology is superior to other available means for explosives identification in many respects. However, collecting sufficient TFF power is a challenge because a low level of excitation light must be used to avoid the degradation of film material. The task becomes even more difficult given the tiny size of fibers involved. In this paper, we propose a significantly improved two-fiber sensor architecture for fast and efficient explosives detection based on TFF quenching. This architecture features small size, uses an easy thin-film coating technique and has a simple but rigid architecture. The most important advantage of the design is that it simultaneously enables highly efficient collection of evanescent-wave-form fluorescent (EF) signals and suppression of stray excitation light. These effects are experimentally confirmed. We also report a stable EF signal at a lower level of UV LED excitation. When exposed to DNT, the low-concentration TNT-related explosive vapor, the proposed sensor shows a fast quenching response that points to a promising future for the design. The high efficiency is further explained by revealing the unique physical mechanism behind the proposed design. [C1058]

"Detection of LED traffic light by image processing for visible light communication system"

We propose a visible light road-to-vehicle communication system at intersection for ITS. In this system, the communication between vehicle and a LED traffic light is approached using LED traffic light as the transmitter, and on-vehicle high-speed camera as the receiver. The LEDs in the transmitter are emitted with 500 Hz and the images of those emitting LEDs are captured by a high-speed camera for conducting communication. In this communication, it is extremely necessary to find the transmitter and detect it for consecutive frames while vehicle is moving. In this paper, we introduce proposals for finding and detecting it for consecutive frames by image processing. Experimental results using appropriate images showed the effectiveness of the proposal. [C1059]

"SPICE model for optoelectronic xor gate based on Light Amplifying Optical Switch (LAOS)"

In this paper an optoelectronic XOR gate based on light amplifying optical switch (LAOS) was modeled by SPICE. The equivalent circuit used to implement this gate consists of only one LAOS and four HPTs. The input and output of the circuit are all optical. The model was used to demonstrate the functionality of such gate. This model can be used to improve and study the physical factors that affect such gate. [C1060]

"Novel driving method to improve picture quality of active-matrix organic light-emitting diode displays"

A novel driving method is proposed to improve the picture quality of active-matrix organic light-emitting diode displays. A pulse-width modulation with current uniformization is presented to overcome the non-uniform characteristics and degradation phenomena of thin-film transistors and organic light-emitting diodes. Its working and effect are confirmed using an actual pixel equivalent circuit. [C1061]

"A fast-switching current-pulse driver for LED backlight"

In this paper, a fast-switching current-pulse driver for light emitting diodes (LED) backlight is proposed. It uses a regulated drain current mirror (RD-CM) and a high-voltage NMOS transistor (HV-NMOS). It achieves the fast-response current-pulse switching by using a dynamic gain-boosting amplifier (DGB-AMP). The DGB-AMP does not discharge the large HV-NMOS gate capacitance of the RD-CM when the output current switch turns off. Therefore, it does not need to charge the HV-NMOS gate capacitance when the switch turns on. The proposed current-pulse driver achieves the fast current switching by removing the repetitive gate discharging and charging. Simulation results were verified with measurements performed on a fabricated chip using a 5 V/40 V 0.5 mum BCD process. It reduces the switching delay to 360 ns from 700 ns of the conventional current-pulse driver. [C1062]

"A novel multiple modes PWM controller for LEDs"

A monolithic controller for pulse width modulation (PWM) DC-DC converter was presented in this paper. The controller was designed specially for LED (light emitting diode) driver circuit with four operation modes, current feedback mode, constant current mode, no sense resistor mode and PWM dimming mode. The controller can be adapted to almost all current DC-DC topologies such like Boost, Buck-Boost and etc.. It also features the different load current sense methods for different topologies. For LED lighting, both the digital and analog dimming modules were integrated onto the chip, which were used to meet the demands of two kinds of dimming applications respectively. The controller integrated circuit (IC) was designed, simulated and fabricated in 1.5 mum BCD process. And both the simulation and test results were consistent with expectations well. [C1063]

"A digital driving technique for an 8-bit QVGA AMOLED using delta-sigma modulation"

We will demonstrate a new digital driving technique for AMOLED using DeltaSigma modulation, which mitigates the TFT VT-shift issue with a simple 2-TFT-1-Cap pixel structure. It also solves the false image contour problem while achieving the same or better resolution and relaxed gate scan time compared with PWM. The system is implemented using a 2.2-inch QVGA AMOLED panel and FPGA. [C1064]

"Evaluation of anxiety related changes in skin conductance and blood volume pulse signals during coronary angiography"

Although, stress, sleep deprivation, excessive fatigue and inattention are common health problem in advanced society, there are many methodological problems that make it difficult to measure these emotional states in clinical situations. The main goal of this study is to investigate whether variation of stress due to treatment techniques used in a hospital setting can be successfully assessed and/or quantized using physiological variables. To this end, blood volume pulse and skin conductance signals of 8 patients who underwent

angiography operation at the Cardiology Center of Erciyes University (Kayseri, Turkey), are obtained. Recordings were done at three stages: one hour before, during, and one hour after the angiography test. Our preliminary results indicate that the changes in the physiological variables across different subjects are remarkably consistent. This promising result is motivating us to consider and include other possible physiological variables and/or signals in our recording scheme to quantitatively assess changes in the emotional state of subjects undergoing critical operations. [C1065]

"Electronic ballast for multiple LED lamps with independent brightness control"

Light-emitting-diode (LED) light sources, which are more compact, capable to change color in real time, less dissipative and more durable, are finding more applications in domestic, commercial and industrial environments. However, requirements such as high power factor, long lifetime, accurate current control and high efficiency pose challenges to the design of LED ballast circuits. This paper proposes an LED ballast with a first-stage isolated current-fed power factor correction (PFC) pre-regulator that puts the short-lifetime high-voltage storage capacitor to the secondary, thus extending the overall system lifetime. Furthermore, the high voltage stress on the main switch, which is typical in current-fed converters, is reduced substantially by appropriately exploiting the transformer leakage inductance. The design uses two secondary transformer windings and an LED current driver to form a non-cascading structure to improve efficiency. Multiple non-cascading structures can be used for LED lamps for instant independent brightness control. Analysis, design example and prototype verification are given for the LED ballast. [C1066]

"Brain-computer interface based on high frequency steady-state visual evoked potentials: A feasibility study"

Brain-computer interfaces (BCIs) based on steady-state visual evoked potentials (SSVEPs) are systems in which virtual or physical objects are tagged with flicker of different frequencies. When a user focuses on one of the objects its flicker frequency becomes visible in the electroencephalogram (EEG) and so the object on which the user focuses can be determined from brain activity alone. A significant problem inherent to such systems is that typically flicker with frequencies in the range 5-30 Hz is used. Flicker in this frequency range is known to elicit easily detectable SSVEPs but is very tiring and annoying for users and can possibly trigger epileptic seizures. In this paper we study the feasibility of using higher frequencies for which the perceived flicker is less intensive. We compare the classification accuracy that can be achieved for stimuli flickering with low frequencies (15-20 Hz), medium frequencies (30-45 Hz), and high frequencies (50-85 Hz). The classification of the data is done with a Bayesian algorithm that learns classification rules and selects optimal electrode pairs. The results show that the medium frequency range can be used to build a high-performance BCI for which the flicker is hardly visible. We also found that for some subjects even high frequency flicker evokes reliably detectable SSVEPs. [C1067]

"Apparatus for detecting advanced glycation Endproducts fluorescence of skin"

An apparatus for detecting advanced glycation Endproducts (AGE) fluorescence spectrum of skin has been designed. Some of the AGE have special fluorescence. When the tissue of skin is illuminated with excitation light, fluorescence emmited by tissue is detected. The intensity of detected fluorescence is related with the concentration of tissue AGE, which can determine a tissue state of individual. The apparatus can scan exciation light, and also can scan fluorescence emitted by tissue. Because the detection is perfomed noninvasively, so the apparatus could be adapted for use conveniently. we make use of the system to detect the excitation spectrum. At the same time, the emission spectrum is also be detected on the skin of nondiabetic individual and diabetes respectively, the result of the experiment indicates that there are difference distinctly about 450 nm between them. The patient can benefit from it to forecast and diagnose the state of illness such as diabetes, decrepitude, oxidative stress. etc conveniently. [C1068]

"New Code Structures Based on Coherent and Incoherent Sources for Spectral Amplitude Coding-OCDMA Systems"

A new code of optical code division multiple access (OCDMA) based on spectral amplitude coding (SAC) is described and analyzed. The coding technique is called random diagonal ldquoRDrdquo code. One of the important properties of this code is that the cross correlation at data segment is always zero, which means that phase intensity induced noise (PIIN) is reduced. From the construction of RD code sequence, we can see that the RD code is constructed using code segment and data segment. Using this code property, RD code is implemented using coherent source (multilaser) and incoherent source (light emitting diode) for the code segment and data segment respectively. RD code using two multi-sources (inchoherent and coherent) can be considered as an effective way for maximizing the capacity while minimizing the cost of SAC-OCDMA. It is shown that the system using this new code matrices not only suppresses PIIN, but also allows a larger number

of active users compared with other codes. [C1069]

"Electroluminescence from a Quantum-Well LED using NEGF"

Nonequilibrium Green's functions (NEGF) are employed to model carrier transport and luminescence in a single-quantum-well light-emitting diode (LED). The sound theoretical formalism allows for a consistent description of coherence loss as well as fundamental scattering mechanisms and reveals details about physical phenomena such as the quantum-confined Stark and Franz-Keldysh effects, tunneling and carrier capture. A comparison to semiclassical results is made and similarities as well as differences are highlighted. [C1070]

"Strain- and Compositional Modulation of the Near-Band-Edge Band Structures of AlN and Its Ternary Alloys with GaN and InN"

In this paper, the k- p perturbation theory is adopted to calculate the interband excitonic transition energies and their polarization selection rules in c-plane A1N films, GaxAl1-xN and InxAl1-xN alloys modulated by both isotropic biaxial in-plane strain and alloy compositions. It is shown that valence band mixing induced by both strain and alloy composition has dramatic influence on the optical polarization properties. The calculated results provide both good physical insight into the band structure engineering and helpful instructions in the future design of high efficient and novel UV-emitters. [C1071]

"Modeling of Junction Temperature and Current Flow in High Power InGaN/GaN Light Emission Diodes Using Finite Element Methods"

InGaN/GaN LEDs offer important lighting devices for human livings. These devices have high efficiency and lifetimes at low injection power but so far show degradation under high injection conditions. Current spreading and heat dissipation are key reasons for degradation under high power operation. In this paper, we have developed a three-dimensional (3-D) finite element method (FEM) to examine the heat generation and dissipation and a two-dimensional (2D) Finite element Poisson and drift-diffusion solver for the analysis of current spreading. As we know, the junction temperature plays an important role to the performance of the LED, and it will influence the optical performance. Therefore, the discussion of different surface current density and sapphire width will be considered in this paper. We examine how current flow can be altered by careful design of the LEDs. Results for a conventional LED and an LED with ion-implantation to improve current flow are presented. Our simulations show that improved device design based on modifying current flow paths can improve the device operation. [C1072]

"Measurement of the pupil diameter under different light stimula"

The subjectivity and the limitation of the standard method for the flicker evaluation have suggested the research of different approaches. The intent is to achieve objective information on the state of annoyance of a human being subjected to light flicker. Recently, a technique based on the analysis of the pupil size variation has been proposed. This paper studies the effects of different light stimula on pupil diameter and highlight some interesting results. [C1073]

"Single-stage Flyback converter for constant current output LED driver with power factor correction"

This paper presents a LED driver circuit based on single-stage Flyback converter with power factor correction. Voltage following control and nonlinear carrier control are applied to constant current mode Flyback converter which is combined with constant current driver technique. By designing the outer loop to stabilize the output voltage and the inner loop to shape input current waveform, that makes the system achieve unity power factor. The circuit doesn't need an expensive multiplier as classical multiplier control. To verify the performance, the proposed circuit was confirmed by simulation and experiment. From the results, the proposed system shows high power factor with 0.96 and constant current output. [C1074]

"Optimization of wireless power transmission through resonant coupling"

We investigate the various experimental setups to find the optimum condition for the wireless power transmission through resonant coupling. We can transmit the power with 20% efficiency up to 2 m distance and light the LED lamp by transmitting 30 watt. [C1075]

"Hybrid life cycle energy assessment of commercial LED lamps"

This work uses hybrid life cycle assessment methods to determine the overall energy use of a commercial LED lamp. Life cycle inventory (LCI) data is built up using industry data for a GaN-based white LED lamp designed to

replace conventional incandescent bulbs. Appropriate data are also taken from generic processes in the semiconductor manufacturing sector. By considering the entire life cycle of the lamp, the analysis considers the systems-level effects of a large-scale shift to LED lighting technology, as opposed to the marketing emphasis on consumer benefits, which focuses on the use stage. [C1076]

"Energy consumption in the production of high-brightness light-emitting diodes"

High-brightness light-emitting diodes (LEDs) form the basis for solid-state lighting (SSL) systems. SSL systems have the potential to reduce electricity consumption of lighting systems as they are much more efficient than current lighting technologies. One concern is that the full life-cycle energy requirements of SSL systems, including the production of the materials and LED components, may negate any savings during the use phase. As a start to estimating the life-cycle energy requirements of SSL systems, we present an estimate for the manufacturing energy consumption of high-brightness light-emitting diodes. Results are based on full-scale, research-scale, and laboratory-scale equipment energy use data, and data from logic chip production processes. Energy consumption estimates for wafer production are 15 kWh to 60 kWh (approximately 1,000 LEDs). [C1077]

"A novel automatic power control system for a light emitting diode driving system"

A feedback power control system includes: a multiplying unit receiving work voltage corresponding to the voltage drop in an electrical component and feedback voltage corresponding to the work current flowing through the electrical component, with outputting a measurement voltage corresponding to the power consumed by the electrical component, having a value equal to the product of the work voltage and feedback voltage. The control unit receives the measurement voltage from the multiplying unit and a reference voltage, and outputs a control voltage corresponding to the difference in voltage between the measurement voltage and the reference voltage. The regulating unit provides the feedback voltage to the multiplying unit and includes an amplifier that receives the feedback voltage from the electrical component. In this way, we can adjust the current flowing through the electrical component when the electrical component voltages vary with temperature. Reducing the power dependence of the electrical component to the temperature that compensates the temperature is our purpose. Both the automatic constant current and automatic power control can be provided by a single system. [C1078]

"Organic light emitting devices using 9,10-bis (dodecylthio)anthracene as a new emitting material"

Organic light emitting devices have been fabricated using a new anthracene derivative; 9,10-bis(dodecylthio) anthracene (ADT). In this paper, ADT was used as dopant and emitter in PVK host matrix by spin-coating the layers of the doped polymer onto the cleaned indium tin oxide coated glass (ITO) / 3,4-polyethylene-dioxythiophene:polystyrene sulfonate (PEDOT:PSS) substrates. At room temperature the electroluminescence, centered at ~475 nm, is delivered with the highest maximum current efficiency of 0.28 cd/A at 9 V and highest maximum luminance of 318 cd/m2at 11.5 V from the PVK:ADT 30wt% device. CIE coordinate of devices was shifted from (0.16,0.13) to (0.16,0.26) for PVK:ADT 0.5wt% and 40wt% devices, respectively. Therefore, this material can be used as a new emitting material. [C1079]

"Indoor free-space optical communication systems design with simulation"

Optical wireless communication is a kind of telecommunication which transmits information through air with wavelengths in nanometers between optical transmitters and optical receivers. This kind of communication which has attracted scientists and producers lately, has been showing itself in several fields like satellite-to-satellite communications and military applications and introduced a new research to the communication world. In this study, the basic subjects related to wireless optical communication has been taken in hand and the hardware and the software which is essential for any wireless optical system achievement has been examined. Indoor free-space optical system has been described and an example algorithm and MATLAB code that would be used in this system has been improved. [C1080]

"Chaos phenomenon in UC3842 current-programmed flyback converters"

This study studies the chaos phenomenon in a UC3842 current-programmed flyback converter. The primary side magnetizing inductance current of a transformer during the conversion operation is considered in continuous-conduction mode (CCM). The nonlinear behaviors of system operation from period-1 to doubling-bifurcation and to chaos is studied by varying the input voltage of the converter. First, mathematical models and discrete-time analytic solutions of the flyback converter are derived. Second, MATLAB/SIMULINK software to simulate the nonlinear behaviors of the converter. Furthermore, the actual circuit is implemented, and experiments are performed. The consistency of simulation and experimental results confirm that the proposed mathematical models and discrete-time analytic solutions accurately model the nonlinear dynamical behaviors of this converter. [C1081]

"The high-lightness LED controller using solar energy basing on PSoC"

Aiming at the situation where solar energy is rich in remote mountain areas and in field but inconvenient for wiring and maintaining power grid, this paper put forward the idea of using the HBLED as the illumination light source and taking advantage of solar energy at the same time. Then, the HBLED controller based on PSoC (programmable system-on-chip) technology is introduced in this paper. This controller can extend the life time of HBLED, save the energy in a much more effective way by improving the P&O algorithm to achieve the solar cells MPPT(maximum power point tracking), and regulate the brightness of HBLED according to the light of circumstance. Finally, the wide used controller which contains the control circuit and HBLED driver circuit is introduced in this paper. In this paper, the design of the control circuit and the HBLED driver circuit and the method of calculating the inductor L of the driver circuit are introduced. This controller has wide applications. [C1082]

"Design and implementation of full-bridge driver for carbon nanotube field emission lamp"

A high voltage full-bridge resonant inverter is proposed for driving carbon nanotube field emission lamp (CNTL). First, we construct an equivalent model of CNTL to exhibit its electric characteristics. Moreover, the high frequency sinusoidal driving strategy is employed to eliminate the arcing phenomenon caused by the traditional DC driving. And then the PLL feedback controller is used to stabilize the lamp luminance. Complete design considerations and mathematical model are detailed. All the experimental results agree with the theoretical predictions. [C1083]

"2010 IEEE international reliability physics symposium"

The following topics are dealt with: pMOSFET, high electron mobility transistors, and heterojunction bipolar transistors; optoelectronics thin films; light emitting diodes; phase change memory devices; dielectric breakdown; magnetic tunnel junction; electromigration; package design; radiation-induced pulse noise; CMOS technology; circuit reliability; industrial fault injection platform; thyristor-based memory cell; flash memory; failure analysis; single metal dual dielectric gate stacks; nanoelectronics; power devices; interconnect electro- and stress-migration; interconnect low-k; high-k gate dielectric; stress-induced leakage current; transistor hot carriers; micromechanical devices; electrostatic discharge; charge trapping NAND flash devices; and other thin film devices. [C1084]

"Investigation of enhanced light extraction efficiency of light emitting diodes with ZnO nanorod arrays"

Numerous researches have been focused on improving the light extraction efficiency of photons generated in the active layer of light emitting diodes (LEDs). Various methods have been proposed, such as LED dies, flip-chip LEDs, surface texturing of p-GaN layer or transparent conducting layer, and two dimensional photonic crystals. However, these methods require complex and expensive processes or may result in surface damage. In this paper, the authors report the enhanced light-output performance by growing ZnO nanorod arrays at low temperature on a top layer of GaN LEDs without thermal and structural damage to the devices. [C1085]

"Intra-cavity frequency doubling of an electrically pumped edge-emitting 980 nm laser diode with PPLN"

In this letter, we demonstrate for the first time to our knowledge ICFD of an edge emitting laser diode using a periodically poled lithium niobate (PPLN) bulk crystal, which has the potential to be scalable to high production volumes and low costs with immense implication for industrial applications. Our new cavity design uses an external dichroic mirror coated for high reflectivity in the near-infrared range and transparent for blue light emission is used as output coupling mirror. These results demonstrate for the first time to our knowledge that stable ICFD is possible using telecom high power laser diodes with PPLN and that our model correlates with the experimental data. Further improvements are now possible through careful design of the lens used on the fast and slow axis beam waists and use of lower-temperature MgO-doped PPLN. This research could lead to disruptive lighting opportunities in laser-based projection displays. [C1086]

"Solution-based grown ZnO nanorods/polyfluorene light emitting diodes for white light emission"

Here, we report the use of organic/inorganic heterostructure to fabricate the p-n heterojunction devices. The heterostructure provides a new approach for constructing high performance electroluminescence devices which improve the balance of hole and electron injection. In this study, we fabricated the white-light inorganic/organic heterojunction diode LEDs, using p-type polymer (PF) and n-type ZnO nanorods (NR). The PF thin films are

fabricated by the spin-coating method. ZnO NR array have been produced on PF thin film by hydrothermal method. The device with ZnO NR array shows five fold enhancement of current density at the same voltage. The ZnO enhances electrons and holes to recombine in the interface between ZnO NRs and PF. [C1087]

"Color identification system development based on full color LED and TCS230D color sensor"

TCS230D color sensor is a programmable light-convert-frequency sensor made IN TAOS Corp. in America. It has the character of high solution, programmable color channel output, also the output signal is digital which make it easy to connect to universal MCU. This article mainly focus the process used the highly quality algorithm to identify color and the application of the algorithm. This is feasible to make a new usable color identification device or system by using the TCS230D chip. [C1088]

"Deposition of pepsin thin layer using IR-MAPLE procedure"

Nowadays significant interest turned towards the thin layers of large organic molecules due to their applicability in medicine and biosensor fabrication. Matrix assisted pulsed laser evaporation (MAPLE) is a promising technique for thin layer preparation in the cases of sensitive biomaterials. An obviously natural, inert matrix material would be the water, i.e. ice for solid target. However its absorption coefficient in wavelength range of the mostly used, ultraviolet lasers is relative low, a few 1/m. Therefore in our experiments beam of a CO2laser was used to ablate an enzyme solved in water showing strong absorptivity in far-IR. Our main aim was to demonstrate that the IR-MAPLE is suitable for the deposition of biologically active pepsin thin layer from frozen pepsin-water matrix solution. Our experiments demonstrated that the IR-MAPLE method is suitable for the deposition of thin layers from sensitive biomaterials using water as matrix material. [C1089]

"Time-resolved studies of pulsed electrical spin injection into single InGaAs quantum dots"

This study investigates on the circular polarization degree (CPD) anomaly emitted by InGaAs quantum dots within a spin-light emitting diode (spin-LED) with a ZnMnSe spin aligner, when the spin-LED device is excited with nanosecond width pulses. Results show that the change of CPD must be related to spin scattering events. One factor that is responsible to these scattering events is a potential barrier that forms within the spin-LED, which the spin-polarized carriers have to pass by a tunneling process. Hence, tunnelling will only be possible if an empty target state becomes available, such as, after injecting a hole into an occupied dot and subsequent optical recombination. [C1090]

"Controlling the coherence properties of quantum dot superluminescent light emitting diodes via frequency selective optical feedback"

In low coherent light interferometry (OCT) broad bandwidth light sources are required to achieve high axial resolution. Here superluminescent light emitting diodes (SLEDs) utilizing quantum dot (QD) gain materials are promising devices as they unify large spectral bandwidths with high power at desired emission wavelengths. However, due to the spectral dot dynamics, dips in the optical spectrum occur that lead to parasitic coherence peaks in the interferogram. We apply frequency selective feedback to increase the output power and to shape the spectrum, hence optimizing the coherence properties of the QD-SLEDs. [C1091]

"MNOS structure: towards efficient and reliable silicon nanocrystal-based LEDs"

Efficiency and reliability improvement of silicon nanocrystals in silicon oxide light-emitting devices is reported. The emission power efficiency is enhanced up to ~1% by depositing a ~15-nm silicon nitride buffer onto the active layer. The presence of this additional layer reduces the leakage current through the structure, leading to an effective increase of the power efficiency without significant effects on the operation voltages. Furthermore, the silicon nitride cools down the electrons that reach the top electrode. Both effects lead to a device degradation reduction of up to 50%. [C1092]

"Limitations to peak continuous wave power in high power broad area single emitter 980 nm diode lasers"

Micro-channel cooling of 975nm single emitter broad area lasers has largely eliminated current heating as a power limitation. Instead, the peak achievable power is limited by high-current driven minority carrier accumulation in the waveguide. In order to enable higher powers, the copper carrier was replaced with a water-cooled microchannel heatsink. In previous studies of broad area lasers under short-pulse condition, rollover was also observed, even in the absence of current heating. This was found to correlate with minority carrier accumulation in the waveguide layer. Such accumulation can be observed experimentally via studies of the spontaneous emission. Carriers in the waveguide recombine and emit light in all directions-such emission can be

separated spatially from stimulated (lasing) emission by measurements at a wide angle. In these devices, we also observe such carrier accumulation in the waveguide layers and such accumulation may be due to fundamental phonon-loss mechanisms. [C1093]

"Theory of electron dynamics in light emitting quantum dot devices"

Quantum dot based light emitters can be used as laser and single photon devices. In particular, we focus on the theory of InAs/GaAs quantum dots (QDs) embedded in a two dimensional wetting layer (WL). For simulating real devices, the interactions between electrons and holes confined in the QDs and the wetting layer are important. Therefore, we include Coulomb interaction as well as electron-phonon coupling, considering multi-phonon processes based on an effective multiphonon Hamilton operator. Here, we focus on non-equilibrium distributions, which are formed both in the WL and the QDs during the injection of carriers. Finally the model is extended by inclusion of Maxwell-equations to add the spatio-temporal dynamics of the light field inside the QD emitter. Here, we discuss the QD and WL influence on normal mode splitting as well as on the turn on dynamic of QD based lasers. [C1094]

"Ultrafast laser patterning of OLED stacks on a multilayered flexible substrate for solid-state lighting"

The authors discuss here recent experimental results from a detailed laser ablation study using different wavelength (1064, 532 and 355nm) ultrafast lasers (ps and fs) for this application. The authors aim to establish an industrially robust laser process window for large-area selective OLED patterning. [C1095]

"A General Photo-Electro-Thermal Theory for Light Emitting Diode (LED) Systems"

The photometric, electrical and thermal features of LED systems are highly dependent on one another. By considering all these factors together, it is possible to optimize the design of LED systems. This paper presents a general theory that links the photometric, electrical and thermal behaviors of a LED system together. The theory shows that the thermal design is an indispensible part of the electrical circuit design and will strongly influence the peak luminous output of LED systems. It can be used to explain why the optimal operating power, at which maximum luminous flux is generated, may not occur at the rated power of the LEDs. This theory can be used to determine the optimal operating point for a LED system so that the maximum luminous flux can be achieved for a given thermal design. The general theory has been verified favorably by experiments using high-brightness LEDs. [C1096]

"Single-Stage Offline SEPIC Converter with Power Factor Correction to Drive High Brightness LEDs"

An interleaved SEPIC converter with LED current dimmable and input power factor correction is proposed as a high performance driver for the high brightness white LEDs. The converter is controlled with voltage mode PWM and run in discontinuous conduction mode so that the inductor current follows the rectified input voltage. The critical design constraints and equations for both the power stage and control loop are highlighted and detailed. A practical evaluation board with 110 V input and 60 V, 700 mA output is developed to verify the proposed design. The proposed converter can be used to drive a wide number of high brightness LEDs for industrial or commercial lighting applications. [C1097]

"Powering LED Using High-Efficiency SR Flyback Converter"

A high-efficiency synchronously-rectified (SR) flyback converter with the proposed multi-function circuit is presented herein so as to get through not only playing the role of an LC snubber but also detecting the zero crossing of the current to reduce switching loss and feeding the peripheral circuit. And hence, this converter has high efficiency all over the operating range, and, together with one front-end power-factor-correction (PFC) AC-DC converter, is applied to feeding the LED street light. In this paper, the basic operating principles of the proposed topology are firstly illustrated in details, and secondly some simulated and experimental results are provided to demonstrate the effectiveness of the proposed topology. [C1098]

"A Power Converter with Pulse-Level-Modulation Control for Driving High Brightness LEDs"

High brightness (HB) LED provides higher efficacy and reliability over incandescent light bulb. Different from incandescent light bulb, HB LED needs to be driven by accurate constant current for consistent brightness and color-temperature light emission. With a novel method pulse-level-modulation (PLM) control applied on conventional switched-mode power stage, a more robust, power-efficient and accurate power converter for driving HB LEDs is realized. This paper includes the step-by-step design of the realized power converter.

Demonstration of the circuit driving a string of 0.35A HB LEDs is presented. [C1099]

"A Universal-Input Single-Stage High-Power-Factor Power Supply for HB-LEDs Based on Integrated Buck-Flyback Converter"

Due to the high rise in luminous efficiency that HB-LEDs have experienced in the last recent years, many new applications have been researched. In this paper, a streetlight LED application will be covered, using the integrated buck-flyback converter developed in previous works, which performs power factor correction (PFC) from a universal AC source, as well as a control loop using the LM3524 IC, which allows PWM dimming operation mode. Firstly, the LED load will be linearized and modeled in order to calculate the IBFC topology properly. Afterwards, the converter will be calculated, presenting the one built in the lab. Secondly, the converter will be modeled in order to build the closed loop system, modeling the current sensor as well in order to develop an adequate controller. Finally, experimental results obtained from the lab tests will be presented. [C1100]

"A Simple Method for Comparative Study on the Thermal Performance of Light Emitting Diodes (LED) and Fluorescent Lamps"

A simple method is proposed to measure the heat dissipation of LEDs and fluorescent lamps in an open system which allows light energy to escape. Based on this method, a comparative study on the thermal and luminous performance of high-brightness LEDs and fluorescent lamps is presented. At rated power, T5 & T8 fluorescent lamps generate about 73%-77% of their total power as heat, whilst three types of high-brightness LEDs dissipate about 87% to 90% of input power as heat. Heat dissipation is an important factor particularly for air-conditioned buildings when overall energy efficiency is considered. T5 fluorescent lamps perform better than some existing LEDs in terms of luminous efficacy and heat generation in this study. [C1101]

"Surface addressable cavity-confined slow light modes for quantum photonic devices: Design and investigation"

We propose to use localized slow Bloch modes in photonic crystals to achieve vertical operation in quantum photonic devices. With our specific implementation, we expect a Purcell factor of 45. [C1102]

"Diffraction manipulated resonators with intracavity photonic crystals"

In this paper, plane-mirror Fabry-Perot resonators filled by photonic crystals, i.e., with periodic intracavity refraction index modulation is investigated experimentally and theoretically. In order to achieve the effect of 2D intracavity index modulation the phase diffraction gratings were fabricated on the surfaces of the mirrors. The diffraction properties of such resonators can be manipulated, resulting in sub-and superdiffractive dynamics of light in the resonator, and in hyperbolic angular transmission profiles. [C1103]

"Diffraction analysis of extraction efficiency for photonic crystal based white light emitting diodes"

In this paper, we have proposed a diffraction analysis for calculating extraction efficiency of photonic crystal based light emitting diodes. Diffraction patterns have been obtained for the three RGB wavelengths. It has been observed that extraction efficiency is higher for lattices bearing more symmetry lines in reciprocal domain in the visible range. Besides, the extraction efficiency is optimized with respect to several photonic crystal geometrical parameters such as thickness, filling factor and lattice type. [C1104]

"Critical study of the Vertical-Cavity Surface Emitting Lasers (VCSEL) electrical access for integrated optical sub-assembly"

The proposal contribution aims at highlighting the consequence of the impedance mismatching in VCSEL-based optical subassembly for optical interconnection applications. The integration of this micro-laser diode to an optical interconnection module needs a particular care to avoid electromagnetic coupling which could transform the advantage of the VCSEL technology in a weakness. Indeed, the vertical emission perpendicular to the active layer gives the possibility to achieve the need of planarization of the optoelectronic circuits and the design of VCSEL arrays. That is why it is of great interest to develop an optoelectronic model including the electrical access effect. This model is based on the VCSEL rate equation comparison with a behavioral small-signal equivalent circuit. Scattering parameters of various VCSEL structures and various VCSEL chip submounts are tested. This characterization allows the validation of the laser model and emphasizes the influence of the electrical access during the light transmission. In a particular VCSEL array structure, a crosstalk phenomenon is also observed. This crosstalk increases strongly with increase in the frequency. Consequently the electrical access to the VCSEL needs to be improved in order to avoid an inadequate utilization of the VCSEL. [C1105]

"DirectShow Application in LED Panel Display System"

A new DirectShow application in the field of LED Panel display system is shown in this paper. It realizes video processing functions with DirectShow architecture on computer. Source Filter and many Transform Filters, which provided by Microsoft Co., transform source video into RGB24 format. Then, the video data are scaled up/down to LED panel resolution by Fixformat Filter which inherite CTramsformfilter baseclass. After that, the R/G/B values of video data are adjusted in CCorrect Filter to adapt LED Panel display. Finally, the processed video is shown on LED Wall through DVI or VGA interface. Our experimental results demonstrate that this system makes a good performance. It is greatly simplify the functions of Sending-Board, Receiving-Board, and Control-Scanning-Board in display system of the LED Wall. The total cost will be cut down observably, if we can transplant the filters into the embedded platform, to build a special video processing system for LED Panel display. [C1106]

"A complete model for electrical behaviour of single carrier organic diodes in the presence of a field-dependent mobility"

In this paper we propose a model to simulate electrical conduction of single carrier organic diodes in the presence of a barrier for carrier injection, and considering a field-dependent carrier mobility. An analytical expression for the internal electric field function, that simplifies operation with the resulting non-linear equation system, is provided. The results of the model are compared with those from other existing approaches that assume simplifications. Finally, the current density versus voltage curves predicted by this model for diodes with different active layer thicknesses show a good agreement with the experimental results. [C1107]

"Research on Navigation Marks-Monitored Network System Based on WSN"

This paper studies a Navigation Marks Remote Monitoring and Control System (NMRMCS) based on Wireless Sensor Network (WSN) and Differential Global Positioning System (DGPS). We designed NMRMCS installed in mountain area using WSN and DGPS to increase the positioning precision of navigation marks. We tested communicating distance of nodes by measuring the signal strength both in open region and wooden region, and record the number of flashing LED on ARM board with CC2420 chip, and tested relative parameters in some fixed points using Received Signal Strength Indication (RSSI) provided by highly integrated single-chip CC2420 with a method of least square curve fitting. The tested results show that the mean positioning error of Navigation Marks is less 2.5 meters, are of less positioning error than traditional NMRMCS. We select low power consumption ZigBee protocol based on IEEE 802.15.4 and use low energy-consumption RSSI position algorithm to reduce energy-consumption of NMRMCS. [C1108]

"Cellulase Activity in Physically Isolated Fractions of a Paddy Soil"

Specific location of extracellular enzymes within the soil matrix was related to soil organic matter (SOM) quality and carbon turnover. A physical fractionation procedure was used to investigate whether soil carbon was spatially isolated from degradative enzymes in a paddy soil. In POM fractions of this study, high C concentrations are found because they are derived from inputs of recent plant materials with high C-to-N ratios and low mineral content. Total nitrogen was highest in the clay-sized fraction and lowest in the silt-sized fraction. The C-to-N ratios were decreased with decreasing particle size, lowest in the clay-sized fraction, greatest in the POM fractions, and inter-mediate in the bulk soil and silt-sized fractions. Different distribution trend in physically isolated fractions indicated that there was fundamental difference in the factors determining their location. The absolute activity of carboxymethyl cellulase activity was greatest in coarse POM fractions and generally decreased from the coarse POM fractions to the silt-size fraction, following a decrease of Corg as well as an increase in bio-stability of the organic material, as indicated by a decrease in the C-to-N ratio. [C1109]

"3D Multi-view Autostereoscopic Display and Its Key Technologie"

Multi-view autostereoscopic three-dimensional (3D) display has been one of the most popular research issues in the world. And 3D displays are classified into two types: stereoscopic 3D display and autostereoscopic 3D display. The former includes head mount system, anaglyph system, polarized filter system, field sequential system and so on. The latter is also called true 3D display, it provides 3D perception without the need for special glasses or other head gear. In this paper we research on the multi-view autostereoscopic 3D display. Focusing on the multi-view stereoscopic 3D key technologies, the latest international development trends and existing problems is analyzed. A multi-view stereoscopic display system, related key technologies are detailed, which includes: Light field representation model and light field capturing system, high efficiency multi-view video coding and transmission method compatible with current video standard, high efficiency rendering method for arbitrary position view at the decoder, 3D display technologies and multi-view autostereoscopic display. [C1110]

"Blue white to warm white tunable luminescent properties of Eu2+, Mn2+ doped Ca8 MgY(PO4)7 phosphor as a potential phosphor for UV LEDs"

The authors reported a new phosphate white LED phosphors, Eu2+, Mn2+co-doped Ca8MgY(PO4)7phosphors, which show tunable emission from blue, blue-white, warm-white and deep red. [C1111]

"CLEO ® Investigation of rare earth doped BaY2F8 crystals as visible emitters."

The spectroscopic investigation of some BaY2F8crystals doped with Sm3+or Eu3+as possible visible light emitters are presented. The interest in the fluoride crystals as host lattices is due to their low phonon energy, a few hundreds of cm-1, that can lead to a highly efficient emission. In the case of Sm3+andEu3+the high energy (near UV) photons populate a few excited levels that can decay to a series of lower lying multiplets, thus giving rise to many different emission bands all located in the visible region .The crystals were grown by the Czochralski method and the time resolved measurements of the fluorescence of the two crystals (Sm3+or Eu3+doped) are presented, in order to evaluate the emission lifetime of the various manifolds involved in the luminescence and understand the potentialities of the materials. [C1112]

"3D object relighting based on multi-view stereo and image based lighting techniques"

We present a 3D object relighting technique for multiview-multi-lighting (MVML) image sets. Our relighting technique is a fusion of multi-view stereo (MVS) technique and image based relighting (IBL) technique. The MVML dataset consists of multiple camera view with each view filmed under multiple time-multiplex illumination modes. A multi-view 3D reconstruction algorithm is first applied using traditional multi-view stereo algorithm. After this, the reconstructed model is relighted through an image based relighting scheme for each camera view, followed with view-independent texture mapping procedure. Interactive relighting results demonstrate our high quality reconstruction accuracy, realistic relighting effects and real-time relighting performance. Moreover, our relighting technique is suitable for dynamic 3D object relighting. [C1113]

"Innovative printed circuit board technology for heat removal with application to power LED based operating room lamps"

Using a simple analytical model we investigate the effect of thermal vias on the heat transfer through a printed circuit board (PCB) . We show that thermal vias can increase the heat transfer coefficient by orders of magnitude. The model considers the arrangement and the geometry of the vias, the metallization thickness and the solder fillets. The application part of the paper addresses three prototypes of high-power LED-based operating room lamps. The heat spreading ability of three types of PCBs-two FR4-based prototypes with thermal vias and one with an insulated metallic substrate (IMS)-is evaluated by using thermal simulation and single point temperature measurement with miniaturized thermocouples. All the three prototypes fulfilled the requirements for the thermal performance satisfactorily: the total thermal resistance of the FR4-based prototypes was below 1.2 K/W, and the one with the IMS even below 0.6 K/W. [C1114]

"Development of reflow soldering processes using heaters' operation control"

Investigation deals with development of reflow soldering processes for some kinds of electronics components, difficult for soldering to PCBs, such as BGA (ball grid array) packages and LEDs mounted on metal substrates. Soldering processes for such kind of objects are complicated and failures are more probable. To solve these problems new kind of soldering equipment is proposed to be used. It is based on low inert heaters for the middle IR spectral region. Due to low inertia of the heaters temperature changes in the soldering camera may be controlled precisely and the soldering cycle may be realized at the same place without conveyor belt. Experiments show that by proper control of the operation of the heaters, of gas flow circulation and by some small changes in the heating camera desirable temperature profiles can be realized and problems with soldering can be solved successfully. [C1115]

"Analysis tools for thermal characterization, performance and reliability of rugged electronic displays"

Current trends for rugged electronic displays moves away from CCFL towards high power LEDs. They provide many benefits such as adaptive light control, reduced form factor and other novel techniques to improve the performance of the display. Introduction of LED also change the thermal characteristics of the backlight and has subsequent effects on its performance and reliability of the display. This paper investigates the tools to predict the performance of the display and highlights the intricate relationships between the thermal, mechanical and optical behaviour when developing a rugged electronic display. [C1116]

"A visual inspection system for surface mounted components based on color features"

The object of this study is to develop a reliable and fast visual inspection system for surface mounted components after they have been placed in wet solder paste on a printed circuit board (PCB). In order to reach this goal, firstly, the features of the components under three colors (red, greed, blue) structure light source are analyzed. Then, a two-stages inspection process is presented. In the first stage, the horizontal and vertical integral projections of the component electrode were obtained after segmentation in the red subimage, based on the projections, the location of component was gotten by the sliding location window algorithm, then, the defects such as missing component, wrong component, shift and rotation were detected. In the second stage, the three color features were extracted from the component body and the Bayes classifier was used to inspect another wrong component class. The proposed inspection system have been implemented and tested with various types of components collected from production line. The experiment results have verified the validity of this scheme in terms of recognition rate and speed. [C1117]

"Practical considerations for indoor wireless optical system implementation using OFDM"

This paper describes the implementation of OFDM (orthogonal frequency division multiplexing) for optical wireless systems using non-coherent light. In particular, light emitting diodes (LEDs) and photodiodes (PDs) are considered. The paper shows how classical OFDM is adapted to optical system constraints. Several key OFDM design issues are studied. In this context it is demonstrated that the impact of the cyclic prefix (CP) length on power and bandwidth efficiencies is negligible. Similarly, the effect of the Doppler frequency shift on intensity modulation with direct detection (IM/DD) optical transmission is discussed. The challenge of a high peak-to-average power ratio (PAPR) OFDM signal in the presence of LED nonlinear behavior is highlighted. An approach to estimate the overall signal-to-noise ratio (SNR) of the system and to determine the required analog-to-digital converter (ADC) resolution to achieve a target system SNR is introduced. [C1118]

""On Donuts and Peanuts": Strongly orientation-dependent spontaneous emission rates in any nanophotonic environment"

According to quantum electrodynamics, the emission rate of a two-level quantum emitter is described by Fermi's golden rule. Currently, there are many efforts to control the emission rate of quantum emitters by optimizing the nanoscale environment via the local density of optical states (LDOS) by, e.g., reflecting interfaces, microcavities, photonic crystals, or plasmonic nanoantennae. Control of spontaneous emission is notably relevant to solid-state applications, including miniature lasers and light-emitting diodes, single-photon sources for quantum information, and solar energy harvesting. [C1119]

"Research of heat dissipation of RGB-LED backlighting system on LCD"

Heat dissipation is a very important subject during the design of RGB-LED backlighting system on LCD because the heat produced by modern LEDs themselves can excessively influence their characteristics. This paper reports on a new substrate technology that offers significant benefits over conventional polymer-based insulated metal substrates (IMS). This new type of insulated aluminum substrate printed circuit board (PCB) consists of a thermally-conductive aluminum alloy substrate that insulated by a thin, chemically grown, anodized dielectric layer. Circuit is formed above the anodized layer with magnetron sputtering technology. The corresponding thermal resistances of the new and conventional insulated metal substrate printed circuit board (PCB) are measured to be 4.78degC /W and 7.61degC/W, respectively. More heat transfer means more reliable product, less light reduction and less material consumption because of eliminating the need for additional heat sinks. [C1120]

"Control of cavity solitons and inhomogeneity compensation in VCSELs with frequency selective feedback"

Cavity solitons (CS) have been demonstrated in VCSELs with feedback from a diffraction grating and display many qualities that are of interest to all-optical processing and telecommunication applications. In a completely homogeneous VCSEL, the formation of CS would not occur spontaneously when increasing current, but could only be excited by an external beam. In the real laser system however the VCSEL is not homogeneous across the aperture. Small micro-scale 'defects', believed to be refractive index modulation, cover the aperture of the device creating an optically rough surface. These defects coupled with noise allow CS to appear spontaneously by increasing current. A spatial light modulator is used to spatially modulate the external laser diode and inject this beam into the VCSEL. [C1121]

"Indirect camera calibration for surgery tracking"

Embedding cameras in surgical lights allows full view of surgery for tracking and storage purposes. However, it presents the challenge of camera calibration, as camera lights frequently change position. In this paper, we propose a novel indirect calibration method that utilizes static ceiling cameras that detect the position of light cameras and calibrate their extrinsic parameters every time there is significant movement. In our experimental setup, indirect calibration was able to locate light cameras with an average error of 4.81 mm of the position found by standard camera calibration methods and offers the added advantage of avoiding interference with the surgeons. [C1122]

"Incomplete mode-locking in one-section QD lasers with ultra-long cavity"

Semiconductor light emitters based on quantum dot (QD) have recently been used in the fabrication of mode-locked lasers owing to their broad gain spectrum as well as fast carrier dynamics. For GaAs-based InAs QD lasers at 1.3 mum range, mode-locking behaviours of two-section devices with cavity length between 800 and 8000 mum, corresponding to round-trip frequency between 5 and 50 GHz, were investigated to show transform-limited pulses with low uncorrelated timing jitter. While for InP-based InAs QD lasers at 1.5 mum range, self-mode-locking in one-section configuration without saturable absorption was reported to show repetition rate as high as 45 and 134 GHz, corresponding to cavity length of 950 and 340 mum, respectively. [C1123]

"LED forward current errors induced in video display tile's PCB"

LED video display smallest module is tile. Common LEDs intensity has to be used in order to match the neighboring tiles and manage white balance. This control is established by common resistor. But large currents present on LED tile distort the common source influence on individual LED drivers. This article is presenting the research conducted in order to evaluate the PCB currents influence on single LEDs currents. The investigation has shown that there is an influence of the high current on the individual LEDs forward current errors. Nevertheless, errors are quite small: maximum average driver current deviation was 4.7 %. [C1124]

"Sulfur dioxide measurements by correlation spectroscopy using an ultraviolet light-emitting diode"

Gas sensing by optical methods employs traditionally conventional broadband radiation sources or narrowband lasers to take advantage of the specific absorption spectra of the studied gas. The gas correlation spectroscopy (COSPEC) technique is particularly simple and immune to spectral interference because it utilizes a reference gas cell to recognize and quantify the amount of the same gas in the sample volume. This technique can be used in monitoring industrial and volcanic emissions by employing various light sources, including thermal background radiation, broadband lasers, light emitting diodes (LED) and multi-mode diode lasers. Recently, LEDs with structureless emission in the UV region have become available. This paper demonstrates that LEDs can be ideal sources for gas absorption measurements combined with the gas correlation technique, especially suitable for industrial emission monitoring.The LED employed is centered around 300 nm and has an emission band width of about 12 nm covering about 8 prominent absorption peaks of SO2.By using a 19-cm long sample gas cell, an Allan variance analysis predicted a sensitivity of 0.4 ppm (1.1 mg/m3) with an integration time of one minute. The obtained sensitivity is sufficient for industrial emissions monitoring where typical SO2concentrations range from tens to thousands of ppm. For atmospheric monitoring applications at ppb level long path absorption or a multi-pass cell can be employed. The system is immune from interfering gases, such as NO2, and it is also largely insensitive to total pressure variations and light intensity fluctuations. [C1125]

"Head-Up-Displays based on polymethylmethacrylate with phenanthrenequinone"

The authors present the experimental realization of a Head-Up-Display (HUD) based on a photopolymer. The aim of our work is to develop a new HUD screen with a holographic grating in photopolymer based on Plexiglas (polymethylmethacrylate, PMMA) and photosensitive phenanthrenequinone (PQ) molecules for vehicle windshields. [C1126]

"Estimation of the louvers influence on LED video display image visibility"

Sun and ambient light is a serious problem for outdoor LED video displays. Shading the front-face surface by louvers implementation is used in majority of LED displays, but louvers influence the LED directivity. The analytical method is developed for image visibility estimation. The louver geometry and position are taken into account. LED FFP goniometry is used for large LED batch and results later averaged. The averaged FFP is then approximated by Gaussian analytical function. Obtained function can be used to calculate the visibility of display image at various viewing distances. [C1127]

"A 100Mbps, 0.19mW asynchronous threshold detector with DC power-free pulse discrimination for

impulse UWB receiver"

An asynchronous threshold detector for DC-960 MHz band impulse ultra-wideband (UWB) receiver is proposed in this paper. It features a DC power-free pulse discriminator. The proposed architecture in 90 nm CMOS achieves the lowest power consumption of 0.19 mW and energy consumption of 1.9 pJ/bit at 100 Mbps in the UWB receiver. [C1128]

"Detection of Shadow Mask Defects Using Periodic Hole Placement"

This paper presents an efficient image analysis methodology which can detect the very small hole defects reliably and rapidly from shadow mask. In fact, shadow mask line image data can be adjusted to be periodical with the period of an integer number. The inspection method mainly depends on the fact that a small defect can be significantly emphasized in terms of the comparison between image pixels departed by the period. In this paper, this comparison is implemented as FIR digital filtering algorithm, which can be rapidly processed by DSP chip. In terms of high speed line image sensing and fast algorithm by DSP, the whole inspection scheme sufficiently supports real time shadow mask handing. From the experimental results, this scheme shows a reliable inspection capability for all types of individual hole defects. [C1129]

"Single Stage Offline LED Driver"

A non-isolated soft-switched high power factor offline LED driver is introduced in the paper. The buck-boost converter is chosen for this application due to its simplicity and low cost. The converter operates with constant peak current for constant power control, and in transition mode (boundary mode between CCM and DCM) to achieve soft switching. High power factor is achieved by reshaping the peak current nearby the zero crossing of input AC line. [C1130]

"Time series analysis of neural facilitation of muscle activation recorded using chronically implanted microwire arrays"

The role that neurons in the motor and premotor cortical regions have in facilitating muscle activation during reaching and grasping tasks can be detected through cross-correlative techniques such as spike triggered averaging (SpTA). The use of chronically implanted electrodes can provide information regarding the dynamics of this functional role over time. Using chronically implanted microwire arrays with electrode insertion lengths of 1.5 mm, 2 mm and 2.5 mm, recording from the motor and premotor regions, this study examines the effects that the initial depth of electrode implantation has on 1) the total number of units facilitating muscle activity over time; 2) the total number of units detected over time; and 3) the total number of units correlated with task-dependant parameters over time. To determine the facilitative role that recorded units play in activation of muscles during task performance, the EMGs recorded during movement from the center holding pad to the target are cross correlated with the recorded spike activity using SpTA. The results suggest that the initial depth of implantation has a significant effect on the total number of facilitating units detected, the total number of units detected, and total number of units correlated with target direction and target orientation in the specific reach to grasp task. Results also suggest that a significant increase in the number of units is detected at initial depths greater than 1.5 mm. In most cases, initial depths of 2 mm produce a significantly greater number of total units compared to initial depths of 2.5 mm. [C1131]

"Spatial tissue oxygenation measurement with near infra-red spectroscopy using a virtual instrument"

We describe near infrared spectroscopy (NIRS) to study spatial variations in tissue oxygenation: oxyhaemoglobin (HbO2); deoxy-haemoglobin (HHb); and total haemoglobin (Hbtot). Apparatus was constructed incorporating light-emitting diodes (LED) as the light sources, sensitive photodiodes (PD) as the detectors, a virtual instrument to control the opto devices and collect and process the signals. The MATLAB script was embedded into LABVIEW to process and display the data. Changes in chromophore concentration were calculated using the modified Lambert-Beer Law together with the diffusion theory. We attached an LED array on the volar surface of the adult forearm with a PD detector placed at various distances of 12 to 40 mm from the sources. Further studies were performed in adults with forearm blood volume and oxygenation manipulated by venous and arterial occlusion respectively. Results indicated that source-detector spacing can achieve spatial sensitivity of blood volume and blood oxygenation measurement. The in vivo results demonstrated that the methodology and equipment achieved good performance as expected. In addition, we used dye-scatterer phantom to analyze the optical properties of near-infrared spectroscopy, where a spectrophotometer was used to calibrate the performance of the instrument. The in vitro results showed good correlation between the new instrument and the laboratory standard. The virtual instrument was a flexible and convenient means to develop apparatus for in vivo NIRS measurement. Spatial changes in tissue blood volume and oxygenation could be useful for clinical and

research applications. [C1132]

"The Tire Burst of Automotive Early-Warning System Design"

In this paper, the anti-flat tire design process is divided into two parts: the tire module and the host module. The micro-controller MC68HC908RF2 is the core of the tire module. The integrated sensor MPXY8020A executes tire pressure and temperature measuring. The transmitter integrated inside the micro-controller executes wireless transmittal task. MC33594 executes wireless receive task in the host module which adopts LED and sound-light warning. [C1133]

"iLamp: A sensor-enhanced lamp with surface-tracking capability based on light intensity"

The iLamp system is a sensor-enhanced desk lamp with surface-tracking capability based on received light intensity. It consists of two components: lamp and bookmark. The bookmark is a ZigBee-enabled sensor node that can report its sensed light intensity to the lamp with a user-friendly interface and two-way communication capability. The lamp can use its LEDs to locate user's reading surface to which the bookmark is attached, move toward the surface, and further tune its luminous intensity to meet user's preference. We develop the geometrical model for surface tracking. iLamp demonstrates a new centimeter-level location-tracking system using light intensity alone without other extra media or devices. [C1134]

"Talk to me! On interacting with wireless sensor nodes"

Wireless sensor networks play an essential role in many pervasive computing scenarios as providers of context data. However, interacting with sensor nodes and selecting specific nodes for an interaction is difficult due to the constraints of the sensor node hardware. In this paper, we present and discuss three different approaches for this node interaction problem based on gestures, on light signals and on information provided by the sensor nodes using their LEDs. We demonstrate in our evaluation that these mechanisms solve the interaction problem for a variety of scenarios and effectively support the user in the interaction process. At the same time, our solutions set only low requirements on the wireless sensor node hardware. [C1135]

"Colourinformatic diagnostic-treatment device for photomedical technologies"

In this work the results of experimental researches of descriptions of the material-optical system are presented at passing through him directed treatment diagnostic light stream of devices photomedic technologies and the analysis of structure of colour-informational is conducted diagnostically colour-informational to the device for photomedic technologies. [C1136]

"Determination of the electric field distribution within multi-quantum-well light emitting diodes by the use of electron beam induced methods"

Dynamic electron beam induced methods are applied to determine the local electrical field distribution of devices with small depletion regions. The dissipation volume generated by the electron beam is much larger than the depletion region during these investigations. The frequency behavior of the electron beam induced signal must be analyzed in order to determine the field strength accurately. The characteristics of the in-phase and quadrature components are discussed for lock-in detection in the frequency domain. Additionally, change of the collection efficiency due to the depletion region widening effect at different biasing conditions has to be taken into account. The advantage and possibility of this technique are demonstrated exemplarily for a commercial multi-quantum-well light emitting diode. [C1137]

"Vision based Injector Spray pattern Testing system"

In a diesel engine any malfunction of the injector degrades engine performance. Currently, the testing of injectors is done using Volumetric Testing, Illuminated spray test tube with high intensity LED or ITU-101 Common rail tester. The current methods require experienced and skilled personnel and are manual in nature. In this research, a novel computer vision based Injector Spray pattern Testing (VIST) system is designed to automate the testing of the diesel spray pattern using images acquired using a CCD camera. The macroscopic and microscopic features of the images are extracted, and analyzed for testing the reliability of the diesel injector. An interactive user interface is developed to display the results. As compared to the manual volumetric testing, the VIST system is more accurate because it uses individual plume features to distinguish between good and defective injector. [C1138]

"Life-stress relationship for thin film transistor gate line interconnects on flexible substrates"

Change in resistance of interconnect traces on flexible substrates is dependent on material properties and mechanical stress imposed by tensile strain. Dedicated test structures and a mechanical flexing / data collection system were designed and fabricated to collect time to failure data based on cyclic loading to different radii of curvature. We propose a life-stress model based on an inverse power law relationship defining the characteristic life of a Weibull life distribution. [C1139]

"Thermally activated degradation and package instabilities of low flux LEDS"

The results achieved in an accelerated life-time test on Phosphor-Converted Light Emitting Diodes (PC-LEDs) have been reported. Two different families of commercially available low-flux devices have been widely characterized and a comparative analysis on performances has been carried out. A wide set of devices has been submitted to a combined electrothermal accelerated stress under different aging conditions. The stress induced a luminous flux decay on LEDs from both series. In particular, the lumen decay was found to be thermally activated for one set of devices. The aged devices showed also a degradation of chromatic properties, in terms of a blue or yellow shift for the two different families. The failure modes found have been detected also in devices aged at constant temperature and no bias. The degradation mechanism responsible for lumen decay and chromatic shift was ascribed to the thermally activated package instabilities. A failure analysis has been carried out on failed devices, detecting different failure modes related to the package (chip detachment) and to the chip (generation of low impedance paths that shorted the junction). [C1140]

"Improved reliability of organic light-emitting diodes with indium-zinc-oxide anode contact"

With this paper we report a comparison of the performance and reliability of organic light-emitting diodes (OLEDs) with indium-tin oxide (ITO) and indium-zinc oxide (IZO) anode contact layer. The analysis has been carried out by means of electrical and optical measurements: the devices have been compared in terms of efficiency, thermal resistance and reliability. The results of this analysis indicate that: (i) the use of an IZO anode allows to achieve an efficiency comparable to the case of ITO contacts; (ii) devices with IZO contact have a significantly lower thermal resistance, compared to the ones with ITO anode; (iii) accelerated stress tests show that the OLEDs with IZO anode exhibit an higher reliability. Therefore, the relevant results presented within this work demonstrate that the use of IZO anodes guarantees OLED performance comparable with commercial ITO anodes, and allows a better heat dissipation and devices reliability. [C1141]

"Electro-thermal modeling of large-surface OLED"

In our project the final purpose is to develop a cost-effective roll-to-roll technology of fabricating large-surface, high-output OLED (organic light emitting diode) devices for intelligent lighting applications. This paper presents the development of the electro-thermal model of OLED devices for circuit-level simulation. The model is based on the measuring of I-V characteristics at ten different temperatures. Our model describes the forward bias and the reverse bias of OLED devices between 5degC and 50degC. The actual initial model ignores the long-term stability problem. [C1142]

"Influence of truncated micro-pyramid cavity for LED packaging heat dissipation"

This research describes the truncated micro-pyramid reflective cavity for light emitting diodes (LEDs) packaging and increasing LEDs' heat dissipation. Research went through different microstructure profiles related to thermal effect in LEDs' packaging. Microstructures based on the silicon bulk micromachining provide unique truncated micro-pyramid reflective cavity geometry for LEDs assembly. Etching (100) crystal silicon in bulk micromachining provides a stable surface quality and replication advantages for the reflective cavities. Simulation works include the optical simulation by using commercial design software Trace Pro3.3 and thermo flow analysis software FLOTHERM 4.2 to obtain an optimum beam profile and geometrical dimensions for heat dissipation. The truncated micro-pyramid cavity and its array were produced using bulk micromachining through lithography process and silicon anisotropic etching. Then, placing LEDs into the silicon pyramid cavities and wire bonding LEDs onto printing circuit board (PCB) are the final works. This truncated pyramid cavity provides the reflective plane and heat dissipation for LED packaging. [C1143]

"Design optimization and stamper fabrication of light guiding plates using silicon based micro-features"

This study applies a novel fabrication process of molding stamper that combines anisotropic wet etching of silicon-on-insulator (SOI) wafers with electroforming to produce precision stampers. Micron-size features, such as trapezoidal grooves and prisms, can be accurately fabricated and distributed. Because the feature geometry and the distribution can be accurately realized using the proposed scheme, the design optimization of light guide plate (LGP) become realistic. By observing the illumination characteristics of LED edge-lit LGP, the distribution

pattern of the LGP is transformed into the parameter design of 7 anchor spacing and the spacing modulation amplitude. This study manipulates the distribution parameters using the fuzzy optimization to obtain a LGP design with high illumination uniformity. The design of a LGP of 3.5 inch using LED light source is used as an illustrated example. The optical software, TracePro is applied to simulate the luminance performance. The optimization converges quickly and provides the optimum design with an average brightness of 2266 (nit) and uniformity of 90% without any use of diffusive sheets. The application demonstrates the feasibility and effectiveness of the proposed scheme. [C1144]

"Reliability issues in AlGaN based deep ultraviolet light emitting diodes"

AlGaN based deep ultraviolet light emitting diodes (DUV LEDs) are key components in systems for air, water, and food purification and germicidal applications. Because of the heteroepitaxial growth of the DUV LED epilayers on sapphire, they have a large number of dislocations that invariably leads to a reduction of quantum efficiency and lifetime degradation. In this paper, we present our recent work at developing DUV LEDs with different device geometries, which includes a new micro-pixel electrode arrangement. This arrangement was used to study mechanisms responsible for their degradation. The micro-pixel device geometry with some new packaging schemes led to DUV LEDs with emission at 280 nm and lifetimes well in excess of 3000 hours. In this paper experimental details and the results of our study are presented. [C1145]

"Degradation mechanisms beyond device self-heating in deep ultraviolet light emitting diodes"

Lifetime measurements on single, packaged UV LEDs were performed under constant current injection at 20 and 75 mA (60 and 226 A/cm2). The junction temperature at operation was found by micro-Raman spectroscopy to be 57 and 184degC, respectively. Unbiased LEDs of similar characteristics placed in an oven baked at the equivalent operating junction temperatures showed a degradation in output power similar to that in the current injection devices during the initial 24 hours, but did not continue to degrade beyond that time. These studies imply that device heating, is correlated with the initial drop in output power during burn-in, but is not directly linked to the total degradation over the lifetime of the device. Time-resolved PL studies on the device active region as well as further electro-optic measurements indicate that the degradation is not due primarily to that of the active region, but may be associated with generation of point defects such as N-vacancies near the p-n junction. [C1146]

"Heat dissipation performance for the application of light emitting diode"

This study was to design and develop the efficient heat dissipation methods for light emitting diode (LED). There are two major achievements in the study: (1) Chips level: Improve the LED packaging materials and layers assembly of LED. This novel design was to introduce additional thin copper layer materials on LED base assembly with geometry that can reduce thermal resistance and increase thermal diffusion efficiency. The design was then being calculated on its heat transfer behavior using simulation with 3-D finite element method. The experimental and simulation results of various packaging area parameters were presented with respect to 0.75 W, 1 W and 3 W LED chips. Both experimental and simulation results show close agreement that through the design of additional packaging arrangement it can reduce the thermal equilibrium temperature of LED. It was found that the addition of 9 cm2copper-packaged area improves the thermal dissipation of LED, resulting in a reduction of chip temperature lower 5degC than non-packaging pattern. (2) System level: Design and develop heat pipe structures as heat sink for a LED illuminator set. The experiments were conducted to investigate the cooling characteristics of heat pipes by changing working fluid mass and working angle. Additionally, both discrete hotspot of LED and central heating of heat pipe were studied. The results of heat pipe experiments show that when the experimental set of LED illuminator was used in horizontal angles, resulting in the heat pipe which fills 2.52 g water volume has the best thermal properties than others. Resulting in the heat source temperature maintain in 50degC. Whereas others have higher temperature results due to the steam inside pipe choked. The experiment and simulation results show in this study provide very useful contributions for the application of heat dissipation for LED both in chip level packages and system level performance. [C1147]

"Adaptive formation transition among a mobile robot group based on phase gradient"

We propose an algorithm for adaptive formation transitions of a robot group composing autonomous, nonlabeled robots. In the proposed system, one leader robot that knows the target position guides the other robots; the other robots do not have any global information. Each individual robot is equipped with a nonlinear oscillator and a simple communication system realized by LED flashlights and photodetectors. In order to control these robots, we have used phase gradients and phase waves in a manner similar to that of a slime mold (amoeba). By controlling only the leader robot, we can generate and erase a phase gradient. We propose an algorithm to control the heading directions of the follower robots according to the phase gradients. By using this algorithm, a

robot group can change its formation adaptively in an obstacle region. The algorithm enables the robots to move in a tight formation in free space and dissolve this formation in obstacle regions in order to avoid deadlocks. We have not only formulated the algorithm but also developed real hardware and analyzed the system design. We have verified the proposed system by simulations and by real implementations of 12 autonomous mobile robots. [C1148]

"Illumination-based real-time contactless synchronization of high-speed vision sensors"

To acquire images of a scene from multiple points of view simultaneously, the acquisition time of vision sensors should be synchronized. In this paper, an illumination-based synchronization technique derived from the phase-locked loop algorithm is proposed. Both Simulation results and experimental results show that the operation of vision sensor can be successfully locked to the corresponding edges of an intensity-modulated LED illumination signal in real time, as long as the feedback gain is empirically chosen with the help of MATLAB simulation. [C1149]

"A PWM Controller IC for LED Driver Used to Multiple DC-DC Topologies"

A pulse width modulation (PWM) controller chip for LED driver was presented in this paper. The controller features two major operation modes, current feedback mode and constant current mode, so as to applicable to almost all DC-DC converter topologies such like buck, boost, buck-boost, flyback and SEPIC. A special error amplifier, which is composed of two sub-modules and a mode selector, was introduced to this chip to different applications. The peak current mode control with slope compensation was proposed to its control strategy. The controller integrated circuit (IC) was designed, simulated and fabricated in 1.5 mum BCD process. And both the simulation and test results were consistent with expectations well. [C1150]

"More Residual Crude Oil Can Be Displaced Out by Micro-Forces in Chemical Flooding"

Experimental results indicate that the displacement efficiency (De) after flooding by driving fluids with and without elastic characteristics is different at the same pressure gradient. Macro forces cannot explain the difference of the De by different driving fluids. Therefore, the changes of micro forces acting on residual oil by driving fluids with elastic properties and the increase in the De are analyzed. In this paper, through experimental analysis, the influence of elastic characteristics of the driving fluid on De is analyzed. The effects of change in micro forces on residual oil are analyzed. This micro force does not change the pressure gradient and mainly acts on the protruding portion of different types of residual oil, causing the protruding portion to change shape and mobilize or migrate. The results on visualization core models confirm the above calculation and analysis, the De after flooding by fluids with different elastic properties are given. [C1151]

"LEDs: A Promising Energy-Saving Light Source for Road Lighting"

Rising demand with diminishing reserves of oil and gas spread the energy crisis all over the world. Renewable energy and efficiency technology are the keys to resolve the energy crisis. As the improvement in luminous efficacy, LEDs have been an energy-saving choice for general illumination and road lighting. This paper made a comparison between LEDs system and HPS system for road lighting to evaluate which one is more energy efficient and discussed some factors may influence the efficiency of LEDs system and HPS system, such as mesopic vision, dimming, color of illumination. Though the difference in total luminaire efficacy was not that much in favor of the LEDs, LEDs show a promising prospect in the near future because of the dramatic improvement in luminous efficacy. [C1152]

"Triazine herbicides determination in water with an optical biosensor"

The alternating deposition on quartz of a cationic polymer and the integral bacterial membrane protein called Reaction Centre led to the formation of the polyelectrolyte multilayer called PEM. The PEM revealed to be a valuable tool for the determination of the presence of herbicides in water through the measurement of its optical properties. Among the most striking features of the PEM is the long time stability of the embedded protein that allowed the use of the same specimen for several months without any loss in sensitivity or reproducibility of the determinations. Here further details on the PEM structure and properties will be presented together with a first attempt to overcome the major drawback of the proposed biosensor, i.e.: its poor sensitivity. [C1153]

"Development of a low cost optical tilt sensor"

The paper deals with the theory, design, fabrication and test results of a Fiber optic tilt sensor. The sensor is based upon the modulation of light intensity with the change in the level of mercury (Hg) surface with tilt. 650 nm light-emitting diode (LED) is used as light source and the reflected light is detected by light dependant resistor

(LDR). The output of the receiver circuit is directly proportional to the tilt angle. The sensitivity of the two probe sensor is 0.013 V mrad-1and the maximum range covered is 53.4 mrad. The sources of error and their minimization have been discussed. [C1154]

"Plasmons on metal layers embedded in dielectric PBG cavity"

This paper describes the analysis of the effects induced on the resonant mode originating inside a Bragg waveguide by the presence of an Ag metal layer. Since it exhibits a negative value of the dielectric permittivity and a relatively low absorption in the visible and NIR ranges, the Ag metal layer is able to support surface modes. By exploiting surface plasmon features we investigate on an alternative fashion of tuning and enhancing resonant modes for LED applications. The analysis has been performed using FDTD method, where the experimental data of the Ag permittivity are introduced using Drude model. [C1155]

"Improvements on Corrugation Pitch Modulated Distributed Coupling Coefficient Distributed Feedback laser structures for single longitudinal mode operation"

Optical communication systems depend heavily on the performance of the light emitter, usually a distributed feedback (DFB) laser. This paper presents optimised corrugation-pitch-modulated (CPM) distributed-coupling-coefficient (DCC) DFB laser structures specially designed for single longitudinal mode operation. The optimisation process is described and divided into two stages: near and above threshold. Near threshold, the purpose is the simultaneous maximisation of the normalised mode selectivity (S) and the minimisation of the electric field flatness (F). Above threshold, the power emission spectrum is assessed, as well as the side mode suppression ratio (SMSR). For the CPM-3DCC-DFB, S ap 2.54, F ap 0.019 and SMSR ges 48 dB are achieved, which clearly outperforms similar laser structures proposed elsewhere. [C1156]

"Advances and prospects in high-speed information broadcast using phosphorescent white-light LEDs"

In this paper, we present experimental results on optical wireless transmission using commercially available phosphorescent white-light LEDs. To the best of our knowledge, we demonstrate for the first time visible-light links operating at transmission rates up to 200 Mb/s over typical room distances and at reasonable bit-error-ratios. The experiments were performed using optical filtering at the receiver and on-off-keying as well as discrete multi-tone modulation combined with off-line processing. Moreover, we briefly discuss fields of application, the status of standardization and topics for further research. [C1157]

"Temperature-Controlled Transfer and Self-Wiring for Multi-Color Led Display on a Flexible Substrate"

We propose an integration method for arranging LED bare chips on a flexible substrate to fabricate a multi-color LED display. LED chips (240 mum times 240 mum times 75 mum) which were arrayed on an adhesive sheet were transferred to a flexible circuit substrate using our temperature-controlled transfer (TCT) and self-wiring (SW) method. Using these methods, we demonstrated a 5-by-5 LED flexible device and a two-color (blue and green) LED device, and observed light emission from the LED chips. [C1158]

"Organic light-emitting diodes as surface plasmon emitters"

The here demonstrated combination of surface plasmons and organic light-emitting diodes enabled the development of a nano-optical light source, which is potentially interesting for nano-photonic devices. [C1159]

"Cost-Effective Hundred-Year Life for Single-Phase Inverters and Rectifiers in Solar and LED Lighting Applications Based on Minimum Capacitance Requirements and a Ripple Power Port"

Energy storage requirements for converters with a dc port and a single-phase grid-connected port are evaluated, based on the unavoidable double-frequency power requirement. The minimum energy storage requirement is linked to a minimum capacitance requirement for converters that use capacitance energy storage. It is shown how to employ a ripple power port to manage energy storage and decouple capacitor ripple from power ripple. A ripple power port allows a designer to make a choice of capacitor voltage independent of system voltages. This in turn allows film capacitors of modest size to be used for energy storage in these applications. A combination of ac link converter and ripple power port leads to a dramatic increase in reliability: it is shown that converters with nominal ratings up to 200 W can be designed with expected mean-time-between-failure ratings on the order of 1.4 million hours-sufficient for hundred-year operation in long-life applications such as photovoltaic converters and LED lamps. This large increase in life is achieved with minimal extra cost. [C1160]

"A Simple Current-Balancing Converter for LED Lighting"

In this paper, a current-balancing converter is proposed herein and applied to driving LED strings paralleled, so as to make the required current shared among LED string. There are two stages of the proposed current-balancing converter. The first stage is one buck converter under constant current control and transfers DC current to AC current, whereas the second stage is passive AC-DC rectifiers with front-end current-balancing transformers. Some experimental results, together with a simple mathematical derivation, are provided to verify the proposed scheme. [C1161]

"New Alternative Passive Networks to Improve the Range Output Voltage Regulation of the PWM Inverters"

This paper presents different topologies of buck-boost converters with passive input networks that have alternative topologies; this is known in the literature as a Z-source inverter. Alternative passive networks were named by the authors as T-inverters; these improve output voltage regulation of the PWM inverters. T-inverter has fewer reactive components in comparison to conventional Z-source inverter. The most significant advantage of the T-inverter is its use of a common voltage source of the passive arrangement. This solves many problems involving electromagnetic compatibility which are present in the Z-source inverter. Experimental results for the T-inverter are in agreement with theoretical and simulated predictions. [C1162]

"Boost-Flyback Single-Stage PFC Converter with Large DC Bus Voltage Ripple"

The life time of lighting emitting diode (LED) can reach 100,000 hours. Compared to other power supplies, the power supply for LED requires long life time in addition to high efficiency and high power factor. Electrolytic capacitor has the shortest life in switching power supplies. In order to prolong the life time of power supply, it is necessary to reduce the storage capacitance and use other kind of capacitor instead of electrolytic capacitor. In this paper the relationship between storage capacitor voltage ripple and capacitance is analyzed. The PF and DC bus voltage of the boost-flyback single-stage PFC converter is analyzed. When flyback works in DCM, the DC bus voltage is independent of the load. Then the capacitance is reduced and the voltage ripple is increased, in this way, the high voltage ceramic capacitor can be used instead of electrolytic capacitor. The analysis is verified by the experiment. [C1163]

"LED Drive Circuit with Series Input Connected Converter Cells Operating in Continuous Conduction Mode"

This paper introduces an LED drive circuit implemented by series input connected converter cells with a common duty cycle control approach operating from a dc voltage bus. With this structure, low voltage high frequency ICs and low profile components can be applied in high voltage applications. Flexibility is provided for the cells to work under different voltage supply conditions by simply changing the number of series converters. With the converters operating in continuous conduction mode (CCM), the common duty cycle control approach enables automatic line voltage sharing and output current copying. The approach results in a control-to-output transfer function of the system that is close to that of a single converter for ease of feedback loop design. The modular approach also allows continued operation in the presence of open circuit LED failures. Design considerations and experimental results are presented for a 25 W 3-cell system with 9 Luxeon K2 high brightness LEDs, demonstrating line voltage sharing, output current copying and LED failure response. [C1164]

"Detailed thermal modeling of high powered LEDs"

The introduction of high powered LEDs has brought extensive challenges with regard to thermal design, from chip level to system level thermal management. With the increased efficiency of modern high power LEDs, it is important that the thermal modeling of an LED application calculate the actual thermal load produced by the component. In the case of high power LEDs; this will differ significantly from the total power consumed. In the following paper the advantage of implementing a detailed and computationally efficient LED model is assessed. The assessment compares the detailed model with thermal resistance models and considers its ability to model transient applications as well as an optimization tool. [C1165]

"Methodology for thermal and electrical characterization of large area OLEDs"

In our project the final goal is to develop the cost-effective roll-to-roll technology of fabricating large area, high throughput OLED devices for intelligent lighting applications. The main achievements of the first six months of the project are described in this paper. An electro-thermal FDM simulator was developed on the basis of an existing thermalonly simulator. The simulations proved the necessity of building a shunting grid of high

conductance at the transparent anode of the OLED device. The model validation technique and a method for the thermal qualification of the targeted device were also elaborated. [C1166]

"On the standardization of thermal characterization of LEDs"

Nowadays the demand for thermal standards for power LEDs is increasing. On the one hand metrics for fair comparison of competing products are needed; on the other hand, designers of power LED-based applications demand reliable and meaningful data for their daily work. Today's data sheet information does hardly meet any of these requirements. In earlier papers we compared the current situation in the LED world with the situation in the IC world over twenty years ago, observed that much can be learned from the progress achieved, and concluded with a proposal for action. This paper addresses thermal issues that are specific to light emitting diodes (in fact, also semiconductor devices), the drawbacks of the current situation with respect to the information in the data sheets, and emphasizes the need for electro-thermal models. It also includes a new version of the proposal for action. Note: This paper is an update of a paper presented at THERMINIC 2008. [C1167]

"Poster: Updating an obsolete trainer using passive haptics and pressure sensors"

Training systems based on hardware mockups provide physical fidelity at the expense of flexibility. Maintaining concurrency in these mock-ups can be time-consuming and expensive. Over the past several years, Southwest Research Institute (SwRIreg) has worked with the United States Air Force to develop a generalized approach which uses purely virtual assets to provide training in a flexible environment in which configuration changes are made solely through software modifications. While a purely virtual approach has proven effective and flexible, it lacks the realistic interactions supported by the physical constraints present in mock-ups. This paper describes a novel approach to provide a more realistic interface while also extending the useful life of a training system which might otherwise be rendered obsolete. The technique combines virtual and real assets to provide haptic feedback. The interaction technique uses precision finger tracking combined with tactile sensors attached to the finger tip. [C1168]

"Study of an LED device with vibrating piezoelectric fins"

This study examines an innovative design of a proposed vibrating fin for thermal management of an LED device. The vibrating fin, coated with thin copper and composed of piezoelectric material, can vibrate and conduct heat from the finned base using the piezoelectric effect. This innovative heat-dissipation device can easily break the thermal boundary layer to enhance heat-transfer rate by changing the convective heat-transfer coefficient. In this study, three-dimensional transitional models for the vibrating fins are successfully built to investigate the major heat dissipation phenomena. Simulated results show that the performance of the vibrating fins is strongly affected by dimensions, vibrating frequency, pitch, and amplitude of fins. In addition, the thermal performance of fins can be further increased by the proper phase difference between the fins and the direction of gravity. The phase angles of the vibrations affect not only the flow field, but also the temperature distribution around the fins. [C1169]

"ESD event simulation automation using automatic extraction of the relevant portion of a full chip"

An ESD SPICE simulation design analysis flow for a diverse design environment is introduced. Since the complexities of today's integrated circuits often make full chip transient simulations impractical and in many cases even impossible, this flow includes the automatic extraction of the relevant devices for a given ESD stress. An additional challenge is posed by the high number of simulations required for a comprehensive ESD analysis. To obtain timely results and cater for all required stress pin combinations, the simulations are run in parallel in a compute farm environment. For small to medium designs, a complete ESD performance assessment is typically available within several hours. [C1170]

"Algorithm for Kinematic Measurements using Active Markers"

Kinematic measurements using active markers are well known methods. This paper aims at the development of an image analysis algorithm and LabVIEW based software tool for active marker based gait analysis. Active markers in the form of light-emitting diodes (LEDs) were positioned at anatomical landmarks to measure the coordinated kinematics of human joints. [C1171]

"A versatile DC-DC converter designed by using switched-capacitor techniques"

Aimed at mobile applications such as backlighting applications, battery applications, etc., a switched-capacitor (SC) DC-DC converter which offers a (N-s+)/(N-s) times mode ((N=1,2...) and (s=0, 1, 2,...)) as well as a step-

down mode of operation is presented in this paper. Compared with the conventional versatile converters, the proposed converter can realize high efficiency and flexibility of output voltages. The validity of the proposed converter is confirmed by SPICE simulations and theoretical analyses. Concerning the power efficiency and the optimal duty factor, the confirmation result shows that the theoretical results correspond to the simulation results well. Furthermore, under the conditions where the input voltage Vin=3.7 V, the output load and RL=30 Omega, and the output voltage Vout=3.3~ 5.3 V, the proposed converter can improve the power efficiency more than 20% from that of the conventional circuit. [C1172]

"High speed VLC system based on turbo-coded OFDM scheme"

Today, the improved wireless communication technique for increasing demand for the next generation communication system is developed variously to transmit a long distance and high data. Visible light communication (VLC) system uses radiated light of LEDs. However, VLC have weak points which deteriorate performance of communication. Because there is multi-path fading that occurs propagation delay by interior walls or other things in indoor environments. In this paper, we propose both turbo codes to mitigate interference at the transmitter and orthogonal frequency multiplexing (OFDM) to provide high speed data transmission. The encoding and decoding of the proposed system are described and simulation results are analyzed. [C1173]

"Performance analysis of the VLC system with modified HDB3 line coding"

We propose a modified high density bipolar 3-zeros (HDB3) line coding for a visible light communication (VLC) system. Modified HDB3 line coding is defined as follows. First, we apply half bit transition to HDB3. Second, we decode encoded bits using difference of bit transition level in one bit duration. As a result, we obtain advantages about synchronization problem and noise effect mitigation at the receiver. We set up indoor the VLC simulation environment by 3m*5m*5m size (height*long*wide). At simulation results, we show 2-3dB gain as compared with existing line coding schemes. [C1174]

"A study on optical wireless train communication system using mobile object tracking technique"

In this paper, we propose a new ground-to-train communication system using mobile object tracking technique thinking that can realize enough transmission speed on the moving train. Based on the field experiments, we report our proposed system's effectiveness as the new high-speed ground-to-train communication system. We also propose the tracking control algorithm of beacon light using the wide-angle lens and the telephoto lens. This algorithm is used for mobile object's position acquisition in the proposed system. The wide-angle lens is used for acquiring the beacon light, and the telephoto lens is used for tracking the beacon light. [C1175]

"125 Mbit/s over 5 m wireless distance by use of OOK-Modulated phosphorescent white LEDs"

We report a wireless visible-light link operating for the first time at 125 Mbit/s over 5 m distance indoor by use of on-off-keying (OOK), resulting in bit-error-ratios below 2middot10-3. [C1176]

"A study on the power LEDs drive circuit design with asymmetrical half-bridge resonant converter"

Recently white light-emitting diode (LED) has very attractive attention as a backlight for LCD display and lighting sources. The series-parallel connected LEDs must be driven from a current source because their forward voltage varies, as a result the brightness changes depending on the forward current increases. In this paper, the suitable LED driving system is proposed for LED lighting sources. The driving system is consist of high power factor correction circuit and isolated constant current DC-DC converter with high efficiency. [C1177]

"Fabrication of a near infrared OLED using a new organic chromophore"

We have fabricated a single-layer near infra-red organic light emitting diodes by a new luminescent material. The characteristics of this diode is measured and investigated with different thicknesses. Electroluminescence is observed with the peak at 800 nm. [C1178]

"LCD panel sector-dimming controlled high efficiency LED backlight drive system"

This paper presents an LCD panel sector-dimming controlled high efficiency LED backlight drive system. The proposed LED backlight drive system is composed of a high efficiency DC-DC converter capable of operating over a universal AC input voltage (180~265 V) and a high performance LED backlight sector-dimming controller. The proposed system achieves high efficiency with a soft-switching asymmetrical half-bridge DC-DC converter using a synchronous rectifier and an LED backlight sector dimming controller using lossless power semiconductor switches (MOSFETs). In order to achieve high performance, the proposed system performs the

sector -dimming and the current regulation using a low-cost microcontroller and MOSFET switching, resulting in high contrast and brightness. A 90 W laboratory prototype was built and tested. The experimental results verify the feasibility of the proposed system. [C1179]

"A novel led driving circuits development for decorative lighting system energy saving"

The forward current draft with the temperature changes is a characteristic of LED. This research used this characteristic to achieve control optimization of LED by the forward current feedback. Temperature detection through forward current measurements was applied to LED PWM to carry out the best thermal management of LED arrays under temperature variations, which can offer steady illumination and keep constant chromaticity. LED spotlight products are mainly used for lighting show box display to replace the incandescent lamp which has been forbidden by EU from the year of 2009. Such kind of products now is available on the market. However, the illumination decay and chromaticity changes with operation temperature obstruct wide distribution of LED spotlight for decorative lighting systems. The developed technology by this research can be used to control the chromaticity and the illumination of the LED spotlight and a great niche is outward. This research tested various types of LED are provided by different manufacturers, and the database of the changes of LED chip grains against forward current is build. Constant temperature bath was employed to get the curve of forward current and temperature, which will be a basis of forward current feedback and temperature conversions. Self-developed driving circuits were used to control LED to make the relative illumination decays to be less than 5% and the coordinate excursion of Color rendering index on the CIE chromaticity diagram is lower than 0.1. The circuit control of LED spotlight with low difference of illumination and Color rendering index were therefore successfully realized in this study. [C1180]

"Optical analysis and measurements of high-power COP LED packages"

The purpose of this study is to investigate the optical behaviors and thus maximize luminous efficiency (focusing on light extraction efficiency here) of high-power chip-on-plate (COP) LED packages with the low-cost feature. First of all, to validate the luminous flux and candela distribution measurements and TracePro (one of commercial optical software) simulation, a Lumiled K1 LED package (one of commercially-available packages) is analyzed numerically and experimentally and compared with given data sheet. After the validation, both measurements and TracePro are applied to studying the candela distribution and light extraction efficiency of the COP LED packages. Furthermore, parametric studies of lens cavity height-radius ratio (h/r) and cup angle of COP LED packages using TracePro are implemented to find out the key factors to the light extraction efficiency. The results show that the candela distribution of COP LED packages from TracePro simulation is consistent with that from experiments. In optical parametric study, the effect of lens cavity height-radius ratio (h/r) of the COP LED packages on light extraction is found to be negligible, except for h/r=0. Moreover, with given lens cavity, the effect of air gap between silicone encapsulant and lens on light extraction is apparent by a way that air gap decreases with increasing light extraction. Also, it is found that the cup angle below 60Г‚В° does not apparently affect light extraction, but beyond 60Г‚В°, light extraction increases with the cup angle. [C1181]

"Range finding system using monocular in-vehicle camera and LED"

Collisions often occur because the area behind a car is not clearly visible in the dark. In this paper, we propose a system to measure the distance between the rear of the car and a target behind it in order to reduce the number of these accidents. Because it is expensive and time-consuming to develop new devices, this system uses a factory-installed monocular camera, brake light, and tail light that are installed beforehand. The light from the brake light and tail light diffuses, though, so with this system, we aim to extract the slit light from the distribution of the diffused light, and to apply a light-section method. [C1182]

"Properties of a copolymer based on N-vinylcarbazole and 1,3,4-triphenyl-6-vinyl-1H-pyrazol[C3,4-B]quinoline applied in electroluminescent devices"

The purpose of this work was synthesis of a new copolymer consisting of poly(N-vinylcarbazole) and pyrazoloquinoline based dye, suitable to provide electroluminescence in the wavelength range corresponding to the blue. The obtained material was tested in a simple, single layer electroluminescent device. It were studied both its electronic and optical performances. It was found that the maximum of electroluminescence spectrum can be tuned within the wavelength of 450 nm and 490 nm (what reads in terms of colours as the blue and the cyan) by simple variation of the dye content. [C1183]

"Influence of host polymer on performance of organic salt-doped P-OLED with ITO/POLYMER:PBD:TBAPF6 /Al structure"

The effect of different host polymers, PVK and PEMA on the performance of single-layer polymer-organic light emitting diodes (P-OLEDs) were investigated. The turn on voltage were measured about 6.5 volts and 7.5 volts for P-OLEDs involve PEMA and PVK respectively, while they had Imaxvalues about 2.81 mA and 4.08 mA, during the test. The photoluminescence(PL) and also electroluminescence(EL) spectra of the samples were also investigated and compared with each other. While the PL spectra were stood in blue region, the EL spectra were covered indigo region. The spectra investigations show that the FWHM of samples involve PVK was larger than that of PEMA. [C1184]

"Fluorescent effect obtained by encapsulation of vegetal extracts in appropriate silica-derived networks"

The sol-gel method allows the physical trapping or the covalent bonding of many types of organic species inside inorganic or hybrid networks. The combination of organic and inorganic materials represents an attractive approach for purpose of creating some advanced optical hybrid materials with high performance and functionality. Sol-gel optics represents the most active field in the use of hybrid materials. Among the various inorganic/hybrid hosts, silica-derived matrices are preferred being indeed the best candidates for their superior mechanical, thermal and most important-optical properties. In fact, these host networks present a high flexibility in the final material property design (e.g. refractive index tunability) and a broad optical window (they are optically transparent glasses with excellent photonic media as a result of their low optical losses, have unparalleled optical properties and so on). In this context, the main advantage that may be fructified is derived from the possibility of embedding some organic chromophores in appropriate hosts, by coupling the hardness and optical transparency of silica-derived networks with optical properties and bioactivity of natural organic dyes, in order to make desired functional materials. Synthesis of some novel fluorescence nanomaterials loaded with bioactive polyphenols which are present in most plants with a high spectrum of biological activity, by replacing synthetic chemicals, may open new opportunities for optical and bio-medical applications. From this point of view, a driving force in this study was the possibility to create multifunctional materials with fluorescent properties by incorporating of some organic molecules with specific properties (e.g. vegetable extracts) in silica and hybrid silica-silsesquioxane matrices, by using a mild sol-gel encapsulation conditions which enables the reproducible and efficient confinement of selected molecules inside selected silica networks. The fluorescent hybrid nan--omaterials are synthesised using a self-assembly approach in which the surfactants are assembled with inorganic and hybrid silica matrices into sophisticated nanostructures through favourable weak interactions. These weak interactions (e.g. hydrogen bonds) between organic molecules and different sol-gel matrices investigated by FT-IR and UV-VIS spectroscopy showed an important role in the optical properties of many natural extracts. As a result of vegetal extract entrappment, all synthesized hybrid materials manifest a meaningful increase of fluorescent signal (by more than twenty times), due to various factors: the physical adsorption of polyphenolic molecules from extract which does not affect the basic chemical structures; well known optical properties of selected silica-derived matrices that lead to enhancement of the transmission of optical signal within the matrix; tridimensional network of silica that assured an optimum conformational arrangement, without allowing a mobility of organic compounds and neither side reactions occurring from chemical point of view. The size distribution and morphology of the synthesised hybrid fluorescence materials were evaluated by dynamic light scattering and electronic microscopy analyses. For all entrapped samples, a narrow size distribution was observed, with good polydispersity indexes. According to TEM images, the average size of hybrid nanomaterials is of about hundred nanometers. As expected, the samples based on silsesquioxane exhibit a lower size, comparative to samples prepared by using an inorganic silica matrix. The results obtained clearly revealed the power of hybrid materials to generate complex systems that exhibited better fluorescent properties, the obtained hybrid materials being favorable potential optical systems for a variety of applications due to their outstanding properties based on the mixture of natural organic compounds and appropriate silica host matrices. [C1185]

"Physical motion analysis system in driving using image processing"

This paper proposes an optical motion capture system for physical motion analysis in driving. Markers for motion capture consist of two high intensity LEDs, one for position measurement and the other for pilot signal. The pilot marker flashes synchronized with the periodic pulse, which is generated by multiplying the UTC second (1PPS) obtained by the GPS. Video cameras are also triggered with the pulse and thus the proposed system can distinguish the marker every one second in the automobile in the daytime. This copes with problems in optical motion capture system, occlusions and swappings. [C1186]

"Control architecture of a virtual matrix LED display without current drivers"

A new electronic design for virtual matrix LED based screens is presented using D-Type Flip-Flops registers (HC logic) instead of constant current drivers. This design reduces in a significant way the cost and the complexity of

the current large LEDs displays. It works as a write only memory on the basis: "it is seen what is saved". This design is adequate for variable brightness screens on multicolour and fullcolor displays. [C1187]

"Thermal characterization of high thermal conductive graphites reinforced aluminum matrix composites"

Due to the development of high power density and high heat flux of IC and LED components and devices, the thermal management of microelectronics has become a very critical issue in 3C and optoelectronic industries. This has lead to the requirement of high thermal performance materials and thermal modules. To enhance the thermal performance of current thermal modules, it is very important to develop advanced thermal management materials to replace the conventional monolithic metals. In this study some kinds of graphites reinforced aluminum matrix composites were developed. The effects of reinforcement types and its volume fraction on thermal properties such as thermal conductivity as well as the thermal expansion coefficient were studied. Moreover, their thermal performance such as heat spreading resistance and thermal resistance compared to pure aluminum and copper were also conducted. From the results, it showed that the thermal conductivity of graphite/Al composites can reach to 500~600 W/m.K in X-Y plane and 40~100 W/m.K in cross plane with thermal expansion less than 10 ppm/K and density less than 2.5 g/cc; The spreading resistance of this composite is 2~5% lower than the one of pure copper, and 25% lower than the one of pure aluminum. [C1188]

"Session 20: Green materials & process II"

First Page of the Article [C1189]

"Development of Thermal spreading technology nowadays"

Thermal spreading is a technology of decreasing the hot spot for electronic cooling and other high heat flux applications, and is characterized by high heat transfer, uniformity of heat removal. Vapor chamber is one of the Thermal spreading technologies which depend on two phase heat pipe technology. This paper provides an introduction to vapor chamber for electronic cooling, high power LEDs, multi heat sources, communication devices, and bio technology applications, reviews the development of thermal spreading technology nowadays, and summarizes the data regarding effects of vapor chamber inside thermal module, future applications, and suggestion. Some models of multi heat sources cooling were also presented. [C1190]

"High brightness LED assembly using DPC substrate and SuperMCPCB"

This paper is to evaluate the thermal performances of a Direct Plated Copper (DPC) substrates attached on a high performance MCPCB thermal board for high brightness LED (HBLED) applications. The advantages of DPC substrate compared to traditional Direct Bond Copper (DBC) substrate include: more robust bonding between the substrate and copper metallization, ability to offer substrates with a wide range of copper thicknesses including thin copper for fine patterning, excellent electrical and thermal contact between copper plated vias and surface metallization and lower temperature processing which means much reduced residual stress in the copper metallization layers and copper/substrate interface. The high performance MCPCB in this study has a unique structure, in which an integrated metal post is located directly underneath the LED device providing an effective thermal path for the assembled device. In addition, as this metal post is an integral part of the heat spreader, resin/metal delamination concern associated with most conventional MCPCB can be avoided and therefore provides the highest possible long-term reliability, especially when lead free solders are used as device attachment materials. Using this DPC substrate and high performance MCPCB combined structure, it was established that the performances of LED devices can be greatly improved. Investigations were conducted to establish the compatibility of the high performance Direct Plated Copper (DPC) ceramics substrate (Al2O3and A1N) assembled on this improved thermal board structure and the findings will be presented in this paper. [C1191]

"Session 7: LED thermal solution"

First Page of the Article [C1192]

"Development of UV stable LED encapsulants"

In recent years, high power white LED devices (LEDs) have been developed and widely used in display, display backlight module and general lightings. UV LED pumped RGB phosphors is one of the methods to generate white light. It shows some advantages, such as: excellent color rendering index (CRI), tolerant to LED variation, etc. However, the high energy of UV or near UV based LED lighting source leads to encapsulated transparent epoxy resin chain scission and forms some chromatic sites. The discolored epoxy materials decreases the light

output and accumulates heat inside to speed up material degradation. Moreover, LED display and LED lighting devices also suffer UV irradiation from sunlight in the outdoor applications. In order to avoid the UV-degraded problem of LED encapsulating materials, we developed UV resistant material technology. Our developing strategies included evaluating UV stabilizer, synthesis of silicone modified epoxy or curing agent to enhance the bonding energy of encapsulating material. Transparent epoxy resin and anhydride curing agent systems are commonly used in LED encapsulation applications. In this work, UV resistant properties of different epoxy resin structures were evaluated, firstly. It was found that aromatic type epoxy system discolored more quickly than the other epoxy systems due to the UV absorption of the conjugated structure. Secondly, we evaluated the effect of UV absorbers (UVAs) for the UV resistant properties. Modification with silicone materials has been utilized as the most effective method to improve the toughness, thermal and UV stability of transparent epoxy encapsulant. Therefore, we also developed silicone-modified reactive compounds to improve UV stability of current epoxy based encapsulant. The results showed excellent UV resistant properties of cycloaliphatic epoxy systems by the addition of silicone-modified epoxy. The technologies of UV absorbers and silicone-modified epoxy systems demonstrate excellent UV resistant- properties for high performance LED applications. [C1193]

"Numerical and experimental study of thermal management on HB LED devices"

A finite element method based on a direct algorithm is applied in this study to estimate the time-dependent and time-independent convection heat transfer of high-bright LED(HB LED) heat dissipating mechanisms. Numerically simulation and experimental measurement are both performed to investigate the thermal characteristics of HB LED devices. By monitoring the transient temperatures at the different measurement positions of the device, it is placed into well controlling ambient temperature environment when the LED is subjected to different thermal loading. Experimental data is subjected to the numerical tests in order to verify the accuracy of simulation models. Therefore, the thermal management of HB LED devices can be investigated. The results indicate that established models are not only proved to enhance heat dissipating of LED but also well consistency to the experimental data. Finally, a simple design of HB LED device is demonstrated to prove the success of this research and can it be applied in the present industry. [C1194]

"Floor plan design for 3D multi-layer substrate"

In this paper, a floor plan design application for multilayer substrate is implemented. The simplified evaluation method for thermal, routing and area criterions are discussed and implemented. And then normalize the criterions before the substrate floor plan such that the settings for substrate floor plan are reasonable. And finally, the calculated routing length, area and ANSYS thermal simulation results are compared. [C1195]

"Optimization design of cup-shaped copper heat spreaders for high-power InGaN/sapphire LEDs"

To improve light extraction efficiency and heat dissipation of sapphire-based light-emitting diodes (LEDs), we develop and optimize copper heat spreader which was electroformed in close contact with sapphire. On the basis of simulation results, an LED with copper lowers junction temperature when compared with the LED without copper. In addition, a copper-surrounded LED with protruded bottom surface exhibits almost the same thermal performance as that with flat bottom surface. In practical fabrication, all the LED samples with copper show significant reduction in junction temperature form 150.4Г‚В°C for the original LED to less than 100Г‚В°C at injection current of 1 A (~3 W/mm2). The encapsulated LED at the same driven current yields an output power of ~700 mW, which is 2.7 times higher than that of the original LED without copper. [C1196]

"Investigation of thermally conductive ceramic substrates for high-power LED application"

In this paper, the thermal analysis is carried out by the combination of actual thermal measurement and numerical finite element simulation to investigate insightfully the thermal characteristics of each element in the whole assembly of the LED lighting system (LLS). Based on the thermo/fluid coupled field numerical simulation, the ANSYSГ‚Вї,Вї,s finite elements are used to model the detailed assembly parts in the high-power LLS. The highpower LLS samples were assembled by soldering the LED-Ceramic package on a copper sheet, which was then attached to an aluminum alloy heat sink using thermally conductive adhesive. Four different ceramic materials: AlN, SiC, LTCC with Ag thermal via and Al2O3, were studied as ceramic thermally conductive substrates (CTCS) for the high power LED dies' packaging. The ceramic sub-mounts were produced by packing multiple LED chips with silicone resin containing phosphors coated on a CTCS. The thermal resistances of ceramic sub-mounts with the same configuration were determined to be 0.1411Г‚В°C/W for AlN, 0.1778Г‚В°C/W for SiC, 1.9732Г‚В°C/W for LTCC with 30 volume% of silver thermal vias, and 2.0262Г‚В°C/W for Al2O3. Results indicate that ceramic materials are very suitable for reducing the thermal management issues for high-power LED lighting applications. [C1197]

"The application of UV-LEDs to printed circuit board process"

This study investigated using high power UV light emitting diode (LED) to replace the traditional UV lamp in printed circuit board process. It was expected to take the advantages of energy conservation, long life and quick response of UV-LEDs. The feasibility of this replacement was evaluated. There were two kinds of light modules in this work; Type 1 composed of six 1-Watt UV-LEDs arranging as a circle of diameter in 50 mm. Type 2 was equipped with twelve 3-Watt LEDs soldered on a MCPCB of 100 mm in diameter. Both modules emitted a spectrum distribution peaking at a wavelength of 400 nm. The angle of view measuring apparatus was completed for measuring light module angle of view and UV intensity. In order to obtain collimated light source, the parabolic reflectors were used for Type 1. The reflectors showed the six to ten times enhancement of intensity and the improvement of the angle of view from 140Г‚В° to 30Г‚В°. In order to approach the practical process, only the original light source was replaced by UV-LED light modules. Other parameters on the automation system remained unchanged. After etching, the patterns were observed and measured by image measurement software. Following the PCB standards, only results with relative errors under 15% were accepted. At present, the minimum reproducible feature size is 75 Г‚Вїm by Type 2 light source with 50 mm or 100 mm distance between light source and mask. The results show the feasibility and potential usage of UV-LED in PCB lithography. [C1198]

"Far field calculations and experimental characterization of nanostructured OLEDs"

We present far field calculations for nanostructured organic light emitting diodes (OLEDs) and compare these to experimental results. OLEDs with a nanostructured indium tin oxide (ITO) anode were fabricated and characterized. Corresponding two-dimensional far field calculations are carried out via two-dimensional finite difference time-domain code (2-D FDTD) with integrated 2-D far-field projection. Furthermore, spherical three-dimensional (3-D) far field calculations are obtained by an efficient multipole-based near-to-far field transformation from three-dimensional FDTD data. [C1199]

"System level design of a LED lighting driver based on switching power supply"

LED has been applied in many aspects in daily life because of its advantages, and this trend will go on. Therefore, the research and design of the LED lighting driver becomes popular. In this article, system level design of a LED lighting driver based on switching power is described. The chip is designed with hysteretic control mode, and the peripheral circuit topology structure is buck converter to drive the LED loads. The important dimming module is discussed and designed; then the frequency jitter technique is introduced into the design to reduce EMI. At last the simulation result of the whole chip is presented. [C1200]

"A practical research on randomness of digits of binary expansion of irrational numbers"

Random number generation methods are subjected to numerous researches in various fields such as cryptography. In this research, statistical quality of a few million digits of binary expansion of some irrational numbers has been tested through dozen of standard tests developed for random and pseudorandom number generators. The results indicate that digits of binary expansion of these numbers can be used as real random sequence in cryptographic applications. [C1201]

"The electrical control system of a programmable LED ring lamp and it's application on vision measuring field"

In this paper, The electrical control system of a programmable ring lamp and it's application on vision measuring machine are introduced. The lamp is separated into five rings and eight sections. Every rings make the light reflection different because the LED eject light with different angle. Lamp control types are designed according to the controlling requirement. After the control styles have been made clear, a lamp control circuit were designed. We developed a program to control the lamp according to the hardware environment. The lamp control program is integrated into the auto-inspection parts in the vision measuring software. A lot of tests were done on the vision machine which is equipped with it. The results show that the multi-angle lighting and combination lighting styles make the measurement more accurate. [C1202]

"Study of biomineralization processes by cryo-TEM"

The present work describes the study of the biomineralization process of biohybrid composite for bone substitution and repair. The material was developed nucleating apatitic phases on self assembling collagen fibers, acting as a template. Using cryogenic transmission microscopy (cryo-TEM) it is possible to freeze material specimens at different times of the mineralization process and then observe the vitrified samples at cryogenic temperature. The preparation procedure of the specimens was set up. The nucleation of the apatitic phase on

the collagen was observed from the beginning of the synthesis and the time needed for the complete assembling of the collagen fiber was determined. [C1203]

"Optimization of optical behavior of InGaN-GaN MQW green LEDs with a novel high-low profile of Indium composition in the active layer"

In this paper, it was proposed and demonstrated with rigorous simulations a method to increase the luminous intensity and radiative efficiency of an InGaN/GaN multiple quantum well (MQW) green light-emitting diodes (LEDs) by incorporating a novel high-low Indium composition in InxGa1-xN in the active layer. The effect of varying Indium composition, p-type and n-type doping of GaN and active layer thickness on the radiative rate and luminous intensity of the LED were studied by using ATLAS software (Silvaco International). By using this novel idea, it was shown that the device performance of GaN based green LEDs incorporating a high-low In composition in the active layer have significantly improved over that of the conventional green LEDs that use a single Indium composition in all the layers. [C1204]

"Monolithic silicon optical microdevices for biomolecular sensing"

Here, we present monolithic silicon optocoupler array chips properly biofunctionalized to affinity biosensors. The optocouplers consist of monomode silicon nitride waveguides that optically link silicon LEDs and silicon photodetectors. The light emitters are silicon avalanche diodes that emit light when reverse biased beyond their breakdown voltage. The optical device is transformed to biosensor by spotting the waveguides with protein or DNA probes and by coupling a microfluidic compartment on top to allow for the supply of the reagents and the sample. Binding of the counterpart biomolecules changes the optical coupling efficiency and the detector photocurrent. The analytical performance in detecting DNA and protein molecules both in labeled and non-labeled assay formats is described. [C1205]

"Sensor system for non-invasive optical hemoglobin determination"

The Hemoglobin (Hb) concentration in human blood is an important parameter to evaluate the physiological condition. A hemoglobin test reveals how much hemoglobin can be found in the blood. With this information anemia (a low hemoglobin level) and polycythemia vera (a high hemoglobin level) can be a diagnosed and monitored. It is also possible to observe imminent postoperative bleedings and autologous retransfusions. Currently, invasive methods are used to measure the Hb concentration. For this purpose blood is taken and analyzed. The disadvantage of this method is the delay between the blood collection and its analysis, which does not allow a real-time patient monitoring in critical situations. A non-invasive method allows pain free online patient monitoring with minimum risk of infection and facilitates real time data monitoring allowing immediate clinical reaction to the measured data. [C1206]

"Fiber optic bio-sniffer (biochemical gas sensor) using UV-LED light for monitoring ethanol vapor with high sensitivity & selectivitiy"

A fiber optic bio-sniffer (biochemical gas sensor) for alcohol gas monitoring with high sensitivity and high selectivity was fabricated and tested. The bio-sniffer is a gas sensor that uses molecular recognition of enzyme to improve selectivity. Usually, enzyme loses activity in the gas phase. Applying a flow-cell with a gas-intake window to the sensing probe, enzyme immobilized at the sensing region was kept in the sufficient wet condition to maintain activity. The bio-sniffer measures ethanol (EtOH) vapor by measuring fluorescence of nicotinamide adenine dinucleotide (NADH), which is produced by enzymatic reaction at the flow-cell. In order to construct a simplified system suitable for on-site applications, a high-intensity ultraviolet light emitting diode (UV-LED) was utilized as an excitation light. Owing to low power consumption comparing with previous light sources, the bio-sniffer was considered to be suitable for laptop applications such as on-site monitoring. According to the characterization, the bio-sniffer for was useful for continuous alcohol monitoring and showed high selectivity. The calibration range was 0.30-300 ppm which is suitable for evaluation of capacity to metabolize alcohol. [C1207]

"Slippage degree estimation for dexterous handling of vision-based tactile sensor"

In this paper, we propose a new slippage degree estimation method, where the vision-based tactile sensor was used to measure multi-dimensional force and moment in contact with an object. We proposed a new method using a reference image to obtain the stick ratio. The reference image is defined as previous image from which the grasped object moves a certain distance while updating the images. We show that the proposed method can be successfully applied to the following situations, after the macroscopic slippage occurs, the moving direction of the grasped object changes, or a moment is applied. [C1208]

"Electron beam evaporation of Tungsten Oxide films for gas sensors"

Pure and Iron incorporated nanostructured Tungsten Oxide (WO3) thin films were investigated for gas sensing applications using noise spectroscopy. The WO3sensor was able to detect lower concentrations (1 ppm-10 ppm) of NH3, CO, CH4and Acetaldehyde gases at higher operating temperatures between 100Г,В°C to 250Г,В°C. The response of the WO3sensor to NH3, CH4and Acetaldehyde at lower temperatures (50Г,В°C-100Г,В°C) was significant when the sensor was photo-activated using blue-light emitting diode (Blue-LED). The WO3with Fe (WO3:Fe) was found to show some response to Acetaldehyde gas only at relatively higher operating temperature (250Г,В°C) and gas concentration of 10 ppm. [C1209]

"UV LED-based fiber coupled optical sensor for detection of ozone in the ppm and ppb range"

A realized novel optical sensor system to measure the concentration of ozone using the emitted light from Light Emitting Diodes in the ultraviolet range is described in this paper. The wavelength selective light interaction of the gas takes place in a fiber coupled and robust reflection cell. The control electronics are separated from the optical sensor head. Therefore it can be used in harsh environment for instance close to discharge plasma in strong electromagnetic fields or at high temperature. The sensor design is potentially low cost, quite small and well suited for a large number of applications. It can be implemented in industrial process control application or in small battery powered hand held devices. This setup is also capable for a parallel and selective measurement of nitrogen dioxide NO2and sulfur dioxide SO2- this is already implemented and proved. Further specific LEDs are utilized for this purpose in the setup. For the ozone measurements two different sensor heads where used. A small 4 cm long reflection cell with potential for handheld devices and a 40 cm one thought for high resolution stationary application. The resolution (standard deviation measured at a zero concentration of ozone) of the sensor with the small cell is about 30 ppb at 700 msec measurement time and about 3 ppb at 1,4 sec at the longer cell. [C1210]

"Shorting-inductor approach for dimming high power light-emitting diodes"

Parallel dimming for reducing the intensity of high power light-emitting diode (HP-LED) is an effective way of achieving high contrast ratio and wide dimming range. However the scheme has limitation due to response of control loop and higher power dissipation due to losses during turn-off period. Therefore shorting-inductor approach is proposed in this paper which is capable of achieving improvement in efficiency while keeping similar level of performance. Moreover the proposed strategy for dimming HP-LED is considered to be more flexible in its design. For example the converter can provide dimming feature even if controller is not used to keep track of inductor current. This indicates performance of the method is assured with different types of control strategy which implies wider deployment in different applications. [C1211]

"The Nano-Atomic-Clock"

AccuBeat LTD. is developing an innovative miniature atomic rubidium standard based on the coherent-population-trapping (CPT) phenomena. This standard, named nano-atomic-clock (NAC) is designed for very small size (~10cc) and very low power consumption (360mW). The NAC implements an extremely small "physics package" with a volume of 1cc. Although small in size and power the NAC achieves very high performance in terms of frequency stability. The CPT phenomenon is achieved by using light that contains two wavelengths that differ by the hyperfine ground transition of the 87Rb (6.84 GHz). The NAC compact size and the low power consumption are achieved by replacing the (power hungry) Rb lamp and a filter cell that are used in the current technology with a miniature low power laser diode (the VCSEL). In order to improve both the short and the long term stability, AccuBeat has implemented a multiple servo-loop sophisticated scheme. [C1212]

"Sequential-color voltage-adaptable RGB-LED backlight driving system with local dimming control for LCD panels"

Higher luminance efficacy, faster response, lower power consumption, longer operation life, wider color gamut and environmental issues makes RGB LED backlight driving system suitable for high end LCD applications. In this paper, a sequential-color voltage-adaptable RGB LED backlight driving system with local dimming control for LCD panels is proposed. Using the topology proposed in this paper, the panel can be divided into 4 individual areas. A digitally-controlled multi-phase driving system for RGB LED lamp, a current sharing method, and a human machine interface (HMI) for dimming the backlight module will be presented. The output voltage is adjustable so that RGB LED maintains the desired string current and maximizes the efficiency. Finally, experimental results are presented to validate the effectiveness and correctness of the proposed system. Besides the presented system can successfully drive the RGB LED backlight module, and the color-mixing can be achieved using the developed HMI and driving system. [C1213]

"Analysis and implementation of a high voltage pulse driver with energy recovery circuit for CNT-FE lamp"

This paper investigates a high voltage pulse driver for driving carbon nanotube field emission lamp (CNT-FEL) based on a two-switch flyback topology. The proposed driver incorporates an energy recovery circuit to feedback the excess energy to DC bus, thus eliminating the arcing phenomenon caused by the traditional DC driving and improving the system efficiency. Analytical modeling, complete design considerations, and experimental results confirm the validity of the theoretical predictions by the proposed circuit architecture. [C1214]

"Buck-boost converter topology for paralleling HB-LEDs using constant-power operation"

A single switch multi-inductor buck-boost converter topology is presented for paralleling LED-networks. The proposed technique is based on discontinuous inductor currents to achieve a homogenous light-distribution of parallel connected high-brightness LEDs. In contrast to the common approach of driving LED-strings with constant-current, the proposed topology supplies the LEDs with constant-power. The topology has originally been developed for automotive low voltage applications; however applications with galvanic isolations and operating off-line from a 230 V or 115 V mains supply are also possible. A prototype converter has been built and tested to proof its performance for an automotive lighting application and to verify the constant-power operation of the LEDs. The converter drives 6 parallel strings with 4 high-brightness LEDs connected in series. Experimental results demonstrate a good performance when the converter is operated in its desired operation range of discontinuous conduction mode. Measurements confirm the good performance of the converter's constant-power operation, with maximum power deviations below 2% in the LEDs. A comparison of the common constant-current drive of LEDs to the prototype's constant-power operation shows a slightly more homogenous light distribution between the LED strings for the constant-power approach. Furthermore, tests with different heatsink temperatures show a better brightness stability of single LEDs operated at the proposed constant-power compared to the constant-current drive. [C1215]

"Low reverse voltage Ku-Band 10W MMIC SPDT Tx/Rx switch using offset PIN diodes"

In this paper we present the design and performance of a Ku-Band MMIC SPDT power switch utilizing low reverse voltage for the PIN diodes control, by placing diodes in a quarter wavelength distance from the main path. The isolation is better than 35 dB, return loss better than 19 dB at all states and insertion loss is about 0.5 dB. The power handling capability exceeds 10 W, while control signals are no higher then 5 V for all states (i.e. Tx and Rx states). To our best knowledge, this is the first reported low reverse voltage switch to posses all of the above properties. [C1216]

"Thiophene-based material for non volatile organic memory devices: A combined experimental and theoretical study"

A diphenyl bithiophene derivative (DPBT), which shows electrical bistability when tested in a two-terminal memory cell, has been extensively characterized with the aim to highlight the molecular root of the bistable behavior. A vibrational spectroscopic characterization has been carried out, supported by first-principles theoretical studies and X-ray analysis. Spectroscopic markers suitable to distinguish the different stable conformers of the molecule have been predicted and detected. These evidences have been further confirmed by the characterization of molecular species related to DPBT. The result obtained can be applied to determine the molecular isomers present in the organic active layer of the memory cell and opens the way to the identification of the molecular species involved in such electrical bistability. [C1217]

"Organic-inorganic nanocomposite micro-spheres: Synthesis and characterization"

Luminescent nanoparticles with advantageous properties for optoelectronics applications come in both inorganic and organic forms. Inorganic semiconductor nanocrystals (NCs), primarily based on CdSe/ZnS, are highly efficient light-emitters in the visible range of the spectrum; truxene oligofluorenes are an organic counterpart with similarly attractive properties. In this work, we developed nanocomposites with these nanoparticles embedded in a polymer matrix. Mask-less and non-contact processes are used to pattern these nano-materials. A suspension polymerization technique is used in particular to create micron-scale luminescent nanocomposite spheres dispersed in water. Their characterization shows that the properties of the nanoparticles are retained in the micro-spheres. [C1218]

"Light extraction enhancement by the fabrication of sub-micron structures on GaN-based LEDs"

A cost effective and high throughput imprinting technique is integrated to conventional light emitting diodes

(LEDs) chip process to enhance the light extraction efficiency. Sub-micron surface texture composed of spin on glass (SOG) is directly imprinting onto the top of transparent conductive layer (TCL). The electrical performances of LED chips are not damaged after applying the sub-micron structure. Compared to LED chips without SOG cover layer, the light extraction efficiency enhancements are 27.6% and 4.8% for LED chips with two dimensional (2D) hole-array and a planar SOG. [C1219]

"Investigation of UV LEDs for compact back-lighted thyratron triggering"

The back-lighted thyratron (BLT), an optically-triggered pseudospark switch, employs high energy (e.g. UV) photons to produce photoelectrons and initiate the breakdown a low-pressure high-power glow discharge. Characteristics of these switches are high-voltage hold-off (>30 kV), high peak current capability, excellent current rise rate (up to 1012A/s) and a simple device geometry. It is of interest to develop ultra-compact BLTs with reliable and practical optical triggering systems for applications in compact pulsed power. Recent remarkable advances in ultraviolet (UV) light emitting diodes (LEDs) have potentially enabled new optical trigger schemes for compact BLTs: replace expensive trigger light sources such as lasers or UV flash lamps, and thereby substantially simplify the light-triggered BLT systems, significantly reducing the total switch cost and the BLT system volume. In this work, potential utilization of UV LEDs for BLT triggering is discussed. The photoelectron yields are measured for metal photocathodes illuminated by a 266 nm UV laser with 5 ns duration and at a pressure range typical for BLT operation. The number of photoelectrons needed to generate an avalanche in a switch and initiate breakdown is extrapolated from a BLT-based, electron-beam current measurement. [C1220]

"Study of emission efficiency in ac driven light emitter devices"

A study of the high field emission efficiency in ZnS:Mn is presented. At intense electric field conditions the band bending resulting from space charge effects has not been considered since the space charge density in the active layer is low. We demonstrate that ac driven TFEL devices with large insulator capacitance and no space charge effects in the active layer are optimal in terms of providing the energy transfer from sensitizers to luminescent centers. The analysis takes into account the pair-producing mechanism by direct electron impact with a characteristic electron energy distribution described by the Wolff distribution function. From the described model for a typical structure, the emission efficiency behavior could be expressed by the relation between the minimum distances required by the emitted carriers to produce electron-hole pairs and ac drive conditions. [C1221]

"High efficiency and simple architecture phosphorescent OLEDs"

We present an ideal host-guest concept for high efficient phosphorescent OLEDs (PHOLEDs). Highly efficient PHOLEDs with an extremely low doping concentration of 1% are developed. The origin of such a low doping is revealed by energy transfer mechanism studies and ideal host-guest concept. Simple architectures for PHOLEDs are realized based on this ideal host guest concept. Organic double layer and triple layer architectures for PHOLEDs with high efficiency are reported. Results reveal a practical way to fabricate the highly efficient simple structure devices for trouble-free manufacturing processes. [C1222]

"Influence of visual feature for application of high-light emitting diode arrays"

Light emitting diode (LED) display arrays have emerged as the leading technology for large indoor or outdoor display applications. The vision characteristics for the person's eye and the LED features and some methods for solving a certain factors that influence LED picture quality are described. [C1223]

"Multilayer polymer light-emitting diode and solar cell by blade coating"

Multilayer polymer light-emitting diode (PLED) and solar cell are fabricated by blade coating. Multilayer of semiconducting polymers can be easily deposited by blade coating without layer mixing, as confirmed by the total thickness and cross section view in scanning electron microscope. The film thickness variation is only 3 % in 10 cm scale and the film roughness is about 0.3 nm in the micron scale. In addition blade coating has the advantages of low material waste and easy scaling up to the meter scale. For blue fluorescent emission, the current efficiency of 5 cd/A is achieved for a three layer structure with hole transport, emissive, and electron transport layers. Only soluble small molecules are used for all the three layers. For green emission phosphorescent emission of 45 cd/A is achieved for a combination of polymer and small molecules. The efficiency for deep red is 4 cd/A based on polymers and small molecules. In all devices efficient electron injection is realized by a blade coated electron transport layer combined with the relatively stable LiF/Al cathode, in contrary the unstable CsF/Al cathode conventionally used for high efficiency PLED. Patterned multi-color PLED is achieved by an epoxy mask during blade coating. [C1224]

"Optical design of a high brightness LED street lamp"

We propose and develop a high brightness LED street lamp to provide a uniform and wide illumination area, which can eliminate the lamp installation numbers and electrical power consumption effectively. [C1225]

"III-Nitride light-emitting diodes for solid state lighting revolution"

This presentation will include an overview of III-Nitride LED technology, applications, key areas for future improvements, challenges such as efficiency droop. Under the "replacement paradigm", LEDs are replacing conventional light sources. In addition, transcending the replacement paradigm of solid-state lighting for future new applications will be discussed. [C1226]

"Design of dichromatic white light-Emitting Diodes using InAlGaN irregular MQW structure"

A new approach for the design of dichromatic white light-Emitting Diodes (LEDs) has been proposed by employing InAlGaN irregular multiple Quantum Well (IMQW) structures. The electronic and optical properties of the designed InAlGaN IMQWs have been analyzed in details using a theoretical model deduced from the k·p theory. [C1227]

"Enhancement of polarized light-emitting diode through surface plasmon coupling generated on a metal grating"

Further enhancement of the polarized emission efficiency of an InGaN/GaN single quantum well (QW) light-emitting diode (LED) with the QW coupling with surface plasmon generated on an Ag nano-grating structure on the top of the LED by inserting a SiO2 layer between semiconductor and metal is demonstrated. [C1228]

"Improvement of LED extraction efficiency with antireflection coating"

In this paper we proposed a SiON layer deposited on the surface of AlGaInP LED used to decrease total internal reflection. Light propagation property of this layer was simulated by the transmission matrix method. The results of the experiment showed that optical power increased by 11.38% after LED encapsulation. [C1229]

"Light extraction analysis of AlGaInP based LED with surface texture"

Regular, periodic arranged structures were fabricated on p-side-up AlGaInP LEDs through dry etching. The dimension of the structures was optimized by Monte Carlo ray tracing simulation. Due to the appearance of an additional escape cone for light extraction enabled by surface structures, it significantly improves the performance of the chip. [C1230]

"Design method for rotational uniform illumination system with LED"

Based on nonimaging design method, uniform illumination systems with LED source was developed to create a uniform illuminated circular region with desired size in a screen at a prescribed place. By using ray- tracing software based on Monte-Carlo method, the simulation results show that in the illuminated region the luminous uniformity is better than 90 %. [C1231]

"Performance of 650 nm AlGaInP RCLEDs with different p-type DBRs"

The performance of 650nm RCLEDs including 34-pair AlGaAs/AlAs n-type DBRs and different pairs of AlGaInP/AlInP p-type DBRs have been investigated both theoretically and experimentally. The experimental results demonstrate that the device of optimized DBR mirrors with 10-pair p-type DBRs obtain high efficiency, low turn-on voltage and better temperature stability. [C1232]

"A Study of Maximum Power Point Tracking in Novel Small-Scale Photovoltaic LED Lighting Systems"

While most of the current maximum power point tracking (MPPT) algorithms for large photovoltaic systems are complicated and inefficient, this paper proposes a novel method of MPPT specially used in small-scale photovoltaic LED lighting systems. The proposed algorithm is based on the improved research on the characteristics of the PV array in novel lighting systems. The proposed method in the special system keeps the operating point on two fixed values which have been calculated based on the research of PV array. It is investigated and confirmed by the simulation that the proposed MPPT method in small-scale photovoltaic LED

lighting systems is simple and efficient. [C1233]

"Labview Based Dissolved Oxygen Sensor"

A dissolved oxygen sensor based on data acquisition card and Labview was studied in this paper. The stimulated light and fluorescence light signal was fed to the data acquisition card of the computer, and by Labview software we calculated the fluorescence lifetime, based on the relationship between fluorescence lifetime and dissolved oxygen concentration we got the dissolved oxygen concentration. [C1234]

"Indoor optical wireless communication system utilizing white LED lights"

White LED (Light Emitting Diode) is expected to be the next generation of lamps due to its advantageous properties such as high brightness, reliability, low consumption and long life span. An indoor optical wireless duplex channel communication system, as an access to the Internet, utilizing both white LED lights and infrared LEDs, has been proposed by our laboratory. The characteristics such as illuminance and power distribution, impulse response, and modulation techniques are studied. Strategies for design of LED lights and receivers are described. A demo system of proposed type with a peak data rate of 64 Kbps for surfing the net is constructed. This system has integrated functions of lighting and communication, showing a great promise in the future indoor wireless networking. [C1235]

"Research and analysis of the design development and perspective technology for LED lighting products"

The popularization of LED has become an inevitable trend in lighting industry. The existing problems in design theory, optical design, heat emission and many other aspects of domestic LED products have been analyzed and the content and major technological implementation plan of the perspective research of LED products are proposed. Through the research, development and practice of high power LED street lights, the basic considerations for structure, material and shape of LED product development is also discussed. [C1236]

"The tendency of lamps and lanterns and the value of implementing industrial design"

Closely combined with some theories, concepts, innovation and creativity of industrial designing, this essay states briefly the evolution of lamps and lanterns, discussing the future tendency of high efficient and energy-saving, integrally adjustable, small-scale, functional with decorating of lamps and lanterns, thus exploring the value of industrial design in lighting emotion, outlooks and LED development. [C1237]

"White-light-emitting diodes based on Ba2+ co-doped Sr3 SiO5 : Ce3+, Li+ phosphor"

Sr3SiO5: Ce3+, Li+phosphors were prepared by solid-state reaction. By co-doping Ba2+into them, the emission band of the phosphors showed a red shifts with a broad emission band peaking at 590nm. The InGaN-based 0.35Ba2+co-doped Sr3SiO5: 0.018Ce3+, 0.018Li+LED presented white emitting and color rendering index of 88. [C1238]

"Investigation on the aging characteristics of high-power white LEDs under different stresses"

In accelerated life tests, the 1-W white LEDs were treated with high temperature and DC current distinctively. The tendencies of the light output decaying in the two conditions were basically the same, while the changing trends of the color temperature were different. The hard silica gels have better stability. [C1239]

"Free-form micro-lens for LED general illumination"

To redistribute any patterns of LED radiation distributions onto a target surfaces to achieve a prescribed distribution, the free-form micro-lens is designed by using the "edge-ray principle". Some modules were done, and the simulation results show that the design of free-form micro-lens is applicable in LED illumination with competitive advantages. [C1240]

"New materials of co-doped ZnO for LEDs and thin films solar cells"

Zr-Al co-doped ZnO (AZZO) were prepared by DC magnetron sputtering on glass slide substrates. Microstructure, Electrical and optical properties of AZZO thin films were investigated. The AZZO films with an electrical resistivity as low as 1.07Ч10−3Ωcm and an average optical transmission of 88.5% in the visible range were obtained at DC power of 170 W. The optical bandgap was in the range of 3.48-3.57 eV. [C1241]

"A trichromatic phosphor-free white light-emitting diode by using adhesive bonding scheme"

A trichromatic phosphor-free white light-emitting diode has been implemented by using adhesive bonding scheme. As 25mA and 60mA was injected into the red and blue-green LED chips at room temperature respectively, white light emission could be observed with CIE chromaticity coordinates (0.3330,0.3241), correlated color temperature Tc=5467K and optical power φe=2.223mW. [C1242]

"Hybrid nano plasmonics for integrated biosensor"

We reported recent efforts on further enhancement of SPR biosensors by the heterogeneous integration of organic electroluminescence light source and nano-grating structure for the feasibility study on the fast and high sensitivity detection of HBV isothermal amplification products, Mg2P2O7. We demonstrated the highly directional emissions through hybrid nano-grating structure corresponding to the resonant condition of SP modes and controllable band-gap by pitch modulation. The effective changes of refractive index resulted in color change at specific viewing angle. It can apply for the real time detection of HBV isothermal amplification in 30 minutes in the range from 5 to 5Ч106copies/25 ul. [C1243]

"Fabrication and characterization of embedded air-prism light emitting diodes"

We report characteristics of the InGaN/GaN light emitting diodes (LEDs) with embedded air prisms (EAP) via a wet etching process. EAP LED output power was increased 2.1 times compared with the conventional LED due to the improvement in the scattering of photons at the EAP interface. [C1244]

"Compact modeling solutions and challenges for organic thin-film transistors"

This is a collection of slides presenting an accurate compact model for organic TFTs, which proved to be valid above threshold. This model has a physical basis and allows an easy parameter extraction. The model parameters have a technological meaning and can be introduce in a numerical 2D device simulator such as ATLAS. The mobility model has been extended to the nonisotropic case. The new OTFT model has been incorporated to the commercial version of SIMUCAD EDA tools developed by Silvaco. [C1245]

"New Position Detection Method Using Image Sensor and Visible Light LEDs"

This paper proposes a new positioning method using an image sensor and visible light LEDs (light emitting diode). The color LEDs are used to detect position. We achieved position accuracy of less than 5 cm using our method. We applied our method to a robot and demonstrated that accurate position control of a robot was feasible. [C1246]

"Investigation of the drain current shift in ZnO thin film transistors"

The combinational properties of ZnO of hardness to visible light, transparency, low temperature deposition, high mobility, and the ability to crystallize on almost any substrate enables ZnO thin film transistors (TFTs) to be promising low-cost optoelectronic devices for the next generation of invisible and flexible electronics, such as switches for addressing active matrices based on organic light-emitting diodes. Using high-K dielectrics in ZnO TFTs substantially increases its transconductance, gm. Using barium strontium titanate (BST) may result in the increase of gmby more than 200 times it value if SiO2is used. [C1247]

"Advances and challenges in active thin film electronics"

Interest in thin film electronics is large and growing. A citation search for organic, zinc oxide, or GIZO transistors returns thousands of journal articles, including more than a thousand published in the last two years. A Google search for Г‚Вїprinted electronicsГ‚Вї brings >150,000 hits. Yet commercial applications of active thin film electronics are few. They include one outstanding success in active matrix liquid crystal displays (> $100 billion/year) and more limited, but significant, product areas in x-ray detectors and thin film photovoltaics, as well as smaller but possibly growing areas of OLED displays or e-book readers. The list of active devices used in commercial applications is similarly limited, perhaps starting and ending with transistors used as simple switches and diodes. Both the current applications and the current scope of devices and circuits appear disconnected from the level of research and business interest. What are the key enablers for ubiquitous thin film electronics? What application areas make the best use of developing thin film technology? This talk will consider some of the issues related to the widespread application of active thin film devices to real world applications. Aspects of organic thin film transistor technology and zinc oxide thin film transistor technology will be used to illustrate some of the challenges and potential for active thin film electronics progress. [C1248]

"Structural, electrical, and optical characterizations of a-plane InGaN/GaN quantum well structures"

GaN and related ternary compounds have been widely used for fabrication of light emitting diodes (LEDs) and laser diodes (LDs). Especially, the low-dimensional systems such as quantum wells (QWs), quantum wires, and quantum dots have been investigated as an effective structure for improving the efficiency of light-emitting devices such as light emitting diodes and laser diodes. Generally, the quantum well active regions in IГ‚Вї-nitride optoelectronic devices grown on conventional templates along the polar orientation have critical problems given by the quantum confined Stark effect (QCSE) due to the effects of strong piezoelectric and spontaneous polarizations. However, the QWs grown on nonpolar templates along aor m-directions are free from the QCSE since the polar-axis lies within the growth plane of the template. In this study, we achieved high quality a-plane GaN films on sapphire substrates and characterized structural, electrical and optical properties in the a-plane InGaN/GaN QW structures. High quality of a-plane GaN templates was confirmed by using selected area diffraction (SAD) patterns and high resolution x-ray diffraction (HRXRD) results. To investigate the electrical properties of aplane GaN QWs structures, the temperature-dependent carrier depth profiles which can determine the carrier confinement with nanoscale spatial resolution were studied. And the redshift of photoluminescence (PL) peaks with increasing temperature will be intensively discussed. [C1249]

"Robust Light Objects Recognition Based on Computer Vision"

This paper proposes a recognition method for light objects in a video for real-time application and the movement of the surrounding objects. The method extracts the objects by considering known geometric arrangements and blinking frequency, while the latter is also used to remove the image noise. Therefore, locations of the light objects can be found rapidly, and the on-off blinking states of these objects can be recognized accordingly if the frame rate of the video is sufficient. Besides, it can be used in the image recognition unit of a light communication system. [C1250]

"The stratified thermal modules for the LCD TV with LED backlight"

There are 180 LED lamps located at the LED panel for 85 W power consumption for the LED backlight. The LED lamps dissipate 68 W for heat. The 32IГ‚Вї LCD TV geometry is 800 mm(L) * 500 mm(W) * 90 mm(H). There are six light-bars on the LED panel and 30 LEDs per bar. The single LED package emits red, green and blue. For fitting the LCD TV package case, the overall thermal module size is 700 mm(L)* 400 mm(W). In order to thin the LCD TV, the fins height is designed from 20 mm to 70 mm per 10 mm. Moreover, the fins length is set as 10 mm to 25 mm by every 5 mm. The thermal modules combine several types of fin under the natural convection. The thermal module multiplies the several fins types in one. Moreover, the stratified module is separated to upper and lower regions. The stratified thermal module provides higher fins for the upper region and induced supplied air-flow by the second opening. The results represent the upper region temperature is reduced from 68IГ‚В°C to 58IГ‚В°C obviously. The cold air-flow entrains the second opening and decreases the thermal and flow boundary effect. As the results, the temperature distribution of the whole thermal module obtains more uniform pattern by stratified design. So, the stratified thermal module enhances the temperature uniformity and increases that the air-flow passes through the tunnel of the fins. [C1251]

"An investigation of thermal spreading device with thermal via in high power LEDs"

A detailed numerical simulation of the performance of thermal module having IГ‚Вїthermal viaIГ‚Вї is made in this study. The results indicate the temperature distributions from the numerical simulation are significantly affected by spreading resistance. The filled thermal via can considerably improve the performance of thermal module. For further explanation of the significant drop of junction and thermal resistance at sub-mount with thermal via, the detailed thermal resistances distribution in the thermal module are further examined. It is found that the significant drop of thermal resistance is mainly from package level with the help of thermal via filled in submount. However, the effect of PCB on the thermal resistance is quite different for the simulated geometries, a IГ‚ВїmaximumIГ‚Вї ratio of thermal resistance of PCB had occurred. The thermal resistance of heat sink remains the same for all simulated case. With further adding the thermal via, the effect of heat sink on the overall resistance will become more and more pronounced. [C1252]

"The thermal analysis of sequential LED driven mode"

In this study, we use a LED die bordered with several LED chips and attached heat removal system for cooling. The commercially available CFD code, IcePak, is used to simulate the thermal behavior among the LED(heat source), heat sink base and fin structure. There are 36 LED lamps located at the LED panel for Full-Load and Partial-Load(Sequential) power consumption. The sequential mode trigger on the LED 7 ms and shut off it 9 ms. the LED dies dissipate 8 W for heat. The simulation results represent the sequential mode reduces the

temperature arise and increase the uniformity of the temperature. The heat sink received the thermal pulse and transmits it to the end of the sinks; the sequential mode has less temperature rise of it. The temperature rise among the LED lamps independents on the both modes. Depend on the results, the uniformity of the LED thermal module is different from that two modes. The Partial-Load induces the lower temperature and more alike distribution nearby. It will stabilize the LED wavelength and color temperature. [C1253]

"The introduction of high heat dissipation material"

Along with the increase in circuit density, it becomes more difficult to dissipate heat through the surface of the components. Therefore, the designs and applications for the materials used in heat dissipation as well as high thermal conductivity and low CTE have become the focal point for discussion. In addition, as the high luminance of LEDs is increased and development for brighter LEDs continues, traditional printed circuit boards are finding it more difficult to catch up with the new thermal management need. As such, metal core PCBs are developed to improve the path of heat dissipation, to increase light emitting efficiency, and extend the service life. We develop heat dissipation materials for the thermal management of LEDs and MCPCB. Materials are available in thermal conductivity from 1.0 W/mK to 3.0 W/mK that can meet needs of various applications. As the use of high thermal conductivity materials is close to the traditional PCB manufacturing process, Nanya CCL is well-positioned to offer a total solution for your thermal management needs with our fully vertically integrated supply chain. [C1254]

"Stretchable circuit board technology in textile applications"

Today's electronic systems are based on an assembly of components onto rigid or flexible substrates, serving perfectly the needs of traditional product fields like automotive, computing or industry electronics. On the other hand, many of the demands from emerging applications like wearable and textile electronics cannot be met if standard technologies are used for their realization. These new fields have therefore become mayor drivers for the development of novel technologies. Among these `stretchable electronics' have attracted strong attention. Especially for textile applications the potential of electronic systems to comply with the body shape and movement will improve the user comfort dramatically. A manufacturing technology for the realization of stretchable systems by common printed circuit board techniques, based on polyurethane as a stretchable matrix material has been developed. The stretchable circuit board technology has been used to realize a number of textile applications. As an example the realization of a fashion dress with integrated high brightness LEDs and movement sensing will be described. [C1255]

"Surface-plasmons enhanced light emitter based on Ag film in GaN"

We study the contribution of Surface-plasmons (SPs) coupling with a single dipole to enhance the emitter emission. When the Ag film is inserted into GaN, the emission efficiency of single dipole in GaN can be enhanced greatly. With 3D-FDTD method, the numerical simulation results demonstrate that the SPs play a key role in enhancement light emitter efficiency. Furthermore, by changing the parameters of GaN and Ag film, emission efficiency peak wavelength in the visible region can be controlled. Our results are of very importance for improving the light-emitting devices of GaN. [C1256]

"50-MHz high speed bilayered organic photodetector"

A bilayered organic photo diode for the detection of 50-MHz signals is firstly demonstrated. With C60 as the acceptor material and pentacene as the hole transport layer, high electron/hole mobility enlarges operation bandwidth. The results enable the development of low-cost organic image sheets for the detection of high-frequency signals. [C1257]

"Visible LED wireless optical transmission in optical access network using electroabsorption transceiver"

Visible light emitting diode (LED) wireless system based on the existing optical access network is proposed for the first time. Electroabsorption transceiver (EAT) is used to construct LED wireless optical link with optical access network. 5Mbps downlink and uplink transmission is verified through 23Km standard single mode fiber (SSMF) and 40cm wireless channel experimentally. [C1258]

"Semipolar (11-22)-based InGaN/GaN quantum wells for visible light emitters"

Visible light emitting diodes (LEDs) using semipolar (11-22)-oriented InGaN/GaN quantum wells (QWs) were demonstrated. Three dimensional microfacet structures realized white/pastel emissions without phosphors, while planar structures led to LEDs with much less polarization-induced internal electric fields compared to the conventional LEDs on the (0001) plane, both of which cannot be realized without the (11-22) planes. [C1259]

"Application of nanosphere lithography to the fabrication of nanorod LEDs and to the performance enhancement of conventional LEDs"

The process of nanosphere lithography was developed and applied to LED epistructure. We demonstrated p-i-n nanorod LED arrays with some specific characteristics. Moreover, LEDs encompassed with self-aligned nanorods are fabricated. Light diffraction behaviors are characterized. The results are explained by photonic crystal effect. [C1260]

"Design of indoor wireless communication system using LEDs"

An indoor wireless communication system using off-the-shelf white LED was presented in this paper. We adopted OOK (On-Off Keying) modulation in transmitter module. Data transmission was realized based on RS-485 protocol. A DC-balanced coding with error check and correction abilities was applied to avoid blinking and improve the performance of the system. The system can keep 10-7 error bit rate within 2.5m reach at a rate up to 115200 bps. [C1261]

"Characterization of nanometer scale compositionally inhomogeneous AlGaN active regions on bulk AlN substrates"

In this paper we report on the structural and optical characterization of NCI-AlGaN active regions grown on bulk AlN substrates. 800 nm-thick NCI AlGaN films having -57% AlN by mole fraction were deposited directly on bulk AlN substrates by plasma-assisted molecular beam epitaxy. The films were characterized optically by temperature dependent cw-photoluminescence (cw-PL) and TRPL, and structurally by X-ray diffraction. [C1262]

"Fabrication technique for arrays of Germanium-on-Nothing nanowires"

The authors have presented a CMOS compatible method for the production and incorporation of NW arrays that may be a basis for future NWFETs and other NW based devices. This work also hints to the possibility of incorporating NWs of different semiconductor material onto the same substrate to achieve high performance FETs, LEDs, and other devices. The authors surmise that alternating layers of Ge and Si could produce stacked Ge NWs similar to the Si NW stacks in other work. Finally, the use of chemicals readily available to most fabrication facilities as well as the use of TMAH, to avoid the mobile ion contamination that can plaque other Si etchants, provides for a series of steps that could be incorporated into a CMOS facility. [C1263]

"Effect of current injection efficiency on efficiency-droop in InGaN quantum well light-emitting diodes"

In this paper, the current injection efficiency (Г,Вїinjection) and internal quantum efficiency (Г,ВїIQE) of InGaN QWs are investigated. Due to the existence of the polarization field in the InGaN QW, the band bending of the band edge potential leads to thermionic carrier escape from InGaN QW GaN barrier regions. The Г,Вїinjectionis the fraction of injected current that recombines in the QW active region, and the radiative efficiency (Г,ВїRadiative) is the fraction of recombination current in QW that recombines radiatively. The Г,ВїIQEcan be expressed as the product of Г,Вїinjectionand Г,ВїRadiative. Here, the current injection efficiency model is developed based on current continuity relation for drift and diffusion carrier transport across the barrier, and the radiative efficiency model is based on self consistent 6-band kГ,В·p method. [C1264]

"Functional Common-Path Fourier-domain OCT for hemoglobin oxygen saturation imaging"

We propose and analyze functional Common-Path Fourier-domain Optical Coherence Tomography (CP-FDOCT) for providing localized and quantitative estimation of hemoglobin oxygen saturation (SO2) level in tissue. Result using a chicken embryo in vivo is presented. [C1265]

"Ambipolar organic phototransistor based on F16 CuPc/α6T pn heterojunction"

The electrical performance of the F16CuPc/α6T TFT was also studied, illuminated by a visible light from a white LED and the performance of the device as a phototransistor. As the illumination intensity is increased from 0 to 3.0 k Lux, the hole mobility decreases to about 1/3, while the electron mobility is only slightly increased. The mechanism of light enhanced photocurrent of n-channel is based on photoinduced charge transfer by donor semiconductor (F16CuPc). The drain current is significantly increased (n-channel) or decreased (p-channel) by a light is used as an additional control parameter, making the device interesting for sensor applications. [C1266]

"Optimization of flexible substrate for automotive LED rear-lamp"

High brightness light-emitting diodes (HB LEDs) for the automotive exterior lighting system are required to maintain the stable light output irrespective of the ambient temperature. We design the flexible substrate with the thick trace layer for heat spreader for the conventional process of printed circuit board (PCB). The performance of flexible PCB substrate with the thick copper layer of 200 um is compared with the conventional substrate attached on aluminum heat spreader of 1.5 mm and 150 W/m-K. The proposed design is analyzed in accordance with the size and thickness of heat spreader, and then the heat emission properties of the proposed substrate laminated with thick copper foil is characterized by using CFD (computational fluid dynamics) technology. The optimization of the substrate is carried out in accordance with the forward current and voltage. The thermal resistance from the top surface of LED to the plastic housing can be decreased over 1.5 times in comparison with the conventional structure while the delta forward voltage is controlled within 0. 04 V. [C1267]

"Preparation and properties of epoxy resin/silicone hybrids for electronic applications"

Epoxy resin/silicone hybrids were synthesized through the cationic polymerization of a cycloaliphatic epoxy resin and a hydroxy-terminated poly(dimethyl siloxane) (PDMS) in different molar ratios. Molar ratios of the epoxy resin and silicone for the hybrids were 1/1, 1/0.75, 1/0.5, 1/0.25.3-Glycidoxypropyl-trimethoxysilane (GPTMS) was also added to the epoxy resin/silicone mixtures to improve the transparency by the reaction between GPTMS and the resin mixtures. The hybrids of epoxy resin/silicone became transparent with increasing the content of PDMS. The addition of GPTMS resulted in the large increase of transparency of the hybrids even at lower concentration of PDMS. Some opaque hybrid samples showed two glass transition temperatures in the thermograms obtained with differential scanning calorimetery (DSC). In case of the hybrids containing GPTMS, nanoparticles of silica were observed in transmission electron microscopy (TEM) images even though they appeared highly transparent after cure. [C1268]

"A high-brightness RGB-LED lamp using palette and PNM current driver"

This paper presents a high-brightness RGB-LED lamp of using palette and high-efficiency pulse-number-modulation (PNM) current driver. Target colors of the RGB-LED lamp designed in this paper are specified on a palette of LabVIEW by using a mouse to point it. A complete 24-bit RGB luminance data provided by the palette is split into three separate 8-bit monochromatic commands and sequentially transmitted to an 8-bit microcontroller via RS232 port. Three-channel driving currents of the RGB-LED lamp are all regulated by an 8-bit microcontroller with PNM current driver to keep color stability. Experimental results demonstrate that all color inside the RGB-LED gamut can be designated by user. Moreover, due to the use of PNM switching drive, the power dissipation of the LED driving circuit is extremely low and hence the energy efficiency is improved. The colorful RGB LED lamp can be utilized as a mood lighting fixture in sleeping rooms, hotels, restaurants, hospitals, advertisement walls, and the places required colorful lighting. [C1269]

"Control of the UV emission of an excimer lamp by means of a current-mode power supply"

The UV power, emitted by a XeCl Dielectric Barrier Discharge exciplex lamp, is shown, on the basis of causality analysis, to be controllable by the current supplied to the lamp. Experimentally, the UV radiation is demonstrated to be proportional to the current injected into the gas. A current-mode converter operating in discontinuous current mode controls in a direct form the amplitude and duration of the pulsed UV power radiated by the lamp. [C1270]

"A single-stage PFC converter for Solid-State Lighting applications"

This paper presents a single-stage power factor corrected (PFC) converter for driving a solid-state lighting (SSL) device through light-emitting diode (LED) for street lighting use. The converter is based on CIC-CPPFC (continuous input current charge-pump power factor correction) technique, achieving continuous input current with high power factor and reduced current ripple by means of a coupled inductor. The converter operates with zero voltage switching (ZVS) resulting in high efficiency for a wide load range. It is also a cost effective and competitive solution for low power applications, such as SSL, where a two stage approach is costly and passive filters are not recommended. Another feature is the absence of a bulky dc-link capacitor, reducing costs, increasing life-time and presenting a significant advantage over many single-stage solutions. [C1271]

"Free space optical sensor networking for underwater sensing applications"

Free space optical (FSO) links for sensor networks can provide data rates that can range from bits/s to hundreds of Mb/s. In addition, FSO links using blue-green lasers or light emitting diodes can provide underwater communication over distances of tens of meters. Compared to acoustic technology, optical communication

provides larger bandwidths, faster propagation speeds, and reduced multipath fading effects. These features make FSO an attractive medium for undersea communications, as compared to present day acoustic technology. In this paper the system design, implementation, and evaluation of a prototype FSO sensor network are presented. The system includes a network of small, low power (mW), integrated systems, or Г‚Вїmotes,Г‚Вї that transmit data optically to a central Г‚Вїcluster head,Г‚Вї which controls the network traffic of all the motes and can relay data to another cluster head in a series of multi-hops to achieve data communication over longer distances. The devices are designed with multiple narrow-beam transmitters oriented in different directions to provide signal coverage over a wide field of view. This paper presents the system design and media access controls of our prototype FSO-based sensor network that can be tailored to fit underwater sensor networking applications. [C1272]

"A simple optical audio signal transmitting system using Maximum Length Sequence"

In the previous paper, we reported a communication method of audio signal using LED or laser diode. However the interference occurs easily in the receiver side when multiple transmitters exist. In this paper, we propose a new modulation technique which does not produce interference. In this method, the random number signal is generated using Maximum Length Sequence (MLS) by a microcomputer. An audio signal and random number are compared. If the audio signal is larger than the random number, a square wave of AM broadcasting modulates a optical source. If the audio signal is smaller than the random number, the optical source is turned on and off alternately. We change the period of the random number signal and examine the characteristic and the effectiveness of this method by some experiments. [C1273]

"LED light fixtures and selection criteria for underwater video inspections"

The advancements in light emitting diodes (LED) technology in the last 15 years, especially with the introduction of white high powered LEDs, have had a significant impact in the design of light fixtures. The main advantages of LED based lighting; efficiency, ruggedness and lifetime, directly benefit underwater lighting needs. Since LEDs are a relatively new technology in the illumination world, and because there are many steps required for their integration into an underwater light fixture, the characterization of light fixtures in terms of performance can be very confusing. The objective of this paper is to explain and clarify the main selection criteria for underwater LEDs in the context of underwater video inspections. [C1274]

"FPGA-based multispectral fluorometer using CDMA and embedded neural network"

We report on the design and implementation of a fluorescence measurement and analysis device that can identify fluorophore substances. The device performs multi-spectral fluorescence measurements, obtained by exciting the unknown substance with light emitting diodes (LED) whose intensity is CDMA coded for noise rejection. The acquired fluorescence data are processed by a CDMA receiver and a neural network for spectral signature identification and measurement. The design's front end exploits the capability of color LEDs to act as photodetectors with different spectral responses when reverse-biased. The system avoids using optical lenses and is implemented as a minimum chip count design where an FPGA performs all of the required processing with the exception of the analog front end. It is thus appropriate for field use. [C1275]

"Remotely sensed study of air-sea CO2 fluxes variability in the Northern South China Sea"

The CO2source or sink status and variability in the coastal ocean are the subjects of highly debate. Satellite remote sensing offers an avenue for expanding observations and analyzing temporal and spatial variability of the environment of the ocean. In the present study, the algorithm for surface layer seawater partial pressure of CO2(pCO2sw) of the northern South China Sea (NSCS) was applied to remote sensing products and the air-sea CO2fluxes were calculated from salinity, wind speed corrected to 10 meters, sea surface temperature data obtained from remote sensing in the NSCS, for the period 2004-2007. The CO2source and sink status in the NSCS were analysed and showed significant variability in time and space. In winter, the pCO2swin most of the NSCS ranged from ~320-360 ?atm, indicative of undersaturation with respect to atmospheric partial pressure of CO2(pCO2air). However, in summer, the pCO2swincreased to ~400-420 ?atm mainly due to sea surface temperature. The air-sea CO2fluxes in summer have been increasing year after year which have the same trend with the pCO2sw. These upswings correlated with a rise in sea surface temperatures, showing that sea surface temperatures played key role in the CO2source and sink status in NSCS. In regions of the Luzon Strait, the air-sea CO2flux remained generally high likely associated with the remineralization of organic matter. The pCO2swhighly undersaturation conditions occurred on the western part of the Taiwan Strait in winter, which may be caused by the low temperature and low salinity China coastal current entering the Taiwan Strait driven by the northeast monsoon. The research showed that most of the NSCS represents weak sinks for atmospheric CO2in winter and sources for atmospheric CO2in summer. [C1276]

"An electronic marker tag detection smart camera for object localization"

In this paper a modulated light detection smart CMOS image sensor is presented. The design has the ability to sense asynchronous signals transmitted from electronic markers such as flashing light emitting diodes (LEDs) tagged on moving robots. With the presented sensor, object localization and position detection functions are simplified, performed at higher speeds in real time, and power requirement is reduced. The sensor in-pixel processing, filters out the background image data and detects the modulated marker regions. Object localization is facilitated by the use of distributed sensors to cover a more extended space. Since marker locations are extracted locally at each sensor, data transmission rate at each node and power demand is reduced; thus the sensor nodes can be designed as wireless and self powered units. The functionality and power consumption of the proposed design are presented in the 0.35 Г‚Вїm standard CMOS technology. [C1277]

"Effects of the PEDOT interface states distribution in polymeric OLEDs"

Four kinds of commercial PEDOT dispersions have been used to realize ITO/PEDOT/PF6/Al polymeric OLEDs. The effects of the different PEDOT layers have been analyzed by using static current-voltage characterizations and dynamical admittance spectra. The measurements have revealed that the current transport is limited by the PEDOT bulk (conductivity) and not by the PEDOT work function (hole potential barrier). Moreover, admittance spectra have shown an interface state distribution having, for the tested PEDOT dispersions, similar densities but very different time constants (about 3 orders of variation). A good agreement has been found between the experimental data and the Nicollian-Brews interface states model. [C1278]

"Inference on the MTTF of LEDs from Accelerated Degradation Data with Bootstrap Method"

In reliability analysis, engineers lacks confidence to verify the mean time to failure of high power light emitting diodes from aging or degradation tests. The lifetime information, however, is important to manufacturers to improve the quality of light emitting diodes. The paper provides a bootstrap computation procedure to infer the mean time to failure of high power light emitting diodes. Assume that the degradation paths collected from an accelerated degradation test follow a Wiener process, confidence interval of the mean time to failure of high power light emitting diodes is found based on bootstrap percentiles. An illustrating example of GaN-based LEDs is used to demonstrate the use of the proposed method. [C1279]

"Steady state-VEP based BCI for control gripping of a robotic hand"

Brain Computer Interface (BCI) is system that established a direct connection between the human brain and computer thus providing an additional communication channel. Nowadays, they are used in a broad filed of application. In the current application, a SSVEP is used to control a robotic hand through a BCI system. This paper present the preliminary results from two subjects which indicate the characteristics of SSVEP harmonics amplitude differ from one subject to another. [C1280]

"Enhancement of solar cell efficiency by spectral-conversion using rare earth-metal nanoclusters"

A novel organic/inorganic nanocomposite is proposed as a luminescent material of a spectral converter (SC) for improving the energy conversion efficiency of solar cells. The nanocomposite consists of a polymer matrix doped with rare earth-centered heterometallic alkoxides, rare earth (RE)-metal (M) nanocluster. The excitation edge of Eu3+was found to be extended from about 400 nm to 470 nm by adding Michler's ketone to the nanocomposite. The broadening of the excitation wavelength range enhanced the energy conversion efficiency of a single-crystalline Si solar cell by 9.9%. Also it was found that Eu-M nanocluster can emit broad-band luminescence ranging from 400 nm to 600 nm in addition to the narrow-bands luminescence peculiar to Eu3+when M is selected. Such controllability in both excitation and emission spectra could make it possible to use the nanocomposite doped with RE-M nanocluster as a luminescent material for SCs for various solar cells having different spectral responses. [C1281]

"Designing PV powered LED products-sensing new opportunities for advanced technologies"

This study covers the design of innovative product concepts based on a combination of PV and LED technology. The products were developed in a project that took place in 2008 and 2009 during a cooperation of the University of Twente with Philips Lighting. It is shown that surprisingly unpredictable-yet technically feasible-PV powered LED products can be designed by carefully selected industrial design methods and an open view towards potential applications. In this scope innovation is not just a matter of implementing advanced technology in existing products, but particularly a matter of sensing new opportunities which are created by the combination of new technologies such as LEDs and PV technology. The PV powered LED product concepts range from small products, like watches, remote controls and other electronic handhelds, to large-sized products such as tents. In

this paper it is shown how the concepts have been developed and they will be visualized by high key renderings. Also attention will be paid to the prototyping a few product concepts to evaluate their functional requirements. [C1282]

"Non-uniform backlighting computation for high dynamic range displays"

In recent years, non-uniform LED based backlighting techniques have been used to build display prototypes and products with extremely high dynamic range, thus making possible to show video content with very high fidelity. These displays have two modulation channels: a low resolution LED layer that provides non-uniform backlighting, and a high resolution LCD front panel for color. Unfortunately, displaying an HDR image on such screens is not straightforward because the lower resolution of the LED layer and the cross-talk between LEDs make not possible to individually control the output of each pixel. Using the wrong backlighting results in low image quality and may even lead to visual artifacts such as false contouring and visible LED patterns. In this paper, we characterize the LED/LCD display using a general model and formulate the backlighting computation as an optimization problem. We further propose an iterative algorithm to solve the optimization problem. Compared to existing methods, our model is more precise and provides better image quality on the same display device. [C1283]

"Design procedure for a compact lamp using high-intensity LEDs"

This paper proposes a circuit to a compact lamp based on light emitting diodes (LEDs). It aims energy savings, high luminous efficiency and high useful life with the replacement of incandescent or compact fluorescent lamps by LEDs without any change in the electrical system installation. In order to supply the LEDs by mains with a constant current, the Buck converter has been used because it provides an output voltage lower than the input one. The circuit has been designed to supply 36 to 52 high-brightness LEDs connected in series, resulting in a converter output voltage between 90 V and 187 V. The load can also be composed of power LEDs. The main disadvantage of series connection is that the damage of one LED can results in an open-circuit, disconnecting the entire group. The proposed idea to solve this problem is the introduction of Diacs connected in parallel with groups of LEDs. So, if one LED burns, the Diac in parallel with this group keeps the current path, guaranteeing the operation of the others groups. To verify the proposed idea, prototypes of the lamp have been implemented and tested. [C1284]

"Compact emergency lamp using power LEDs"

This paper presents a compact emergency lamp using light emitting diodes (LEDs). The goal is to develop a compact and low cost electronic circuit to drive and control the current of LEDs arranged in a single enclosure. The proposed idea allows using the same equipment in the daily activities, supplied by mains, and under a possible failure of it. The proposal aims energy saving, high luminous efficacy and high useful life when replacing traditional emergency lighting systems, using fluorescent lamps by LEDs. The use of E-27 socket (the same used in traditional incandescent lamps), provides the advantage of easy installation, with the simple replacement of the lamp without any change in the electrical installation. To supply the LEDs by mains and by battery a Buck and a Boost converter were employed. The converters work without electrolytic capacitors which has advantages such as reducing of size and cost of the circuit and increasing the driver's useful life. The battery can be composed of three rechargeable Ni-MH batteries (1.2 V) or a Li-Ion battery (3.6 V). The design complies with the Brazilian standard and international standard for emergency lighting systems. The complete circuit was implemented and the experimental results show a satisfactory behavior of the lamp. [C1285]

"Electronic driver without electrolytic capacitor for dimming High Brightness LEDs"

This paper presents a full ballast for driving an assembly of high brightness LEDs, based on a new dc to dc converter. The converter provides a constant current waveform to the load parting from a DC bus voltage. The converter, operating with a peak current control, keeps the current through the LEDs constant independently of the bus voltage. This is carried out internally by self-adjusting the switching frequency of the converter. Thus, the requirements of the capacitance of the bus capacitor are greatly diminished, allowing the avoidance of electrolytic technology. Also, low frequency PWM dimming can be carried out easily. The present work shows the design procedure and the experimental results obtained after building a prototype of a full ballast for HB LEDs. [C1286]

"Lighting system for pattern recognition. workbench based on a tricolor LED array"

In pattern recognition systems the lighting method is critical to determine the success or failure of an algorithm. The goal of this work is to design a lighting workbench able to control the color and luminous flux allowing the vision systems programmers to verify the robustness of their algorithms. This paper describes the methodology

to control an RGB chip to determine luminous flux and color of the whole lamp. An experimental prototype has been built and tested. [C1287]

"Low cost ZVS PFC driver for power LEDs"

This paper presents a low cost converter for driving power light emitting diodes (LEDs). The converter is a series-resonant half-bridge with reduced DC-link capacitor which increases the conduction angle of the bridge rectifier and the power factor. It also allows the elimination of electrolytic capacitors, making the converter suitable for long life applications. Due to the resonant operation, there is no need for a current sensor to stabilize the average current through the LED string and it operates with zero-voltage-switching clamped-voltage (ZVS-CV). The simplification of the control design, and of the converter, reduces the component count and the cost. Analytical results are verified by laboratory experiment. [C1288]

"Irradiance patterns of directive illumination sources"

In previous works, we presented the development of a semi-spherical prototype irradiance meter. On the base of this device, we obtain the radiation patterns of two illumination sources, considering only nine sensors. [C1289]

"Design of Thyristor Digital Trigger Circuit Based on Microcontroller Unit"

In the current paper, a kind of thyristor digital trigger circuit, based on 8-bit microcontroller unit, is designed. The circuit can be used to trigger the three-phase full-controlled-bridge rectifier circuits. It adopts single phase voltage as the synchronization signal; 6-channel trigger pulses from it are very symmetrical and the pulses can be shifted within a cycle of a sine wave from 0 degree to 180 degree. The circuit consists of a microcontroller unit, a keyboard, a LED display, synchronization shift phase module and trigger pulses output module and so on. Its structure is simple; its performance is high stable and reliable; its anti-interference ability is strong and its operation is easy. The hardware structure of the trigger circuit and its principle are the emphasis of this paper and especially the process of generating of the trigger pulses has a detailed description. [C1290]

"3D-color video camera"

We introduce a design of a coded light-based 3D color video camera optimized for build up cost as well as accuracy in depth reconstruction and acquisition speed. The components of the system include a monochromatic camera and an off-the-shelf LED projector synchronized by a miniature circuit. The projected patterns are captured and processed at a rate of 200 fps and allow for real-time reconstruction of both depth and color at video rates. The reconstruction and display are performed at around 30 depth profiles and color texture per second using a graphics processing unit (GPU). [C1291]

"Cost Benefit Analysis of solar powered LED based lighting system for N.I.T. Silchar"

This paper presents a small scale case study of the energy scenario in N.I.T. Silchar. A sector wise analysis is carried out and a proposal has been put forward for implementation in order to conserve energy and thus bring down the related expenses as well as the consumption. A cost comparison between the existing power consumption and the conditions that will prevail if the proposal is implemented, thus proving that the proposal is efficient from both the economic and energy point of view. [C1292]

"Nanocomposite materials for high frequency ultrasound matching layers"

A new class of materials for ultrasonic acoustic matching layers is presented. The materials exhibit nanoscale cerium oxide particles with diameters between 10 nm and 15 nm in an organic inorganic hybrid polymer matrix. By the content of particles the acoustic impedance of the material can be adjusted on values between 4 MRayl and 7 MRayl. The materials are synthesized by a hydrolytic condensation combined with polymerization. This way of synthesis allows the use of organic solvents to adjust the viscosity of the sol and the application of different coating techniques. 100 MHz zinc oxide ultrasound transducers were produced with a photolithographic technology and measured with the new matching layers. The measurements showed a significant increase in voltage signal amplitude with the new matching layer. [C1293]

"Feasibility study of multispectral photoacoustic coded excitation using orthogonal unipolar Golay codes"

Photoacoustic (PA) imaging is a new imaging modality based on the generation of ultrasound in biological tissue by laser irradiation. It would be desirable to use laser diodes as excitation sources for PA since they are less expensive and more compact than commonly used Nd:YAG lasers. Laser diodes exhibit a higher pulse repetition

frequency (PRF) and a lower pulse energy compared to Nd:YAG lasers. In order to increase the SNR of PA imaging using laser diodes, we propose multispectral photoacoustic coded excitation (MS-PACE) based on orthogonal unipolar Golay codes (OUGC). This concept allows acquiring photoacoustic data generated by two laser diodes at two different wavelengths simultaneously and separating them afterwards. The SNR gain and coding gain compared to time equivalent averaging is analytically derived. Furthermore, the feasibility of the concept is experimentally verified. Two laser diodes, emitting light at 850 nm and 905 nm, are triggered according the OUGC scheme. They irradiate a metal slab. The resulting PA signals are acquired using a reconfigured clinical ultrasound system with an 128 element linear array. The data are decoded and images are formed using a delay-and-sum algorithm. Using an 8 bit sequence the SNR is increased by 8.68 dB (905 nm) and 8.87 dB (850 nm). These results are in good agreement with the theoretical SNR gain of 9.03 dB. The resulting images allow a clear discrimination of both wavelengths, demonstrating the feasibility of MS-PACE using OUGC. [C1294]

"Multi-input multi-output (MIMO) indoor optical wireless communications"

Indoor optical wireless systems often use arrays of transmitters and receivers to achieve high data rates. MIMO offers the potential to use these components to transmit data in parallel between multiple sources and detectors. The slowly varying incoherent communications channel can be measured using straightforward techniques, and resulting channel matrix used to recover data that is transmitted in parallel from a number of sources. In this paper we report results from several preliminary indoor communications experiments. A four channel MIMO system that uses white light LEDs for communication (and associated illumination) is described, as well as experiments in a diffuse environment, using infra-red sources. Design issues, as well as future opportunities and challenges are also discussed. [C1295]

"CMOS phototransistor device: A total solution for skin whitening assays"

Three skin whitening assays combining the semiconductor technology was demonstrated for screening the drug candidate and discussing the mechanisms of melanogenesis in medical cosmetics. We proposed a miniaturized photometric system using complementary metal oxide semiconductor (CMOS) phototransistor as a detector with high sensitivity. The CMOS phototransistor was a small, portable optoelectronic device with enlarged depletion region of the outer Nwell/Pwellring-shaped photodiode, able to cause a sensitive shift of the threshold voltage and enhance photocurrent response. The device was further connected to IC system to show it ability for high-throughput screening needed in the pharmaceutical industry. Three methods for evaluating effects of skin whitening agent were applied, including 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay, melanin amount measurement, and tyrosinase assays. The change of light absorbance due to enzymeatic catalysis was easily measured with the proposed system. The skin whitening effects by kojic acid was determined and comparable to the commercial system. [C1296]

"Application of a novel focused microlens to the LED packaging"

The light-emitting diode (LED) has been extensively applied to the lighting system. In this paper, a novel optical structure design of the focused microlens, it can achieve a specific light focusing effect through changing the structural design. We modified and redesigned the optical microlens structure from the basic specification of the present LED packaging, and the light pattern can be altered through adjusting the proportion of depth and width of the structure. The light focusing ability of this novel focused microlens has been greatly enhanced within the range ±15° of the lighting angle. The maximum illuminance has been enhanced 99.3% in comparison with the traditional LED packaging, and the average luminous flux rayed out through within the range ±15° from the normal of the LED has been enhanced 34% as well. [C1297]

"Modelling of Spatial Light Distribution in the Greenhouse: Description of the Model"

In Dutch greenhouse horticulture, use of additional assimilation light in the form of lamps plays an important role. So far, little is known about the effect of lamp positions, types, and spectra, on light distribution per se and on light interception by the crop canopy in relation to the arrangement and architecture of different crops. We present here a new model of a SON-T assimilation lamp, implemented using the interactive modelling platform GroIMP. A set of virtual lamps is positioned in a simulated 3D greenhouse, which latter exhibits main geometric features and semitransparent surface textures imitating glass and construction elements. Here we show results of the simulation of spatial distribution of light. The application of such virtual lamps for the simulation of light interception in static virtual crops of rose and tomato is briefly illustrated and the extension of this model to other lamp types, such as LED, is discussed. [C1298]

"Design and implementation of a multispectral iris capture system"

Most commercial iris recognition systems use infrared or near-infrared cameras to capture the iris images because they show rich and complex textures that can be used to identify a person. This paper presents the design and implementation of a multispectral iris acquisition system that can efficiently capture and store iris images exposed under different wavelengths of illumination. The goal is enable the study of wavelength effects on iris recognition performance. A set of multispectral illuminators is designed to sequentially activate for short periods of time to expose the iris to spectral bands in the 405 nm-1550 nm range. A specialized camera is used to capture iris images for each wavelength. A software program was developed to control the illuminators, camera, and the image acquisition process. [C1299]

"Automated selection of LEDs by luminance and chromaticity coordinate"

The increased use of LEDs for lighting purposes has led to the development of numerous applications requiring a pre-selection of LEDs by their luminance and / or their chromaticity coordinate. This paper demonstrates how a manual pre-selection process can be realized using a relatively simple configuration. Since a manual selection service can only be commercially viable as long as only small quantities of LEDs need to be sorted, an automated solution suggests itself. This paper introduces such a solution, which has been developed by HarzOptics in close cooperation with Rundfunk Gernrode. The paper also discusses current challenges in measurement technology as well as market trends. [C1300]

"LED driver with self-optimized channel voltage: A switch-mode voltage regulator optimizes an active current regulator for a LED driver"

A novel LED driver with multiple LED-channels is presented, consisting of an active current regulator and a switch-mode voltage regulator for each channel. The active current regulator means no current-sensing resistor and directly controls an LED-current. The switch-mode voltage regulator optimizes the channel voltage by means of keeping a minimum voltage drop across the active current regulator to barely supply a desired current to the LEDs. This self-optimization can be independently achieved for each channel. The proposed driver is designed by 0.35 Г‚Вїm 40 V high voltage process. Simulation results show that when the voltage drop across the LEDs is different for each channel, the proposed LED driver can adapt the channel voltage to a threshold voltage for normal operation and regulate an LED-current to obtain desired luminous intensity. Roughly, the proposed driver has a power-conversion efficiency of above 85%. [C1301]

"Thin-film transistors and circuits on plastic foil"

We present our recent achievements in organic semiconductor technology in two emerging application areas. We show that the performance of our technology approaches the requirements for Electronic Product Coding RFID tags. Also, backplanes of OLED displays are enabled by the unique compatibility of pentacene transistors with high-k gate dielectrics. [C1302]

"Implementation of a LED display system for high quality video processing"

Due to the improvement of LED (Light Emitting Diode) technology, the LED display system for a high quality video has attracted public attention. LED display system for a high quality video requires not only the ability of processing image frame but also of having the image enhancement block for quality. Thus, in this paper, we demonstrate that we are able to improve frame processing when we use a fully-hardwired system adopting FPGA that has advantages of processing fast the video frame and controlling excessive LED modules. Also, our hardwired design shows that it is so effective as to produce a better quality than that by microcontroller-based system, especially when implementing a complex image processing. The proposed system has other properties that can select a particular part of image for display by manipulating DIP switches. Incorporating these advantages and properties, we propose an efficient system architecture integrating the image cropping, video enhancement, DPRAM interface, and LED interface blocks. As a result, we are able to obtain the synthesis result with 20,428 gates. [C1303]

"Electrical properties measurements of commercial GaN blue light emitting diode"

The present work reports some experimental results on the electrical properties of commercial Gallium Nitride blue light emitting diode (GaN blue LED). Many instruments have been used in this study to make different kinds of measurements. For example, Keithley 238 high current measure unit, Boonton 7200 capacitance meter, and Wayne Kerr 6440 precision component analyzer (within frequency range from 20 Hz to 3 MHz). In this paper, the electrical properties of the selected sample are studied in details under wide range of temperatures (100-440) K. Analysis and discussion for the obtained results are adopted. [C1304]

"Wii Remote-enhanced Hand-Computer interaction for 3D medical image analysis"

In this paper, we introduce a low cost, not cumbersome, 3D user interface for exploring medical data. 3D imaging data can be manipulated in a semi-immersive virtual environment by means of an off-the-shelf wireless data glove equipped with additional infrared light emitting diodes (LED). The LEDs are tracked by a Wii Remote, which is able to provide accurate positional information with no need for further six degrees of freedom position trackers. We also describe the interaction techniques we have designed specifically for a medical imaging scenario and provide some implementation details of the integration of the interface in an open-source image processing software for medical research. [C1305]

"Infrared-based system for vehicle classification"

This paper presents a low-cost infrared-based system developed for vehicle classification in urban areas. The system contains an equipment that is placed above the roadway and emits down-looking pulsed infrared beams through infrared LEDs (Light-Emitting Diodes). Vehicle profile is obtained detecting and analyzing the infrared light reflected by the vehicle passing directly below the equipment. Profiles of different vehicles were obtained to build a template databank. Vehicle classification is achieved by comparing a vehicle profile with all of the templates. Dynamic Time Warping (DTW) technique is used for carrying out the comparisons. Results obtained are presented and discussed. [C1306]

"A Remote Control System Based on Real-Time Image Processing"

A novel human-computer interaction (HCI) system based on real-time image processing is proposed in this paper. With the help of infrared tracking technology, the proposed system achieves real-time processing and stable operation on an ADSP-BF533 hardware platform. Compared with the conventional remote control methods, the proposed system enables a user to control the cursor on the screen of a TV by targeting it, and provides users with new experiences of remote control. To realize such a new remote control system, cross-ratio invariant, which is an important characteristic of the projective transformation, is also studied. Experimental results show the potential of the proposed system in TV remote control. [C1307]

"Debye temperature of ternary chalcopyrite semiconductors"

Debye temperature (Г‚ВїD) of AIBIIIC2VIand AIIBIVC2Vchalcopyrite semiconductors have been calculated using plasma frequency formalism. Six simple relations have been proposed to calculate the values of Г‚ВїD. Two are based on plasmon energy data and one each on molecular weight (W), melting temperature (Tm), ionicity (fi) and energy gap (Eg). The calculated values of Г‚ВїDfrom all equations are compared with the experimental values and the values reported by different workers. Reasonably good agreement has been obtained between them. [C1308]

"Multi-Channel Gabor Filter Design for Finger-Vein Image Enhancement"

Finger-vein recognition has been considered as one of the most convenient and effective biometric ways for personal identification. Extracting vein characteristics is crucial for finger-vein classification. However, the finger-vein extraction results always are greatly sensitive to noises due to the low contrast of finger-vein images. To robustly exploit real vein information, this paper proposes a novel method of finger-vein enhancement based on multi-channel Gabor filters. Firstly, multi-channel Gabor filters are used to prominently protrude vein vessel information with variances in widths and orientations in images. The vein information in different scales and orientations of Gabor filters is then combined together to generate an enhanced finger-vein image using a reconstruction rule. Experimental results show that the proposed method is capable of enhancing finger-vein images effectively and reliably. [C1309]

"Low-cost cascaded 1Ч4 Polymer Optical Fiber coupler for multiplexing wavelengths"

The Wavelength Division Multiplexing (WDM) technology considered as the only solution for increasing demand for higher bandwidth in optical communication, whereby several different wavelengths can carry variety information over one Polymer Optical Fiber (POF). Wavelength Division Multiplexer is an essential component to combine several different wavelengths before all wavelengths are carried together over single POF. In most instances, the conventional multiplexers are afflicted with certain disadvantages and one major disadvantage is that they are costly for most of the POF applications. Thus, the goal of this study is to develop self-fabricated POF coupler as an economical optical multiplexer for WDM transmission over POF. The POF coupler has been fabricated by homemade fusion technique. Red LED with a 650 nm wavelength has been injected into the coupler for the purpose of characterization testing to analyze the level of power efficiency of the coupler. The characterization of POF coupler reveals that the maximum power efficiency could be reached up to 70%. The

result exhibits that self-fabricated 1Γ́B—4 POF coupler has great potential to be applied as optical multiplexer for WDM fiber technology due to the character of high-efficiency and low-cost. [C1310]

"Integrated system of visible free space optic with PLC"

In the recent past, employing visible light generated by white LEDs for indoor optical wireless have been proposed and implemented. Since white-LED is usually distributed over the ceiling for illumination, it is possible to use the ubiquitous powerline cables as a communication medium between other fixed network and LED lights. Some works have been done in this area but because powerline is an unpleasantly medium in case of noise and multipath distortion the existing systems do not have good quality factor. So considerations of these parameters are very important issue to model the actual system. In this paper a review of the integrated system is given while the multipath distortion and noises in the powerline channel are simulated. [C1311]

"Functional common-path fourier-domain OCT for hemoglobin oxygen saturation imaging"

In this paper, we propose and investigate a technique to deduce hemoglobin oxygen saturation (SO2) variation image using Spectroscopic Optical Coherence Tomography (OCT). The technique is based on Morlet wavelet transformation and make use of the different absorption properties of hemoglobin (Hb) and oxyhemoglobin (HbO2) around 800 nm. In order to test the technique, we combined three superluminescent light emitting diodes (SLED) together in a Fourier Domain Common Path OCT (FD-CP-OCT) set-up. The result using chicken embryo in vivo shows that we are able to obtain highly localized oxygen saturation variation. [C1312]

"Influence of visual feature for application of high-light emitting diode arrays"

In recent years, light emitting diode (LED) display arrays have emerged as the leading technology for large indoor or outdoor display applications. LED has a lot of prominent advantages, for example, the high luminous efficiency, the less power consumption, the longer lifetime for using, the better control performance, and so on. Because the luminance of LED is higher than the traditional light source, the effects of display and picture quality are suitable for the LED display. However, the increment of luminance has a limit for the LED display arrays, which is decided by the vision characteristic of person's eyes. If the luminance goes beyond the limit, the person's eye will feel not comfortable. This paper presents the vision characteristics for the person's eye and the LED features and some methods for solving a certain factors that influence LED picture quality are described. [C1313]

"Visible LED wireless optical transmission in optical access network using electroabsorption transceiver"

Visible light emitting diode (LED) wireless system based on the existing optical access network is proposed for the first time. Electroabsorption transceiver (EAT) is used to construct LED wireless optical link with optical access network. 5Mbps downlink and uplink transmission is verified through 23Km standard single mode fiber (SSMF) and 40cm wireless channel experimentally. [C1314]

"A study on the Cl2 /C2 H4 /Ar plasma etching of ITO using inductively coupled plasma"

In this study, the indium tin oxide (ITO) was etched by an inductively coupled plasma (ICP) etcher using Cl2/C2H4/Ar as the etching gases. The etch rates were studied as a function of RF power, inductively coupled plasma (ICP) source power, working pressure and gas mixing ratio. We found that the RF Power plays a dominant role in the elevation of the etch rates, which indicates that the ITO etching in this study is a physical mechanism dominated etching. The state of the photoresist (PR) was observed after each experiment. As expected, the high power, which generally leads to a high etch rate, would distort the PR mask, resulting in a bad etched profile of the sample. Through research, we got a relatively high etch rate (200nm/min) with the shape of PR mask remain undistorted. The profile, which includes the morphology of the film sidewall and surface after the etching process, was sensitive to the gas mixing ratio. We adjusted the gas mixing ratio, and observed the profile using a scanning electron microscope (SEM), then optimal morphology was get as the Cl2/C2H4/Ar at the value of 30sccm/7sccm/50sccm. [C1315]

"Design of indoor wireless communication system using LEDs"

An indoor wireless communication system using commercial white LED is presented in this paper. OOK (On-Off Keying) modulation is adopted in the transmitter module. Data transmission is realized based on RS-485 protocol. A DC-balanced coding with error check and correction abilities is applied to avoid blinks and improve the performance of the system. The system can keep 10−7error bit rate within 2.5m reach at a rate up to 115200 bps. [C1316]

"A trichromatic phosphor-free white light-emitting diode by using adhesive bonding scheme"

A trichromatic phosphor-free white light-emitting diode (LED) has been implemented by using adhesive bonding scheme. The device has been operated as a three-terminal device with independent electrical control of an AlGaInP-based red LED chip and a GaN-based dual-wavelength (blue and green) LED chip. As 25mA and 60mA was injected into the red and blue-green LED chips at room temperature respectively, white light emission could be observed with CIE chromaticity coordinates (0.3330,0.3241), correlated color temperature Tc=5467K and optical power Φe=2.223mW. The electroluminescence measurements also show that the emitted white light is composed of blue, green and red lights, centered at around 452nm, 517nm and 632nm. The fabrication and the electrical and optical performances of such white LED were described. [C1317]

"Performance of 650 nm AlGaInP RCLEDs with different p-type DBRs"

Resonant cavity light-emitting diodes (RCLEDs) which composed of active region surrounded by two distributed Bragg reflector (DBR) mirrors have been reported in the communication system based on Plastic Optical Fiber (POF) and high brightness application. However, high performance of 650nm AlGaInP RCLED, which is strongly depends on the optimization of DBRs, especially the matched reflectivity between p-type and n-type DBR mirrors, is still difficult to obtain. In this paper, the performance of 650nm RCLEDs including 34-pair AlGaAs/AlAs n-type DBRs and different pairs of AlGaInP/AlInP p-type DBRs have been investigated both theoretically and experimentally. Top emitting chips with the size of 225Ч225μm2without encapsulation were fabricated under the same conditions, experimental results reveal that the device of optimized DBR mirrors with 10-pair p-type DBRs obtain high efficiency, low turn-on voltage and forward resistance, good temperature stability. [C1318]

"New materials of co-doped ZnO for LEDs and thin films solar cells"

Zr-Al co-doped ZnO (AZZO) were prepared by DC magnetron sputtering on glass slide substrates under different sputtering powers.Microstructure,Electrical and optical properties of AZZO thin films were investigated.The AZZO films with an electrical resistivity as low as 1.07Ч10−3Ωcm and an average optical transmission of 88.5% in the visible range were obtained at DC power of 170 W.The optical bandgap depends on the deposition condition,and was in the range of 3.48-3.57 eV.These results make the possibility for light emitting diodes(LEDs) and solar cells with AZZO films as transparent electrodes. [C1319]

"Improvement of LED extraction efficiency with antireflection coating"

It is very important to increase light extraction efficiency in LED structure design. The antireflection film technology is a simple and cost-cutting method. In this paper, we proposed a SiON layer as an antireflection coating deposited on the surface of the conventional AlGaInP LED which can be used to improve the performance of the chip. In the conventional AlGaInP LED, ITO thin film was deposited as current spreading layer. The propagation of lights through these layers was analyzed by transfer matrix method. The thicknesses of ITO and SiON layers have been optimized. SiON film was deposited by PECVD. The results of the experiments showed that optical power increased by 11.38% after LED packaged. The difference of peak wavelength between the two samples was less than 1nm. [C1320]

"Optical design of a high brightness LED street lamp"

We proposed and developed a series of high brightness LED street lamps to provide uniform and wide illumination areas on the road, which can eliminate the lamp installation numbers and electrical power consumption effectively. The modularized light engine design makes LED street lamp more flexible in installation and maintenance. It can also enhance the optical and thermal performance of the whole LED street lamp lighting system. [C1321]

"Light extraction analysis of AlGaInP based LED with surface texture"

A Monte Carlo ray tracing method is applied to analyze the light extraction characteristics of AlGaInP based LED with various shapes of surface texture. Regular, periodic arranged structures were fabricated on p-side-up AlGaInP LEDs through dry etching. The dimension of the structures was optimized by Monte Carlo ray tracing simulation. Compared to the conventional LED, it significantly improved the performance of the chip, the light extraction efficiency was increased more than 11.5%. the enhancement is attributed to the appearance of an additional escape cone for light extraction enabled by surface texture. And it is also easy to extend the Monte Carlo ray tracing method to develop LED lamps, consisting a reflector dish and an epoxy lens. [C1322]

"Opto-chemical method for ultra-low oxygen transmission rate measurement"

A highly sensitive alternative to established methods for measuring oxygen transmission rates of ultra-barrier membranes is presented. The key idea is the employment of an opto-chemical sensor (a luminescent dye immobilized in a matrix) which has vital advantages over electrochemical sensors, such as consumption-less detection and extraordinary sensitivity. The luminescent response to modulated light, which is altered in the presence of oxygen, is recorded by an opto-electronic instrument in a non-invasive manner. Provided with said sensing system, a reusable stand-alone permeation cell was developed. Unlike in conventional devices, the permeating oxygen is accumulated while being simultaneously monitored. The demonstrator unit achieves a limit of detection in the 10-5cm3m-2day-1bar-1regime. It is therefore among the most sensitive O2permeability testers, outperforming commercial instruments by two orders of magnitude, yet offering reusability and similar convenience in operation. [C1323]

"Automatic reaction to a chemical event detected by a low-cost wireless chemical sensing network"

A test-scale wireless chemical sensor network (WCSN) has been deployed within a controlled environmental chamber (EC). The combined signals from the WCSN were used to initiate a controllable response to the detected chemical event. When a particular sensor response pattern was obtained, a purging cycle was initiated. Sensor data were continuously checked against user-defined action limits, to determine if a chemical event had occurred. An acidic contaminant was used to demonstrate the response of the sensor network. Once the acid plume was simultaneously detected by a number of wireless chemical sensor nodes, an automatic response action, which was the purging of the EC with clean air, was initiated and maintained for a period of time until the WCSN indicated that normal status had been re-established. [C1324]

"A mid infrared LED-photodiode based sensor for cell analysis"

We report on the development of a novel LED-photodiode based mid-infrared absorbance sensor system for label-free cell analysis. Compared to common techniques to distinguish healthy from malignant cells our sensor system does not require specific labeling or staining, or the use of expensive liquid nitrogen cooled IR spectrometers. The detection principle comprises a four-wavelength based absorbance measurement to determine the lipid CH2-symmetric/CH2-antisymmetric stretch ratio (3.51 and 3.42 Г‚Вїm, respectively). The other two wavelengths (3.33 and 3.57 Г‚Вїm) are used as reference points to derive a baseline for determination of the functional absorbance values at 3.51 and 3.42 Г‚Вїm. Our sensor experiments show significant differences in CH2stretch ratio of healthy and malignant epithelial kidney cells. The developed sensor has the potential for fast, low cost and label-free screening of suspicious biopsy samples. [C1325]

"Multi-channel turbidity detection of shrimp virus by loop-mediated isothermal amplification reaction"

Reverse transcription loop-mediated isothermal amplification (RT-LAMP) assay is a novel method of gene amplification that amplifies nucleic acid, which can be applied for disease diagnosis in shrimp aquaculture. During the LAMP reaction, the white precipitate of magnesium pyrophosphate (Mg2P2O7) is formed correlates with the amount of synthesized DNA. So, the turbidity can be measured. In this study, a portable turbidimeter has been developed for field to detection of Taura Syndrome Virus (TSV) that causes large economic losses to most major shrimp-producing countries including Thailand. The device could maintain an optimal temperature (63Г‚В°C) for 25 Г‚Вїl of LAMP sample solution contained in a 0.2 ml commercial PCR tube. We also applied the spectroscopic measurement technique to monitor a by-product of LAMP reaction, light emitting diode (LED) was used as a light source. Light dependent resistance (LDR) was used as detector. The results obtained from turbidity measurement revealed the same detection limit to those from agarose gel electrophoresis method. [C1326]

"Non-planar target for multi-camera network calibration"

Rapid calibration of multi-camera systems using planar targets is typically impractical. Here we report a non-planar target for rapid calibration of inward-looking visual sensor networks (VSNs), designed using a novel VSN simulator and verified experimentally. The target consists of a large central sphere, surrounded by several smaller, rigidly mounted spheres. Rotation about an axis through the center of this sphere changes the location of the outer spheres, while keeping a fixed reference point in the center to permit extrinsic parameter extraction. Using the simulation, different target configurations are tested for field-of-view (FOV) coverage for each camera. Experimental results using a constructed operational prototype are consistent with traditional planar target calibrations, but require only a single view of the target to extract the intrinsic parameters. [C1327]

"Feature-extraction algorithms for the PANDA electromagnetic calorimeter"

The feature-extraction algorithms are discussed which have been developed for the digital front-end electronics of the electromagnetic calorimeter of the PANDA detector at the future FAIR facility. Performance parameters have been derived in test measurements with cosmic rays, particle and photon beams. [C1328]

"Low cost indoor location management system using infrared leds and Wii Remote Controller"

Many applications in wireless sensor networks can benefit from position information. However, existing accurate solutions for indoor environments are costly. RF based approaches are not suitable for some indoor environments such as factory floors where heavy machinery can cause interference. In this paper, we propose a low cost and simple location management system using the Wii remote controller and infrared leds. Proposed solution is motivated by the need to find the location of a mobile robot used for data collection in a wireless sensor network. In proposed scheme, Wii remote controller is placed on the mobile robot pointing upward and several IR leds are placed on the ceiling. Proposed scheme uses the resources efficiently and can cover a large area using a single Wii remote controller and multiple IR leds. Proposed scheme is easy to implement and requires minimal bandwith for location management. [C1329]

"Surface-plasmons enhanced light emitter based on Ag film in GaN"

We study the contribution of Surface-plasmons coupling with a single dipole to enhance the emitter emission. When the Ag film is inserted into GaN, the emission efficiency of single dipole in GaN can be enhanced greatly. With 3D-FDTD method, the numerical simulation results demonstrate that the SPs play a key role in enhancement light emitter efficiency. Furthermore, SPs is sensitive not only to the thickness and refractive index of dielectric, but also to the geometry and dispersion model of Ag film. By changing the parameters of GaN and Ag film, the location of the enhancement peak of the emission efficiency in the visible region can be controlled. According to the simply optimal parameters, about 9 times enhancement at 470nm occurs. Our results are of very importance for improving the light-emitting devices of GaN. [C1330]

"A digital brightness controlled white LED driver with I2 C-bus interface"

We presents a white light emitting diodes (WLEDs) driver based on the boost topology, with digital pulse width modulation and pulse skip modulation, as well as an I2C (Inter Integrated Circuit) communication bus interface. The results of the boost converter show that the chip can drive 2-6 WLEDs when the input voltage varies from 2.7-5.5 V, with the peak efficiency of 84%. The chip can work not only in digital mode with four different brightness level, but also in I2C control mode, in which the brightness of WLEDs are controlled in 256 levels. This simple WLED driver with flexible control mode meets the requirements of low cost, high efficiency backlight applications. [C1331]

"Progress and validation of Geant4 based radioactive decay simulation using the examples of Simbol-X and IXO"

The anticipated high sensitivity and the science goals of the next generation X-ray space missions, like the International X-ray Observatory or Simbol-X, rely on a low instrumental background, which in turn requires optimized shielding concepts. We present Geant4 based simulation results on the IXO Wide Field Imager cosmic ray proton induced background in comparison with previous results obtained for the Simbol-X LED and HED focal plane detectors. Our results show that an improvement in mean differential background flux compared to actually operating X-ray observatories may be feasible with detectors based on DEPFET technology. In addition we present preliminary results concerning the validation of Geant4 based radioactive decay simulation in space applications as a part of the Nano5 project. [C1332]

"Upgrade of Mini-DDL applied in the radiation field measurement"

Mini-DDL is a specific device designed for radiation field real-time monitoring, which has already been applied in NSRL, SSRF and BEPC. Although these applications have proved this device to be functional and helpful, users have presented some concrete proposals for improvement according to their usage experience. Based on brief review of the previous Mini-DDL, this paper introduce technologies which are applied to upgrade the Mini-DDL, including the OLED display and the FatFs module. The new version of Mini-DDL will offer more flexible data transfer interfaces, larger and various storage capacity, capable of running in more critical environment. [C1333]

"Design of dichromatic white light-Emitting Diodes using InAlGaN irregular MQW structure"

A new approach for the design of dichromatic white light-Emitting Diodes (LEDs) has been proposed by employing InAlGaN irregular multiple quantum well (IMQW) structures. The InAlGaN IMQW structures are assembled by two different type QWs emitting complementary wavelengths. The electronic and optical properties

of the designed InAlGaN IMQWs have been analyzed in details by fully considering the effects of strain, well-coupling, valence band-mixing and quasi-bound states using a newly developed theoretical model from the k·p theory. The influence of material components, well width and well number of different type QWs, and barrier thickness on the spontaneous emission spectra of InAlGaN IMQWs was studied. The IMQW structure was obtained which can realize near white light emission by optimizing the structure parameters of IMQW structure for dichromatic white LEDs. [C1334]

"System level designing of FSO link through LED and NRZ modulation scheme by using different filters"

Free space optics (FSO) communication provides an attractive solution to bridge the gap between the existing fiber optics infrastructure and the end user. This paper investigates the system level design link of FSO by using different filters for the reduction of noise and timing error. The use of FSO links has been proposed as a solution to the connectivity bottleneck problem which has arisen from the ever increasing demand for high bandwidth in different network topology. Transmitter consist of NRZ modulating LED with a wavelength of 1550 nm and using positive intrinsic negative type photodiode as a receiver, the link range is 450 meters. The result shows the response of timing error, zero crossing distortion and SNR by using different filters. [C1335]

"A simple indoor self-localization system using infrared LEDs"

In this paper, a simple and robust method for indoor self-localization is proposed. Infrared LEDs are used as landmarks. They are set at known positions and observed by a CCD camera on a mobile robot. As a consequence, self-localization is carried out. The acquisition of the position and orientation of the robot with two or more LEDs is formulated. The nonlinear least squares method is applied. Experiments with a constructed experimental system evaluate the proposed method. Error analysis is performed by simulations. The proposed method realizes a very simple indoor GPS using only several infrared LEDs and a CCD camera. [C1336]

"DC and Thermal behavior of PEDOT:PSS thin films"

A material widely used in organic electronics is the intrinsically conductive polymer poly(3,4-ethylendioxythiophene) doped with polystyrene sulfonate acid (PEDOT:PSS). It is used as a conductive layer, as a hole injection layer in organic light emitting diodes (OLED's) or as a semiconductor layer in organic thin film transistors (OTFT). In this paper we focus on the DC and thermal behavior of this intrinsically conductive polymer (ICP) and study the resulting changes of the resistive properties. [C1337]

"Debye temperature of II-VI and III-V semiconductors"

The Debye temperature (Г‚ВїD) of II-VI and III-V zincblende semiconductors has been calculated using plasma frequency formalism recently developed for ternary chalcopyrite semiconductors. Four simple relations have been proposed to calculate the values of Г‚ВїD. Two are based on plasmon energy (Г‚Вїp) data and one each on molecular weight (W) and melting temperature (Tm).The calculated values of Г‚ВїDare compared with the experimental values and the values reported by different workers. Reasonably good agreement has been obtained between them. [C1338]

"LabVIEW powered remote lab"

The goal of this paper is to present the main features of the Programmable Logic Systems and Technology laboratory implemented in the Politehnica University Timisoara, Romania. Remote learning in electronics is a demanding task; our purpose was to perform remote hardware experiments and in the same time to keep the real life feeling for each of them. In order to fulfill this goal, we combined some LabVIEW features with NI hardware and a web camera. Webcam stream servers and Linux Apache web servers were used as well and at last we came out with a platform where students can perform both simple and complex electronics experiments over a simple web browser. Several experiments are currently running and the web camera can be used to monitor the behavior of the motors, the status of the LEDs and even an overview of the boards. A detailed description of each experiment is supplied in the paper. All common browsers and operating systems are supported by our application. This laboratory makes e-learning more exciting, while the student is directly involved in all the experiments. [C1339]

"A new linear voltage-to-current converter with threshold voltage compensation for analog circuits applications in polycrystalline silicon TFT process"

A new linear voltage-to-current (V-I) converter with threshold voltage compensation for analog circuits design implemented with low-temperature polycrystalline silicon thin-film transistors (LT poly-Si TFTs) is proposed. The

proposed V-I converter has been verified through simulations with Synopsys HSpice using level 62 RPI model. In order to obtain realistic simulations, parameters extraction in fabricated LT poly-Si TFTs was made. The proposed V-I converter exhibits high linearity for a wide input range (~ 2 V). Furthermore, the impact of the threshold voltage variation on the output current can be reduced from 38.5 % to 4.5 % under a biasing voltage of 6.5 V and an input voltage of 3 V. [C1340]

"Oligothiophenes incorporating metal-metal quadruple bonds (MM = Mo2, MoW and W2). A chemical approach for photon harvesting and spectral expansion"

The syntheses, electronic structures as determined by calculations employing density functional theory, and the physic-chemical properties of oligothiophenes attached to MM quadruply bonded centers (MM = Mo2, MoW and W2) by carboxylate tethers are described. These materials absorb light across the spectral range 300-1000 nm due to intense 1LLCT and 1MLCT transitions. The ММГ,Вї orbital is strongly coupled to the p-system of the oligothiophenes and the photoexcited states have relatively long lived singlet and triplet state which are on the order 10 ps and 50 Г,Вїs, respectively. Electrochemical and Photophysical studies are reported. [C1341]

"Optimized emitter wrap-through cells for monolithic module assembly"

Migration from the previous generation of Advent Solar emitter wrap-through (EWT) cells to the current technology platform based on 243 cm2multicrystalline Si cells and monolithically interconnected cell and encapsulated modules has brought with it significant performance increases. Extraction of current from multiple contact pads distributed on the cell rear, optimization of the emitter through-holes, and reduction of through-hole lengths associated with moving to thinner silicon wafers has led to significantly reduced series resistance. Ag metallization costs are also lowered because of the reduction of grid finger lengths. Improved isolation between interdigitated p and n regions on the cell rear has lead to negligible shunt resistance losses. This, in combination with understanding of diode recombination losses, passivation, and optimization of Si material for the cell design through appropriate choice of base resistivity has lead to a greater than one percent absolute efficiency improvement over previous generation EWT cells, with best multicrystalline Si cells producing 17% conversion efficiency using the regular production processes. Additional improvements to efficiency are obtained with the implementation of texturing. These efficiency gains are further leveraged on the module level by the reduction of series resistance losses associated with the backplane interconnect design compared to conventionally interconnected front-side contacted cells. [C1342]

"Microcontroller based smart charge controller for standalone solar photovoltaic power systems"

This paper presents a cost efficient PV charge controller with the function to disconnect and reconnect battery and load during battery overcharging or under discharging. The proposed charge controller is equipped with LCD to display the temperature, battery voltage and current flow through the battery. Output of these 3 inputs are used to obtain the accurate and efficient disconnecting/ reconnecting action which is capable of protecting the battery and the load whereas LED indicator is featured to show the status of the systems. The source code for the PIC microcontroller is written in C code which is more user friendly than using assembly language. Furthermore, this smart charge controller is developed to reduce the current market price of charge controller to an affordable level. This project deals with the design of an intelligent charge controller using PIC microcontroller to control and coordinate the activity in charge controller. [C1343]

"Integration of polypyrrole microactuators and organic optoelectronic devices for lab-on-chip applications"

Two type of devices suited for lab-on-a-chip applications were investigated. First, the integration of a polymeric microactuator deposited on top of carbon electrodes placed below a microfluidic channel. This actuator uses the out-of-plane strain of the polypyrrole/NaDBS (sodium dodecylbenzene sulfonate) system. The electrodeposition of polypyrrole on top of graphitic and carbon nanotube microelectrodes has been achieved. Secondly, the combination of an organic light emitting diode (OLED) with a microfuidic channel in order to build an integrated fluorescence detection system was also investigated. [C1344]

"Efficienct LED driver with an adaptive reference tracking technique"

An adaptive reference tracking driving technique is proposed to minimize the boost output voltage oscillation and improve the power efficiency when the digital pulse width modulation dimming is enabled. An asynchronous 1 MHz DC/DC converter with a dynamic resistor implements the minimum voltage reference tracking technique. Therefore, high efficiency and a stable boost output voltage can be guaranteed whether the LED strings turn on or off. The test chip was simulated by TSMC 0.25 um BCD 40 V to demonstrate high efficiency and the stable

boost output voltage. Simulation results show the oscillation output voltage can be minimized from 1.4 V to 0.2 V. [C1345]

"Investigation on the aging characteristics of high-power white LEDs under different stresses"

We used two types of 1-W white LEDs, both of which had the structure of GaN chip with phosphor covered and packaged in metal PCB boards with laminated aluminum. Of the two types of packaging lens, one is made of hard silica gel, and the other is made of soft plastic. The purpose of this paper is to analyze the aging characters of high-power white LEDs under stresses. In accelerated life tests, the two types of white LEDs were treated with high temperature and DC current distinctively. The tendencies of the decay of luminous flux in the two conditions were basically the same, while the changing trends of the color temperature were different. The hard silica gel had better stability. [C1346]

"White-light-emitting diodes based on Ba2+ co-doped Sr3 SiO5 : Ce3+, Li+ phosphor"

A yellow-orange-emitting Ba2+codoped Sr3SiO5: Ce3+, Li+phosphor was prepared by high-temperature solid-state reaction. Through transitions of 5d→4f in Ce3+, the phosphor showed a very broad and strong yellow emission under near ultraviolet (UV) or blue light excitation. The shifts of the emission band to longer wavelength (yellow-orange) of the Sr3SiO5: Ce3+, Li+yellow phosphor under the 450-470 nm excitation range have been achieved by adding the element Ba2+in the Sr3SiO5host. White light could be obtained by combining this phosphor with 460nm light-emitting diodes. As the concentrations of the Ba2+, Ce3+and Li+ions in the phosphor were 0.35mol, 0.024mol and 0.024mol respectively, the InGaN-based Ba2+codoped Sr3SiO5: Ce3+, Li+LED presented intense white emitting and good color rendering of 88. [C1347]

"Design of free-form microlens for LED general illumination"

For breaking through the restrictions of multiple LED products with irregular radiation patterns, free-form microlens optics is designed by the Snell's law and "edge-ray principle" for illumination applications. This non-imaging optics can freely redistribute LED radiations onto target surfaces for prescribed uniform illuminations without considering the specific radiation patterns of LED sources. The surface shape of the single free-form microlens is totally determined by the practical illumination requirements, and calculated by using the three dimensional ray tracing method and B-spline fitting way. Some models of free-from microlens optics were done to achieve prescribed rectangular illuminations. The simulation experiments for these models were done, and the results show that the achieved illuminations have high uniformities, precise illuminating shapes, and insensitivity of the radiation pattern of the sources used, which means that free-form microlens optics is applicable in LED lighting with competitive advantages. [C1348]

"High efficiency and simple architecture phosphorescent OLEDs"

We present an ideal host-guest concept for highly efficient phosphorescent OLEDs (PHOLEDs). Highly efficient PHOLEDs with an extremely low doping concentration of 1% are developed. The origin of such a low doping is revealed by energy transfer mechanism studies and ideal host-guest concept. Simple architectures for PHOLEDs are realized based on this ideal host guest concept. Organic bi-layered and triple-layered architectures for PHOLEDs with high efficiency are reported. Results reveal a practical way to fabricate the highly efficient simple structure devices for trouble-free manufacturing processes. [C1349]

"Application of nanosphere lithography to the fabrication of nanorod LEDs and to the performance enhancement of conventional LEDs"

The process of nanosphere lithography was developed and applied to LED epistructure. We demonstrated p-i-n nanorod LED arrays with some specific characteristics. Moreover, LEDs encompassed with self-aligned nanorods are fabricated. Light diffraction behaviors are characterized. The results are explained by photonic crystal effect. [C1350]

"Hybrid nano plasmonics for integrated biosensor"

SPR biosensor with OLED and nano-grating for HBV LAMP product detection is reported. Directional emissions by grating-coupler match the resonant condition of SP modes. Concentration changes result in color shift at specific angle. Real time detection of virus load down to 5 copies/25 ul can be achieved in 30 minutes. Surface plasmon Resonant (SPR) biosensor has been used for quantitative measurement of molecular interactions for its advantages of high sensitivity, label-free and real-time detection. In this paper, we report recent efforts on further enhancement of SPR biosensors by the heterogeneous integration of organic electroluminescence light source and nano-grating structure for the feasibility study on the fast and high sensitivity detection of HBV isothermal

amplification products, Mg2P2O7. We demonstrated the surface plasmon coupled through hybrid nano-grating structure has highly directional emissions corresponding to the resonant condition of surface plasmon modes on the Au/air interface and controllable plasmonics band-gap by pitch modulation. SPGCE resulted in color change from yellowish green to orange at a certain viewing angle, when contacting glucose with concentration increasing from 10 to 40%. [C1351]

"Core-shell Ge nanowires and heterojunctions for memory and photodetector devices"

Germanium nanowires are attractive due to their higher carrier mobilities and lower effective masses and compatibility with Si-based CMOS devices. Semiconductor heterojunctions grown on one dimensional nanowire templates have been demonstrated to be useful for photoelectrochemical cell, light-emitting diodes, electrochromic devices, and sensor systems. This core-shell nanowire heterojunction possesses a unique advantage of high surface area-to-volume ratio with carrier separation taking place in the junction in radial direction within one diffusion length of minority carriers. These nanowires sandwiched/embedded in polymers are also attractive for applications in organic light emitting diodes, photovoltaic cells, flat panel displays and in organic field effect transistors. In addition, the memory devices using semiconductor/organic heterostructures make them useful for the realization of flexible and low cost polymeric electronic and optoelectronic devices. We shall present the growth and characteristics of Ge-CdS core-shell nanowire radial heterojunctions and memory characteristics of Ge/GeO2core-shell nanowires sandwiched between a tunnel silicon oxide and poly[2-methoxy-5-(2-ethylhexyloxy)-1,4-phenylene-vinylene] (MEH-PPV) polymer. The growth of core-shell nanowires was based on vapour-liquid-solid (VLS) mechanism using a Ge ingot, under controlled conditions with the assistance of a gold catalyst. Before the deposition of Ge, a thin gold film was evaporated on oxidized p-type silicon substrates. The growth of nanowires was carried out at temperatures ranging from 750-950?C for different times in nitrogen ambient at a flow rate of 100 seem. Transmission electron micrographs revealed the formation of Ge-GeO core-shell nanowires, having core diameter of 20-50 nm2and shell diameter of 10-15 nm. The selected area electron diffraction pattern clearly indicated the formation of single crystalline Ge in the core region. The core-shell Ge/CdS nano- wires heterojunction was fabricated using a simple chemical process. Raman spectrum revealed the formation of phonon confined nanocrystalline CdS shell on Ge nanowires surfaces. Room temperature and low temperature photoluminescence characteristics of the nanowires as well as core-shell Ge/CdS nanowire heterostructure showed dominant defect related emission from the GeO shell region whereas a strong band edge emission from CdS was recorded. A blue shift of the energy gap of CdS with decreasing temperature was observed from the PL spectra. The photocurrent characteristics of Ge/CdS core-shell nanowires junction under reverse bias were studied in detail. An enhanced photoresponse with broad spectral bandwidth was observed in core-shell nanowire devices in the wavelength range of 450-1000 nm. The observed photoresponse can be essentially useful for fabricating broad band photovoltaic and photodetection devices based on nanowire heterojunctions. The hybrid polymer heterostructure was prepared by spin coating of MEH-PPV solution on Ge/GeO core-shell nanowires. The capacitance-voltage characteristic's (C-V) of core-shell nanowires/conducting polymer device exhibited excellent metal-insulator-semiconductor behaviour with hysteresis due to charge storage at 300 K. The C-V characteristics at different operating frequencies revealed that the hysteresis was mainly due to the trapping of charge carriers in Ge nanowires rather than in the interfacial states. A simplified model based on tunneling of carries into the valence subbands of Ge was used to explain the charge storage behaviour. The study indicates that the core-shell nanowire/conducting polymer heterostructure holds promise for potential applications in next generation nonvolatile memory for polymer electronic and optoelectronic devices. [C1352]

"Nanosilicon photonics"

Silicon photonics is no more an emerging field of research and technology but a present reality with commercial products available on the market, where low dimensional silicon (nanosilicon or nano-Si) can play a fundamental role. After a review of the field, the optical properties of silicon reduced to nanometric dimensions are introduced. The use of nano-Si, in the form of Si nanocrystals, in the main building blocks of silicon photonics (waveguides, modulators, sources and detectors) is reviewed and discussed. Recent advances of nano-Si devices such as waveguides, optical resonators (linear, rings and disks) are treated. Large emphasis is dedicated to the visible optical gain properties of nano-Si and to the sensitization effect on Er ions to achieve infrared light amplifications. The possibility of electrical injection in the light emitting diodes is presented as well as the recent development addressed to exploit nano-Si for solar cells. In addition, nonlinear optical effects which will enable fast all-optical switches are described. [C1353]

"GaAs based quantum dot superluminescent diodes for optical coherence tomography of skin tissue"

The development of high power broad bandwidth quantum dot super-luminescent diodes (SLEDs) is described.

The requirements for time domain optical coherence tomography is described and the suitability of GaAs based quantum dots (QDs) highlighted. The effect of reducing QD deposition temperature is shown to be beneficial for broadband applications, and the fabrication of such material into single-pass multi-contact SLEDs is outlined. The operating characteristics of these devices are discussed in terms of power, emission bandwidth, spectral shape, axial imaging resolution, and sensitivity to optical feedback. Finally the effect of increased bandwidth and power on the imaging of skin tissue is practically demonstrated. [C1354]

"Design of in vitro light stimulation device"

Optogenetic technology is a novel method which can achieve bidirectional control of neural signals with cell type specific and high spatiotemporally precise. We developed an illumination system to control light sensitive cytoactive based on optogenetic technology. A NE555 driven circuit was utilized to control the high-intensity of a blue or yellow light-emitting diode (LED). The optical wavelength is about 470nm for the blue LED and 590nm for the yellow LED. To supply enough light intensity to activatee the light sensitive cells which were living in the culture dish, the whole LED circuit was integrated into a culture dish. [C1355]

"Design of temperature control device underground coal mine based on AT89S52"

Temperature underground coal mine is an important index, especially for mining workers underground. To monitor the temperature effectively, a temperature measurement and control system is necessary to design. Temperature value is displayed on LED screen on line. When temperature value reaches the maximum, conditioning device connected with the opening end of the relay controlled by the MCU will start up. Temperature signal and control information is all transmitted by wireless signal transmission module nRF905. The system program consists of transducer control and display of the temperature value. The control program of transducer is compiled according to its communication protocol. Program of wireless data transmission should be debugged between the data transmission modules. Alarm device is designed to provides effective information to workers when the temperature value is unusual. Thus monitoring of the temperature underground coal mine can be real and effective. [C1356]

"The research of humanized design of the LED landscape lighting lamp"

Along with the development of LED industry, the design of LED landscape lamp is faced with great challenges and chance. It brings higher requirements for humanized design of the LED landscape lighting lamp. The article found out the current design problems of LED landscape lighting lamp, by the analysing the humanized design requirements and the humanized design strategies of the LED landscape lighting lamp were constructed according to Maslow's Hierarchy of Needs. Finally, some factors about the design of LED Landscape lighting lamp were discussed through actual case of Hangzhou Qianjiang New city landscape lighting. The goal is promoting the humanized design quality of the LED landscape and accelerating the development of the LED landscape lighting lamp design. [C1357]

"Application of High-Brightness LEDs in Tissue Human and Their Therapeutic Interaction"

The LEDtherapy is increasingly becoming important in several health treatment areas, such as biomedical engineering, deontology, physical therapy and dermatology. The biomedical engineering, for example, has been experiencing major advances in the research on the application of LEDs in the treatment of pre-malignant or even malignant skin lesions, rejuvenation treatments, acne, hair loss, skin injuries and postoperative incisions recovery and in the psychological improvement of patients where the LED lights can be applied. The driver topologies to supply these LEDs also has been experienced remarkable improvement, regarding the application of different light intensity control techniques, colour distribution besides current output and power optimization. This paper describes a wide study of the state of the art on this topic in concert with proposals of driver topologies and preliminary results based on ongoing experiments. [C1358]

"Single-Stage Flyback Power-Factor-Correction Front-End for HB LED Application"

This paper presents a single-stage flyback power-factor-correction (PFC) front-end for high-brightness light-emitting-diode (HB LED) applications. The proposed PFC front-end circuit combines the PFC stage and the dc/dc stage into a single stage. Experimental results obtained on a 78-W (24V/ 3.25-A) prototype circuit show that at VIN= 110 Vac, the proposed PFC front-end for HB LED applications can achieve an efficiency of 87.5%, a power factor of 0.98, and a total harmonic distortion (THD) of 14% with line-current sharmonics that meet the IEC 61000-3-2 Class C standard. [C1359]

"Viewing-Zone Control of Large Full-Color LED Display for 3-D and Digital Signage"

We propose methods to control viewing zones of large screen consisted of full-color LED panel. Large parallax barriers have been developed for public 3-D display. By changing pixel arrangements, locations and number of perspectives can be reconstructed. Response of viewer's position caused by a shift of viewing was detected to evaluate the design of stereoscopic viewing zone. Furthermore, an array of slits has been utilized to provide multiple image s depending on viewers' distances for use of digital signage. [C1360]

"Implementation of bi-level current driving technique for improved efficacy of high-power LEDs"

Presently, amplitude mode (DC mode) and pulsewidth modulation (PWM) represent the two main driving techniques used in LED drivers. The dimming function with PWM driving technique is attractive although lower luminous efficacy and stresses on the LEDs due to pulsating power are the disadvantages in comparison to amplitude mode. This paper introduces a current driving technique to improve the luminous efficacy over the conventional PWM technique while maintaining the dimming capability. This is achieved by introducing a DC-offset into the conventional PWM current waveform. It is found that the luminous efficacy increases with increasing DC-offset while the stresses due to pulsating power are reduced. Implementation and verification of the proposed driving technique using a prototype driver are presented. [C1361]

"Readability of Characters on Display Faceplates in Terms of Human Sensation"

Readability tests were carried out for three types of displays; a TFT-LCD with backlight of white LED matrices, a TFT-LCD with backlight of two-row cold cathode fluorescent lamps (CCFLs), and a CRT. Readability of the TFT-LCD with backlight of white LED matrices was highest among the others from the viewpoint of flicker and luminance unevenness. The efficiency of VDT operations contiguously carried out for up to 90 minutes for the TFT-LCD with backlight of white LED matrices was higher than the other two types of displays by a factor of 10 to 20%, since the readability for up to 30 minutes was greatly improved by TFT-LCD with backlight of white LED matrices. Throughout these experimental studies, we found that the temperature rise was recognized of the ciliary muscles surrounding the eye lenses, when measured on the infra-red thermometer, due to fatigue of the ciliary muscles during the VDT operations. [C1362]

"Equivalent Circuit Model of Light-Emitting-Diode for System Analyses of Lighting Drivers"

This paper presents the equivalent circuit models of the light-emitting-diode, including the piece-wise linear model, DC model and small-signal model. In order to characterize the equivalent circuit model of the LEDs, a piece-wise linear model is built by adopting the superposition concept of the multi-branch equivalent circuit model. Furthermore, in order to perform the DC and small-signal analysis of the LEDs, the equivalent DC and small-signal resistance will be derived from the piece-wise linear model. [C1363]

"Evaluation of Visual Performance When Using Incandescent, Fluorescent, and LED Machine Lights in Mesopic Conditions"

This experiment investigated the effects of different machine mounted area lighting technologies on visual performance. The primary objective was to conduct a comparative evaluation of the lighting technologies based on the visual performance of thirty-six human subjects in a simulated underground mine environment. Incandescent (Incand), fluorescent (Fluor), and light-emitting diode (LED) technologies were used to create four lighting combinations. Visual performance was quantified for the detection of movement in the peripheral field of view and the identification of ground hazards. Measurements were made of the speed [response time measured in milliseconds (ms)], the accuracy (the number of targets and objects missed), and the subjective discomfort rating of the glare experienced for each lighting combination. A secondary objective explored the effects of aging on visual performance. The results indicate that lighting combinations which consisted of LED area lights significantly improved visual performance for the detection of hazards found in the peripheral field of view, as well as those found on the ground. They furthermore, indicate that age plays a significant role in visual performance. [C1364]

"Observation of room temperature THz emission based on photoluminescence from Ge"

Room temperature terahertz (THz) emissions were observed from a single crystalline germanium (Ge) by photoluminescence mechanism. The emission mechanism can be explained by intracenter transition of antimony impurities in n-Ge. The emission spectrum contains two peaks corresponding to the 2Pplusmn rarr1S (T,A) (about 8.28 meV; 149.6mum), and 3P0 rarr1S (T,A) (about 7.45 meV; 166.3 mum) intra-center antimony transitions in n-Ge1. [C1365]

"LED Lamp with a Compact Emergency Lighting System"

This paper presents an efficient and compact emergency lighting system using high intensity light emitting diodes (LEDs). The proposal aims energy saving, high luminous efficacy and high useful life when replacing traditional emergency lighting systems and incandescent or compact fluorescent lamps by LEDs without any change in electrical system installation. A buck converter is used to supply the LEDs and charge the battery by mains, with universal input voltage (90 VAC 240 VAc)iota and a boost converter is used to supply the LEDs by battery. The converters operate at high frequency and control the LED's current independently. A Li-Ion battery was chosen because it has higher voltage and density of energy than Ni-MH one. The design attends the Brazilian standard (NBR 10898) and IEEE standard (IEEE Std 446-1995) for emergency lighting systems. The complete circuit was implemented and the experimental results show a satisfactory behavior of the lamp. [C1366]

"System Analysis of DCM Dual-Loop Controlled Light-Emitting-Diode Boost Driver"

This paper presents the system analysis of the discontinuous-conduction mode (DCM) dual-loop controlled light-emitting-diode (LED) boost driver. The equivalent circuit models of the LED boost drivers are constructed to derive the system transfer functions for predicting the system performance, including the loop gain, line regulation and load regulation. The corresponding Bode diagrams are plotted and compared with those of the SIMPLISregsimulations and measured results to validate the derived transfer functions. [C1367]

"System Analysis of CCM Dual-Loop Controlled Light-Emitting-Diode Boost Driver"

This paper presents the system analysis of the continuous-conduction mode (CCM) dual-loop controlled light-emitting-diode (LED) boost driver. In order to predict the system performance, including loop gain, line regulation and load regulation, the equivalent circuit models of the LED boost drivers are constructed to derive the system transfer functions. Based on the given circuit specifications and parameters, the calculated results are compared with the SIMPLIS* simulations and measured results to verify the derived transfer functions. [C1368]

"On the driving techniques for high-brightness LEDs"

High-brightness light-emitting diodes (HBLEDs) are conventionally driven in the amplitude mode (AM) or pulse-width-modulation (PWM) mode. High luminous efficacy is obtained with AM, but precise dimming is difficult to achieve and such AM-driven LEDs suffer from significant color variations. PWM offers excellent dimming capability and color stability but the LEDs acquire lower luminous efficacies compared to AM. The advantageous features of both conventional methods can be united in a single generalized methodology as proposed in this paper. It utilizes pulsating current while enables simultaneous adjustments of the current levels and duty cycle for achieving a predetermined luminous efficacy and dimming range of interest to the users. The dimming dynamics using the proposed method is investigated through a detailed parametric study by experiments and numerical calculations. [C1369]

"Ballast for independent control of multiple LED lamps"

Light-emitting-diode (LED) light sources, which are more compact, capable to change color in real time, less dissipative and more durable, are finding more applications than conventional lighting bulbs in domestic, commercial and industrial environments. However, requirements such as high power factor, long lifetime, accurate current control and high efficiency pose challenges to the design of LED ballast circuits. This paper proposes an LED ballast with a first-stage isolated current-fed power factor correction (PFC) pre-regulator that puts the storage capacitor to the secondary, thus allowing the use of lower-voltage storage capacitor in order to extend the overall system lifetime. Furthermore, the high voltage stress on the main switch, which is typical in current-fed converters, is reduced substantially by appropriately exploiting the transformer leakage inductance. The design uses two secondary transformer windings and an LED current driver to form a non-cascading structure to improve efficiency. Multiple non-cascading structures can be used for LED lamps for instant independent brightness control. Analysis, design example and prototype verification are given for the LED ballast. [C1370]

"A novel LCD backligth with mixed white and colorful LEDs"

With improved luminous efficiency, reduced cost, long lifetime, wide color gamut, fast response, LEDs are becoming a suitable solution for LCD backlight. Backlight consisting of white LEDs has the merit of high luminous efficiency while is not possible to change color temperature. Backlight with colorful LEDs of red, green, blue to form white lights can reach various color temperatures while luminous efficiency is not as high as white LED backlight. A mixed backlight combining white and colorful LEDs is presented in this paper to preserve the merits of both kinds of LED backlights. High luminous efficiency white LEDs provide most of luminance and colorful LEDs are only lightened when color temperature is to change. An implementation is realized. The experimental results show that the theoretical model is appropriated and the mixed backlight presents the high luminous

efficiency with less LEDs and possibility to change color temperature. [C1371]

"Design and fabrication of Mach-Zehnder interferometer bistable laser diode all-optical flip-flop"

We fabricate and experimentally demonstrate all-optical flip-flop switching based on novel Mach-Zehnder interferometer bistable laser structure. The MZI-BLD successfully acts as set-reset flip-flop with continuous light injection. [C1372]

"Laser sources at 760 nm wavelength for metrology of length"

First set-up of the laser source based on the DFB (Distributed FeedBack) laser diode is presented. We used the DFB laser diode at 760 nm wavelength with mode-hop free tuning range above 1 nm and fiber output up to 10 mW. We present our first characteristics without external stabilization of the output wavelength. We compared our new DFB laser source with our previously developed laser source with VCSEL (Vertical Cavity Surface Emitting Laser) diode. Results are presented. Both laser sources were developed for laser interferometry, laser metrology of length. We present set-up of the laser interferometer proposed with respect to using of our laser sources. The design of optical set-up of the experimental interferometer is realized using fiber optics to reduce the influence of the index of refraction of air. The laser interferometer in the first set-up was used for absolute measurement of length. We used the method of the frequency stabilization on optical resonator to stabilize of frequency of laser diode and measurement of the tuneability of the wavelength. [C1373]

"Self-oscillating flyback driver for power LEDs"

The self-oscillating flyback converter is a popular circuit for cost-sensitive applications due to its simplicity and low component count. It is widely employed in mobile phone chargers and as the stand-by power source in off-line power supplies for data-processing equipment. However, this circuit was almost not explored for supplying power LEDs. This paper presents a self-oscillating flyback driver for supplying Power LEDs directly, with no additional circuit. A simplified mathematical model of the LED was used to characterize the self-oscillating converter for driving the power LEDs. With the proposed converter the LEDs manufacturing tolerances and drifts over temperature presents little to no influence over the LED average current. This is proved by using the LED electrical model on the analysis. [C1374]

"Dynamic control of a light-emitting diode system based on the general photo-electro-thermal theory"

This paper presents a dynamic thermal model of a LED system and a control strategy for optimal power point tracking (OPPT). The control strategy is based on the general theory which links the photometric, electric and thermal behaviors of LEDs together. The control implementation enables the optimal operating of the LED systems to be determined dynamically. By measuring the ambient temperature and the heatsink temperature of LED system, the proposed control scheme allows the LED system to operate at the optimal dynamic operating points at which maximum luminous flux is generated. Practical tests have been carried out to verify the model and the general theory. [C1375]

"Fault monitoring and control of PEM fuel cell as backup power for UPS applications"

This paper presents the expert fault monitoring and intelligent comprehensive control of a proton exchange membrane (PEM) fuel cell (PEMFC) as backup power source for an uninterruptible power supply (UPS) system. The failure status can be shown on the screen of a micro-computer (or a PC) linked with the UPS through an RS-232 and on the control panel of the UPS through LED indicator lights. The proposed intelligent comprehensive monitors and controllers of PEMFC and UPS can supply high quality power with flexible conversion functions, leading to the establishment of reliable power management for UPS applications. Finally, a suitable strategy and technique of fault monitoring and control for a UPS hybrid system with backup PEMFC and battery is implemented. The performances of the monitors and controllers are evaluated by experimental results, showing that the developed UPS system with backup PEMFC and battery power sources is suitable for industry applications. [C1376]

"Comparative study on the structural designs of led devices & systems based on the general photo-electro-thermal theory"

An investigation into the effects of the structures of both LED devices and systems on the luminous performance is presented. Single-chip and multi-chip LED structures are evaluated and compared, and concentrated and distributed LED systems are studied and compared. Practical tests on both of the device and system levels have confirmed the theoretical predictions that parallel LED structures can lead to much lower thermal resistance and

thus higher luminous output. The results of this paper contribute to new information for both LED device manufacturers and system designers towards the optimization of the LED technology. [C1377]

"PV power system using buck/forward hybrid converters for LED Lighting"

This paper presents an LED lighting system with a PV source. The circuit structure of the proposed system adopts buck converter combined with forward converter. In this research, buck converter is used as a charger for charging battery, and forward converter with active clamp circuit, which can recover leakage inductor energy and reset magnetizing energy stored in the transformer, is adopted to drive LED lighting. To simplify the circuit structure, switches of two converters are integrated with a synchronous switch technique. With this approach, the proposed system has several merits, which are a less component counts, lighter weight, smaller size and higher conversion efficiency. Compared with the conventional converter with hard-switching circuit, the proposed one can improve conversion efficiency of 5% and achieve efficiency about 82% under full load when the proposed system is operated in the driving LED condition. Experimental results obtained from a prototype with the output voltage of 10 V and output power of 20 W have been implemented to verify verified its feasibility. [C1378]

"Comparison of Inductor-Half-Bridge and Class-E resonant topologies for piezoelectric transformer applications"

A comparison of inductor-half-bridge (IHB) and class-e (CLE) resonant converters using piezoelectric transformer (PT) is presented in this paper. The analysis approach is based on state space normalized solutions which allows precise analyzing and comparing the two topologies for different applications with mathematics software. The obtained mathematic results can be directly used to design and to optimize the converter parameters to meet the requirements of specific applications. Two demonstration boards for an offline 2 Watts LED application have been implemented with IHB and CLE resonant converters separately. The experiment results are in a good agreement with the theoretical calculations and conclusions. [C1379]

"Extraneous-light resistant multipixel range sensor based on a low-power correlating pixel-circuit"

This work covers a correlation-based, optical time-of-flight matrix range sensor which is able to suppress ambient light up to 150 klx full-electronically and autonomously in each single pixel. The CMOS-compatible sensor features 16times16 pixels and permits distance measurements with a standard deviation of 1 cm (5 cm) up to 1 m (3.2 m), while the linearity error is within plusmn2 cm for the entire measurement range within a measurement time of 50 ms per distance point. A 0.9 W LED source is used to illuminate the field of view with near-infrared light, which is modulated at 10 MHz. In this design, the current consumption could be reduced from 100 muA to 2 muA per pixel, while increasing the distance measurement performance at the same time. [C1380]

"Compendium of Total Ionizing Dose Radiation Test Results from Ball Aerospace & Technologies Corp."

A number of electronic devices have been tested for sensitivity to total ionizing dose for space applications at Ball Aerospace & Technologies Corp. Test results are presented for optoelectronics, digital, analog, mixed signal, and hybrid devices. [C1381]

"iTracking: Accurate light-based location-tracking in wireless sensor networks"

Most previous localization and tracking systems in wireless sensor networks are based on RF signals, ultrasounds, and UWB. However, systems using RF signals suffer accuracy fluctuations and systems using ultrasound or UWB need extra hardware. In our paper, we propose to utilize light, an easily accessible and pervasive resource in our daily life, and off-the-shelf TelosB Motes to achieve the goal of stability and high accuracy in localization and tracking. The iTracking system is a mobile light source location-tracking system based on light intensity. Our main contribution is the first demonstration to track mobile light sources based on light intensity with high accuracy, which may provide an alternative method for localization and tracking or inspire game designers. We examine point light based tracking and flashlight based tracking in our demonstrations, which proves these two main sources of light in our daily life can achieve centimeter-level location-tracking requirements. Our future work will focus on enabling the iTracking system to writing Chinese characters in flashlight. [C1382]

"Bio-inspired fluidic lens surgical camera for MIS"

We report a new type of surgical camera that will greatly improve minimally invasive surgery (MIS). The key enabling technology for this camera is a unique type of lens-bio-inspired fluidic lens, which is a bio-mimetic lens that can change its curvature, just like the way human crystalline lens can accommodate. Because of its

curvature changing capability, it is now possible to design a new regime of optical systems where auto-focusing and optical zoom can be performed without moving the lens positions, as is done in typical cameras. Hence, miniaturized imaging system with high functionality can be achieved with such technology. MIS is a surgical technique where small incisions are made on the abdominal wall as opposed to a large cut in open surgery. This type of surgery ensures faster patient recovery. The key tool for MIS is its surgical camera, or laparoscope. Traditional laparoscope is long and rigid and limits the field of view. To further advance MIS technology, we utilized bio-inspired fluidic lens to design a highly versatile imager that is small, can change its field of view or zoom optically, works in low light conditions, and varies the viewing angles. The surgical camera prototype is small (total track < 17 mm), possesses 3times optical zoom, operates with light emitting diode (LED) lighting, among many other unique features. [C1383]

"Measurement of scale defects on steel plate in pickling line"

This paper describes on-line measurement of pickling grade on a steel plate in a pickling line of a cold rolling mill. Two kinds of light sources such as a red color laser and a white LED were tested to determine which one shows a better performance for pickling degree measurement. Based on the laboratory test results, a proper scheme was designed for a feasibility test. After that, a prototype device for on-line measurement system was fabricated and installed after the pickling line in the cold rolling mill, and the performance was investigated. [C1384]

"Optical measurement of blood hematocrit on medical tubing with dual wavelength and detector model"

Blood hematocrit (Hct) is a clinically important index to detect death-dealing symptoms such as anemia and thrombosis, especially for patients with artificial heart, in dialysis and during open-heart surgery. Optical technology has been applied to monitor hematocrit noninvasively, continuously and conveniently, however, it was not well established for actual use. The purpose of this study is to develop an accurate and stable optical hematocrit measurement without any calibrations for device-mounting errors. To this end, we propose a theoretical method. In this method, disturbances are cancelled by using dual detector and optical path changes are calibrated by dual wavelength so that we can measure hematocrit without calibrations of these. Based on the method, a measurement unit that has two LEDs (805/1300[nm]) and four photo detectors was developed. Then, we performed experiments with 38 blood samples from five bovines' blood (Hct: 19-55%). These blood samples were circulated in a mock-up circuit by a blood pump. During the experiment, we measured hematocrit on medical tubing with the developed measurement system. As a result, we could measure hematocrit within 1.7 Hct% mean errors for 38 blood samples without any calibrations. The result indicates that the proposed method is applicable for hematocrit measurement on medical tube in enough small error. We found this proposed method is effective for developments of clinically workable hematocrit measurement/monitoring system. [C1385]

"A Novel Vehicle Brake Light System"

The novel advantages offered by the electronic component LED (Light Emitting Diode) have received much attention and caused a quick and broad application of this device in replacement of incandescent lights. The increasing trend for the application of LED in automotive lighting is very obvious. In this article, a novel vehicle brake light system design using LED has been proposed. Some benefit of the proposed circuit is emphasized. [C1386]

"Electro-thermal modeling of different LEP-thickness white OLEDs"

In our project the final purpose is to develop a cost-effective roll-to-roll technology of fabricating large-surface, high-output OLED (organic light emitting diode) devices for intelligent lighting applications. The electrical and optical characteristics of multi-layered OLEDs depend on the thickness of the layers. To reach the highest efficiency in an application is needed to optimize the each layers. In this paper we have measured the I-V characteristics of the different LEP (light emitting polymer) thickness white OLEDs. We have examined in 50degC wide temperature range. We have created an electro-thermal model, which describe the temperature and LEP thickness dependence of the forward bias. The results work as the feedback for the fabrication process and the OLED planning to our project partner. [C1387]

"Design of CMOS LED driver and optical receiver for 650-nm POF applications"

In this paper, LED driver and optical receiver for 650-nm plastic optical fiber (POF) applications are designed and implemented using 0.5-mum CMOS technology. In LED driver, modulation current has to be arranged in 3 to 4-mA to meet eye protection regulations in visible red wavelength (650-nm). To apply for low cost POF applications, simple and low cost LED driver is proposed. LED driver is designed to operate at 50-Mb/s bit rates

and consumes only 6-mA DC currents including modulation current of 3.5-mA. In the receiver side, two methods of auto-threshold control technique will be introduced and compared. The designed optical receiver achieves transimpedance gain of 145-dBOmega, 50-Mb/s operations with 45-MHz bandwidth for 4-pF photodiode parasitic capacitance. And proposed optical receiver guarantees digital level output swing against the range of incident photo current from 200-nA to 25-uA and the range of operating frequency from DC to 50-Mb/s. Receiver chipset consumes only 10-mW from a 3.3-V single supply. [C1388]

"Carbon nanotube enhanced thermally conductive phase change material for heat dissipation"

Carbon nanotube enhanced thermally conductive phase change material for heat dissipation has been studied in the present paper. It was indicated that the thermal resistance was greatly reduced by incorporating multi-walled carbon nanotubes into the organic matrix. The uniform distribution of carbon nanotubes has been realized by optimizing the dispersion parameters like temperature, shear strength, rolling speed and gap of rollers. New phase change materials have been developed and the thermal performance has been evaluated. The further work relating to physical and mechanical properties and application in heat dissipation is being undertaken. [C1389]

"Bipolar injection in nanocrystalline-Si LEDs with low turn-on voltages and high power efficiency"

Bipolar (electrons and holes) charge injection, the onset voltages of electroluminescence as low as 1.4 V, and power efficiency of around 0.2% are demonstrated in thin nanocrystalline-Si/SiO2multilayer LEDs grown by plasma-enhanced CVD. [C1390]

"Nano-stamping of quantum dot based inorganic light emitting devices"

We report a nanopatterning technique to fabricate multicolored inorganic light emitting diodes on silicon substrates, with well correlated electroluminescence and photoluminescence spectra. [C1391]

"Stabilization of a forward looking bow camera using photogrammetric measurements"

Stabilization of images is required for many applications, these include target identification and tracking. Many methods of performing this stabilization exist, primarily classifiable as either software techniques or mechanical stabilization using external information such as an inertial reference system or geo-pointing system. The aim of this work is to investigate the feasibility of using only photogrammetric data obtained from a bow-mounted narrow field of view camera to mechanically stabilize the resultant image in rough sea conditions. This will allow the exclusion of inertial measurement equipment with its accuracy/expense trade off, yet still be able to stabilize the image in the presence of sea surge that places the target outside of the camera's nominal field of view. The experimental results obtained using a 3 axis ship motion simulator showed a 20 dB and 30 dB attenuation for roll and pitch respectively. [C1392]

"Design of an ultra thin secondary lens for visible light communication based on a white LED"

Light-emitting diodes (LEDs) have begun to penetrate the traditional lighting industry and have left a profound impact on the illumination of thin and portable personnel telecommunication devices. Aside from this, LEDs can also be used in the design of visible optical wireless communication systems. In lighting applications, surface mount device (SMD) LEDs play an important role; however, their low light flux brought about by the large viewing angle should be redistributed to increase luminescence and the communication range in communication applications. For this reason, the current study issue in this application is how to achieve a long data transmission range while dramatically reducing the overall system size for use in thin electronic products. This work presents a proposed design of an ultra-thin secondary lens for visible light communication based on white LEDs. The accurate physical modeling of a chip die and its package can make ray-trace simulation a powerful tool in predicting power distribution of the SMD LEDs in the near-field. To verify the proposed method, modeled ray data was compared with measured data. While relaxing several design constraints, the secondary light colliminator was carried out with a solution of a central refractive aspheric surface and an outer reflective surface. The optical performance of the modeled LEDs was very similar to the real one. The designed lens reduced the viewing angle of white SMD LEDs from 120deg to 20deg in FWHM. The proposed lens is extremely compact and efficient and is a good starting point in achieving an effective design of visible light communication between personnel telecommunication devices. [C1393]

"Fabrication of organic light emitting display using inkjet printing technology"

In this paper, we have investigated the characteristics of polymer inkjet printing and fabricated OLED (organic light emitting diode) display using inkjet printing technology. To control the wetting condition of the droplet to the

substrate, UV/ozone treatment technique is used. To make the repeated pixels on a substrate, precise vision alignment and multi-layer printing is used. With the successive printing of PEDOT/PSS as a hole injection layer and MEH-PPV as a light emitting layer, we have successfully fabricated an OLED and demonstrated basic working of OLED. [C1394]

"Development of soft sensor exterior embedded with multi-axis deformable tactile sensor system"

In some important robotic human daily life support applications, such as housework or nursing care, soft sensor exterior is needed for allowing close contacts against humans or environments. Although there are many studies on tactile sensing elements themselves and some of them realize the mechanical softness of the element, most of their studies just propose their detection theory with their sensor element prototypes and it is difficult to use them for developing soft tactile exterior. Therefore a soft sensor exterior embedded with multi-axis deformation sensor is developed in this paper. The most important feature for this sensor is that it can detect multi-axis deformation, and the sensor element itself has enough softness to deform with the outer exterior. The developed sensor is constructed by molding a soft urethane foam with infrared LEDs and corresponding phototransistors. It detects 3D deformation of the sensor as voltage changes at each phototransistors. Furthermore, a prototype of soft sensor exterior embedded with the developed sensing elements is realized and we confirmed that the 3D deformation, such as stroking, pinching, and pushing, can be detected using the developed sensor exterior prototype. [C1395]

"The use of CCD pixel binning in PIV measurements"

In this work, we study the effects of a CCD camera binning option, which increases camera frame rate throughput at the expense of loosing spatial resolution, on the particle image velocimetry measurements. The camera frame rate defines upper bound on a speed of a flow a PIV system can measure. We have carried our experiments on the real images of the 1 mum size fluorescence polystyrene microparticles placed onto a thick quartz glass plate and illuminated with the high-power LED. The in-plane images were captured at various CCD binning factors and the distances between particles were calculated using cross-correlation analysis with a sub-pixel interpolation scheme based on the Gaussian regression. As a result of this study, we show that despite the decrease in the spatial resolution, the advantages of the pixel binning, such as increase in sensitivity and the total full frame rate, can be useful for LED illuminated PIV measurements, especially in laminar fluid flows. [C1396]

"An Autonomous Mobile Robot System for Advanced Microcontroller Education"

This paper introduces an autonomous mobile robot (AMR) system to enhance students' project planning, designing, and implementing capabilities while taking the advanced microcontroller course. The AMR system includes three parts of interface circuitries: the main I/O controls, parallel I/O extensions, and serial I/O extensions. In the circuitries of the main I/O controls, an AT89S51 single chip is used as the major controller to trigger LEDs, switches, voice, and RS232 controls; the interface circuitries of the parallel I/O extensions consist of LCM display, keyboard, and optical sensors; as for the serial I/O extensions, 7-segment display, A/D converter, DC motors' drivers, and memory controls are included. According to the students' feedbacks, introducing the ARM system in the advanced microcontroller course can attract more students interesting in designing the microcontroller-based applications and influence them in preparation for the senior laboratory project. [C1397]

"Development of sensor materials for fluorescence thermometer application using LED excitation"

Phosphor materials, such as Cr doped spinel (MgAl2O4|), garnet (Y{ub3}Al5O12) and sapphire (Al2O3) crystals and composites of these materials are developed for a highly sensitive thermo-sensor in fluorescence thermometer excited using LED. Temperature dependences of photoluminescence (PL) intensity from these materials are evaluated using LED excitation. PL intensity from sensor materials decreases linearly with temperature. Impurities doped sapphire, spinel, garnet crystals and their composites are found to be suitable materials as sensor materials for fluorescence thermometer using LED excitation. Yellow colored LED is found to be useful excitation light for Cr doped sensor materials. All the materials examined in this paper can be effectively excited using a yellow colored LED. [C1398]

"A new compound sensor for optical, electrical and ultrasonic measurements in the liquid"

In this paper, a compound sensor is proposed for the measurement of ingredient concentration in liquid. In the proposed sensor, the optical property is measured by a light emitting diode (LED) and a phototransistor. In addition, the electrical and ultrasonic properties are measured by PVDF(polyvinylidene fluoride) films, which each electrode is constructed by the transparent conductive electrode (ITO electrode), arranged on the surfaces of the

LED and phototransistor. In the experiment, the liquid with yellow color, ethanol and NaCl concentrations in distilled water was prepared, and the optical, electrical and ultrasonic properties of the liquid were measured by the proposed sensor. The result suggested that it was possible to measure three kinds of concentrations in the liquid by using the proposed sensor. [C1399]

"An optical microsystem for wireless neural recording"

In this paper, we describe an optical microsystem for wireless neural recording. The system incorporated recording electrodes, integrated electronics, surface-mount LEDs, and a CCD camera. The components were mounted on a PCB platform having a total dimension of 2.2 times 2.2 cm2, 4 integrated biopotential amplifiers (IBA) and 16 LEDs. The IBAs having a bandwidth of 0.1-93.5 Hz with the midband gain of 38 dB were fabricated using AMI 1.6 mum technology. The simulated local field potentials (LFP) were amplified and used to drive the LEDs. A CCD camera with a temporal resolution of 30FPS was used to capture the image and retrieve the signal. [C1400]

"Multi-infusion Timing Controller with User-Friendly Interface for Loose Leaf Tea Brewing Service"

This study proposes a multi-infusion timing controller with user friendly interface for loose leaf tea brewing service. The proposed timing controller uses AT89S51 programmable microcontroller to detect the input signals and trigger the corresponding outputs. The input signals come from a power switch for turning the controller on/off, three push buttons for setting the brewing time, and two other push buttons for controlling initial/extra brewing time setting and start/stop timing. The corresponding outputs include a power LED for indicating whether the controller is working or nonworking, a buzzer for reminding the completion of timing, and three 7 segments for displaying the remaining time. Conclusively, the proposed microcontroller-based tea brewing service device can remind users remembering pour the water out timely, allow users to adjust brewing time based on personal favorite tastes, and allow users to make multi-rounds of tea infusion time for each individual setting. Therefore, the tea quality can be self-guaranteed. [C1401]

"Bioelectric potential characteristic of pothos under light emitting diode"

Plant bioelectric potential changes according to environmental factors, for example temperature, humidity, light intensity and atmospheric pressure. Light is very important factor for plant to photosynthesize. In this paper, the relationship between bioelectric potential and wave length of emitting light (LED: blue, green, red and white) was examined. The characteristic in darkness was adopted as a control and it was compared with the characteristics in each wave length. The characteristic was measured as a function of time. The data was input every 0.1 seconds and summed for one hour. The summation value was adopted as a representative value. The correlation-ship between the characteristic under light emitting and the control was derived. The coefficient had a maximum as the characteristic under emitting was shifted one to three hours as of control characteristic. The coefficient became lower as the frequency of emitting light became higher. The coefficient of 0.84 under red light (660 nm) at the shifted time of 3 hours was obtained, and 0.7 for green light (525 nm) at the shifted time of one hour, 0.5 for blue (475 nm) without shift. The coefficient of over 0.5 was obtained under white light at the shifted time of one to two hours. It is thought that the result makes contribution to elucidate the plant physiology. In addition, it makes contribution to plant environmental sensor and plant factory. [C1402]

"Image Processing in Vision 3D Coordinate Measurement System"

In the image processing of a vision three-dimensional (3D) coordinate measurement system which is consisted of a CCD camera, a computer and a special light pen with several LEDs, unknowable noise images hold the way to get the image of LEDs out of the original image in data processing of the system. It is intolerant in real-time measurement system to use a usual method of recognizing object which can give a correct answer only in weak noise background. In this paper, a method using the principle of subtraction is introduced to efficiently separate the image of LEDs from the original image at the first step of the image processing. The positions of LEDs image in original image can easily be estimated when background is subtracted from the original image. The coordinates of image center of these LEDs will be obtained with ellipse fitting methods to analyze some small areas of the original image around the estimated image of LEDs. It theoretically costs computer less half time to use the proposed method than to use the usual method of recognizing object in algorithmic analysis. The experiments show that this method is not only fast but precise in estimating and ascertaining the coordinates of the image of LEDs in the original image. [C1403]

"Durable & printable blue-violet DFB solid-state dye lasers using spirobifluorene derivatives"

Spirobifluorene derivative, as novel and high performance organic compound for light emitting diodes, shows laser action in a distributed feedback waveguide cavity. This compound was developed for wet process such as

a pritable laser fabrication system. Spirobifluorene-doped distributed feedback solid-state laser shows loger durability than traditional. [C1404]

"Thermal quenching of Ce3+ : YAG glass-ceramic phosphor"

Fluorescence thermal quenching of YAG glass-ceramic (YAG-GC) phosphor was evaluated and compared to YAG polycrystal (YAG-PC) and GdYAG glass-ceramic (GdYAG-GC). The fluorescence intensity of the YAG-GC showed smaller temperature dependence than that of GdYAG-GC, although it showed more drastic decrease than that of the YAG-PC. [C1405]

"Training simulator for photoelectric theodolite based on visual emulation"

The three-dimensional visual emulation system can be used as a training simulator for photoelectric theodolite, the system construction, the generation and show method of the 3D Scene in the virtual environment is presented in detail. [C1406]

"Directional light extraction from photonic crystal thin-film GaN light-emitting diodes"

The light enhancement of PhC LEDs within the collection cone angle was obtained according to measured far-field patterns. In a plusmn20deg collection cone, the collimated PhC LED was enhanced up to ~2.4. [C1407]

"Transmission, reflection and out-coupling dependence on duty cycle for second order"

The dependence of reflectivity, transmission and out-coupling of second order gratings on duty cycle are investigated. Optimum duty cycles for maximum out-coupling (~43%) or maximum reflection (>70%) are determined. [C1408]

"Improvement on output-power stability of AlGaInP/GaAs light emitting diodes by hydrogen annealing"

In this article, we report the improvement on the output-power stability of AlGaInP/GaAs LEDs by hydrogen annealing. Compared with those samples annealed in AsH3ambient, the variation of hydrogen-annealed LED's output-power is well controlled in the range of 0.5%~1.5%. [C1409]

"Light extraction from photonic crystal ultra-thin GaN light-emitting diodes with ITO current spreading layer"

The optical effect of ITO current spreading layer on light extraction behavior of photonic crystal ultra-thin-film light-emitting diodes was investigated numerically. The slab-type ITO layer with half wavelength thickness behaves completely transparent to optical properties. [C1410]

"White light emitting from Ba2 MgSi2 O7 :Ce3+, Tb3+ phosphor"

Ba2MgSi2O7:xCe3+, yTb3+was synthesized by solid-state-reaction and X-ray powder diffraction analysis confirmed the formation of it. It has five emission bands peaking at 390 nm, 480 nm, 545 nm, 585 nm and 615 nm. White-light-emitting was obtained by mixing the five emissions. [C1411]

"A double-layer phosphor package with high efficiency of white-light-emitting diodes"

A double-layer phosphor package of white LED has been proposed. Calculation has been showed that the efficiency of double-layer phosphor package improves a lot and the multi-layer phosphor package also has higher efficiency. [C1412]

"Enhancement in the extraction efficiency of GaN-based LED with naturally textured surface"

GaN-based light-emitting diodes (LEDs) with naturally textured surface grown by metal-organic chemical vapor deposition (MOCVD) were fabricated. A naturally textured p-GaN surface layer was achieved by controlling the growth temperature. The output power of the naturally textured surface LED with 850degC growth temperature increased >50% than the commercial LED. The results show that the naturally textured surface LED could extremely enhance light extraction efficiency and be a candidate for manufacturing high-efficient low-cost GaN-based LEDs. [C1413]

"Beam shaping of laser diodes using lloyd's mirror interference"

A novel beam-shaping method for laser diodes that uses Lloyd's mirror interference is proposed and demonstrated. The vertical beam divergence angle is reduced from 15.6 to 6.3 degrees by setting a substrate below the active layer. [C1414]

"Pulse thermography measurements of heat dissipation from high power LED"

In the article authors focused on the research of heat dissipation problem in electronic devices. For this purpose, a series of thermovision measurements were carried out, and the object of the research was a high-power LED diode attached to a radiator. During the research, diode cooling conditions were to change as a result of changing the properties of contact to the radiator. Authors found out the dependence between the thermal response of the set-up and diode cooling conditions, that were affected by a quality of diode-radiator contact and additionally the convection between the radiator and ambience. Thermal response time characteristics of the set-up during normal diode operation were determined. Next, using FFT transform, the response in frequency domain was calculated. Gained data consisting of amplitude and phase values of the thermal response of the diode-radiator set-up during work allowed authors to estimate its cooling conditions, with particular interest set to the quality of thermal connection between the diode and radiator. [C1415]

"Thermal aspects of LED automotive headlights"

The introduction of LEDs has made slow progress entering general illumination. Describing LED technology adoption as slow highlights that almost 50 years has elapsed from the first LED to products with today's high brightness white light LEDs. The human story of LED technology development is itself amazing (as told in Dupuis and Krames), and the results of these struggles are about make LED technology truly ubiquitous. The introduction of LEDs into automotive headlamps is now underway. The introduction of the LED headlamp will improve overall automotive energy efficiency. This survey paper drives to thermal aspects of this headlamp transition. [C1416]

"Testing of an optical feedback pixel driver using supply current"

The testing of an optical feedback pixel driver is discussed and simulated by HSPICE. A basic characteristic of the specific circuit is the fact that the gray scales of the pixel are created by pulse width modulation. So, the integral of the output Ipixelcurrent (which is proportional to Ioled) has to be measured or calculated and tested. The method that is presented enables the detection and identification of many common processing defects up to 88%. [C1417]

"Simulation and Evaluation for the Design of Passengers Guidance Departure from Railway Station Based on 3DS MAX"

From the prospective of real visual experience of passengers, this paper gave out how to set the relevant parameters in the production of 3D images, and put forward the methods for determining the parameters of the experimental environment. Then a simulation scene on the design for passengers guidance departure from Railway Station of Hankou Railway Station was made through 3DS MAX software. With the AHP method, an evaluation model on passengers guidance design was established. Thereafter, the paper evaluated the present situation and design programs of Hankou Railway Station respectively through the evaluation model, which would provide a new evaluation methodology for the design of passengers guidance departure from Railway Station. [C1418]

"A single-stage high efficiency high power factor LED driver"

In this paper, we study the feasibility of a single-stage LED driver. The operating principles and design considerations for the LED driver in this study are analyzed and discussed in detail. A laboratory prototype has been built and tested. Using the prototype, high efficiency, high power factor and LED current control were achieved using a wide AC input voltage range from 90 V to 270 V. [C1419]

"Unified Mobility Model for Amorphous Organic Materials"

The influence of temperature, carrier concentration and electric field on the hopping transport in disordered organic semiconductors is studied theoretically, and a simple and accurate analytical model is worked out. The model is based on the concept of percolation in a variable range hopping system and the calculations are worked out exploiting the effective temperature approach. At room temperature the dependence on carrier density plays a major role, whereas at low temperatures or high fields the electric field dependence becomes relevant. Neglecting only one of those effects, depending on the operating conditions, leads to an evident underestimation of the hopping mobility. [C1420]

"High light-extraction efficiency GaN-based vertical injection LEDs with surface nipple array"

The surface nipple arrays were formed by self-assembled polystyrene nano-spheres and inductively coupled plasma etching. The light output power of the vertical-injection LEDs with nipple array shows 68% enhancement than that of without the nipple array at a driving current of 350 mA. [C1421]

"Study on GaN micro-rod growth by nature patterned sapphire substrate"

In this study, we investigated the kinetics and etched morphology on sapphire substrate by mixing acid solutions. We developed different etching conditions to produce various etching morphology patterns on sapphire surface. Then, GaN micro-rod embedded with quantum wells (QWs) were grown on the patterned sapphire surface. The cathode luminescence (CL) images of these QW embedded micro-rods have shown great crystal quality. [C1422]

"Light extraction from photonic crystal ultra-thin GaN light-emitting diodes with ITO current spreading layer"

The optical effect of ITO current spreading layer on light extraction behavior of photonic crystal ultra-thin-film light-emitting diodes was investigated numerically. The slab-type ITO layer with half wavelength thickness behaves completely transparent to optical properties. [C1423]

"Fiber optic engine for full color micro projection"

In this paper we report a micro projector including of RGB sources, a fiber optic color synthesizer (FOCS), and a two dimensional micro mechanical scanning mirror. We further report a modifier micro collimator which can enhance the resolution of the screened image. [C1424]

"Photoluminescence properties of zinc-alumino-silicate glass ceramics"

In this paper the properties of photoluminescence of zinc-alumino-silicate glasses were studied by excitation and emission spectra. A blue band of emission was observed in the zinc-alumino-silicate glasses when the glass was excited by UV light. Also it was observed that the emission intensity could be tuned by varying the heat treatment time and the temperature of the glass matrices. [C1425]

"Injected charge distribution in thin films of polymethylmethacrylate"

A possibility of application of an scanning electron microscope for injection of the charge into thin films of the polymethylmethacrylate (PMMA) located on well spending substrates is observed. Resolution capability of this structure depends on proximity effect of an electron beam. And this effect must be estimated. For this estimation an analytical model combining small-angle and diffusive approximations of initial Boltzmann equation is proposed. [C1426]

"Title page"

The following topics have been dealt with: photonic crystals, quantum cascade lasers, novel optical materials, photodetectors, photorefractive crystals, quantum well lasers, evanescent semiconductor waveguide optical isolators, semiconductor optical amplifiers, VCSELs, DFB lasers, nanostructures, photodiodes, solar cells, Fabry-Perot lasers, light emitting diodes, and integrated systems. [C1427]

"The Deviation of Color Matching Algorithm in the Field of Full-Color LED Display"

In this paper, a color gamut transformation method which transformed the different color gamut into a same one has been proposed. In the transforming process, the deviation which was arose from the quantization error and the truncation error were existing. If the deviation was out of the color tolerance, the uniformity of the screen color will be deteriorated. Firstly, the color tolerance of vision was calculated by the color-difference formula. Secondly, in the full-color IED display experiments, it was analyzed that the tri -color tolerance values are respectively 2.5, 2.8 and 1.3. According to the tri -color tolerance values and the color difference formula, the express of the quantization precision, gray value and the color difference was set up. Finally the gray-scale range of the color uniformity was analyzed by the collected data, it was concluded that the uniformity of the display was satisfied the requirement of the visual when the range of the gray level was [11, 14], and when the range was [1, 11], the value of the color difference was also reduced significantly. [C1428]

"Design and simulation of superperiodic photonic-crystal light emitting diodes with highly directive luminance characteristics"

By use of finite-differene time-domain analysis for lightwave devices, a novel super-periodic photonic-crystal light-emitting diode (LED) design exhibiting high-luminance patterns is proposed for applications that require highly-directive vertical light extraction. The device design is made on the theoretical consideration on the density of radiation modes within the photonic band coupled with far-field diffraction of the spontaneously-emitted light from a structure with double periodicity. [C1429]

"The effect of temperature on the recombination rate of AlGaN/GaN light emitting diodes"

Nitride semiconductors and their alloys recently have versatile applications as high-power and high-efficiency electro optical devices duo to their high thermal stability, direct transition and wide bang-gap. Nanostructure light emitting diodes of these materials have an emission spectrum from infrared to ultraviolet. In this paper, besides simulating a nanostructure nitride semiconductor LED, such as multi quantum well nitride LEDs, the effect of temperature on the recombination rate has been investigated. [C1430]

"Theoretical analysis of polarization characteristics of InGaN/GaN LEDs with photonic crystals"

We investigated theoretically the polarization characteristics of GaN-based green (525 nm) light-emitting diodes (LEDs) with photonic crystals (PCs) using a three-dimensional finite difference time domain method. The light extraction efficiency depends strongly on the photonic bandgap (PBG) position relative to a frequency (a/lambda) and the depth of air hole for transverse electric (TE) and transverse magnetic (TM) polarizations. The maximum extraction efficiency was achieved when the frequency of a/lambda was matched within PBG region, leading to about 29% (22%) higher than the conventional LED without photonic crystals for TE (TM) polarization. It is found that the polarization of light can be controlled by the a/lambda in PC structure. [C1431]

"New HDTV Signal Processing System for Extended Gamut Transmission"

A new HDTV signal processing system for extended gamut signal transmission is proposed in this paper. The system has determined the gamut of Pointer colors as target gamut, and transmit all Pointer colors by designing a new set of chroma signal. Moreover, the capability of decreasing color difference of the new system is evaluated. Compared with the system of ITU-R BT.1361, the average color difference DeltaEmacr00* was calculated according to CIEDE2000, and DeltaEmacr00* is 0.2755 for the new system, while DeltaEmacr00* is 0.5011 for the system with ITU-R BT.1361. [C1432]

"Integrating Linkage Effect Analysis Using I-O Method and DEA-Oriented Performance Assessment on China's LED Industry"

Input-output (I-O) analysis and data envelopment analysis (DEA) are tools that both can be used in study on the production process. Whilst these two types of model are similar in structure, I-O analysis is directed to assessing performance consequents to the other sectors as a basis for determining the role of an industry and DEA to assessing performance consequents to the industry itself as part of development planning function. This paper is a joint application of I-O analysis and DEA to study on China's LED industry. This study, therefore, has two major goals. The first is obtaining at least a preliminary indication of the role of the LED industry by addressing inter-industry linkage effects in 42 sectors. The second goal is getting some useful information for industry development planning through examining input-output efficiency. [C1433]

"A Fully Digital Approach in Sensing and Processing Photoplethysmographic Signal"

A fully digital sensor-actuator has been developed for photoplethysmographic (PPG) measurements. Instead of classical sensor it uses standard light emitting diodes (LEDs) for both light emitting and detecting. Time-duration based conversion protocol is implemented by a field programmable gate array (FPGA) avoiding the need for analog amplifiers and precision analogue to digital converters (ADCs). The basic sensing configuration, presented here, consists of a pair of LEDs directly connected to two FPGA's I/O pins and is capable of detecting the PPG signal from a finger or a toe. The better spectral sensitivity, increased and adjustable resolution, reduced noise, lower cost and dimensions are confirmed advantages. In this paper we introduce a sensing principle in conjunction with pulse-based measurement technique, signal filtering and data communication implemented in a single FPGA chip. The approach in general, as well as the prototype in particular, where evaluated through both qualitative and quantitative experiments. [C1434]

"Adaptive Regulation of CCD Camera in Eye Gaze Tracking System"

To capture eye images with good quality in the eye gaze tracking system, a strategy to track and aim at the eye is proposed, and an automatic method, which combines the regulation of the aperture with the adjustment of the focus of the camera lens, is developed. Firstly, the geometrical positions of LEDs, camera, cornea and glints are analyzed. The image's average brightness value is utilized to control the aperture of the lens, and then the glints information can be obtained to control a pan-tilt unit for aiming at and tracking the eye, and to adjust the focus lens. If the pupil contour can be extracted from the image, the average gradient value of the pupil edge points can be used for real-time focusing. Experiments show that this system can adapt to external lighting changes and to the head movements, and it can track the eye and acquire clear eye images in real-time. [C1435]

"Towards the Development of a Portable Smell-Seeing Electronic Nose and its Applications in Amine Recognition"

A portable smell-seeing electronic nose (e-nose) device based on webcam and white LEDs was designed. The time stability and spatial uniformity errors of the device in color measuring was processed. Six kinds of sensitive materials, including porphyrins and phthalocyanines with typical central ions and functional groups, were selected to fabricate the odor sensitive arrays and their principles of color change upon interaction with odors were analyzed. The odor recognition capability of the e-nose was then tested by six volatile organic amines and the results showed that the designed smell-seeing electronic nose was capable of not only discriminating all the vapors correctly but also clustering those analytes with similar molecular structures and electronic properties. [C1436]

"Design of Reconfigurable LED Illumination Control System Based on FPGA"

The dynamic reconfiguration technique based on FPGA (field-programmable gate array) can improve the resource utilization. The dynamic reconfiguration principles and methods are discussed. A remote dynamic reconfiguration scheme using Xilinx Virtex-II FPGA and SMCS Ethernet PHY (physical layer transceiver) is proposed. The hardware of system is designed with Xilinx Virtex-IIXC2V30P FPGA that embeds MicroBlaze and MAC IP core, and its network communication software based on TCP/IP (transmission control protocol/Internet protocol) protocol is programmed by loading LwIP to MicroBlaze. The experimental results indicate that the RFDRS (remote FPGA dynamic reconfiguration system) can remotely control the changes freely in the eight LED (light emitting diodes) lighting modes, which is advantageous in the system upgrade and software update, and that, using remote dynamic reconfiguration technology, the FPGA resource utilization can be reduced remarkably. [C1437]

"3-dimensional current flow analysis in InGaN light emitting diodes grown on sapphire substrate"

In order to analyze current spreading 3-dimensionally in an InGaN/GaN multiple quantum well (MQW) light emitting diode (LED), we successfully developed a method of modeling a LED as an electrical circuit consisting of resistances and intrinsic diodes. The main advantage of this method is its simple algorithm and fast calculation time. [C1438]

"High efficient 635nm resonant-cavity light-emitting diodes with modified electron stopped layers"

In this work, the analysis of thermal, electrical and optical properties of 635 nm InGaAlP resonant-cavity light-emitting diodes is presented. We show that including the electron stop layer in both side of active layer improves the efficiency of such device due to increasing the electron capture efficiency in the quantum wells. Theoretical analysis is proved by experimental work. [C1439]

"Optical properties of type-II InGaN/GaAsN/GaN quantum wells light-emitting diodes"

Spontaneous emission spectra of type-II InGaN/GaNAs QW light-emitting diodes are investigated using the multiband effective mass theory. These results are compared with those of conventional InGaN/GaN QW structures. In the case of a low carrier density, a type-II InGaN/InGaN/GaN QW structure shows much larger matrix element than a conventional InGaN/GaN QW structure. On the other hand, in the case of high carrier density, a type-II QW structure shows slightly smaller matrix element than a conventional QW structure. The type-II InGaN/InGaN/GaN QW structure shows much larger spontaneous emission peak than that of a conventional QW structure. This is mainly due to the fact that, in the case of the type-II QW structure, the effective well width is greatly reduced. [C1440]

"Solid state lighting for industrial locations"

Advances in LED (light emitting diode) technology are creating broader applications in general illumination. Customer requirements, including long life, high brightness and reliability for industrial, harsh and hazardous

locations can be achieved with current LED technology. This paper will bring awareness of LED technology and show its applicability and benefits to hazardous and industrial locations. Once considered only for exit signs or specialty indicators, LEDs are now targeting opportunities in down lights, flood lights and street lights. When compared to conventional light sources such as fluorescent or metal halide, LED light sources can have longer life with energy savings, plus equal or better light characteristics that will provide years of maintenance-free operation with a quantifiable return on investment. Along with the benefits come challenges due to the demands of the applications and the constraints of LED technology. Thermal management, optical control and LED selection top the list of challenges that luminaire manufacturers face when developing new fixtures using LED technology. End users of this technology must be aware of the limitations of both LED technology and suppliers. LED technology does not lend itself well to a simple screw-based solution and is not the solution to every lighting application. The benefits and drawbacks of new designs, environmental concerns, system considerations and market trends in solid state lighting will be discussed further, as well as a detailed description of the components of LED-based illumination systems. [C1441]

"Effects of strain distribution on the optical gain of InGaN/AlInGaN"

Effects of the strain distribution on the optical gain of InGaN-AlInGaN QW light-emitting diodes (LEDs) is investigated. The amount of stress and strain in the multilayer quantum well structures are calculated taking into account the difference between crystalline parameters. Significant enhancement of optical gain is expected with the introduction of strain distribution layers. [C1442]

"Light-emitting diodes for space applications"

The LED device for illumination in space application has been well done in the past few years, including the in cabin application on bio-science satellite in 2007 and out cabin application on spacecraft in 2008 to shine on the first step in space of Chinese astronaut. The optical simulation has been performed to optimize the brightness of LED lamp. The thermal property of assembled LED lamp have been experimental characterized combing with the numerical simulation to improve the precision of p-n junction temperature determination for LED packed in the lamp. The measurement precision on the LED p-n junction temperature is improved to the value better than 1 K. [C1443]

"Numerical investigation of fast dynamic response of organic light-emitting diodes"

We make a numerical investigation of transient responses of organic light-emitting diodes (OLEDs) to various device and material parameters such as the device length, carrier mobility, energy level offset, exciton lifetime, barrier height, and recombination rate. We have found that the delay time is mainly determined by the device length and bias voltage, whereas the rise time depends on the electron mobility and recombination rate. This study may provide design guidelines of OLEDs for applications in high-speed visible light communications (VLC). [C1444]

"Numerical simulation of bilayer polymer light-emitting diodes"

A numerical model for the electrical properties for polymeric light emitting diodes (PLEDs) is presented which accounts for drift-and diffusion transport, recombination and re-emission processes. [C1445]

"Analysis of undulated micro-cavity in organic light-emitting diodes"

We investigate the internal physical mechanisms of undulated micro-cavity that controls the emission wavelength in organic light-emitting diodes (OLEDs). Finite-difference-domain method is applied to a previously manufactured OLED design featuring optical structure on a wavy over-coat layer. The emission spectrum of dipole oscillation is calculated with various amplitudes of undulation and emission angles. [C1446]

"Acceleration of a quasi-3D spectral laser diode simulator"

In this work, we present a scheme to accelerate the convergence of a quasi-3D spectral laser diode simulator. It is demonstrated that the acceleration scheme allows the number of Fox-Li roundtrips to be substantially reduced. The accelerated spectral laser model is then used to simulate a narrow index guided 980 nm tapered laser. The width of the simulated emission spectra is found to agree well with the measured spectra using an appropriate value of the spontaneous emission coupling factor. [C1447]

"tdkp/AQUA: Unified modelling of electroluminescence in nanostructures"

This article summarizes the capabilities of the optoelectronic simulation framework tdkp/AQUA aimed at the

description of electroluminescence in semiconductor nanostructures such as light-emitting diodes (LEDs). tdkp is a standalone finite-element software able to accurately calculate strain, built-in fields due to spontaneous and piezoelectric polarization, quantum states, gain and luminescence spectra in zero- to three-dimensional structures. AQUA calculates transport through nanostructures using an original model which accounts for the distinct behaviour of carriers confined to active regions and unconfined carriers. Furthermore, it computes electroluminescence spectra via a self-consistent coupling of the confined carriers to quantum-mechanical calculations using tdkp. Two examples are presented which highlight the versatility and generality of the developed simulator. [C1448]

"A built-in self-test high-current LED driver"

In this paper, a built-in self-test (BIST) high-current light-emitting-diode (LED) driver circuit is proposed. The circuit not only maintains different constant currents for multiple LED strings, but it also minimizes the conduction power dissipation by keeping the power MOSFETs in the constant-current controllers operating in the linear region. The proposed driver first acquires the current-voltage (I-V) data of the constant-current power MOSFETs and stores them into memories. These stored I-V data, along with a duty cycle control of the switching converter, are used to ensure that these power MOSFETs are operating in their linear region to minimize conduction power dissipation. The proposed circuit was verified using PSPICE with two to five LED strings. Simulation results show a maximum efficiency of 95.6%. [C1449]

"Highly efficient LED light driver with dimming control using delta sigma modulation"

This paper describes the LED dimming control system using ADPCM (adaptive differential pulse code modulation). ADPCM accurately controls the LED current with high resolution. The ADPCM also reduces the RFI (radio frequency intensity) because of spreading out the harmonic current of pulses. Additionally, this method makes it easier to increase the control accuracy. [C1450]

"Design of parallel backlight LED driver IC"

This paper presents a LED(light emitting diode) backlight driving system for automobile panels. A new scheme is presented and compared to the conventional scheme, and the simulation model for new scheme is presented and used to simulate the system. The study indicates the necessity of a technique for current equalization when using parallel LED arrays system. [C1451]

"A synchronous boost regulator with PWM/PFM mode operation"

This paper presents a synchronous boost regulator with PWM/PFM mode of operation. It uses synchronous rectification architecture to reduce the conduction loss and improve the efficiency. Furthermore, this paper features a two-level soft-start circuit which prevents the presence of large current generation during system start-up. The simulation results show an efficiency of more than 90% with an input voltage range of 2.7 V~4.2 V and with a load current of 1 mA to 200 mA. This regulator is suitable for ion-battery supply application. It uses TSMC's 0.35 Г‚Вїm 2P4M CMOS process. [C1452]

"Non-isolated high step-up converter based on boost integrated half-bridge converter"

A classical boost converter has a limited voltage step-up ratio because of its parasitic resistances, which does not make it suitable for high step-up applications. Therefore, to obtain a high step-up capability with high efficiency, non-isolated high step-up technique based on isolated type converters is introduced in this paper. By stacking the secondary sides in addition to the primary side, high step-up conversion ratio can be achieved. Moreover, a careful choice isolated converter provides zero-voltage-switching (ZVS), low voltage stress on devices, and continuous input current. The operational principle and characteristics of proposed converter are presented, and verified experimentally with a 140-W, 24-Vdcinput, 150~250-Vdcoutput prototype converter for a LED driver. [C1453]

"A local-dimming LED BLU driving circuit for a 42-inch LCD TV"

This paper presents an LED BLU driving circuit with a local-dimming structure. The efficiency of the proposed LED driver has been improved by parallel driving 8 serial-connected LED arrays. It employed the soft-switching boost converter topology to reduce the switching power loss of the hard switching boost converter. The soft-switching converter reveals superior ripple and efficiency. A smaller inductance can be used for the soft-switching converter contrasting to the hard-switching one and studied on an over-voltage protection circuit of the output of the driver at the no load condition. [C1454]

"Examination of high luminance light guide plate by accumulating method"

LEDs are attracting attention as a light source for a new form of lighting, taking the place of the fluorescent lamp and the light bulb. They are not suitable for lighting use by themselves, as LEDs are a point light source. However, it is possible to convert them into plane emission form by combining them with light guide plate technology used for the liquid crystal displays. It is therefore possible to use them as lighting devices through the plane emission method. In this laboratory, a minute dot was formed at the bottom of a light guide plate, and light hitting the dot was emitted from the luminescence side of the light guide plate. The amount of light emitted from the luminescence side also increased, if the number of these dots was increased from previous research results. It was thought that a high luminance plate or a plate guiding more light could be created. A method of piling thin light guide plates was proposed as a method of increasing the number of dots, with the piled light guide plates being designed using an optical simulator. [C1455]

"Development of wireless communication-based safety equipment for protection of trackside maintenance workers"

Personnel maintaining or repairing the railway tracks or signaling equipment around tracks may experience the sensory disorder when they do routine works for many hours and they may not recognize the approaching train, leading to train accidents. In order to prevent such train accidents that may occur because railway track workers are unable to recognize the approaching train, a safety-equipment is developed to make the approaching train send radio signals. [C1456]

"An LED color control system with independently changeable illuminance"

This paper presents and LED color control system using color control algorithm which adjusts its color temperature and illuminance independently. The proposed system consists of a power factor correction (PFC) circuit, LED driving circuit, and a digital controller. The color temperature variation range of the proposed LED lighting system is 3500-7500Г‚В°K, and its illuminance one is 500-1500 lux. Within these range, the color temperature and illuminance relative deviations are as low as Г‚В±1%. [C1457]

"Individualized laboratory using Moodle"

Practical laboratories are an integral part of an engineering education. The development of a challenging lab for a course requires a significant effort on the part of faculty and support staff. Thus labs, once developed, tend to have a relatively long lifetime. A problem with traditional labs is that student's lab results can be passed on to Г‚Вїnext yearsГ‚Вї students. This reduces the effectiveness of the lab, since students are unlikely to put the same effort into the lab when working from a previous lab book. This paper describes a method to address this problem. This method makes use of a Moodle-based implementation to individualize the lab. The lab is structured to make use of the features in Moodle to automatically vary key parameters in the lab tasks. Thus, each lab group effectively has a different set of lab tasks. An added advantage of this approach is that the individualized lab task results are automatically marked. This approach has been used in a course that introduces students to a DSP (Digital Signal Processing) chip and the software used to build and debug DSP programs. Preliminary feedback indicates that the students like this Moodle-based approach. [C1458]

"Toward an active contact lens: Integration of a wireless power harvesting IC"

The overarching goal of an active contact lens is to integrate sensing or display functionality onto a wearable device, enabling on-lens medical monitoring and heads-up displays. We present progress toward a wirelessly-powered active contact lens comprising a transparent polymer substrate, loop antenna, power harvesting IC, and a custom micro-LED. The fully integrated radio power harvesting and a power management system was fabricated in a 0.13 Г‚Вїm CMOS process and utilizes a small on-chip capacitor as an energy storage element to light up a microLED pixel. We have demonstrated wireless power transfer and LED intensity control using the custom IC and on-lens antenna. [C1459]

"Optoelectronic microarrays for retinal prosthesis"

In this work we demonstrate the use of optoelectronic Gallium Nitride LED micro arrays for optical neural stimulation. We demonstrate the ability to control these sufficiently to transfer a spike coded `image' to arrays of channelrhodopsin-2 photosensitized cells. We also show how this initial work is scalable from in-vitro towards a long term optoelectronic system for optogenetic retinal prosthesis. [C1460]

"Intelligent LED Display Technology with SCM and CPLD"

Small and medium-sized LED dot matrix display is widely used. In order to show steady large-size images, a LED dot-matrix driven method based on the combination of single chip microcomputer and CPLD is presented. An Intelligent LED display is designed. The hardware and application software of system are designed and the whole principle of various details in the system is described. AT89S52 single-chip microcomputer is used for data control and external connection of system. Altera's CPLD EPM7128 chip is used as the display hardware control circuit to display information dynamically, under the control of the single chip microcomputer. The experimental results show that this control method, compared to traditional single chip microcomputer or a single scan cpld drive, has advantages of high efficiency and good display effect. The system can be fully utilized to control a flexible single-chip, CPLD drive ability, the logic of the advantages of easy modification. Due to the versatility of this design, it can be widely used in any of the occasions the need to display information. [C1461]

"A vertically integrated CMOS micro-system for time-resolved fluorescence analysis"

We describe a two-chip micro-scale time-resolved fluorescence analyzer integrating excitation, detection and filtering. A new 8 Гґ— 8 array of drivers integrated in standard low-voltage 0.35 Г‚Вїm CMOS is bump-bonded to AlInGaN blue micro-pixellated light-emitting diodes (micro-LED). The array is capable of producing sample excitation pulses with a width of 777 ps (FWHM) enabling short lifetime fluorophores to be excited. The fluorescence emission is detected by a second, vertically-opposed 16 Гґ— 4 array of single-photon avalanche diodes (SPADs) fabricated in 0.35 Г‚Вїm high-voltage CMOS technology with in-pixel time-gated photon counting circuitry. This constitutes the smallest reported solid-state micro-system for fluorescence decay analysis, replacing lasers, photomultiplier tubes, bulk optics and discrete electronics. The system is demonstrated with measurements of fluorescent colloidal quantum dot and Rhodamine samples. [C1462]

"Hebbian learning of visually directed reaching by a robot arm"

We describe a robotic system consisting of an arm and an active vision system learns to align its sensory and motor maps so that it can successfully reach the tip of its arm to touch the point where it is looking. This system uses an unsupervised Hebbian learning algorithm, and learns the alignment by watching its arm waving in front of its eyes. After watching for 25 minutes, the maps are sufficiently well aligned that it can execute the desired behavior. [C1463]

"Emerging Urban Applications of Broadband Optical Wireless Networking"

Optical wireless technology offers a unique solution to a variety of communications needs. It provides a balanced option between the convenience of traditional radio frequency and the communication capacity of wired media. This offers novel solutions to existing and new communication challenges. Such uniqueness comes at a price, however, as the deployment of optical wireless is not straightforward. New challenges are introduced. Fortunately, much research has been done to overcome these challenges and to create new ways of applying this unique technology. Of the different possible areas in which optical wireless communication can be applied, urban networks effectively embrace its unmatched qualities. In this paper, we survey the use of optical wireless in urban applications. [C1464]

"Research on a New Type Design Method of Laser Diode Current Source"

In this paper, according to the characteristics of the continuous light-emitting laser diode, a new type deign method of SCM controlled, miniaturization, high efficiency, non-impact, slow-start laser diode drive current source has been studied. We established a mathematical model of current source circuit controlled by analog circuit, gave a design method of transform the analog control model to the digital control model realized the digitizing of the current source control circuit system, and improved the performance of laser diode current source. [C1465]

"Trade-offs for low power integrated pulse oximeters"

The paper presents detailed trade-offs encountered in the design of low-power integrated pulse oximeters (PO). The significance and interdependence of parameters such as the switching frequency, duty cycle, settling speed, stability and capacitor area and their role in system power and noise are discussed thoroughly. Quantitative relations between these parameters are derived and numerical examples with typical values given. [C1466]

"Design of Electrical Safety Tool Ark Monitoring System Based on ARM"

A Electrical Safety Tool Ark Monitoring System Based on ARM is designed. Using the ARM S3C44B0X as controlling core, collecting tools type and quantity informations through the photoelectric switch, it displays the informations on the LED display screen simultaneously. Collecting temperature and humidity informations

through the humiture sensors, transferring the informations to the humiture Controller, it does heating and dehumidification processing to the tool ark. Through RS232 or Ethernet interface, it communicates with the superordination machine. It implements the modern and intelligent management combined with moisture proof, dedusting, loss prevention, neat and beauty. Experimental result shows that this system has good transmission speed, high efficiency, low cost. It realizes the goal to use single CPU system in place of more machine system controlling LED display purposes. It has the remarkable economic, security, and management efficiency. [C1467]

"An automated remote messaging system using GSM communications"

This paper discusses a method for implementing global system for mobile communications (GSM) control of a Light Emitting Diode (LED) Messaging Display for advertising purposes. The existing LED display will be used and integrated with the custom-built GSM controller board, inclusive of microcontroller for control and data transmission to the GSM modem. [C1468]

"Realization of an Economical Self-Fabricated Polymer Optical Fiber Splitters for Small World Communication"

Small world networks are promising candidates for communication networks since typical data-flow patterns in communication networks show a large amount of clustering with a small number of long-distance communications that need to be completed quickly. Polymer optical fiber (POF) can be and are being used in various fields of application. Two of the main fields are the automotive and the home networking. So, POF here can be seen as one of the best solutions for small world communication especially in home networking application. In this paper, optical 1Гґ—3 fused-taper-twisted polymer optical fiber (POF) splitters has been fabricated by a perform technique and proposed to be applied on small world communication application. There several systems available on the market, which can be split a coupled signal to be transmitted into some different channels, which are all afflicted with certain disadvantages. But all these solutions have one main disadvantage; they are all too expensive for most of the applications mentioned above. So the goal of this study is to develop an economical splitter for small world communication over POFs. Characterization of the splitter was reported. Red LED with a 650 nm wavelength has been injected into the splitter for the purpose of characterization testing to analyze the level of power efficiency of the splitter. Final analysis shows that efficiency of splitter output able to reach up to 30%. The device performance can be improved gradually through experience and practice. Main point here is, the fabrication process is simple, easy and suitable to be used for household. [C1469]

"Three Dimensional Fluorescence Spectra of DOM in the Incineration Plant leachate"

Three Dimensional emission and excitation emission matrix (3DEEM) fluorescence spectra were used to characterize the dissolved organic matter (DOM) of controlled tip leachate and effluents of the leachate biochemical treatment process of one incineration plant in Three Gorges Reservoir Region. Tyrosine-like, tryptophan-like and UV fulvic-like are found in the DOM of the leachate. Landfill fluorescence properties are characterized by intense fluorescence at Ex=272 nm, and Em=301 nm which we suggest being high-excitation wavelength tyrosine-like which is different from the former research. The cause of the above difference may correlate with the landfill age. Fluorescence index f450/500over 1.9 from different sampling sites shows that the humic acid is derived from microorganisms. The central position and intensity of the characteristic fluorescence peaks of landfill leachate in the treatment process vary significantly. In the biochemical treatment process, Protein-like fluorescence intensity was reduced 61.4%~92.1%, while UV fulvic-like fluorescence intensity was only reduced 37.4%. The results show protein-like has better biodegradability compared with fulvic-like. The 3D fluorescence Spectra can provide the information of the variations about the pollutant species, composition and concentration in leachate treatment process. [C1470]

"Improving Performance of Handwork-Fused 1x3 Polymer Optical Fiber Splitter through Progressed Fusion Technique"

As demands for plastic optical fiber (POF) rise up in optical data communication system, POF are now being applied as base material for passive optical splitter. In order to produce the economical passive device, optical 1Гґ—3 splitters have been fabricated four times through handwork fusion. Besides, red LED with wavelength of 650 nm has been transmitted into splitter for the purpose of characterization testing in order to analyze the level of power efficiency of each splitter. As result, the latest 1Гґ—3 splitter reveal that maximum power could increasingly be reached up to 60%. This paper highlights that fusion technique by handwork is realiable fabrication method rather using expensive machine to fabricate POF-based optical splitter. [C1471]

"The Design of Microcomputer Control System for Step Motor"

The paper gives a control system for step motor with the core of AT89C51 singlechip. The system design includes hardware design and software design and the circuit design contains keyboard input, LED display, the state display of light emitting diode and alarm. The keyboard can be used to input operation parameters, start and close system. The motor drives the load to process preconcerted work by the keyboard input so as to carry out point-position and speed control. The application of display circuit can show the input data of step motor and running state. The software part is realized by compiling program with AT89C51 singlechip instruction system. The system can carry out the above function well by testing. [C1472]

"FPD Grayscale Control Based on Sub-Space Division"

This document introduces flat panel display grayscale control based on Sub-space division to overcome the defects that two common grayscale control methods have. The proposed method controls the loss of luminance in 10.16%, and experiment results indicate that human eyes feeling flicker has been reduced to solve the problem of vision limitation, in some degree. [C1473]

"Design of Solar LED Street Lamp Automatic Control Circuit"

An automatic control circuit of LED street lamp is designed. The circuit is supplied with solar cell and stored electric energy with battery. It has three working modes of light control, delay quenching and delay plus low power. Under the light control mode, the LED street lamp is turned off in daytime and lit at night automatically. Under the delay quenching mode, the LED street lamp is turned off in daytime. It would be lit at night automatically and turned off after the setting time. Under the delay plus low power mode, the LED street lamp is lit at night automatically and changed into pulsed lighting in low power after the setting time. It would be turned off in daytime. The circuit also has the functions of protecting the battery from the over voltage or under voltage and automatic restoration of charging. [C1474]

"Design of Transfusion Speed Monitor Based on MCU and Photoelectric Switch"

The manual operation mode of measuring transfusion speed in medicine is inconvenient and inaccurate, and is likely to cause dispute. A supervisory computer was designed to monitor transfusion speed. It mainly consisted of MCU C8051F930 as the control core, a photoelectric switch as liquid drop sensor, a threedigit seven-segment LCD, four keys, four LEDs and acousto-optic alarm circuits. The supply voltage for C8051F930 is 0.9 to 3.6 V, so the monitor can work in one-cell mode (supports 0.9 to 1.8 V operation) or two-cell mode (supports 1.8 to 3.6 V operation). The operating range of one cell is extended and the service life of cells in two-cell mode will be increased. The monitor has the merits of low cost, simple structure, convenient operation, accurate counting, quick respond, reliable functions, small volume, light weight, ultra-low power, low drive voltage, etc. [C1475]

"A Multiple-Input SC DC-DC Converter with Battery Charge Process"

Aimed at a backlighting application, a multiple-input switched-capacitor (SC) DC-DC converter with battery charge process is proposed in this paper. Unlike conventional SC power converters such as a Dickson-type converter, etc., the proposed converter drives some LEDs by converting energy from solar cells when solar cells offer enough energy. Furthermore, the proposed converter can charge a lithium battery when an output load is light. Hence, the proposed converter enables us to realize long battery runtime. The validity of circuit design is confirmed by theoretical analyses, simulations, and experiments. The derived theoretical formulas will be helpful to estimate circuit characteristics, because theoretical results agree well with SPICE simulation results. [C1476]

"Application of Headspace Liquid-Phase Microextraction Using Ionic Liquid as Extractant Combined with Gas Chromatography-Hydrogen Flame Ionization Detector to the Determination of BTEXs in Water"

This paper presents a new headspace-liquid-phase microextraction (HS-LPME) strategy for extraction and preconcentration of benzene, toluene, ethyl- benzene, and o-, m- and p-xylenes (BTEXs) from aqueous samples. A typical room temperature ionic liquid, 1-butyl-3-methylimidazolium hexafluorophosphate ([BMIM]PF6), was used as extractant, and the extract was subsequently determined by gas chromatography-hydrogen flame ionization detection (GC-FID). Parameters such as ionic liquid volume, sampling temperature, extraction time, stirring rate and salt content, were found to have significant effects on the HS-LPME. The optimized experimental conditions for extraction of target compounds were: 4 Г‚ВїL of [BMIM]PF6, 20 min extraction time, a stirring rate of 800 rpm and 40% sodium nitrate (w/v) in a sample solution at temperature of 70Г‚В°C. The proposed method provided good recoveries in the range of 94.7~101.0%, and the related standard deviations (RSDs) (n=10) of 2.5~9.3%. The limits of detection (LODs) varied from 9.8 to 38.9 Г‚Вїg L-1(S/N = 3) using GC-FID. This novel method was applied to the analysis of BTEXs in lake water and river water. [C1477]

"An energy-recycling (ER) technique for reducing power consumption of field color sequential (FCS) RGB LEDs backlight module"

A single driving module with field color sequential (FCS) LCD technology needs to dynamically switch output voltage between 40 V for 12 series G- and B- color LEDs and 26 V for 12 series R-color LEDs at related time cluster. Thus, an energy-recycling (ER) technology is proposed to accelerate voltage settling and save compressed energy when the driving voltage is pressed from 40 V to 26 V. Only one recycling capacitor and one Schottky diode are added into the power structure of synchronous boost converter for composing the proposed ER technology. A proposed energy-recycling mode (ERM) controller is plugged into a boundary current mode (BCM) controller to control energy delivering and recycling. The proposed ER technology was fabricated by TSMC 0.25 Г‚Вїm 2.5/5 V BCD process. Experimental results demonstrate fast and efficient tracking performance of driving voltage is achieved. [C1478]

"High-temperature electro-optical degradation of DC-Aged InGaN based high power GaN LEDs"

In this study, we have investigated the high-temperature electro-optical degradation of DC-Aged InGaN based high power GaN LEDs. For this purpose, we fabricated large size blue InGaN/GaN LED chips (1mmГ‚В—1mm) by using standard LED fabrication processes, where the ITO and Cr/Au served as p-type ohmic contact and n-ohmic contact layer, respectively. [C1479]

"Polarization-induced zener tunnel junctions in wide-bandgap heterostructures"

The wide bandgap semiconductors such as the III-V nitrides (GaN, AIN) and SiC, tunneling is low due to the high barrier heights, and is hampered further by the inability to achieve degenerate n and p-type impurity doping. By utilizing the giant built-in electronic polarization fields present in wurzite III-V nitride semiconductor heterostructures, it is possible to achieve interband tunneling in p-n junction diodes. GaN-AIN-GaN heterostructures were grown by plasma assisted Molecular Beam Epitaxy (MBE) on n-type doped GaN 0001 substrates. The layer structure, and a Transmission Electron Microscope (TEM) image of the GaN/AIN/GaN tunnel junction which was used to confirm the thickness and uniformity of the AIN layer. Current-voltage characteristics of the junctions were measured at 300 K in a probe station using a semiconductor parameter analyzer. By utilizing the polarization fields present in III-V nitride semiconductors it is possible to generate band to band tunneling. This will enable multicolor light emitters/detectors and multijunction solar cells, as well as enable efficient injection of polarized carriers for spintronic devices. [C1480]

"Passive construction of diagnostic decision models: An empirical evaluation"

Bayesian networks have proven their value in solving complex diagnostic problems. The main bottleneck in applying Bayesian networks to diagnosis is model construction. In our earlier work, we proposed passive construction of diagnostic models based on observation of diagnosticians solving diagnostic cases. This idea has never been tested in practice. In this paper, we describe an experiment that tests an interactive prototype system called MARILYN on implementation of a system based on passive construction of diagnostic model, by inputting four hundred help desk cases collected at the University of Pittsburgh campus computing lab. We show that while the system's diagnostic accuracy continues to increase with the number of cases, it reaches very reasonable levels after merely tens of cases. [C1481]

"A simple inexpensive interface for robots using the Nintendo Wii controller"

To have a robot at home might be great fun: it could fetch and carry things. However it remains open how to teach the robot the places it should go to in a manner that is cheap and entertaining for the user. This paper presents an easy-to-use interface that takes the robot on a virtual leash: using the Nintendo Wii remote the user can go towards target places while pointing at the robot. Using the inbuilt infrared camera and accelerometers and a couple of LEDs on the robot, the robot will follow the user. We show how a particle filter and an interacting multiple model (IMM) Kalman can be configured such that simple hand gestures with the Wii make the robot follow the user's intention. The concept has been implemented on a mobile robot developed within the robotshome project. The robot leash interface has been tested with 12 volunteers who are interested in new technology but have never controlled a robot. The result is that most users could within a few minutes show the robot the first three places in a home environment. Given the little cost of the interface (about $ 50) the proposed robot leash is a promising human robot interface. [C1482]

"Characteristics of staggered InGaN quantum wells light-emitting diodes emitting at 480-525 nm"

In this work, we present simulation and experimental studies of staggered InGaN QWs LEDs emitting at 480nm

and 525-nm spectral regimes. The staggered InGaN QW design can be realized by employing combination of high In-content and low In-content InGaN layers to form the QW with significantly improved electron-hole wave function overlap. This leads to the enhancement in radiative efficiency of nitride LEDs.The power-dependent cathodoluminescence measurements exhibited enhancement of 2.5-times for staggered InGaN QWs. The electroluminescence output power for electrically-injected staggered InGaN QW LEDs exhibited improvement by 2.5-3.5 times for emission in the green spectal regime. [C1483]

"A single stage flyback power supply unit for LED lighting applications"

This paper presents a 75W single-stage power supply unit for LED lighting. The proposed power supply designed using flyback converter topology that is controlled by the critical conduction mode control. The secondary side of main transformer is directly connected to LED strings. By a constant current feedback circuit, this flyback converter directly regulates LED current. Although the proposed circuit doesn't need input current-sensing and input voltage feed-forward, it can achieve high power factor for wide input range. A prototype experimental set-up has been built and tested. Through this experiment with a prototype set-up, the validity of the proposed circuit is verified. [C1484]

"A design of embedded dmx512 controller using FPGA and XILKernel"

A design of the various control devices with a DMX512 protocol is widely used in many areas, such as decorative lighting for both inside and outside of the building, or stage lighting and equipment control, such as spot light, smoke machine, strobe light, moving light. This article presents the creation of embedded DMX512 controller using FPGA with real time operating system (RTOS). This creation enables us to build multiple channels of DMX controller within a single device and to control DMX controller through the TCP/IP. Thus we can control or update the data through the internet. [C1485]

"Milliwatt power 245 nm deep ultraviolet light-emitting diodes"

The paper presents a 245 nm LEDs with milliwatt continuous wave power achieved for devices with large junction area. DUV LED structure used in this work consisted of very high quality n +-AlGaN emitter/cladding layers, AlGaN multiple quantum well active region, Mg -doped p -AlGaN cladding, and p +-AlInGaN contact layers which were grown over (0001) sapphire substrates using combination of conventional MOCVD and proprietary MEMOCVD R process. After growth, LED wafers were processed into devices using standard RIE etching and e -beam metallization steps. These results obtain from this device represents the highest continuous wave output powers reported for sub-250 nm wavelength semiconductor light source. [C1486]

"Modeling of high power LED illumination distribution using ANN"

High power light emitting diodes (HP-LEDs) are more suitable for energy saving applications and have becoming replacing traditional fluorescent and incandescent bulbs for its energy efficient. Therefore, HP-LED lighting has been regarded in the next-generation lighting. In this study, illumination distribution of white color HP-LED was examined and modeled by artificial neural network (ANN) to use at the different lighting applications. Illuminance measurements were done at different distances and voltage levels in the isolated test room. The obtained data was used to model the HP-LED illuminance distribution by ANN. As the realized ANN model, it was presented illumination distribution graphs. Matlab's neural network tool box was used for the simulations. [C1487]

"Tetris Game System Design Based on AT89S52 Single Chip Microcomputer"

Tetris game is one of the most popular and interesting computer game. To reduce the cost and simply the circuit, a Tetris game system is developed base on single chip microcomputer and light-emitting diode dot matrix module. The hardware and application software of system are designed and the whole principle of various details in the system is described. The system including five parts: single chip microcomputer, address lock module, LED display module, input module and C51 program. The input module is composed of five keys through which one plays Tetris game. The address lock module uses 74ls373 chip to realize the multiplexing of P0 port. AT89S52 single chip microcomputer is used as the main control circuit for data processing. The software is developed in C language environment. The designed system is simulated with PROTEUS software. The external keys are simulated to control the movement of different form pieces when playing the game. It is indicated that this design can achieve the basic function of the game and realize the intended purpose. The system has many advantages such as small volume, very low cost, convenient usage and strong function. [C1488]

"Low drift and high sensitivity Fiber Optic Gyroscope using tunable VCSEL as optical source"

Continuously tuned VCSEL is employed as optical source for a fiber optic gyroscope (FOG) for the first time.

Results show very low drift and are comparable to those obtained by systems employing superluminescent diodes (SLD). [C1489]

"Research on lamp-house design method of LED based on modular idea"

This article summarized the existence questions of lamps taking LED as the lamp-house, and proposed the plan of LED crystal grain base modulation, and then carried on a series of lamp-house design in LED by this, which provided the strong function, energy conservation and environmental protection product for consumers. [C1490]

"Spectroscopic Stokes vector polarimetry for biomedical applications"

We present the design and calibration of a spectroscopic Stokes vector polarimeter. The polarimeter can measure the full Stokes vector in the wavelength range 450 nm to 767 nm with 1 nm resolution and consists of a fiber based spectrophotometer, a white LED light source, two liquid crystal retarders, and one polarizer. Calibration of the system is achieved with a scheme that does not require knowledge of the polarizing elements orientation or retardation. Six intensity spectra are required to calculate the full spectrum Stokes vector. Error in the polarimeter is less than 5%. We report the Stokes vectors of light transmitted through several polarizing element and biological media. [C1491]

"Hybrid green LEDs with n-type ZnO substituted for n-type GaN in an inverted p-n junction"

Recently, the GaN and ZnO materials systems have attracted considerable attention because of their use in a broad range of emerging applications including light-emitting diodes (LEDs) and solar cells. GaN and ZnO are similar materials with direct wide bandgaps, wurtzite crystal structure, high thermal stability and comparable thermal expansion coefficients, which makes them well suited for heterojunction fabrication. Two important advantages of GaN over ZnO are the reliable p-type doping and the mature know-how for bandgap engineering. Thus GaN-based LEDs can be made to emit from the deep UV right into the green through alloying with Al and In, respectively. The performance is not identical at all wavelengths, however, and the performance of InGaN-based green LEDs is still relatively poor. [C1492]

"A CMOS sensor for in-vivo fluorescence and electrical imaging in a mouse brain"

We report a complementary-metal-oxide-semiconductor (CMOS) image sensor for in-vivo imaging. The sensor is implemented on a flexible substrate with LEDs as excitation light sources. The images are successfully obtained in a mouse brain. We demonstrate a image contrast improvement method on the basis of image processing and multiple readout in order to overcome non uniform illumination of the excitation light. [C1493]

"Architectural tuning of color chromaticity by controlled nonradiative resonance energy transfer in CdTe nanocrystal solids"

The authors presented highly sensitive tuning of color chromaticity by controlling radiative decay kinetics and steady state emission of layer-by-layer spaced nanocrystal solids through adjusting the separation between donor and acceptor nanocrystal bilayers. Such FRET-based fine tuning offers a post-synthesis approach to control color in NC solids, alternative or additive to using the NC size, shape, and composition control. This approach can be utilized to fune the photometric properties of nanocrystal integrated white LEDs. [C1494]

"Quantum dot emitters integrated with smart peptides"

In our study, we investigated the quantum dots integrated with silica binding peptides on silica surface for three different assembly approaches. We used biotinylated silica binding peptides (SBP-bio) as smart linkers to immobilize quantum dots and streptavidin functionalized CdSe/ZnS core-shell quantum dots (SA-QD) as light emitters. [C1495]

"Wavelength dependent color conversion of CdSe/ZnS core/shell nanocrystals for white LEDs"

In this paper we investigate spectrally resolved relative quantum efficiency and relative photon conversion efficiency of CdSe/ZnS core/shell nanocrystals. We study the optical absorbance, photoluminescence, spectral relative quantum efficiency and spectral relative photon conversion efficiency of red-emitting CdSe/ZnS core/shell nanocrystals with the amounts of 0.4, 0.8, 1.6 and 2.4 nmol quantum dots. We find out that both the average quantum efficiency and the average photon conversion efficiency of the nanocrystal film raise with the increasing photon excitation energy. [C1496]

"Individually-addressable III-nitride micro-LED arrays for integrated CMOS control"

We report the characterization of micro-pixellated III-nitride LED arrays giving maximum output per pixel of 5 mW in continuous mode and 500 pJ per 25 ns pulse. These have been integrated with custom CMOS control electronics. [C1497]

"Wide wavelength operation of all-optical flip-flop using Mach-Zehnder interferometer bistable laser diode"

We demonstrate all-optical flip-flop operation of Mach-Zehnder bistable lasers with falling time of less than 68 ps. The device can be controlled with continuous 58-nm wavelength range of input light. [C1498]

"Influence of optical path difference on visible light communication systems"

In indoor visible light communication channels and LED road illumination communications for the Intelligent Transport Systems (ITS), inter symbol interference (ISI) due to multipath propagation prevents high data rate transmission. Indoor wireless optical communication systems utilizing white LED lights and on the road illumination have been studying about it. Generally, plural lights are installed in room and considered to the traffic information system using existing LED traffic lights. Therefore, their optical path difference must be considered. In this paper, the influence of an optical path difference has been investigated and two approaches against this problem are introduced. One uses On-Off Keying, Return-to-Zero (OOK-RZ) coding and the other uses optical orthogonal frequency division multiplexing (OFDM). [C1499]

"Performance analysis of indoor visible lighting communication using spread codes"

In this paper, the application of spread codes in indoor visible lighting communication (VLC) system is investigated. We choose four spread codes, pseudo-noise (PN) binary-valued code, Walsh code, m-sequence and gold code and compare their bit error rate (BER) performances on directed line of sight (LOS) channel and diffuse channel, respectively. The experiment validates that VLC using spread code is indeed feasible to alleviate the effect of multi-path dispersion. [C1500]

"Performance analysis of optimum line coding for high speed data communication in VLC system"

We propose a V5-HBT line coding for a visible light communication (VLC) system. V5-HBT line coding is defined as follows. First, we apply half bit transition to one bit. Second, we decode encoded bits using difference of bit transition level in one bit duration. As a result, we obtain advantages about synchronization problem and noise effect mitigation at the receiver. We set up outdoor the VLC simulation environment. At simulation results, we show 2-3dB gain as compared with existing line coding schemes. [C1501]

"Performance analysis of the VLC system with Z-HBT line coding"

We propose a Z-HBT line coding for a visible light communication (VLC) system. Z-HBT line coding is defined as follows. First, we apply half bit transition to one bit. Second, we decode encoded bits using difference of bit transition level in one bit duration. As a result, we obtain advantages about synchronization problem and noise effect mitigation at the receiver. We set up outdoor the VLC simulation environment. At simulation results, we show 2-3 dB gain as compared with existing line coding schemes. [C1502]

"A Combined Wiimote-Camera Tracking System for Small Aerial Vehicles"

In this paper, the Wii remote (Wiimote) controller and a conventional video camera are used to perform real-time position tracking of an aerial vehicle. The combination of the Wiimote's infrared and video camera fields of view creates a virtual cube in which motion can be fully monitored. This controlled space allows a vehicle to navigate with no onboard sensors. The proposed approach is advantageous for applications in which vehicles are too small or lightweight to carry sensors. Design, implementation, and preliminary results conducted on a small helicopter are presented and discussed. [C1503]

"Germanium photodetectors in silicon photonics"

Near-infrared photodiodes using Ge on Si are presented. Applications of Ge to optical modulators and light emitters are also discussed, showing Ge as an enabler to integrate active photonic devices on a Si platform. [C1504]

"UV extraordinary optical transmission through nanoslits"

The UV extraordinary optical transmission through nanoslit structures in the far-field and localized field

enhancement in the near-field are both directly observed. Numerical modeling results are also presented, showing good agreement with the experiment results. [C1505]

"High throughput Free Space Optical communication using white LED lightning equipement"

This paper presents a conceptual architecture for high throughput short distance free-space-optical (FSO) communication using white LEDs lighting equipment. Multiple carriers' modulation techniques are used to increase the system bit rate. [C1506]

"Smart control of road-based LED fixtures for energy saving"

Lighting consumes one fourth of all energy consumed worldwide, and case studies have shown that commonly 50 to 90 percents of building lighting is unnecessary for the purposes required. Energy is wasted when light does not fall on its intended target, as when lighting fixtures allow light to go up instead of (as it is generally preferred) downward. Leakage also occurs when more light is generated than needed. Many governments are looking for ways to reduce energy use after signing the Kyoto Protocol, and individuals, organizations and local authorities are increasingly improving lighting efficiency in order to reduce energy consumption. The main scope of this paper is to establish some criteria in designing a sensing and signal conditioning system for energy saving in public lighting. [C1507]

"Fabrication of a near infrared OLED"

We have fabricated a single-layer NIR OLED by a new luminescent material. The characteristics of this diode is considered and investigated with different thicknesses. Electroluminescence is observed with the peak at 800 nm. [C1508]

"Emergency lighting system integrated into a compact high-brightness LED lamp"

This paper presents an emergency lighting system integrated into a compact lamp using high-brightness LEDs. These devices have high luminous efficacy, long useful life, small size and they are resistant to vibrations. Besides, they are supplied with low voltage and current values and they do not need ignition process. These features make these devices attractive to use in emergency lighting. The proposed circuit is simple and has low cost. Its main characteristic is the easiness of installation simply replacing incandescent and compact fluorescent lamps with a LED lamp. The proposed circuit supplies the LEDs in two ways. First, by mains (220 VAC) using a circuit called voltage regulator in DC. Another way, in the emergency mode, the circuit supplies the LED using a Ni-MH battery without the need of converter. The Brazilian standard (NBR 10898) and IEEE standard (IEEE Std 446-1995) for emergency lighting systems are attended by the topology. The complete circuit was simulated and the results show a satisfactory behavior of the lamp. [C1509]

"Compact emergency lamp"

This paper presents a compact emergency lamp using light emitting diodes (LEDs). The goal is to develop a compact and low cost electronic circuit to drive and control the current of LEDs arranged in a single enclosure. The proposed idea allows using the same equipment in the daily activities, supplied by mains, and under a possible failure of it. The proposal aims energy saving, high luminous efficacy and high useful life when replacing traditional emergency lighting systems, using fluorescent lamps by LEDs. The use of E-27 socket (the same used in traditional incandescent lamps), provides the advantage of easy installation, with the simple replacement of the lamp without any change in the electrical installation. To supply the LEDs by mains and by battery a Buck and a Boost converter were employed. The converters work without electrolytic capacitors which has advantages such as reducing of size and cost of the circuit and increasing the driver's useful life. The battery can be composed of three rechargeable Ni-MH batteries (1.2 V) or a Li-Ion battery (3.6 V). The design complies with the Brazilian standard and international standard for emergency lighting systems. The complete circuit was implemented and the experimental results show a satisfactory behavior of the lamp. [C1510]

"Automatic die inspection for post-sawing LED wafers"

Wafer defect inspection is an important process that is performed before die packaging. Conventional wafer inspections are usually performed using human visual judgment. A large number of people visually inspect wafers and hand-mark the defective regions. This requires considerable personnel resources and misjudgment may be introduced due to human fatigue. In order to overcome these shortcomings, this study develops an automatic inspection system that can recognize defective LED dies. An artificial neural network is adopted in the inspection. Actual data obtained from a semiconductor manufacturing company in Taiwan were used in the experiments. The results show that the proposed approach successfully identified the defective dies on LED

wafers. Personnel costs and misjudgment due to human fatigue can be reduced using the proposed approach. [C1511]

"Evaluating a model for generating interactive facial expressions using simple recurrent network"

To improve face-to-face interaction with robots, we developed a model for generating interactive facial expressions by using a simple recurrent network (SRN). Conventional models for robot facial expression use predefined expressions, so only a limited number of expressions can be presented. This means that the expression may not match the interaction and that the person may find the expressions monotonous. Both problems can be overcome by generating expressions dynamically. We tested this model by incorporating it into a robot and comparing the expressions generated with those of a conventional model. The results demonstrated that using our model increases the diversity of face-to-face interaction with robots. [C1512]

"A high efficiency autonomous street lighting system based on solar energy and LEDs"

This work presents an autonomous street lighting system based on solar energy as primary source, batteries as secondary source, and lighting emitting diodes (LEDs) as lighting source. This system is being presented as an alternative for remote localities, like roads and crossroads. Besides, it presents high efficiency, because all power stages are implemented in DC current. The design of LEDs fixture, in order to replace a 70 W high pressure sodium (HPS) lamp, is performed. This design takes into account the human eye response in scotopic conditions. LEDs driver and battery charger experimental results are presented. The battery charger presents three control modes: maximum power point tracker (MPPT) mode; constant current mode; and constant voltage mode. The control mode depends on the battery state (charged/discharged), and solar irradiance level. [C1513]

"A triple output driver for line-fed HBLED LAMPS"

The paper proposes a triple-output buck topology as a practical, line-fed, high-power-LED lamp driver. The presented application consists of a 20 W, 500 kHz switching converter, designed to drive a 1000 lm white-light, solid-state lamp. Key features of the proposed topology are the capability to achieve high step down ratios, a reduced voltage stress on the active components and the capability to automatically balance the average current on its three outputs. [C1514]

"Non-isolated DC-DC converters with wide conversion range used to drive high-brightness LEDs"

Light emitting diodes (LEDs) have many features that make them attractive for use in an increasing number of applications. Particularly in lighting, the small size of LEDs compared to fluorescent and incandescent bulbs is a prominent advantage. This paper presents two topologies based on the buck converter, which have higher step-down characteristic than that of the original converter. The quadratic buck converter is studied and used to drive series-connected LEDs. Improved characteristics if compared with the traditional converter include the continuous current maintained through the LEDS and the possibility of driving several types of LED arrays. The study is then extended to the cubic buck converter, as a novel arrangement to obtain the mentioned step-down characteristic is introduced in this work. The use of such converter allows obtaining lower output voltages than those resulting from the quadratic buck converter. Experimental prototypes of the converters are implemented and fully tested. It must be also mentioned that a PIC microcontroller is used to control the current through the LED array, what provides robustness and flexibility in the adjust of the control algorithm without the need of hardware modification. [C1515]

"A simplified technique of lighting performance evaluation applied to led-based modern luminaires"

This paper presents the practical implementation details of a simplified and low cost technique useful to provide elements that sustain, with solid scientific data, the comparison between conventional small size, low wattage lamps (or luminaires) and LED-based modern counterparts. A case study is also included, which consists of the comparison of a high-power LED linear luminaire, constituted of four LEDs of 3 W in series, with a conventional 15 W fluorescent bulb, which is fed by an electronic ballast. The LED luminaire implementation is also described in the text, along with some details of the power driver design. Experimental results, assembling electrical and luminous parameter information (illuminance), are also given, revealing that the simple LED arrangement could easily overcome the performance of the fluorescent bulb. [C1516]

"Proposal of a DC-DC converter with wide conversion range used in photovoltaic systems and utility power grid for the universal voltage range"

This paper describes the design and implementation of a boost connected in cascade with a quadratic buck converter, with just one active switch, used to drive a LED string for public and private lighting purposes. The

proposed converter supports a wide input voltage range that makes it possible to be supplied from 12 VDCto 340 VDC(240 VAC), without any additional adjustment. It can be used in hybrid electrical systems supplied by photovoltaic systems or 110/220 VACfrom the utility power grid. Experimental results from an 11 W prototype are also presented. [C1517]

"Experimental evaluation of parallel transmission using optical ZCZ-CDMA system"

In the high speed parallel transmission of optical wireless communication, shifting of optical axis is important problem. An optical CDMA system using the optical ZCZ code is proposed as a method with the possibility that this problem can be solved without complicating hardware. The optical ZCZ code, which is a set of pairs of binary and bi-phase sequences with zero correlation zone, can provide optical code division multiple access (CDMA) communication system without co-channel interference. We proposed the compact construction of a code generator and a bank of matched filters for this code . In this paper, we verified that this system can remove co-channel interference even if an optical axis is shifted, by experiment of parallel transmission using an optical ZCZ-CDMA wireless communication system, consisting of a infrared light emitting diode(LED), an avalanche photo diode(APD) module and field programmable gate array(FPGA) boards corresponding to 400,000 logic gates. Desired to undesired signal ratio (DU ratio) in correlation output whose shiftings of optical axis are 0Г‚В° and 45Г‚В° are improved about 61.9 dB and 39.1 dB, respectively. As a result of experiment on the optical parallel transmission, it was proved that this system was able to suppress interference by shifting of optical axis. [C1518]

"Nanocrystal integrated light emitting diodes based on radiative and nonradiative energy transfer for the green gap"

In this paper we present the design, growth, fabrication, integration and characterization of these nanocrystal integrated light emitting diodes. [C1519]

"Properties of responsive liquid crystal/polymer fibers"

The development of optically responsive liquid crystal (LC)/polymer composite fibers is presented. The morphology and electro-optical properties of LC/polymer fibers are studied with scanning electron microscopy and polarizing optical microscopy, respectively. [C1520]

"Fabrication of planar GaN-based micro-pixel light emitting diode arrays"

We report a new processing approach which enables the fabrication of planar GaN-based micro-pixel LED arrays. This process is based on selective passivation of the p-doped GaN surface by a CHF3plasma treatment. [C1521]

"Improvement of PLED lifetime using inorganic Mg-Zn-F thin film passivation"

We manufactured a novel gas permeation thin film passivation by using inorganic Mg-Zn-F. The film was formed about 200 nm and WVTR was reached 10-3g/m2-day. Applied to PLED device, lifetime was increased 25 times. [C1522]

"PLED integrated FR4 MEMS display"

A novel, all polymer, integrated micro-system, which realizes a two-dimensional (2D) display by integrating a one-dimensional (1D) array of polymer light emitting diodes (PLEDs) with a polymer scanner of micro electro-mechanical system (MEMS) is presented. [C1523]

"Multilevel logic transmission using disparate intensity levels of white light and programmable controllers"

This paper analyzes the transmission of a multilevel logic information by assigning a distinct level of Intensity of white light to a specific Byte. The criterion for allocation of Intensities is fed into the programmable transmitter controller. The receiver employs a Photocell to detect the transmitted intensity of white light emitted by an LED. The information at the receiving end is retrieved and processed by the programmable receiver controller. The technique discussed takes into consideration the channel's behavior and the involvement of noise excursions, thus settling for a unique Look up Table at the receiving end. The programmability of the transmitter and receiver controllers allows adjustment according to the variation in channel's behavior. The paper uses a normal dust free channel opaque in nature, thus providing a cost effective alternative to Optical Fibers and a loss effective alternative to Copper Wires for short length communication systems. [C1524]

"Dynamic fuzzy controller based multilayered architecture for extended battery life in mobile handheld devices"

Recently, the mobile phones are evolving into mobile multifunctional terminals with the incorporation of various useful functions; the display devices also have advanced in terms of size, design, and resolution as a user interface of the mobile phone. Many low power display techniques have been proposed for example dynamic luminance scaling, liquid crystal orientation shift, variable frame refresh, organic LEDs (light emitting diodes) etc. It has been observed that optimizing software alone or hardware alone the solution might not be most optimal. The paper describes the design of a dynamic fuzzy controller based multilayered architecture which is a combination of software and hardware levels to interface between software application layer and physical layer to eventually control the current through LEDs of cell phone and thereby improving battery life depending on user choices and applications running on mobile devices. [C1525]

"Three-dimensional photonic crystals developed by double-angled reactive-ion etching technique"

Three-dimensional photonic crystals are successfully fabricated by a double-angled deep-etching technique. Furthermore, bonding a light emitter onto or between three-dimensional crystals has been shown to enhance or suppress emission. [C1526]

"Aequorin: Design of a system for reduction of the user's stress in one day"

This paper describes the design of aequorin which is the system for measurement and reduction of the user's stress for a day. This system consists of a wearable device which is composed of a pulse sensor, MCU (Micro Control Unit) board and iPodTouch and also a rocking chair with biofeedback function embedded with LED lights and a display for stress reduction experience. After the user comes back home, the user experiences the stress reduction with the log data measured for the day through the wearable device. The system adopts two approaches for stress reduction; one is an indirect presentation of the stress information as biofeedback in which the system illuminates the LED lights with 1/f noise according to the amount of stress, and the other is a direct presentation of the stress information composed of stress values and their time codes as biofeedback to the display. After introducing the design and implementation of stress reduction, this paper describes about a hearing to validate these approaches, and introduces the limitations of this system. [C1527]

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