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EOSLE Daily Overview / EOSLE Poster Session- Tuesday June 23

Date: Tuesday, June 23	
16:00 - 18:00 Hall B0, Ground Floor, Congress Centre	**EOSLE Poster Session**
Date: Wednesday, June 24	
8:30 - 10:00 Room 22, 2nd Floor, Congress	**EOSLE I: LED Chip Technology**
10:30 - 12:10 Room 22, 2nd Floor, Congress	**EOSLE II: Light Engineering**
14:00 - 15:30 Room 22, 2nd Floor, Congress	**EOSLE III: Materials for Lighting 1**
16:00 - 17:30 Room 22, 2nd Floor, Congress Centre	**EOSLE IV: Materials for Lighting 2**

16:00– 18:00 EOSLE Poster Session, Tuesday, June 23

Location: Hall B0, Ground Floor, Congress Centre

POSTERS

Analytical optimization of the ablation efficiency at normal and non-normal incidence for generic super Gaussian and truncated super Gaussian beam profiles 1

Shwetabh Verma, Samuel Arba Mosquera
SCHWIND eye-tech-solutions GmbH & Co.KG, Germany

We suggest a general method to determine the optimum laser parameters for maximizing the ablation efficiency for different materials (in particular human cornea) at different incidence angles, for generic Truncated super Gaussian beam profiles. The model is comprehensive and incorporates laser beam characteristics and ablative spot properties. The model further provides a method to convert energy fluctuations during ablation to equivalent ablation deviations in the cornea. The proposed model can be used for calibration, verification and validation purposes of laser systems used for ablation processes at relatively low cost and would directly improve the quality of results.

Femtosecond fiber ring laser using liquid crystal polarizers 3

Alexander Sergeevich Gnatenko[1], Yuriy Pavlovich Machekhin[1], Alexander Anatolievich Muravsky[2], Anatoli Alexandrovich Murauski[2]
[1]Kharkov National University of Radio Electronics, Ukraine; [2]Institute of Chemistry of New Materials NAS Belarus, Belarus

In this paper was developed fiber femtosecond ring laser which is based on erbium-doped single-mode fiber and operates in passive mode locking. Passive mode locking is realized by rotating the polarization using liquid crystal cells. This model ring fiber laser can be widely used in information technology.

8:30– 10:00 LED Chip Technology

Location: Room 22, 2nd Floor, Congress Centre

Invited Talk **8:30 LED chip technology for high performance applications** N/A

Stefan Illek
Osram Opto Semiconductors GmbH, Germany

9:00 Nanostructured plasmonic luminophores with directional sideward emission 5

Dick K.G. de Boer, Marc Verschuuren, Cocoa Guo, Femius Koenderink, Jaime Gómez Rivas
Philips Research, The Netherlands

Periodic arrays of metallic nanoparticles can be used to enhance the emission of light in certain directions. We made hexagonal arrays of metallic nanoparticles combined with thin layers of luminescent material and optimized period and thickness to obtain sideward directional emission into glass.

9:20 Functional nanomembrane for visible light down-conversion 7

Joao Miguel Melo Santos[1], Scott Watson[2], Benoit Guilhabert[1], Peter J. Schlosser[1], Andrey Krysa[3], Anthony E. Kelly[2], Nicolas Laurand[1], Martin D. Dawson[1]
[1]University of Strathclyde, Institute of Photonics, United Kingdom; [2]University of Glasgow, Electronic & Electrical Engineering, Glasgow, UK; [3]University of Sheffield, Electronic & Electrical Engineering, Sheffield, UK

We report a color down-converting scheme for blue InGaN lasers and LEDs based on a multi-quantum-well nanomembrane, itself hybridized onto a hemispherical lens for light-extraction enhancement. The fast modulation response (> 80 MHz) of this color-converter makes it suitable for visible light communications.

9:40 Optical waveguides fabricated by ion exchange technique in photo-thermo-refractive glass 9

Yevgeniy Sgibnev, Alexander Ignatiev, Nikolay Nikonorov
ITMO University, Russian Federation

We present research of ion-exchangeable properties of photo-thermo-refractive glasses. Optical waveguides were fabricated by ion-exchange using diffusion of K+, Rb+, Cs+ and Ag+ into the glass, refractive index profiles were determined by WKB method. Basic mechanisms of formation refractive index profile are proposed.

10:00-10:30 COFFEE BREAK

10:30– 12:10 Light Engineering

Location: Room 22, 2nd Floor, Congress Centre

Invited Talk **10:30 Designing Optical Systems with Freeform Surfaces: Mathematical and Practical Challenges and Solution Strategies** 11

Rolf Wester
Fraunhofer ILT, Germany

Optics deals with creating and manipulating light. Solid state light sources are now used in many applications. Due to their comparatively low process temperature and small geometric extent, LED allow for more compact designs compared to conventional light sources. The main objectives are energy efficiency, color (color temperature and color rendering index) and the distribution of light according to the application at hand. The design of optical elements that achieve the distribution of the light according to prescribed specifications is a challenging task that will be described in detail.

11:00 Assessment of the wave propagation method for the simulation of micro-lenses 13

Sören Schmidt[1,2], Thomas Paul[1], Herbert Gross[1,2]
[1]Institute of Applied Optics and Precision Engineering, Germany; [2]Friedrich-Schiller-Universität Jena, Institute of Applied Physics, Abbe Center of Photonics, Germany

The optical design, analysis and optimization of micro-structured optical components requires wave-optical algorithms that provide accurate results, while simultaneously having a high computational performance. Especially the simulation of components

with high numerical apertures and abrupt index changes along the optical axis is challenging. This is the case, e.g. for micro-lenses with small radii of curvature. We assess the applicability of the Wave Propagation Method for the simulation of such components. We show, that accuracies can be achieved, which are comparable to rigorous simulations, while having a competitive computational performance compared with Beam Propagation Methods.

11:20 Optically Active Nanocomposite Prototyping by Laser Ablation in Liquids 15

Bilal Gökce, Marcus Lau, Stephan Barcikowski
University of Duisburg-Essen, Germany

The potential of functionalized nanoparticles with their unique properties is, till now, not completely utilized due to a lack of methods to integrate these properties into materials and products. Purity is mostly an advantage for these kinds of applications. If nanoparticles are produced by the pulsed laser ablation in liquids technique they emerge completely free of ligands and are therefore highly reactive. Those ligand-free nanoparticles can be hybridized with polymers and be applied in optical applications. In this work, the method as well as optically active nanocomposites generated with this route will be discussed.

Invited Talk **11:40 Beamed enhanced emission from nanoantennas for solid state lighting** 17

Jaime Gomez Rivas
FOM Institute AMOLF, The Netherlands

The introduction of white LEDs is leading to the solid state lighting revolution with the fast replacement of incandescent lamps by much more efficient light sources. In white LEDs, high efficiency UV or blue LEDs are used to excite the luminescence of a high quantum efficiency (QE) material called phosphor. Much effort is dedicated to the development of stable phosphors with the highest possible QE and with designed absorption and emission spectra. These efforts are also on the design optical elements to couple light out of the devices and to beam this light in certain directions. This extraordinary enhancement can lead to the replacement of bulky optical components in LEDs by nanostructures.

12:00 - 14:00 LUNCH BREAK

14:00-15:30 Materials for Lighting 1

Location: Room 22, 2nd Floor, Congress Centre

Invited Talk **14:00 Design of the active layer stack in organic light-emitting diodes using three-dimensional kinetic Monte Carlo simulations** 18

Reinder Coehoorn
Philips Research, TU Eindhoven

14:30 The OLED technology for automotive applications 19

Thomas Trojak
BMW, Germany

Electroluminescence in organic materials is progressively establishing itself in different sectors. In the display market, the Organic Light Emitting Diode (OLED) technology is already a state of the art. For both general lighting and exterior automotive lighting applications, the situation remains different. Due to commercial and technological challenges, a widespread introduction of this new lighting technology is under scrutiny. This contribution will give an overview about the current development, some technical challenges which have still to be solved as well as about some unique properties of that new lighting technology.

14:50 A self-compensation approach for chromaticity coordinate maintenance of phosphor converted LEDs upon temperature variations 21

Wolfgang Nemitz[1], Franz Peter Wenzl[1], Susanne Schweitzer[1], Christian Sommer[1], Paul Hartmann[1], Paul Fulmek[2], Johann Nicolics[2]
[1]JOANNEUM RESEARCH Forschungsges.m.b.H, Austria; [2]Vienna University of Technology

We suggest a method to compensate temperature induced impacts on the colour temperature constancy of phosphor converted LEDs without additional sensors and drivers: namely simply by a sophisticated composition of the phosphor layer using materials with suitable thermo-optic coefficients.

15:10 - 15:30 Transport of light through white-LED phosphor plates in the overlap range of emission and absorption 23

Maryna Meretska[1], Ad Lagendijk[1], Teus Tukker[2], Allard Mosk[1], Wilbert IJzerman[3], Willem Vos[1]
[1]University Twente, Netherlands, The; [2]Philips Research, Netherlands, The; [3]Philips Lighting, Netherlands, The;
We have studied transport of light in the wavelength range 400 to 700 nm, through polycarbonate diffuser plates with different phosphor concentrations of YAG:Ce3+ , that are used for commercial LEDs. We have developed a new technique to measure light transport of LEDs in the range where emission and absorption overlap. A narrow band light source is employed to measure the total transmission. We have managed to extract the full range of transport parameters for phosphor plates in the visible wavelength range using nanophotonic theory. In our presentation we will elaborate on the consequences for real devices.

15:30 - 16:00 COFFEE BREAK

16:00- 17:30 Materials for Lighting 2

Location: Room 22, 2nd Floor, Congress Centre

Invited Talk **16:00 3D Nanowire LEDs for Solid State Lighting** N/A

Andreas Waag
TU Braunschweig

16:30 Phosphor in glass based on high refractive index glasses doped with Eu3+ and Mn2+ ions for LEDs 25

Vladimir Aseev, Anastasiya Bibik, Julia Tuzova, Maria Shvaleva, Yana Nekrasova, Nikolay Nikonorov, Elena Kolobkova
ITMO University, Russian Federation
New types of phosphor (YAG: Ce3+ (yttrium-aluminum garnet doped with Ce3+ ions) containing glass material doped with europium and manganese ions was developed for light–emitting diodes (LEDs). The optical, spectral and luminescent properties of the experimental samples were investigated. The usage of new phosphor material in white LEDs fabricated with the "chip-on-board" technology is demonstrated. The general CRI (Ra) and correlated color temperature's changes depending on the europium and manganese ion concentration have been investigated for WLED.

16:50 Liquid glass–based phosphor materials for white LEDs 27

Shvaleva Mariia[1], Shulga Evgeniy[2], Kink Ilmar[2], Romanov Alexey[1,3], Mynbaev Karim[1,3], Bougrov Vladislav[1]
[1]ITMO University, LED Technology Department, Saint-Petersburg, Russian Federation; [2]Institute of Physics, University of Tartu, Estonia; [3]Ioffe Institute, Division of Solid-State Electronics, Saint-Petersburg, Russian Federation
We develop composite phosphor material based on liquid glass (Na2SiO3) matrix and microparticles of cerium–doped yttrium-aluminum garnet (YAG:Ce3+) for white light emitting diodes (LEDs). The morphology of composite material samples, their optical and thermal properties and quantum yield are investigated. Operation of LED modules with the sintered composite phosphor material is demonstrated.

17:10 - 17:30 Tailored emission enhancement of extended phosphor layers by nanostructured surfaces 29

Mohammad Ramezani
FOM Institute AMOLF, The Netherlands

18:15 - 20:30 EOS Annual General Assembly (AGA), Room 22