

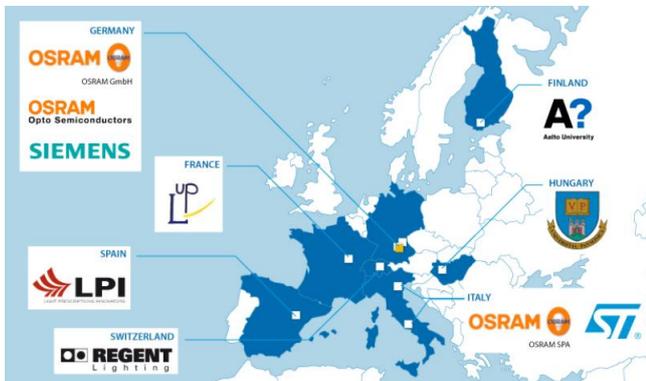
Solid-State Lighting for Europe Newsletter #3 June 2012

Introduction

Welcome to the third Newsletter from the SSL4EU project.

SSL4EU stands for Solid State Lighting for Europe. It is an Integrated Project funded by the European Commission under the 7th Framework Programme. It gathers 10 partners from 7 different member states for a period of 3 years until 2013.

Consortium



Our Goal

Explore universally applicable LED light-engines with high colour rendering, a tuneable light output spectrum and an adaptable light output level. These will keep Europe at the forefront of the energy-saving SSL business and serve as leverage to push the LED luminaire business in Europe.

The SSL4EU consortium includes large industrial companies, two SMEs and two universities:

- OSRAM AG
- OSRAM Opto Semiconductors
- OSRAM IT
- SIEMENS Corporate Technology
- ST-Microelectronics
- LPI
- REGENT
- AALTO University
- University of Pannonia
- L-UP

Summary of Progress

During the last half year there was much progress in the SSL4EU project. You will find here the description of what was achieved within all work packages.

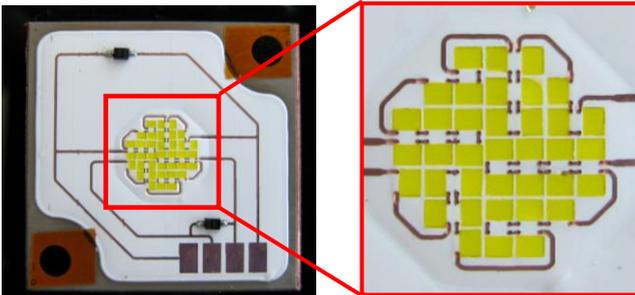
High Quality LEDs

The aim of work package 1 is to implement a versatile multi-chip LED package platform for the targeted spot light-engine with 4000lm output. LED packages will be developed for single-colour warm white and colour-temperature (CCT) adaptive solutions, both with high colour quality.

During the second year of the project, the focus for the development of warm white ceramic phosphor platelets was to improve the workability of layered green/red phosphor powders to a single warm white ceramic converter platelet. Hereby, several approaches were evaluated to suppress the chemical reaction between the yellow oxide based and red nitride based phosphor precursors

presented in the Helsinki meeting in January 2012.

An intelligent full digital driver, based on STM microcontroller STLUX385, has been developed for the coloured application, and is able to control, with high accuracy, the light intensity and colour temperature.



Chip spot light-engine with planar interconnect technology

For the development of multi chip spot light-engines with densely packed chip arrays and bond wire free contact technology, the workability of the overall assembly has been shown and a final process flow has been fixed. The focus during year two has been on optimization of layout geometry and reliability issues. Major improvements have been made to increase the accuracy of the soldering process of the chip arrays and the lithographic and galvanic process of the feed lines..

Luminaire Electronics

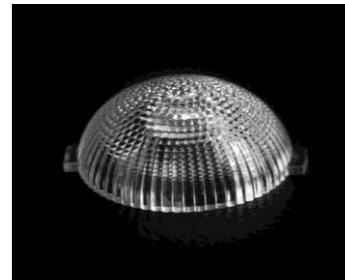
The electronic system has been developed with two different approaches, the first for the full white multi channel LED application and the second for the coloured one. Both solutions contain a new AC/DC flyback power converter controlled by specially designed integrated circuits (ASIC).

For the full white application, an innovative current regulator for low cost and high efficiency multiple channels solution, has been developed, tested and patented by Osram IT. The prototype was

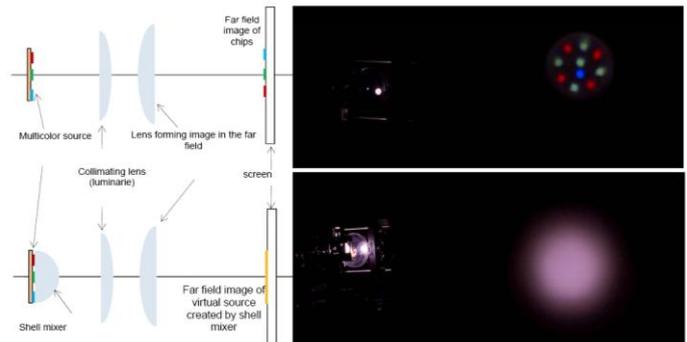


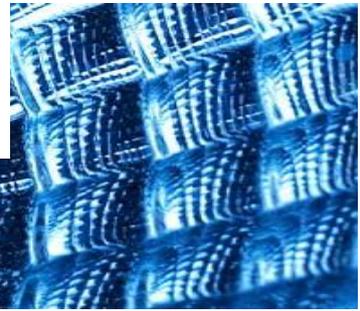
Optics

Two sets of *shell optics* prototypes have been developed, one comprising more polished surfaces (enabling a slight enhance on the Light Output Ratio - LOR - and less diffusive light).



Apart from the outstanding LOR measured (95%), the shell performance confirm the ability of this “plug-in” optics to produce a virtual source free of color and luminance separation. This is confirmed with an imaging lens acting as luminaire (see picture below) and with some off the shelf reflectors.





Ultrasonic cooling

The ultrasonic cooler has been optimized with respect to power consumption and to geometry and material in order to increase the amplitude.

Optimization with respect to power consumption:
The electromechanical system with the piezomembrane exhibits some complex behaviour. It is able to recover energy back to the power supply on the one hand and it is emitting energy to the ultrasonic field on the other hand. To reduce the energy recovery back to the power supply, a matching impedance Z has been placed between power generator and piezo actuator, thus the overall (input) power sunk to a minimum.

Optimization with respect to geometry and material:

After analyzing ultrasonic vaporizer used in former Siemens micro nebulizers, it was found that this concept has high potential to be adopted for the utilization in ultrasonic cooling applications. The idea was to optimize the geometry and the material of the Sonotrode in order to get higher amplitudes. For the new concept of the Sonotrode, titanium and aluminium are used, which have significant lower material damping. This leads to higher amplitudes of the resonating surface of the Sonotrode, which is necessary for efficient cooling. Small Ultrasonic vaporizers made of steel have amplitudes of nearly $2 \mu\text{m}$, the optimized titanium Sonotrode has maximas of amplitudes over $18 \mu\text{m}$. Cooling experiments with a heat sink have been performed with the titanium Sonotrode. At 2 Watt electrical input power of the titanium sonotrode, the cooling performance was doubled compared to free convection.

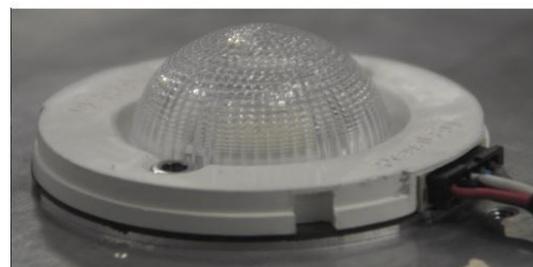


Sonotrode for ultrasonic cooling

Universally applicable LED light-engines: system integration & reliability analysis

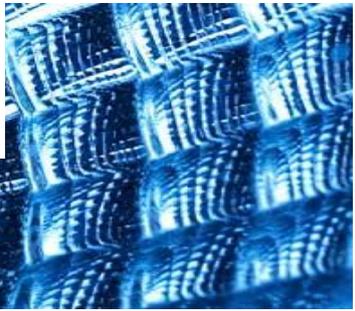
Several PrevaLED light-engines for a 4000 lm output out of a light emitting surface (LES) of 9mm in diameter have been developed. This is a significant reduction of the LES. For these high lumen packages, a typical LES diameter is nowadays 23 mm. Therefore, the SSL4EU light-engine is a perfect HID replacement. The new housing allows the shell mixer from the project to be simply mounted by pushing and twisting and is now ready for the multi colour module which will be developed within the project.

For the reliability investigations, the experimental set-up has been finished and several long-term degradation measurements have been started.



Full-scale experiments for user acceptance studies

The investigations of user acceptance in light booths have been finished. The results were the recommended light spectra of LED lighting to be



used in the full-scale experiments simulating home, office and shop lighting. At the three locations of Aalto University, University of Pannonia and OSRAM OS one-to-one size experimental rooms have been re-furbished as offices, living room and kitchen-dining area and special commercial environments. In these special tunable LED lighting get inserted to be able to test the long term effect of different spectra that can be produced with LED lighting, to find most agreeable and at the same time efficient LED spectra.

Interviews

SSL4EU Newsletter #3 offers you the possibility of getting to know some of the Project Partners a little better... Thus, the Interviews section will let you discover the day-to-day life of the people involved in achieving the SSL4EU goals.

In this edition of the SSL4EU Newsletter #3, we propose you 3 tags that will lead the interview:

investigation, efficiency, outcome

Interview with Janos Schanda, Professor Emeritus at Pannonia University, Hungary



Office-room set up at Aalto for the user acceptance studies on LED lighting.

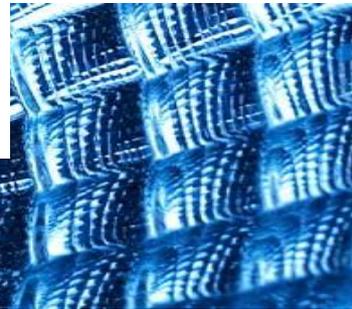
Q1: The room size experiments started a few months ago. They include office, home and shop lighting situations. What are the objectives of your investigation?

A1: The objectives of the investigations are to find the most pleasing and energy efficient lighting spectra for the different types of human occupation. We know that we need different lighting in an office or in our homes. Spectral investigations were performed up to now mainly in so called box-experiments, in small compartments, where the observer has seen different objects, but could not move in the space and experience the input of light for a prolonged period. The present experimental setup will provide opportunity for prolonged – real life – experience under the different light spectra. By the help of these an optimum between light spectrum and well-being of the occupant and efficiency will be looked for.



Driving electronics for luminaires

Q2: How will the efficiency of LED light luminaires be evaluated by the experiment participants? What kind of indicators will you use to determine the efficiency?



A2: Efficiency can be interpreted in different forms.

- In the shop it is whether the client finds the lighting agreeable, would like to spend there the necessary time to find the product that he/she would like to purchase, etc. In this case e.g. replies on the acceptance of the lighting might be of interest.
- In office some task performance measures might be used to collect information on the efficiency of the lighting, but here as well the acceptance of the lighting is an important contribution.
- In home lighting the main question is perception: preference of the light, whether it stimulates the occupant, pleases him/her, etc.

Q3: How will the outcome of your experiments contribute to develop the solid-state lighting in Europe? Have this kind of experiments been already run in Europe?

A3: No such large scale experiments were run in Europe. Some preliminary investigations were carried out in the USA, but only in a relatively small room, and – to our best knowledge – no long term investigations were performed. A first impression is naturally important, but will not provide the final answer. We hope that European light source manufacturers will profit from these investigations and will bring onto the market some Solid State Light sources that help to become more energy efficient without scarifying on the visual comfort.

LEDs News

After having invested in SSL in automobiles and streetlights, Germany is investing in SSL manufacturing base. An estimation made by Frost&Sullivan, a market research company, foresees that the LED lamp industry in Germany will grow at a compound annual growth rate of 27% between 2008 and 2018.

Source: <http://ledsmagazine.com/news/9/6/23>

The 2012 Next Generation Luminaires (NGL) Solid-State Lighting Outdoor Design Competition has been opened. Candidate luminaire submissions are due by August 3 and winners will be announced at Strategies in Light in February.

Source: <http://ledsmagazine.com/news/9/6/14>

With Prevaled Core Z2, Osram offers its first Zhaga-certified LED light engine. It is ideally suited for spot- and downlight applications.

Source: <http://ledsmagazine.com/press/34861>

LEDs Events

The **LED Show** will be held from July 30 to August 1st 2012 in Convention Center in Las Vegas, Nevada, USA. The “LED Show” will propose conference and exhibition floors dedicated to hot topics of the LED industry. The organizers of the event want to provide attendees with a critical platform for networking and learning about the latest LED products and technology developments.

Source: <http://www.theledshow.com/index.html>

PLASA 2012 will be organised on the 9-12 September 2012 in London, United Kingdom. The event addresses itself to entertainment and installation technology professionals. It offers free to attend sessions, specialist conferences, product training, special interest seminars and in-depth case studies of audio, light and stage technology products.

Source: <http://www.plasashow.com/>

The 3rd edition of **Strategies in Light** will take place on the 18-20 September 2012 in M.O.C Event Centre in Munich, Germany. Attendees of the event will gain valuable insights into future directions and strategies of the European and broader worldwide LED markets. “Strategies in Light” will offer presentations and panel discussion sessions, trade show floor and a Networking Reception.

Source: <http://sileurope.com/index.html>

The **CIE Lecture on Photometry, Colorimetry, Metrology and Standards for SSL Lighting** will be held on 16 – 18 September 2012 in Hangzhou China. The lectures are intended to provide the most up-to-date knowledge in the field of CIE Colorimetry, Metrology and Applications for SSL and LED Lighting, and Standards Development for SSL and LED Lighting. The first session will cover the fundamentals of color science and recent developments in CIE Division 1 (Vision and Colour), whereas the other two will include metrology, applications, and standards for SSL and LED lighting.

Source:

<http://www.cie.co.at/index.php/Events/Future+CIE+Events>

The CIE 2012 conference **Lighting Quality & Energy Efficiency** is organised on 19-21 September 2012 in Hangzhou China. The three-day conference will highlight topics in: Right Lighting and Energy Efficiency, Lighting Systems and Energy Saving, Measurements and Photometry, Light and the Visual Perception of Quality, Photobiological Effects, with several talks emphasizing LED light sources and solutions.

Source: <http://hangzhou2012.cie.co.at>

The **2nd International LED professional Symposium + Expo (LpS 2012)** takes place on September 25-27 2012 in Bregenz Austria. The LpS (LED professional Symposium) is Europe's foremost LED lighting technology event for lighting experts in industry and research. The symposium covers LED/OLED lighting technologies for luminaries, lamps and modules focusing on new system approaches, new components and the most up to date design methodologies.

Source :<http://www.led-professional-symposium.com>

The **4th ForumLED Europe** will take place on 21st and 22nd November 2012 at the Grande Halle de la Villette in Paris. The Forum will propose a 2-day conference addressing all the topics related to the LED sector: from chips and connectors to lamps and lighting fixtures. What's more, the participants

can visit 2 exhibition areas and network during a cocktail dinner.

Source:

<http://www.forumled.com/led/archives/category/home>



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