

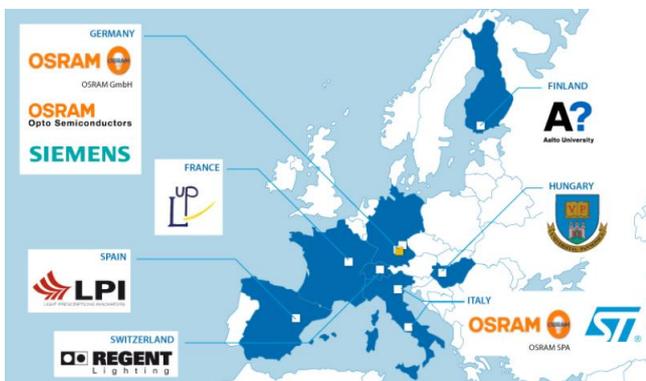
# Solid-State Lighting for Europe Newsletter #2 February 2012

## Introduction

Welcome to the second 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 within all work packages.

In **WP1** we now have the first double layer ceramic phosphor samples made via tape casting. We also have the first multi chip module with planar interconnect

technology to achieve 4000lm out of a light emitting surface with diameter 9.5mm.

In **WP2** we developed the first driver prototype with an efficiency of ~90%. A microcontroller based board, able to drive the incoming tuneable CCT light engine was developed and tested with preliminary theoretical data. The relevant AC/DC driver is also finished.



The ultrasonic cooler showed an equivalent cooling capacity of more than 5l/min compared to a conventional fan cooler. The first mixing optic prototype has been finished and showed an efficiency of 95%. Also the first PrevaLED-like light engine has been finished with the multi chip module from WP2 and the mixing optic. For the reliability investigations the experimental setup has nearly been finished. The programming of the simulation code has been completed and a comprehensive testing of the model was done.

In **WP3** the first luminaire with a variable CCT light engine from 2700K to 6000K was developed.

In **WP4** the booth experiments have been finished, test spectra for next steps determined. The rooms and luminaires for the full scale experiments are under construction.

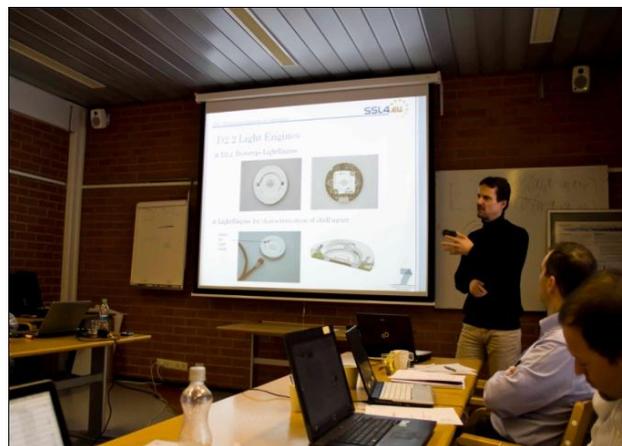
In **WP5** the internal training workshop has been held. Furthermore there was a student exchange from AALTO University to University of Pannonia and from both universities to Osram AG Regensburg.

## M18 Meeting and Workshop

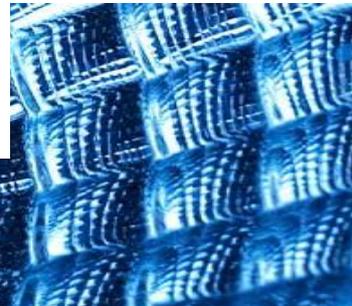
As you know from the previous SSL4EU Newsletter, the Project Partners gathered for a two-day meeting at Aalto University in Finland, 19<sup>th</sup>-20<sup>th</sup> January 2012.

The first day was an opportunity to organise a Workshop on “User Acceptance for LED Lighting– Preferences for Light Spectrum”. The Workshop gathered 25 Partners who shared and discussed the findings of the user acceptance studies of the project. The acceptance studies by Aalto University, University of Pannonia and Osram OS in small-scale experiments were presented.

The small-scale acceptance studies resulted in recommended light spectra to be used in the large-scale experiments starting in May. The full-scale environments will be office lighting at Aalto University, home lighting at University of Pannonia and shop lighting at Osram OS.



During the Workshop the small-scale experimental settings at Aalto were introduced at the laboratory site. This gave the partners opportunity to learn the construction of the triple lighting booths, the lighting control systems and the actual experimental conditions of the subjects participating in the study.



The day provided good forum for sharing the experimental findings, discussing them and making plans for the next steps to be taken in the project.

Aalto University is located in Espoo Finland, where plenty of snow had just fallen on the ground a few days before the Workshop. Thus the Workshop was spent in the middle of white snowy scenery.



Within the SSL4EU several PhD Thesis are being prepared, and the Workshop also provided nice opportunity for the PhD students to meet and share their research findings.



## Interviews

SSL4EU Newsletter #2 offers you the possibility of getting to know some of the Project Partners a little better... Thus, here are 3 interviews that will let you discover the day-to-day life of the people involved in achieving the SSL4EU goals.

### Interview with Elmar Baur, coordinator of the SSL4EU project, OSRAM AG, Germany



**Q1:** You are well-experienced in leading complex projects in R&D. Could you tell us how SSL4EU is different from the projects you managed before?

**A1:** The biggest difference to my other projects is the amount of different topics. In the SSL4EU project there are the technical topics like efficiency improvement but also topics like light quality and the question how this affects the human well being. This is a very different kind of thinking and leads to fruitful discussions between the different partners.

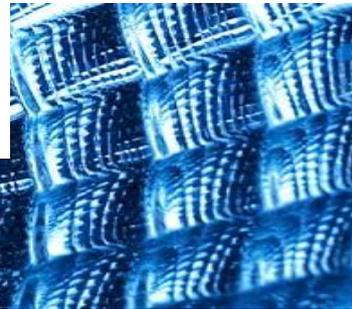
**Q2:** In your opinion, what are the most important differences between a private-driven project in R&D and a European (-funded) project?

**A2:** Concerning private-driven projects, they are in general market-driven product development projects and thus tend to avoid “risky” topics and their results are supposed to be immediately exploited and bring profit to the company. I would say that European-funded projects encourage the stakeholders of the sector to undertake projects with higher risk topics and therefore look ahead for a higher level of innovation which is crucial for future products

**Q3:** Do you think that SSL4EU contributes to the establishment of the European Research Area? If yes, how?

**A3:** In SSL4EU there are many topics, for example warm white ceramic phosphors or ultrasonic cooling, which are leading edge research topics. Furthermore, in SSL4EU we will make the first European full scale acceptance studies on lighting: office and living rooms with luminaires which are allowing an infinite number of different spectral distributions to be investigated.

**Q4:** Does SSL4EU improve the competitiveness of the European LED industry? If yes, how?



**A4:** Currently the lighting industry worldwide faces a paradigm shift towards solid state lighting (SSL). Many non European companies now try to enter the field. SSL4EU improves the competitiveness of the European LED and luminaire industry by enabling to collaborate with competent partners across the value chain and funding these highly important research topics for SSL that gives the European lighting industry a competitive edge.

**Q5:** Impact and dissemination are two important aspects of the FP7 projects. How do you communicate about SSL4EU with your colleagues, potential users? Which way of communicating is the most efficient in your opinion?

**A5:** The main effort of exploitation of SSL4EU results and dissemination is concentrated on the WP5. All SSL4EU partners are involved in this process that includes training workshops, and at a larger scale, publications, participation in conferences, seminars and trade fairs. In my opinion the best way for dissemination are the training workshops for luminaire makers and of course our contact to the customers in general which is extremely valuable. Particularly small luminaire makers may have no outstanding LED specialists.

**Q6:** What do you think about the academic-industrial partnership in R&D projects?

What do you think about the academic-industrial partnership in SSL4EU?

Could you give us some details about this cooperation?

**A6:** A well-balanced industrial-academic partnership is perfectly reflected in SSL4EU. On the one hand, we can find industrial partners, who are mainly interested in increasing performance and decreasing costs. On the other hand, we can find academic partners, who work on completely different aspects like new colour rendering indices. During the project we have seen that a product fulfilling the new color rendering requirements from the university partners will be much too expensive. Therefore end of last year PhD students from the university partners came to Osram to work out together weather special color

rendering requirements can be realized in a more simple way.

**Q7:** What message would you like to give to our readers?

**A7:** My message is that I am very happy about the possibilities within the SSL4EU project to work together with many excellent partners all over Europe to push a new era of lighting.

### Interview with Ruben Mohedano, Managing Director, LPI Europe, Spain



**Q1:** What is your role in the SSL4EU project?

**A1:** LPI is a partner, in charge of optical design, analysis and prototypes. Most LPI efforts are within work packages 2 (LED components and Light engine) and 3 (LED luminaries).

**Q2:** How do you participate in the day-to-day life of the project?

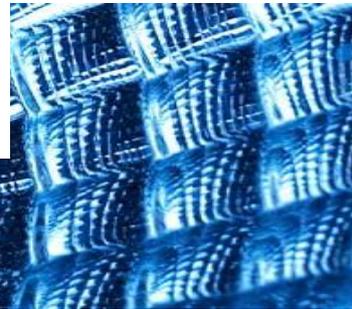
**A2:** We have constant contact with other partners, especially WP2 (OSRAM) and WP3 (Regent Lighting) leaders. All weeks some kind of information is transferred or shared with the partners, and this happens in a daily basis when a deliverable or a meeting is coming. LPI has also attended all WP2 and Project Review meetings (6 so far).

**Q3:** Is it your first participation in a FP7 project?

**A3:** Yes, this is the first time I participate in an FP7 project and my impressions are fairly good. LPI has been in other subsidized projects (FP5 program) of previous programs and expectations are therefore well grounded. The SSL4EU project is running smoothly, consortium is quite well balanced and Osram is leading the project very efficiently.

**Q4:** In your opinion, what are the most important differences between a private-driven project in R&D and a European (-funded) project?

**A4:** There is less room for disruptive solutions in private driven projects and therefore the technologies developed will hardly constitute a



noticeable step ahead. However, the private funding prevents the loss of resources in speculation activities, and might be better adapted to market and has lower risks to reach it: when a company decides to invest on some technology, it's because it's somewhat more mature or easier to bring into commercialisation.

**Q5:** Does SSL4EU improve the competitiveness of the European LED industry? If yes, how?

**A5:** Yes, it does. By the definition of a new type of light engine which does not consists only in "lumens", but on other enhanced quality standards the industry has forgotten. By letting companies get to know other companies within Europe able to offer an added value/key components, design methods, technologies that merge well with their own skills. The joint efforts and skills of various companies that met within the frame of the SSL4EU project will probably lead to cutting edge products in the future, not only those developed within the project, but others that are collateral.

**Q6:** What did you learn during the project? Did the project change the perception of your work at the day-to-day level? If yes, how?

**A6:** I learnt more about LED chips and package insights, beam aesthetics, definition of different quality standards (objective and subjective) to measure illumination, electronics drivers and heat sinking aspects... Now I have a clearer picture of both the type of constraints the optics should be paying attention to, both from the performance and from the feasibility standpoint.

**Q7:** Impact and dissemination are two important aspects of the FP7 projects. How do you communicate about SSL4EU with your colleagues, potential users?

**A7:** The ways I communicate rely on participation in congresses (presentations) and showing prototypes in events or work meetings. In my opinion, the most efficient way of communicating is the face to face demonstrations of working prototypes as well as oral presentations in congresses.

### Interview with Ferenc Szabo, PhD researcher at Pannonia University, Hungary



**Q1:** What is your role in the SSL4EU project? How do you participate in the day-to-day life of the project?

**A1:** Our laboratory is the leader of WP4 of the project entitled Acceptance Studies. As a researcher, I am very involved in planning of the experimental set-up, optimising LED spectra and evaluating visual results, compiling reports.

**Q2:** Is it the first time you participate in an FP7 project?

**A2:** Yes, this is the first FP7 project I participate in. I think that SSL4EU is a huge, challenging inter-disciplinary project. Thanks to that complexity, I can try myself out in many fields SSL4EU refers to.

**Q3:** What did you learn during the project (from a scientific and relational point of view)?

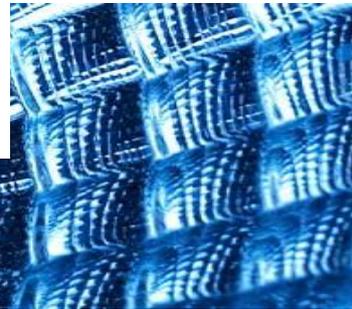
**A3:** During the project I deeply studied LED light sources and spectral optimisation of light source SPDs. What's more, I learned to work as a member of an international research team and how to co-operate with other partners from a distance. I also discovered the functioning of project administration software (EMDESK). Although, the most important experience is feeling of satisfaction and joy that you have when your team and the project succeed.

**Q4:** Did you improve and/ or acquire any knowledge that you did not have the opportunity to learn during your studies?

**A4:** I improved my knowledge mainly in the fields of light source SPD optimisation, LED photobiology and LED measurements.

**Q5:** How did the involvement of your University in the SSL4EU project help you in the preparation of your thesis?

**A5:** The preparation of my thesis was already closed during the time of SSL4EU. Nevertheless,



it is always interesting to participate in experiments that let me enhance my knowledge in the area.

**Q6:** What do you think about the academic-industrial partnership in R&D projects?

**A6:** According to my point of view, academic partners have the opportunity to know the actual practical problems of industrial partners. With the help of this kind of project, universities are able to shift theoretical knowledge to practice and improve their laboratory equipments. For the industry, the cooperation is useful because it proves that research practice is time-consuming but very important.

**Q7:** What do you think about the academic-industrial partnership in SSL4EU? Could you give us some details about this cooperation?

## LEDs News

In December 2011, the European Commission published a Green Paper on LED- and OLED-based lighting. The document presents main initiatives that should be taken in order to reinforce the development of SSL technologies and invites the interested parties to participate in a public consultation.

Source:

<http://www.ledsmagazine.com/features/9/2/2?cmpid=EnILEDsFebruary12012>

Access to the report:

[http://ec.europa.eu/information\\_society/digital-agenda/actions/sslconsultation/docs/com\\_2011\\_0889\\_ssl\\_green\\_paper\\_en.pdf](http://ec.europa.eu/information_society/digital-agenda/actions/sslconsultation/docs/com_2011_0889_ssl_green_paper_en.pdf)

Innovative chip from STMicroelectronics enables greater storage capacity and faster multimedia access on portable devices. ST's voltage-level translator is first to support the newest Secure Digital 3.0 standard.

Source:

[http://www.st.com/internet/com/press\\_release/p3265.jsp](http://www.st.com/internet/com/press_release/p3265.jsp)

**A7:** I think that there is an excellent co-operation between industrial and academic partners in the SSL4EU project. Industrial partners always provide the necessary inputs to researchers, whereas researchers try to answer the questions of industrial partners.

**Q8:** How are the training and exchange of PhD students going? Is it efficient?

**A8:** A PhD student from AALTO University visited the group at Pannonia University and joined our part of SSL4EU research. The same PhD student visited OSRAM OS in Regensburg.

**Q9:** Does the involvement in SSL4EU interest you in considering your career in the European R&D?

**A9:** I plan my future as a researcher, working on similar projects as SSL4EU.

A recent report of the US Department of Energy (DOE) states that the large utilization of LED lighting could reduce energy consumption if compared with conventional white-light sources.

Source:

<http://www.ledsmagazine.com/news/9/1/32?cmpid=EnILEDsFebruary12012>

Energy-efficient LED lights from OSRAM Opto Semiconductors replace old lighting in the supermarkets of the Jerónimo Martins Group.

Source:

[http://www.osramos.com/osram\\_os/EN/Press/Press\\_Releases/Solid\\_State\\_Lighting/2012/OSRAM\\_Arquiled\\_shop\\_lighting.html](http://www.osramos.com/osram_os/EN/Press/Press_Releases/Solid_State_Lighting/2012/OSRAM_Arquiled_shop_lighting.html)

Strategies Unlimited offers a wide range of LED lighting reports with 2011 reviews and 2012 forecasts. The review may be interesting at the time when the worldwide LED market, especially in the lighting sector, grows rapidly.

Source:

<http://www.strategies-u.com/leds-lighting.html>

## LEDs Events

The 4<sup>th</sup> Conference “Lighting” organized by public and private players of the sector will take place on the 21-23 February 2012 at the University of Technologies in Troyes, France. The event is intended for researchers, engineers, decision makers and manufacturers and will be an opportunity to discuss, get informed about the results of new studies, exchange views...

Source:

<http://www.eclairage3.com/>

From September 25<sup>th</sup> to 27<sup>th</sup>, 2012, key players from the fields of industry and research in LED/OLED lighting technologies will be meeting in Bregenz, Austria. The topics covered will be among others: the evolution of LED lighting systems, technologies for increased efficiencies of white LED systems, technologies for mixing LED light...

Source:

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

A 3-day LED Lighting Institute will be organised on the 1-3 May 2012 at the LRC in Troy, New York. LED Institute participants will learn about the latest advances, experiments, studies and applications in LED technology.

Source :

<http://www.lrc.rpi.edu/education/outreachEducation/inHouseInstitute.asp>

## Contact

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The ninth annual “euroLED” event will be held on the 13-14 June 2012 organized by Birmingham Science Park Aston. The reasons for participating are many: networking with the LED community, meeting the industry decision makers, attending a technical LED conference, increasing your exposure and more.

Source:

<http://euroled.org.uk/>



The 2012 CIE (Commission Internationale de l'Eclairage) “Lecture on Photometry, Colorimetry, Metrology and Standards for SSL and LED Lightings” will be held on the 15-18 September 2012 at Hangzhou, China. The session is intended to provide the most up to date knowledge in the field of colour and vision science and illuminating engineering, with special emphasis on metrology and applications for SSL lighting and standards development for SSL and LED lighting.

Source:

<http://hangzhou2012.cie.co.at/cie-lectures>