LED Lighting Technologies
International Winning Approaches

25-27 SEPTEMBER 2012 | BREGENZ | AUSTRIA

CONTACT: LUGER RESEARCH | Moosmahdstrasse 30 | 6850 Dornbirn | T +43 5572 39 44 89 | F +43 5572 39 44 89 90
info@lps2012.com | www.lps2012.com

Europe’s Foremost LED Lighting Technology Event
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Dear Ladies & Gentlemen!

About 20% of global electrical energy consumption is related to lighting. LED lighting can save up to 90% of energy compared to traditional light sources. Therefore, LEDs do have an important impact on the development of our global resources.

Lighting systems based on LEDs require aligned and harmonized subsystems such as electronics, optics or thermal management. Ongoing innovations in each of these fields drive development. This means that we can expect 50% of the installed lighting devices to be LED based by the end of this decade.

But how do we design these systems and what will the winning approaches be in the years to come?

The LED professional Symposium + Expo 2012 is designed to outline background information and suggest answers for your engineering problems. It also presents papers on the topics of LEDs, optics, electronics, reliability, materials, standards, measurement and applications.

OLED, Thermal-Management and LED Lamp Tech-Panel discussions will be set-up with the experts to deepen the attendee’s knowledge in these specific domains. In addition, the “Working Beyond Competition” workshop will explain strategies to circumvent existing patent-barriers.

But what about realization?

Partners, suppliers and networks are needed for getting into the market or strengthening market positions. For this to happen, we need to meet and work with the leaders in the LED lighting industry. Key global, leading service, component, module, manufacturing and distributor partners will all be present at the LpS 2012 EXPO.

LED professional Symposium + Expo, the LpS 2012, Europe’s foremost LED lighting technology event, presents winning technology approaches, and introduces you to the industry and research leaders who are important for building up your networking opportunities.

The symposium and exhibition are located at the renowned Opera House and James Bond film location in Bregenz, on Lake Constance.

At the end of September, this great holiday location is a meeting point for LED experts from all over the world. Welcome to the heart of Europe! Welcome to LpS 2012!

Siegfried Luger
Event Director - LpS 2012
LpS2012 is Europe’s foremost LED lighting technology event covering materials, equipment and applications for the design and manufacture of LED/OLED lighting devices. It is an ideal platform for research and industry experts to explore state-of-the-art technologies, meet the leading service and product providers and build-up international partnerships with people from various engineering areas.

Explore Winning Technologies - Meet the Leaders - Get Key Contacts

**SESSIONS**
- LED Technologies
- Light Conversion
- Optics Design
- Electronic Design
- Production & Materials
- Standardization
- Measurement
- Reliability
- Outdoor Applications

**WORKSHOP**
Competitive patent circumvention techniques using TRIZ with examples from LED lighting and other industries.

**TECH-PANELS**
- OLED Technologies
- Thermal Management
- LED Lamp Technologies

**EXPO**

**NETWORKING**
Get-Together Event on Lake Constance. Live Entertainment on September 26, 19:30 - 23:00.

Over 900 experts from all LED lighting technology fields anticipated.
Top class contributors will present 30 lectures covering highly relevant technologies.
More than 70 exhibitors expected from all over the world.
### LpS 2012 SCHEDULE

#### DAY 1 - TUE 25 SEPT

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<tr>
<th>Time</th>
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<td>08:30</td>
<td>WORKSHOP Registration</td>
</tr>
<tr>
<td>09:00</td>
<td>SESSION I: LED Technologies</td>
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<tr>
<td>09:30</td>
<td>SESSION II: Phosphor Technologies</td>
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<tr>
<td>10:00</td>
<td>SESSION III: Optics Design</td>
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<tr>
<td>11:15</td>
<td>SESSION VI: Materials &amp; Manufacturing</td>
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<td>12:00</td>
<td>SESSION VII: Thermal Management</td>
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<td>SESSION VIII: Outdoor Applications</td>
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<td>14:30</td>
<td>SYMPOSIUM Registration</td>
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<tr>
<td>15:00</td>
<td>OPENING &amp; KEY NOTES</td>
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<td>GET TOGETHER: Live Entertainment on Lake Constance</td>
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#### DAY 2 - WED 26 SEPT

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#### DAY 3 - THU 27 SEPT

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<td>TECH-PANEL: Thermal Management</td>
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<td></td>
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<td>15:00 - 15:15</td>
<td>OPENING Symposium Opening</td>
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<td>Siegfried Luger, EMBE / Luger Research, Austria</td>
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<tr>
<td>15:15 - 15:45</td>
<td>KEY NOTE I The Future of Solid State Lighting in Europe</td>
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<td>Michael Ziegler, Ph.D. / Member of Photonics Unit at the EU Commission’s General Directorate for Info. Society and Media, Belgium</td>
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<td>KEY NOTE II LED Lighting - From Revolution to Mainstream</td>
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<td></td>
<td>Dr. Hans Nikol / VP LED Technology Strategy, Philips Lighting, The Netherlands</td>
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<tr>
<td>16:15 - 16:45</td>
<td>KEY NOTE III Challenges and Opportunities of LED Technology in Lighting Projects</td>
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<td>Prof. Andreas Schulz, DI / Professor HAWK Hildesheim and CEO LichtKunstLicht AG, Germany</td>
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<td>EXPO OPENING</td>
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<td>Mag. Karlheinz Rüdisser</td>
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<td>Pars Mukish, M.Sc. / Market and Technology Analyst for LED and Compound Semiconductors at Yole Développement</td>
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<td>11:15 - 11:40</td>
<td>SESSION II Mechanisms of White Light Generation with Phosphors</td>
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<td></td>
<td>Lena Pilz, Dipl.-Ing. / Scientist for LED Technology at Tridonic Jennersdorf GmbH</td>
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<tr>
<td>11:40 - 12:05</td>
<td>SESSION II Thermal Issues of Phosphor Converted LEDs</td>
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<td></td>
<td>Prof. Johannes Nicolics, Ph.D. / Prof. Vienna Univ. of Tech. - Applied Electronics Materials at Inst. of Sensor and Actuator Systems</td>
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<tr>
<td>12:05 - 12:30</td>
<td>SESSION II New and Remote Phosphor Technologies for Future Solid-State Lighting Designs</td>
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<td>David Nauth, MBD / Director of Sales for Northern Europe and Benelux at Innolux Inc</td>
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<tr>
<td>12:30 - 13:55</td>
<td>LUNCH BREAK</td>
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<td>14:00 - 14:25</td>
<td>SESSION III Optical Design Challenges when Using Multi-Chip or Single-Bin LEDs</td>
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<td>Dr. Alexander Leis, Ing. Dipl.-Phys. / Optic Designer at Zett Optics GmbH, Braunschweig</td>
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<td>14:25 - 14:50</td>
<td>SESSION III Intelligent Reflector Technology for Glare Reduced LED Luminaires</td>
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<td>Dr. Hans Laschefski, Ing. / Consultant Business Development MRO – ALANOD GmbH &amp; Co. KG</td>
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<td>14:50 - 15:15</td>
<td>SESSION III Tolerancing Tailored Freeform Optics for Illumination Systems</td>
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<td></td>
<td>Angelika Hofmann, Ph.D. / Optical Design of Imaging and Illumination Optics, Freeform Optics Specialist, OEC AG</td>
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<td>15:15 - 16:15</td>
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<td>16:20 - 16:45</td>
<td>SESSION IV LED Driver Designs to Overcome the Costs vs. Performance Dilemma</td>
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<td>Harald Reichert, DI (FH) / Application Engineer at International Rectifier</td>
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<tr>
<td>16:45 - 17:10</td>
<td>SESSION IV Understanding the Challenges and Complexity of LED Dimming Technology</td>
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<td>Steve Roberts, M.Sc. / Technical Director for the RECOM group at Gmunden, Austria</td>
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<tr>
<td>17:10 - 17:35</td>
<td>SESSION IV Application of Color-Managed Ambient Light Sensor for LED Lighting Systems</td>
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<td>Sajal Ghoshali, M.Sc. / Director Sensor Driven Lighting, AMS-TADS &amp; Director Office of CTO for Akrros Silicon</td>
</tr>
<tr>
<td>17:35 - 18:00</td>
<td>SESSION IV Optimization of Absolute Accuracy for True Color Sensors in a Closed Control Loop</td>
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<td></td>
<td>Fredrik Haller, Dipl.-Ing. (FH) / Application Engineer for Color and Spectral Sensors at MAZeT GmbH</td>
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<tr>
<td>19:30 - 23:00</td>
<td>GET TOGETHER EVENT / Live Entertainment on Lake Constance</td>
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# DAY 2 / WED 26 SEPTEMBER

**Moderator:** Dr Ilka Mellert

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<td>TECH-PANEL</td>
<td>OLED Technologies</td>
<td>Jörg Amelung / LEDON OLED Lighting, Dr. Hans Nikol / Philips Lighting, Dr. Patrizia Melpignano / OR-EL.doo</td>
</tr>
<tr>
<td>14:00 - 15:15</td>
<td>TECH-PANEL</td>
<td>Thermal Management</td>
<td>Dr. Matteo Meneghini / University of Padua, Philippe Trommenschlager / Brytec, Michael Stoll / Bergquist</td>
</tr>
<tr>
<td>16:20 - 18:00</td>
<td>TECH-PANEL</td>
<td>LED Lamp Technologies</td>
<td>Dr. Christopher Kusch / Everlight, Thomas Zabel / e:lux, Stephane Rosa / Arrow, Franz Offer / Bartenbach</td>
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# DAY 3 / THU 27 SEPTEMBER

**OPEN 08:00**

**EXPO & SYMPOSIUM REGISTRATION**

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<tr>
<td>08:30 - 08:55</td>
<td>SESSION V</td>
<td>Glass - A Viable Alternative Optical Material for LED Applications</td>
<td>Harald Reisigl, Dipl.-Ing.(FH) Mag. / Director of Optical Glass Elements and System at Swareflex</td>
</tr>
<tr>
<td>08:55 - 09:20</td>
<td>SESSION V</td>
<td>Compression and Transfer Molding Solutions for HB LED Optics</td>
<td>Huub Claassen / Managing Director of TOWA Europe GmbH</td>
</tr>
<tr>
<td>09:20 - 09:45</td>
<td>SESSION V</td>
<td>Stamped Circuit Board Technology as a Solution for SSL Thermal Management</td>
<td>Andreas Steffen Klein, Dipl.-Ing. (FH) / Research &amp; Development Project Manager at Heraeus Materials Technology</td>
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<tr>
<td>09:45 - 10:25</td>
<td>COFFEE BREAK</td>
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<td>10:30 - 10:55</td>
<td>SESSION VI</td>
<td>Zhaga Compatible Light Engines - Requirements, Design &amp; Compliance</td>
<td>Dipl.-Phys. Guido Nattkemper / Director Product Management at BAG electronics</td>
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<tr>
<td>11:20 - 11:45</td>
<td>SESSION VI</td>
<td>Measurement of LED Light Sources in Respect to Photobiological Safety Standards</td>
<td>Peter Laepple / Manager Solutions at Instrument Systems Optische Messtechnik GmbH</td>
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<td>11:45 - 12:55</td>
<td>LUNCH BREAK</td>
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<td>13:00 - 13:25</td>
<td>SESSION VII</td>
<td>Fundamentals of LED System Design to Avoid Mistakes</td>
<td>Shawn P Keeney, B.Sc. / Applications Engineer at Cree, Inc. with focus on TEMPO Testing Services Program and Technical Support</td>
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<td>13:25 - 13:50</td>
<td>SESSION VII</td>
<td>Failure Analysis and Prevention for Improved LED-Lamp Lifetime</td>
<td>Reinhard Pusch, Dipl.-Ing. / CISO and Vice President RoodMicrotecGmbH</td>
</tr>
<tr>
<td>13:50 - 14:15</td>
<td>SESSION VII</td>
<td>Reliability Issues of LEDs and LED Based Luminaries for Outdoor Applications</td>
<td>Janick Ihringer, M.Sc. / Application Engineer of Osram OS in Regensburg, responsible for Outdoor Lighting and Reliability</td>
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<td>14:45 - 15:10</td>
<td>SESSION VIII</td>
<td>Influence of the Light Spectrum on Visual Perception in Street Lighting Applications</td>
<td>Andreas Uebberschaer, Dipl.-Ing. / Research Associate at the Technical University of Ilmenau, Department of Lighting Engineering</td>
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<tr>
<td>15:35 - 16:00</td>
<td>SESSION VIII</td>
<td>Analysis of Three Projects to Optimize the Design Process of Street Lights</td>
<td>Daria Cascliani, Dip. In.D.A.Co. / Collaborator at the Laboratorio Luce Politecnico di Milano</td>
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**Workshop**

### Operating Beyond Competition

**Competitive patent circumvention techniques using TRIZ with examples from LED lighting and other industries.**

This workshop will focus on competitive patent circumvention strategies using Function Analysis and TRIZ. The participants will learn how to obtain “freedom to operate” through function modeling of the patent claims and applying trimming techniques. The approach will also enable the attendees to strengthen their own patents and use trends of engineering system evolution for developing a “patent firewall” of dependent claims around their IP. The case studies and examples include cases from the LED industry.

**The workshop’s major learning points are:**

- Competitive patent circumvention through trimming
- Competitive patent circumvention through substitution
- Antidote Strategy
- Picket Fence Strategy (Trends of Engineering System Evolution)

**Sergei Ikovenko, Prof. Dr.**

Director and Chief Specialist, Innovation Leadership Programs
Massachusetts Institute of Technology (MIT), USA

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**Key Note I**

### The Future of Solid State Lighting in Europe

**An overview of EU initiatives launched under the Digital Agenda for Europe in the area of Solid State Lighting.**

On 15 December 2011 the European Commission as part of the Digital Agenda for Europe published the Green Paper “Lighting the Future”, which addresses challenges for the wider uptake of LED-based solid-state lighting (SSL) in Europe and launched a public consultation on the topic that closed on 1 March 2012.

The presentation will report on the results of the open consultation and provide an overview of EU initiatives relevant for the faster deployment of SSL in Europe and for fostering the leading position of the European lighting industry.

- The role of LED-based lighting for achieving the Europe 2020 energy efficiency goals
- Challenges for the wider uptake of SSL and results of the open consultation
- The role of the European lighting sector
- European support in the area of SSL: from research and innovation to regional policy

**Michael Ziegler, Ph. D.**

Member of the Photonics Unit at the European Commission's General Directorate for Information Society and Media, Belgium
**Key Note II**

**LED Lighting - From Revolution to Mainstream**

Summary of recent LED technology trends and strategies for future lighting system developments.

LED lighting, which began as a revolution for a well established century old lighting industry, has in just over 15 years, evolved to a mainstream technology penetrating virtually every lighting segment. The intrinsic optical, electrical, and dimensional properties of LEDs result in a manifold of advantages in those various applications: energy saving, better optical design and properties, miniaturization, electronic driving and control.

Even more interesting is the road ahead: intelligent light sources, embedded lighting, new form factors not possible before and many other features create excitement amongst luminaire manufacturers, specifiers, light designers and other key players in the lighting industry.

- Latest developments in LED Lamps
- New approaches to key building blocks for luminaires
- Developments in intelligent lighting
- Underlying cost structure for key LED building blocks

**Dr. Hans Nikol**

VP LED Technology Strategy, Philips Lighting, The Netherlands

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**Key Note III**

**LED Technology in Lighting Projects**

Demonstrating state-of-the-art technology for LED lighting designs using the example of a museum project.

For museum lighting, the principal objective is to create optimal conditions for viewing objects in an exhibition context. Novel artificial lighting technology using LED light sources lends itself to providing for a pleasant and informative visual experience whilst avoiding damage due to light exposure. Using the examples of the Städel Museum in Frankfurt and the Museum of the Bavarian Kings in Hohenschwangau, Andreas Schulz discusses lighting strategies, design approaches and explains the characteristics of implemented lighting technologies.

- State-of-the-art lighting technologies in the museum context
- Lighting for complex and remarkable museum architecture
- Daylight control, artificial lighting and conservational requirements
- Illustrating qualitative and quantitative features of lighting and energy concepts

**Prof. Andreas Schulz, DI**

Professor HAWK Hildesheim and CEO LichtKunstLicht AG, Member of the IALD Board of Directors, Germany
Session I  

**Disruptive LED Technologies**

Chair: Dr. Paul Hartmann, Joanneum Research

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**Chances and Challenges of the GaN-on-Si LED Technology**

Sapphire is presently the major substrate/platform with more than 95% of the market. Essentially all LED makers are currently working on evaluating Si based solutions due to their potential cost benefits. It will be shown which challenges, for instance, thermal expansion coefficient mismatch, light absorption at the typical emission wavelength of GaN LEDs, have to be overcome to finally become a serious option.

- Key-drivers & challenges
- Technology overview
- Cost potentials
- Associated business models

**Pars Mukish, M.Sc.**
Market and Technology Analyst for LED and Compound, Semiconductors at Yole Développement

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**GaN-on-Si Technology to Create Cost Breakthroughs**

New technologies focused on performance and high scale manufacturing capabilities will have to be developed to make future breakthroughs happen. GaN on Si is just such a breakthrough.

- Key-drivers & challenges
- Technology overview
- Cost potentials
- Associated business models

**Tom Van den Bussche, M.Eng.**
Director Marketing EMEA and Global Director of Segment Marketing at Bridgelux

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**AC-LED Technology - A Niche Product or the Future of LED Lighting**

Like most disruptively innovative concepts, AC LEDs have been treated with skepticism by much of the conventional technology fraternity. This presentation looks at the emerging AC LED market and identifies where the technology is likely to find a strong niche and why. The technical challenges to AC LED implementation will be discussed and some of the more promising solutions identified and qualified.

- Key-drivers & challenges
- Technology overview
- Cost potentials
- Associated business models

**Bob Kottritsch, M.Sc.**
Corporate Vice President of Lynk Labs Inc
**Advanced LED Technologies for General Lighting Applications**

LEDs have improved dramatically over the last few years but there are still limitations and hurdles to overcome. It will be shown how changes in the LED structure using alternative substrates and liquid phase epitaxy (LPE) processing can alter and improve LEDs. For instance, introduce a grid-load regulator in the chip-layers and improve thermal stability and efficacy.

- Influences on LED structures during the liquid phase epitaxy (LPE) processing
- In-chip-protection - a grid-load regulator in chip-layers
- Driverless 230VAC applications
- Improved thermal stability and efficacy for reduced heat-output of LEDs

Thomas Zabel  
Chief Executive Officer and Head of Technology at e:lumix AG

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**Mechanisms of White Light Generation with Phosphors**

The most important phosphor types for LED applications are the garnet, silicate and nitride types. Various mechanisms can affect the conversion efficiency of a phosphor and will be presented during the talk. Furthermore, fundamental physical limits of the conversion efficiency and the application of Quantum Dots in white light LED’s will also be discussed.

- The most important phosphor classes
- Light conversion efficiency - physical limits
- Various white light generation techniques
- Basics of Quantum Dots

Lena Pilz, Dipl.-Ing.  
Scientist for LED Technology at Tridonic Jennersdorf GmbH

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**Thermal Issues of Phosphor Converted LEDs**

The reliability and long-term stability of solid-state lighting devices strongly depend on appropriate thermal management. Thermal issues of the color conversion elements of phosphor converted LEDs will be shown in theory and praxis.

- Temperature distribution within color conversion elements
- Heat removal and the temperature distribution within the LED package
- Conversion element temperature induced color deviations
- Comparison of measurements and thermal simulations

Prof. Johannes Nicolics, Ph.D.  
Head of the Dept. of Applied Electronics Materials - Inst. of Sensor and Actuator Systems at Vienna Univ. of Tech.
New and Remote Phosphor Technologies
for Future Solid-State Lighting Designs

New phosphor materials have allowed LEDs in general lighting to match the light quality of traditional sources. The focus of the discussion will be how new phosphor and remote phosphor technologies are enabling luminaire manufacturers to break ground in developing new innovative designs to meet market demands.

• Remote phosphor systems to increase system performance up to 30%
• Phosphor blends to create CRI > 95
• Red phosphor with higher temperature stability

David Nauth, MBO
Director of Sales for Northern Europe and Benelux at Intematix Inc.

Session III
LED Optics Design
Chair: Prof. Dr. Paula Belloni, FH Furtwangen

Optical Design Challenges when Using Multi-Chip or Single-Bin LEDs
Combining different colored chips inside of one multi-chip array allows the production of single bin LEDs. Problems arising from the use of either single bin or multi-chip LEDs as well as possibilities to overcome some of these problems will be disclosed.

• Spectral filtering problems with single-bin LEDs
• Spatial color problems with multi-chip LEDs
• Spatial distribution problems with multi-chip LEDs
• Suggestions in using single-bin or multi chip LEDs

Dr. Alexander Leis, Ing. Dipl.-Phys.
Optic Designer at Zett Optics GmbH, Braunschweig

Intelligent Reflector Technology for Glare Reduced LED Luminaires
If LED-luminaires want to have long term success in office lighting they have to meet the established general quality criteria for that kind of lighting, such as an optimised light distribution or glare control in relation to maximum efficiency. The presentation will deal with the demands of ergonomic office lighting and how to fulfill the demands with a linear LED-light-source.

• Demands of ergonomic office lighting
• Optimised light distribution in LED luminaires
• Glare control in relation to maximum efficiency
• Intelligent reflector technology

Dr. Hans Laschefski, Ing.
Consultant Business Development MIRO – ALANOD GmbH & Co. KG
Tolerancing Tailored Freeform Optics for Illumination Systems

Deviations of optical elements and assembly tolerances have great impact on the optical efficiency and light quality of LED luminaires. A Monte-Carlo tolerancing method based on realistic modelling that allows well balanced specifications for production to be defined will be shown.

- Monte-Carlo tolerancing for illumination systems
- Automated tolerancing of freeform optics
- Shape deviations from measurement of parts
- Flexible representation of shape and assembly deviations

Angelika Hofmann, Ph.D.
Optical Design of Imaging and Illumination Optics, Freeform Optics Specialist, OEC AG

LED Driver Designs to Overcome the Costs vs. Performance Dilemma

LED converter circuit types for the LED general lighting market are always a tradeoff between cost and performance. Performance requirements will be outlined and then several different circuit approaches will be talked about. It will be discussed where PFC is necessary and how to integrate this adding the least cost.

- Overview of LED driver topologies
- TRIAC dimmer compatibility
- Cost, performance and efficiency tradeoffs
- Future trends of LED driver designs

Harald Reichert, DI (FH)
Application Engineer at International Rectifier

Understanding the Challenges and Complexity of LED Dimming Technology

TRIAC dimming offers new challenges and the dimming range is an often misunderstood concept that is dependent on many factors. Why dimming causes difficulties will be explained and some practical advice on choosing the optimum driver / dimmer combination will be given.

- Fundamentals of LED dimming: Current vs. PWM
- Introduction to Phase-Angle Dimming (TRIAC dimming)
- Dimming Range and Human Perception
- Dimmer/Driver Compatibility

Steve Roberts, M.Sc.
Technical Director for the RECOM group at Gmunden, Austria
Application of Color-Managed Ambient Light Sensor for LED Lighting Systems

LED replacement lighting will provide about 50% reduction in energy consumption. These environments can benefit from an additional 30% or more in energy reduction simply by exploiting basic daylight harvesting. Available approaches and benefits of fully integrated intelligent color-managed ambient light sensor and driver technology for this task will be discussed.

- Energy spectrums of different light sources
- Determination of the actual amount of available ambient light
- Optimized daylight harvesting
- Color-managed ambient light sensor and driver technology

Sajol Ghoshal, M.Sc.
Director Sensor Driven Lighting, AMS-TAOS & Director Office of CTO for Akros Silicon

Optimization of Absolute Accuracy for True Color Sensors in a Closed Control Loop

It is well known that LEDs have a drift of peak wavelength and intensity. This leads to various shifts of chromaticity coordinates and intensity depending on the LED type, which could be measured and controlled by the true color sensors. This presentation illustrates an optimized calibration method, with which those lamps are measured with an accuracy even better than the human eye.

- Optimized calibration for true color sensors
- High-accurate LED measurements
- Constant luminous color over life-time
- Basis for high CRI closed control loop

Fredrik Hailer, Dipl.-Ing. (FH)
Application Engineer for Color and Spectral Sensors at MAZeT GmbH

Session V

LED Production Technologies & Materials

Chair: Dr. Günther Sejkora, Kompetenzzentrum Licht

Glass - A Viable Alternative Optical Material for LED Applications

LEDs are rapidly improving regarding reliability, lifetime and lumen output. Therefore lighting systems that keep up with the requirements of today’s high power LEDs are required. Latest insights on how to reach an optimum level of efficiency and the role of glass in optical designs for glare-free lighting solutions will be given.

- How to reach an optimum level of efficiency in LED lighting solutions applying glass optics
- The role of optical designs in combination with today’s high power LEDs
- Significance and realization of glare-free lighting solutions
- Advantages of glass and surface finishing options for the application with LEDs

Harald Reisigl, Dipl.-Ing.(FH) Mag.
Director of Optical Glass Elements and System at Swareflex
Compression and Transfer Molding Solutions for HB LED Optics

Driven by the substantial changes on high density IC packages and the decreasing chip size over the past 10 years, a new molding technology, Compression Molding, has been developed. The presentation will describe this process for HB-LED silicon lenses on substrates, for high reliability reflectors and the cutting process for singulation of the lenses on a substrate.

- Molding technologies for high density IC packages
- Transfer molding vs. compression molding
- Wide process window for significant cost reduction
- Challenges of the singulation process

Huub Claassen
Managing Director of TOWA Europe GmbH

Stamped Circuit Board Technology as a Solution for SSL Thermal Management

The Stamped Circuit Board (SCB) technology combines structured metal and polymer foils (Multilayer: Metal-Plastic-Metal layers also an option) for the assembly of substrates for LEDs. Based on thermal simulations and investigations the influence of different designs and materials will be explained.

- Alternative substrate technology
- Customized solutions
- New silver based surfaces
- “Reel to Reel” process

Andreas Steffen Klein, Dipl.-Ing. (FH)

Session VI LED System Standardization & Measurement

Guido Nattkemper, Dipl.-Phys.
Director Product Management LED at BAG electronics
LED Measurement to Obtain Polychromatic Raydata and their Value for Simulations

Many LEDs exhibit spectral distributions that vary depending on the viewing angle and depending on the location on the chip. The importance of a polychromatic rayset for proper simulation of sophisticated LED based luminaires and how to gain data for such a rayset using a near-field goniometer system will be demonstrated.

- Polychromatic raysets of LEDs
- Near-field goniometer systems
- Luminance camera systems combined with spectroradiometer
- Colorimetric modeling and simulation

Dr. Dirk Hansen, M.Sc.
Development of Goniometric Measurement Systems and Generation of Polychromatic Raydata

Measurement of LED Light Sources in Respect to Photobiological Safety Standards

LEDs used in lamps and lamp systems for general lighting purposes are typically not emitting radiation in the UV or the IR range of the spectrum. Therefore, only one of the photobiological hazards mentioned in the IEC62471 standard remains critical – the blue light retinal hazard. Measurement, critical limits and standards of photobiological safety for lamps in respect to LEDs will be discussed.

- Photobiological hazards for the human skin and eye
- Standardisation of photobiological safety for lamps and lamp systems
- Critical limits for the identified hazards
- Measurement of optical radiation in regards to determining potential threats
- Evaluation of the blue light retinal hazard of LEDs in general lighting systems

Peter Laepple
Manager Solutions Instrument Systems Optische Messtechnik GmbH

Session VII  LED System Reliability

Chair: Pars Mukish, M.Sc., Yole Développement

Fundamentals of LED System Design to Avoid Mistakes

Designing and building a successful LED product requires knowledge and skill in several technical aspects. The fundamentals of designing and building a robust and reliable LED system will be examined and some of the more common mistakes that engineers, designers and product developers should avoid will be discussed.

- SSL luminaire system design
- SSL reliability
- Thermal management
- Photometric performance of SSL products

Shawn P Keeney, B.Sc.
Applications Engineer at Cree, Inc. with focus on TEMPO Testing Services Program and Technical Support
**Failure Analysis and Prevention for Improved LED-Lamp Lifetime**

There are a lot of reasons LED lamps are not reaching the promised and expected lifetime. The presentation will show various general examples from the real world and in practice and will provide a relevant precaution strategy and give ideas for corrective action to improve the overall lifetime and reliability of the lighting system.

- Reasons for not reaching the expected lifetime
- Various general examples out of the practice
- Precaution strategy and corrective actions to improve lifetime and reliability
- Provide experience to users for faster and cheaper development of LED systems

Reinhard Pusch, Dipl.-Ing.
CSO and Vice President RoodMicrotec GmbH

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**Reliability Issues of LEDs and LED Based Luminaries for Outdoor Applications**

In outdoor applications, humid environments, sulphur contaminations or temperature cycles cause stress to LED lighting systems that may reduce lifetime. It will be discussed how to limit these risks using proper package design, suitable materials and material combinations.

- Outdoor reliability for LED based luminaries
- Humid environments
- Sulphur contaminations
- Temperature cycles

Janick Ihringer, M.Sc.
Application Engineer of Osram OS in Regensburg, responsible for Outdoor Lighting and Reliability

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**Influence of the Light Spectrum on Visual Perception in Street Lighting Applications**

The design of street lighting systems is primarily based on the average luminance level. Criteria like the color of light and color rendering are mentioned primarily due to aesthetic issues without respect to possible effects on object detection. Most recent results of an investigation on the spectral influence on human perception under street lighting conditions will be presented.

- Development and test of an intelligent-adaptive multi-chip LED based street lighting
- Spectral influence on visual tasks under street lighting conditions
- Effect of light spectrum on human perception under normal and poor visual conditions
- Effects on object detection

Andreas Ueberschaer, Dipl.-Ing.
Research Associate at the Technical University of Ilmenau, Department of Lighting Engineering
Design Process and Optics Selection for Roadway Lighting Applications

Roadway lighting applications are unique as the target illumination area is often offset from the light source. Optical needs should be defined at an early stage of design. It will be shown why that can decrease development time, minimize power consumption, reduce system cost and improve overall reliability.

- Roadway Lighting Presents Unique Design Challenges
- Requirements Extend Beyond Optical Considerations
- Asymmetric Optics Offer Design Flexibility
- Luminaire Performance Relates to Early Optics Selection

Bob Derringer
Director of Business Development, Development of Readily-Available Optics Engineering for Key Markets

Analysis of Three Projects to Optimize the Design Process of Street Lights

Nowadays, the design of lighting fixtures is completely changing. On-going technological innovations of LEDs’ components and performance, a wider amount of knowledge required, more stakeholders involved, describe a general situation of design complexity. OLA, BUTTERFLY, PLUS describe the experimental design approach applied for a new design strategy from the idea to the prototype testing and represent the fast evolution of LEDs.

- State of the Art of the on-going evolution of LED street lighting projects
- Practice-based design method to manage the complexity of LED lighting fixture projects
- Simulation and measurement techniques in order to check LED features, validate hypotheses and define alternatives
- Definition of a design strategy toward efficient, sustainable and performing lighting fixtures

Collaborator at the Laboratorio Luce Politecnico di Milano
OLED Technologies

OLEDs are the next challenge that luminaire manufacturers will be facing. In some aspects they can be treated similarly to LEDs but not in others. Luminaire and module manufacturers have certainly learned from the inorganic relatives of the OLEDs and OLED suppliers are working hard to optimize the technical and quality parameters. However, some questions may still be unanswered or unclear. The expert panel discusses and clarifies technical issues such as OLED types, color consistency and luminous homogeneity, reliability, temperature dependencies as well as how to drive OLEDs.

- Relevant OLED parameters and differences to LEDs
- OLED lifetime issues
- OLED applications and criteria
- Future trends

Attending experts: Jörg Amelung / LEDON OLED Lighting, Dr. Hans Nikol / Philips Lighting, Dr. Patrizia Melpignano / OR-EL.doo

Thermal Management

The efficacy of LEDs has improved a great deal over the years. However, in an LED lighting system 60-80% of electrical energy is still transformed into heat and has to be dissipated. Discussions are ongoing concerning which thermal management method should be applied. There are the questions of whether active or passive cooling is sufficient or necessary and if it leads to a relevant increase of system efficiency or not. Does it sacrifice or improve system reliability? Does it increase costs disproportionally? Can it improve light quality? The expert panel discusses and clarifies these and other technical issues.

- Pros & cons of active/passive thermal management approaches
- Cornerstones of thermal management design in applications
- Appropriate thermal management methods for given applications
- Thermal management trends due to new materials and components

Attending experts: Dr. Matteo Meneghini / University of Padua, Philippe Trommenschlager / Brytec, Michael Stoll / Bergquist

LED Lamp Technologies

LED replacement lamps have made a great deal of progress. The first 100W equivalent bulbs were announced recently and will be available on the market soon. Designing reliable replacement bulbs is still one of the most challenging tasks. Engineers have to deal with inappropriate form-factors, sockets, dimming devices or other electronics. One may ask if there are alternative solutions and what they might look like. On the other hand, we have to find solutions that will serve the billions of existing sockets and apply technologies that lead to reliable products immediately. The plenum discusses the different approaches and technical key issues for lamp designs.

- Technical boundaries of replacement applications
- AC or DC LED based designs
- New ideas and strategies for lamp designs

Attending experts: Dr. Christopher Keusch / Everlight, Thomas Zabel / e:lumix, Stephane Rosa / Arrow, Franz Offer / Bartenbach
Event Registration

Registration Office
For online registration please visit www.lps2012.com
For further help please contact:
Phone: +43 (0)5572 394 489
Fax: +43 (0)5572 394 489 90
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Event Packages

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<td>€ 990,-</td>
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<td>Incl. keynotes, tech-panels &amp; all sessions + workshop, EXPO-opening event, food, refreshments. Max. 60 tickets available.</td>
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<td><strong>3-DAY SYMPOSIUM + EXPO PASS</strong></td>
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<td><strong>1-DAY SYMPOSIUM + EXPO PASS - Sept 25, 26, or 27</strong></td>
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<td><strong>2-DAY EXPO VISITOR PASS - SEPT 26+27</strong></td>
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<tr>
<td><strong>GET-TOGETHER EVENT/DINNER</strong></td>
<td>€ 79,-</td>
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<td>Catering, Refreshments, Live Entertainment on Lake Constance for Attendees, Exhibitors, Press and Visitors.</td>
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All prices in EURO incl. 20% VAT
Bregenz / Austria

Bregenz is located on the shores of Lake Constance and it is one of Austria’s leading cultural and leisure areas. It is the capital city of the state of Vorarlberg and the seat of the provincial government with a population of 28,000. The area is known as a high tech region in the heart of Europe and is only a 2-3 hour drive from other technology hubs in northern Italy, France and Germany. Vorarlberg borders on Germany, Switzerland and the Principality of Liechtenstein. Bregenz can be reached directly by rail and the airports of Altenrhein, Friedrichshafen and Memmingen. The major airports of Munich, Zurich and Stuttgart are less than a two hour drive away.
Airport Transfer

Airport Drivers
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Accommodations

Lake Constance is well known for its high quality touristic environment. Bregenz offers numerous accommodations from comfortable guest houses and B&B's to luxury hotels. The region offers culinary highlights for every taste. First-class local and international cuisine is offered in award winning gourmet restaurants in Bregenz and the surrounding cities.

LpS 2012 - Partner Hotels

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Convention Partner Vorarlberg

Phone: +43 (0)5574 43 443 23 | Fax: +43 (0)5574 43 443 4 | E-Mail: service@convention.cc | Web: www.lps2012.com
Exhibitor List

www.elumix.de | PLATINUM SPONSOR | Werkstattbühne, Booth No. B9, B11, B13, C10, C12, C14

e:lmix Technologie AG is a leading and innovative manufacturer of LED-Chips and solid state lighting solutions. As a producer of LED semi-conductors as well as a vendor of replacement light items and innovative lamp bodies for general lighting technique, the company possesses the complete process chain beginning with chip production all the way to the final product. Based on the long experience of the team in the field of architecture lighting and production of semiconductors, as well as the vertical range of manufacture (own production of LED semiconductors (Chip-FAB), metal and plastic processing, own production of boards and electronic components), e:lmix is able to act demand-oriented as well as flexible on market needs and special requests of costumers.

www.osram-os.com | GOLD SPONSOR | Werkstattbühne, Booth No. N6, N7, N8

OSRAM is part of the Industry sector of Siemens and one of the two leading lighting manufacturers in the world. Its subsidiary, OSRAM Opto Semiconductors GmbH in Regensburg (Germany), offers its customers solutions based on semiconductor technology for lighting, sensor and visualization applications. OSRAM Opto Semiconductors has production sites in Regensburg (Germany) and Penang (Malaysia). Its headquarters for North America is in Sunnyvale (USA), and for Asia in Hong Kong. OSRAM Opto Semiconductors also has sales offices throughout the world.

www.benmayor.com | Werkstattbühne, Booth No. D10

Aismalibar- Gabriel Benmayor S.A. is the only European manufacturer of IMS Aluminium based laminates. Our product, IMS Cobritherm ® is a laminate with recognized reliability and high technical qualification. With metallic base substrate, IMS Cobritherm ® offers the best solution to dissipate heat, since it is an excellent insulator with high thermal conductivity, low thermal resistance and high dielectric capacity. IMS Cobritherm ® is made of an aluminium board, epoxy resin with ceramic mineral charge and a copper sheet. We are one of the first manufacturers of metallic substrate laminates in the world. The laminates in Aismalibar are base materials used in printed circuits for several applications such as: Lighting by LEDs, the automotive industry, electronic components, power circuits, power supplies, and electrical engineering. Among our range of products we have: Laminates CEM-1 and CEM-3 with RA thick copper over 200, 210 and 400 microns , FR4 and glass cloth bases (prepreg) impregnated with epoxy resins for multilayer applications, with the logos VR® and IGAV®.

www.alanod.com | Werkstattbühne, Booth No. C9

ALANOD GmbH & Co.KG is world leader in producing anodized and enhanced aluminium (MIrO®). For the distinctive LED market, ALANOD offers special reflector surfaces. The optical characteristics of these surfaces are particularly suitable for LED light sources. MIrO® surfaces, with a total reflection of 95% and MIrO-SILVER® with 98% total reflection, are ideal reflector materials for LEDs due to their constant reflection values across the visible wavelength spectrum. The excellent neutral colour reflection of all MIrO® and MIrO-SILVER® surfaces render these ideal for all types of LEDs irrespective of their colour, even white. The classic reflector as an effective optical element for lighting requirements is still indispensable for LED lighting.

www.al-systems.eu | Werkstattbühne, Booth No. D2

AL Systems, member of the Swarovski group, is developing innovative optical elements for use in illumination optics (LED). The focus is on taking advantage of the benefits of glass lenses. The development of LEDs and their increased use in lighting applications leads to new challenges on the selection of materials for lenses. Because of the special properties of glass, such as high and constant transmission during the life cycle of the luminaire, high mechanical, chemical, thermal cycle and UV-resistance, new applications for innovative lighting optical components can be developed.

www.ams.com | Werkstattbühne, Booth No. D14

ams develops and manufactures high performance analog semiconductors that solve its customers’ most challenging problems with innovative solutions. ams’ products are aimed at applications which require extreme precision, accuracy, dynamic range, sensitivity, and ultra-low power consumption. ams’ product range includes sensors, sensor interfaces, power management ICs and wireless ICs for customers in the consumer, industrial, medical, mobile communications and automotive markets. ams’ headquarters are in Graz, Austria. Key research and development facilities are based in Graz, in Plano, Texas (USA), a center of excellence in optical sensors, and in six other design centers worldwide. Employing around 1,200 people in over 20 countries, ams operates direct sales offices in all major regions of the world. It has a network of channel partners around the globe, including its worldwide distribution partners DigiKey, Future Electronics and Mouser. ams is the new name of austriamicrosystems, following the 2011 acquisition of optical sensor company TAOS Inc. ams is listed on the SIX Swiss stock exchange.
APLUX LED-Lighting BV is a company located in Eindhoven (The Netherlands) with joint-venture by key professional LED technologies providers in Taiwan and original OEM manufacturers in China. APLUX LED-Lighting can offer total LED Lighting solutions to European customers with key LED technologies from Taiwan and China. We can provide service from LED Lighting designing, R&D, testing and evaluation, OEM manufacturing. Also we can provide final products distribution service with our own warehouse and testing lab in The Netherlands. APLUX key LED solutions:
2. LED Lens: Omni Direction LED Lens – OmniStar™.
3. Zigbee: Smart LED Lighting control.
5. Full range of finished LED products for OEM manufacturing.
A global network of more than 310 locations in 51 countries and territories.

Arditi GmbH, a German-Italian joint venture, has been established in 2009 as a distributor for all products made by the Arditi S.p.A., Brembilla (BG) such as electro technical and opto-electronic components as well as customer solutions of Highpower and SMD LED products with focus on OEM of an kind of light industry. More than 50 years of experience in electrotechnics and 15 years of LED driver development and manufacturing give us strong and deep know how to stabilize the supply chain management of LED luminaries. Standard product range shown in catalogues and on our webpage in the field of LED technology enables us to be seen as one-stop-solution for any architectural light provider as well as shop lighting and exhibition lighting companies.

Arrow Electronics is a global provider of products, services and solutions to industrial and commercial users of electronic components and enterprise computing solutions, with 2009 sales of $14.7 billion. Headquartered in Melville, New York, Arrow serves as a supply channel partner for over 900 suppliers and 125,000 original equipment manufacturers, contract manufacturers and commercial customers through a global network of more than 310 locations in 51 countries and territories.

Asetronics AG is one of Europe’s leading companies in the development, production, installation and testing of opto-electronic sub-systems and optoelectronic products/systems. Asetronics own internal IMS production enables the generation of complex technologies (rigid, flexible, multilayer…) with the most appropriate heat management (material selection) in the shortest turn-around time. The component placement is carried out using state-of-the-art systems, either as encased components (access to the product ranges of the leading LED manufacturers) or bare die (access to the product ranges of the leading chip manufacturers) in COB technology. The installation in products/systems takes place in product-specific installation cells within which the customer-specific test is integrated. With Asetronics, you get the complete service package not only from one source but rather from one production. As customer you profit from short turn-around times, market-driven prices, the latest technologies and all that with only one point of contact.

AT&S is Europe’s market leader and one of the world’s strongest-performing printed circuit board manufacturers. AT&S is especially well positioned worldwide in the high-tech market segment for HDI microvia printed circuit boards, which are chiefly used in mobile devices. The company is also highly successful in the automotive, industrial, and medical sectors. AT&S supplies eight of the ten largest smartphone manufacturers in the world, more than 500 industrial customers and is key supplier to the automotive industry. As an international growth enterprise AT&S Group has approximately 7,500 employees and has a global presence, with production facilities in Austria, in India (Nanjangud), China (Shanghai) and Korea (Ansan).

BECK Elektronik is a worldwide acting company and with over 85 years of experience and tradition a leading distributor for the complete electronic industry. Besides active, passive and electromechanical components as well as displays, optoelectronics and batteries, BECK supplies a comprehensive range of everything you need for LED-lighting applications including power supplies, optics and units for mounting and thermal management.

Innovation, performance and customer satisfaction are Bergquist’s guiding principles. Today, Bergquist supplies the world with some of the best-known brands in the business: Sil-Pad thermally conductive interface materials, Gap Pad electrically insulating and non-insulating gap fillers, Hi-Flow phase change grease replacement materials, Bond-Ply thermally conductive adhesive tapes, and Thermal Clad insulated metal substrates.
Cree is leading the LED lighting revolution and making energy-wasting traditional lighting technologies obsolete through the use of energy-efficient, environmentally friendly LED lighting. Cree is a market-leading innovator of lighting-class LEDs, LED lighting, and semiconductor solutions for wireless and power applications. Cree’s product families include LED fixtures and bulbs, blue and green LED chips, high-brightness LEDs, lighting-class power LEDs, power-switching devices and radio-frequency/wireless devices. Cree solutions are driving improvements in applications such as general illumination, backlighting, electronic signs and signals, variable-speed motors, and wireless communications. To learn more about the LED Lighting Revolution, please visit www.creeledrevolution.com.

DK Thermal is a passive and active cooling specialist for LED lighting. Located in Austria and Switzerland, we offer performing product portfolio and support: Brady foil for LED thermal mounting systems, Meccal heatsink for passive cooling, Sunon fan and cooling module for active cooling and Thoptec fan mounting accessory. Centralize all you need for LED Heat Management to one source, only at Brytec.

Breyer was founded in 1949 by Anton Breyer. The company is located in Singen in the south of Germany, near the Lake of Constance. With 330 employees Breyer is developing and manufacturing innovative and high quality extrusion lines for the plastic-processing industry. The perfect combination of know-how, superior extrusion technology and the company’s passion for bright ideas have earned Breyer a worldwide reputation. With Breyer’s BrightLine extrusion line new standards are set for the production of light guide panels for LED lighting. Intelligent transparent surface structures are applied on the upper and lower panel side to assure optimum light distribution and high brightness using less LEDs. The benefit of the new panel is maximum light yield with a clearly reduced amount of energy. Breyer BrightLine light panels are a brilliant solution for better and more efficient lighting.
D-WAV Scientific Co., Ltd. was founded in 1999 as one of the LED lighting professional makers in Taiwan. The D-WAV engaged in the integration of LED lighting technology and the RGB LED color mixing technology, and provide to customers the full function LED lighting fixtures to fulfill the illumination for various needs as well as give them the appropriate mood lighting. Products: Touch panel controller, RGB controller, RGB LED controller, RGB LED driver, Strip light controller, RGB LED lamps, RGB LED Module, MR16, E27, PAR16, GU10, AR111, Outdoor lighting, Wall wash lighting, Under water lighting, Strip light etc.

EKL AG offers a wide range of thermal solutions for LED applications such as passive and active coolers, fans and accessories. Based in southern Germany EKL co-operates with leading lighting companies in central Europe in design, development and manufacturing of customer specific thermal management solutions. Thermal simulation and mechanical design made by EKL AG help the customers to best possible cool their LED applications. The production of the solutions will be done at EKL partner companies in Asia to meet the budget of the customer.

Emtron has been selling electronic components since 1981. In 1983, it started offering hybrid-built DC/DC converters, which laid the foundation for what Emtron is today: one of the leading providers of power supplies. The company's extensive range encompasses DIN rail power supplies, closed switched-mode power supplies, open-frame versions, power supplies for the medical industry, external connector and desktop units, and LED power supplies. The high efficiency and no-load input of these products enable them to meet the latest energy-saving requirements.

Everlight Electronics Co., Ltd. was founded in 1983 in Taipei, Taiwan. Playing a critical role in the formation of the global LED industry, the company is rapidly ascending to become a leading supplier due to its dedication to certification, R&D, production, quality, marketing and global customer service. Everlight provides a diverse product portfolio consisting of High Power LEDs, Lamps, SMD LEDs, LED Lighting Modules, Digital Displays, Optocouplers and Infrared Components for various applications. Today, Everlight is a global company with over 6,400 employees based in China, Hong Kong, Japan, Korea, Singapore, Malaysia, Germany, Sweden, U.S., and Canada.

excisciton is a company based in the center of Europe. Their dynamic “think tank” for the design and development of customized power supplies is located in Chemnitz, the “Silicone Valley” of power electronics in Germany. With regard to engineering implementation, prototyping, custom-made manufacturing and serial production, excisciton works very closely together with “inpotron Schaltnetzteile”, a medium-sized company in South-West Germany. With around 65 employees, inpotron manufactures highly efficient switch-mode power supply units, both custom-made and in serial production.

Fairchild’s expertise in power and signal path products helps customers differentiate their products and solve difficult technical challenges. The worldwide team of technical experts listen to, respond to and anticipate the needs of major manufacturers, offering customized silicon solutions and employing business policies designed to help them maintain a competitive advantage. Delivering energy-efficient, easy-to-use semiconductor solutions for power and mobile designs! Fairchild’s high performance semiconductors optimize energy and enable mobile connectivity in applications such as power supplies, portable, lighting, motor, computing, consumer and automotive.

Fela Leiterplatten GmbH has made the transition from a supplier of double sided printed circuit boards and multi-layers to a System Supplier. As the specialists for metal core circuit boards (IMS) and the European market leader in this field, Fela has special techniques at their disposal which can, for example, make it possible to produce three dimensionally shaped LED assemblies with optimal thermal features at a reasonable price. Fela's FELAM® brand is manufactured with highly flexible products and is customized to the requirements of the end product, aligned with the superstructure and materials. Fela is a member of the Osram Partner Program – “LED Light for you”.

www.ekl-ag.de | Werkstattbühne, Booth No. B10
www.emtron.de | Werkstattbühne, Booth No. D3
www.everlight.com | Werkstattbühne, Booth No. B1
www.excisciton.com | Werkstattbühne, Booth No. A21
www.fairchildsemi.com | Werkstattbühne, Booth No. C11
www.fela.de | Werkstattbühne, Booth No. A8
Heraeus, the precious metals and technology group headquartered in Hanau, Germany, is a global, private company with over 155 years of tradition. Our businesses include precious metals, materials and technologies, sensors, biomaterials and medical products as well as dental products, quartz glass, and specialty light sources. With product revenues of €2.6 billion and precious metal trading revenues of €13.6 billion, as well as more than 12,300 employees in over 110 subsidiaries worldwide, Heraeus holds a leading position in its global markets.

The Hungarian government established the Hungarian Investment and Trade Agency (HITA) on 1 Jan 2011 with the aim, in addition to encouraging foreign companies to invest in Hungary and facilitating bilateral trade, of supporting the foreign trade activity of Hungarian small and medium-sized enterprises. HITA is an organisation working under the direction of the Minister for National Economy and operates independently with its own financial management. In defining its aims and activity, it engages in extensive domestic and international cooperation, primarily with the involvement of ministries, professional associations and chambers. It takes part in the preparation of the background materials and analyses necessary to shape medium and long-term foreign economic strategy. It develops the modules of company, supplier, industrial park and other databases, and maintains the database aimed at developing business and promoting investment. HITA has a headcount of 155, and its budget for the year 2011 is HuF 3.6 bil., a significant proportion of which goes to fund the fulfilment of professional duties. HITA is headed by the President, whose work is aided by the Vice President General and six directorates.

GLYN GmbH & Co. KG is an independent European High-Tech-Distributor, established in 1980. The head office is located in Idstein / Germany. Specialisation and focussing has guided GLYN to a profitable and organic growth through all the years. The LED –Lighting Line was launched in May 2008. GLYN is focussing on the successful LED portfolios of SAMSUNG, TOSHIBA, RENESAS, HARVATEK and OT-Brightek. Providing an excellent 1st and 2nd source service GLYN offers LEDs tight-fit for everyone’s budget.

For more than 30 years Just Normalicht GmbH Germany has been the world’s leading supplier of the standardized light solutions for printing industry. Since 2009 under the brand of GL Optic - JUST is developing and distributing a product family of precise spectral Light Measuring Devices.

www.glyn.de | Werkstattbühne, Booth No. B5

www.gloptic.com | Werkstattbühne, Booth No. C5

Haeusermann GmbH specializes in the production of small and medium-sized batches of printed circuit boards (PCBs) with special reliability requirements. Besides proven technologies like through-hole plated, multilayer, HDI, and rigid-flexible PCBs, Haeusermann produces membrane keyboards and innovative PCB technologies like “HSMtec”, which offer powerful solutions for a wide range of diverse LED applications. HSMtec enables sophisticated thermal management within standard copper and FR4 based boards and allows to create self-supporting multidimensional boards with maximum optical flexibility.

www.haeusermann.at | Werkstattbühne, Booth No. B17

Heraeus, Packaging Technology GmbH & Co. KG is a global player in the field of packaging technology, with over 110 years of tradition. Our businesses include packaging materials and technologies, sensors, biomaterials and medical products as well as dental products, quartz glass, and specialty light sources. With product revenues of €2.6 billion and precious metal trading revenues of €13.6 billion, as well as more than 12,300 employees in over 110 subsidiaries worldwide, Heraeus holds a leading position in its global markets.

HITa.hu | Werkstattbühne, Booth No. A11

Gigahertz-Optik GmbH, founded in 1986, is a world class manufacturer of innovative UV-VIS-NIR light measurement instrumentation for industrial, medical and research applications. Our calibration laboratory for light measurement quantities provides the most extensive range of light measurement calibrations available from industry. Our ISO/IEC/EN 17025 accredited calibration laboratory for light measurement quantities (Registration number D-K-15047-01-00 DAkkS for spectral responsivity and spectral irradiance) offers the highest possible level in calibration and its traceability from industry. Our U.S. subsidiary Gigahertz-Optik, Inc., incorporated in 2001, along with a worldwide network of representatives serve our international customer base.

www.gigahertz-optik.com | Werkstattbühne, Booth No. D15

www.gloptic.com | Werkstattbühne, Booth No. C5

Inpotron Schaltnetzteile is specialized in developing and manufacturing of full customized switch mode power supplies and complete power solutions (AC/DC, DC/DC, constant current, UPS, charging devices) for industrial, medical and LED-lighting applications, as PCB-solution, open frame or also as complete mounted / integrated units. If desired we arrange all needed approvals as TÜv, VDE, UL and CSA for your product. We are solution- and system supplier and provide complete power-solutions from consulting, development and construction to purchasing, production and logistics service. Our focus is in the range from 1W to 1KW and quantities of >1,000 pcs/year.

www.inpotron.com | Werkstattbühne, Booth No. A19

Instrument Systems develops and produces high-performance optical test & measuring systems for applications in the automobile industry, avionics, and the light engineering sector. These systems are also deployed by LED manufacturers and research laboratories. Instrument Systems supplies a broad product range for all applications in light measurement including spectroradio-meters, imaging photometers and colorimeters, and accessories like optical probes and integrating spheres.

www.instrumentsystems.com | Werkstattbühne, Booth No. A13

www.heraeus-packaging-technology.com | Werkstattbühne, Booth No. C2

www.hita.hu | Werkstattbühne, Booth No. A11

www.inpotron.com | Werkstattbühne, Booth No. A19

www.instrumentssystems.com | Werkstattbühne, Booth No. A13

www.heraeus-packaging-technology.com | Werkstattbühne, Booth No. C2
JOANNEUM RESEARCH actively cooperates with the business sector to generate new innovations. The Light and Optical Technologies research group at the MATERIALS Institute aims to use light as a tool in novel technologies for energy-efficient lighting, light transmission and colour conversion and to translate these technologies into industrial production. Optical simulations are primarily carried out using ray-tracing or finite-difference time-domain (FDTD) methods. Additional services include rapid prototyping and assistance in the large-area cost-effective fabrication of (micro-)optical structures and components for light coupling, light transmission and light control, for example for white LED components or lamps. A roll-to-roll facility is available at the Institute for large-area production. The institute can also draw on state-of-the art equipment (transmission, reflection and luminescence spectroscopy, optical microscopy, ellipsometry, goniometry, Ulbricht spheres, SEM, AFM, XPS) for analytical services ranging from materials characterisation through to the characterisation of optical effects at both micro and macro levels.

Since our start in 1985, Khatod has been specifying and developing the entire product process 100% in-house, Milano, Italy: a full optical service - from Project to Object - encompassing optical and mechanical designs; optical simulations and experimentations; injection moulding process including mould fabrication; test and inspection. Khatod has recently doubled its facility including a new 150 sqm dark room provided with high-tech photogoniometer and innovative Vacuum Coating Treatment Plant customized for specific optical treatments. Pioneer in optical solutions for LED Lighting with great ability and expertise in custom products; Developer of exclusive ready-to-use optical modular systems for Wide Area Lighting (Street / Outdoor / Indoor), Creator of most innovative Reflector Systems with special coating for HB LEDs and COB LEDs; Front-Runner in silicone lens technology with its state-of-the-art Ultra Clear Silicone Optic for HB and COB LEDs; Khatod is able to meet and address the most demanding requirements in LED Lighting. Evolution, Innovation, High Technology, Continuous Research are Khatod key words: the best guarantee for Optical Specifiers as well as End Users in LED Lighting.

Kompetenzzentrum Licht, located in Dornbirn, Austria, performs research projects in the field of light and lighting as a link between industry and scientific partners. The research projects deal with lighting technology (with focus on LED), with lighting applications and with lighting effects on human. We work together with company partners - from the supplier to the user of light - and with scientific partners - universities and research labs.

Kunze Folien is a leading supplier of customized heat management solutions and an important business partner for customers all over the world. The cornerstone of our success lies in the long-standing competence and commitment of our international staff. Individual responsibility in an open-minded, teamwork-oriented company culture is our maxim: it is the pre-condition for technical knowledge, management competence, know-how and innovation to effectively contribute to maximum customer benefit.

LM Electronic is a company specialized in printing of standard electronic devices and flexible boards. The company was founded in 1988. Since then the increasing complexity of electronic devices was a major challenge for the continuous development of the company. LM Electronic offers technical service and support to their clients for planning and design of boards, for procurement of components and for SMD-assembling including testing and controlling of equipped boards. The complete assembling of units is offered also as well as forwarding to customers. LM Electronic offers innovative manufacturing technologies for your innovative products.

LUXeXcel Group, Inventor of Printoptical Technology, develops, manufactures and markets optical solutions for the global LED lighting industry, by a novel and patented digital printing, optical and lighting technology, a fundamental innovation in the Additive Manufacturing of optics. The company is at the forefront of research and development of environmentally friendly, easier and less costly solutions and act as a game changer for traditional optical products and production methods. The optical devices are engineered to enhance light and light distribution, to improve and ease the performance, design and manufacturing of LED lighting optics, and to create new product, marketing, and media possibilities. Focus is on the design, short term prototyping and manufacturing of LED lighting optics. LUXeXcel leads the “digitization of optics”, and offers OEM lighting manufacturers and Optics Specialists significant cost reductions and time savings through adopting their one step “CAD-to-Optic” process. LUXeXcel, headquartered in Goes, the Netherlands, was founded in 2009 and offers manufacturing as a service.
MAZeT GmbH is an electronics design & manufacturing services provider, which is specialized in the market segment of medical electronics, automation technology and industrial electronics with customized, embedded computing solutions and mixed signal ASIC/FPGA design services. MAZeT provides its own products and solutions for applications of spectral and color sensor technology. MAZeT is certified according to ISO 9001:2008. MAZeT GmbH was founded in 1992. The company headquarters are in Jena. MAZeT employed 80 people in 2011, of whom approx. 70% are engineers. The history of MAZeT GmbH is characterized by continual company growth.

MELECS, a MBO from Siemens and specialist for electronics, mechanics and switchgears, has been a reliable production partner to the industry for more than 25 years. MELECS relies on innovative, customized solutions and has great experience in automotive high bright LED applications. FLOTHERM for thermal Simulation enables innovative and cost effective design. MELECS provides working samples with complete cooling equipment within 1 month.

MAZeT GmbH is an electronics design & manufacturing services provider, which is specialized in the market segment of medical electronics, automation technology and industrial electronics with customized, embedded computing solutions and mixed signal ASIC/FPGA design services. MAZeT provides its own products and solutions for applications of spectral and color sensor technology. MAZeT is certified according to ISO 9001:2008. MAZeT GmbH was founded in 1992. The company headquarters are in Jena. MAZeT employed 80 people in 2011, of whom approx. 70% are engineers. The history of MAZeT GmbH is characterized by continual company growth.

The Mechanical Analysis Division of Mentor Graphics provides 1d thermo/fluid & 3d MultiCAD- embedded general purpose CFD simulation software, electronics thermal testing hardware and consultancy services that help our customers in a wide range of industries worldwide to eliminate mistakes, reduce costs and accelerate their engineering design and maintenance processes. Engineers are able to use our solutions to optimize designs involving heat transfer and fluid flow before physical prototypes are built, as well as thermally characterize electronic components and systems.

Since 1982 MSC Vertriebs GmbH is one of the leading high-tech distributors of electronic components in Europe. As well as its core distribution business MSC is also able to offer customer specific design as well as production in one of four European production centers. In addition a very close relationship to the major semiconductor manufacturers results in the best support for the newest technologies. Especially the implementation of innovative LED based lighting systems for customized applications requires comprehensive know how in order to choose the ideal solution from all available products – from single components to complex modules. Technical expertise with high power LEDs, secondary optics and driver electronics as well as sophisticated heat management are especially called from here. Competent solution provider MSC handles valuable consulting work and design complete, customer-specific lighting solutions based on its cooperation with leading manufacturers.

Neumuellern GmbH was established in Munich in 1952. Today it conducts business in all German speaking countries in the areas of sales and development of electronic high-tech products that are focused on opto-electronics. Together with Seoul Semiconductor who is one of the leading LED suppliers, worldwide, and who holds about 6,000 LED technology patents, both companies form a unique LED competence partnership. As a result of their first class engineering and top support, together they deliver innovative and commercial LED system developments.

OEC AG is a leading service provider for optical design. We focus on illumination optics, using our unique experience and mathematical tools. We incorporate the most recent findings into our work and therefore are able to offer innovative solutions. Furthermore, we support our customers in their product development. We have developed a proprietary optical design software-solution RTOP® for tailoring free form optics. This new tool is now available. In addition to the illumination optics we are also knowledgeable in classical optics. We complete our services by distributing the most professional software packages for optical design, Synopsys’ LightTools® and Code V®.

Opsira engineers with their years of experience in the development of optical systems and optical measurement services ensure Opsira being a competent partner for your optical innovations. Opsira develops and optimizes your optical systems by means of the most efficient and state-of-the-art simulation and measuring techniques. Our target is your successful product on the market.
PINBLOC is a leading supplier of heat sinks for LED applications. PINBLOC offers a broad portfolio of standard heat sinks for LED applications. PINBLOC is an easy access to a superior cooling technology. We support our customers in the thermal solution. PINBLOC heat sinks are pin fin heat sinks out of pure aluminium. The high thermal conductivity and the high cooling surface offer a superior thermal performance in situations of natural convection and circumstances of an omnidirectional air flow. We supply to customers from the automotive to the design industry with samples, standard parts or customized solutions.

RECOM Electronic designs and manufactures high quality AC input LED ballasts and DC input LED drivers in both buck & boost topology. The products are designed for a long operational life and come with a 3 or 5 year warranty. As a pioneer in DC/DC converters, switching regulators and AC/DC modules, RECOM serves a wide variety of applications in markets like lighting, automation, energy, medical electronics, aviation, transportation and virtually every industry requiring low-to-medium power DC voltage conversion in the 0.25 to 100 watt range.

With 40 years’ experience as an independent value-added microelectronics and optoelectronics service provider, RoodMicrotec offers a one-stop shopping proposition to fabless companies, OEMs and other business partners. RoodMicrotec has built up a strong position in Europe with its powerful solutions. Its services comply with the highest industrial and quality requirements as demanded by the high-reliability/aerospace, automotive, telecommunications, medical, IT and electronics sectors. Certified by RoodMicrotec concerns certification of products inter alia to the stringent ISO/TS16949 standard for suppliers to the automotive industry. The company has an accredited laboratory for testing and calibration activities in accordance with the ISO/IEC 17025 standard. The value-added services include failure & technology analysis, qualification & monitoring burn-in, test- & product engineering, production test (including device programming and end-of-line service), ESD/ESDFOSS assessment & training, quality & reliability consulting, supply chain management and total manufacturing solutions with partners. RoodMicrotec has facilities in Germany (Dresden, Nördlingen, Stuttgart) and in the Netherlands (Zwolle).

SILICA, a division of Avnet Electronics Marketing EMEA, provides a comprehensive range of products from 25 semiconductor manufacturers along with design support and the full set of logistical and value added services to industrial and commercial customers throughout Europe. SILICA has built a strong reputation within the distribution industry by continually adding value within the supply chain to improve both their customers and suppliers results. Today, SILICA is the third largest semiconductor distributor in Europe, employs more than 580 people and operates in 41 branch offices.

With the new product family SoLed XP, the Austrian company SoLed presents a highly efficient Solar LED street light with an increased security standard. Through its one-of-a-kind control module and a perfectly balanced overall concept, the solar-powered street light SoLed XP ensures a high luminous output over a long period of time. This is due to the intelligent energy supply system. SoLed XP can be operated stand-alone, as a hybrid model or as a power station. The stand-alone model operates autonomously and is especially recommendable for sunny areas. The hybrid model can be used in less sunny areas. In case of a long-lasting bad-weather periods, its battery is recharged by the public electricity grid. The Power Station model offers the possibility to feed power into the public grid, thus supplying it with extra power capacity during peak demand times. All three systems guarantee a high level of luminous efficiency, starting from 2200 Lumens up to approx. 9000 Lumens, with symmetrical and asymmetrical optics.

TDK Corporation is a leading electronic components company and markets the product brands TDK and EPCOS. The portfolio of TDK’s passive components business includes ceramic, aluminium electrolytic and film capacitors, ferrites and inductors, magnets, high-frequency components such as surface acoustic wave (SAW) filter products and modules, piezo and protection components, and sensors. TDK focuses on demanding markets in the areas of information and communication technology and consumer, automotive and industrial electronics.

Telcona AG is active European wide as a distributor of Electronic Components since 25 Years. Specialized in Optoelectronics, especially Power LED, they represent the Lustrous, Edison and Huey Jann brands. Together with these leading Taiwanese manufacturers, Telcona can provide a complete technical and commercial support for the user of Power LED. Telcona's head office is located in Oberglatt Switzerland and the branch office is in Sinsheim Germany.
Headquartered in Taiwan, Unibrite Technology is the leading LED Light Guide Bar (LGB) provider. We focus on delivering full services of design, product development and production manufacturing to our customers. We have filed patents of this LED light beam transferring technology around the globe for more than 20 regions. Unibrite helps customers to develop lighting products from conceptual design, engineering development, prototype units fabrications/reviews and product readiness for production release. We interact with customers closely to ensure all requirements are met and the product is marketable. Our design and manufacturing teams are located in Asia area. This strategic presence enable us to provide design and manufacturing solutions with low costs and timely to market.

Vossloh-Schwabe Optoelectronic GmbH & Co. KG has been established in 1979 as a distributor for opto-electronic components. Today, the company is part of the Panasonic Electric Works Vossloh-Schwabe Group. As a supplier of an extensive standard product range in the field of LED technology (LED, SMD, COB) VS Optoelectronic is understood primarily as a service provider in the field of LED lighting technology. In addition, we offer support in search for individual solutions for LED application, optimized for each of your requests. To complete the offer, the entire product range and expertise of the group is used to thereby meet the following performance expectation: „everything from one source“.

The cooperation with renowned partners, the technological head-start in the sector of the COB-production and the strong customer focus guarantee innovative products.

Beginning in 1998 with Yole Développement, the organization has grown to become a group of companies providing market research, technology analysis, strategy consulting, media in addition to finance services. With a solid focus on emerging applications using silicon and/or micro manufacturing Yole Développement group has expanded to include more than 40 associates worldwide covering MEMS and microfluidics, Advanced Packaging, Compound Semiconductors, Power Electronics, LED, and Photovoltaic. The group supports companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to develop their business.

ILLUMINATING THE FUTURE. Whether indoor or outdoor, Zenaro offers lighting solutions for every need using the best LED technology available. Their products are contemporary and expertly crafted by Zenaro and its partners. Zenaro works together to consider regional needs and support the global community in order to provide the most efficient solutions that will amaze. Zenaro – today’s technology for the future life.

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