



LEDs 2004

Light Emitting Diodes

The Fifth Annual Strategic Summit for LEDs in Illumination

Conference Highlights:

Conference Co-Chairs:



KATHRYN M. CONWAY
Principal
LED Consulting



KLAUS STREUBEL
Manager R&D
Osram Opto Semiconductors

Strategic Insight from over 30 Industry Leaders Including:

- | | |
|-----------|-----------------------|
| AIXTRON | Color Kinetics |
| Barco | Cookson Electronics |
| CDT | Enlighted Designs |
| CREE | Evident Technologies |
| EPIC | Kennedy & Violich |
| IFC | LED Specialists |
| iSuppli | Lighting With LEDs |
| Nichia | Lumileds Lighting |
| Osram OS | Microvision |
| Philips | Pearl Harbor Shipyard |
| Reflexite | Radiant Imaging |
| TIR | Samsung Electronics |
| Veeco | Sirio Panel |
| YESCO | Teknologue |
| | Vishay Semiconductor |

October 20-22, 2004

Sheraton San Diego Hotel & Marina
San Diego, California

"This is an excellent gathering representing the entire LED marketplace."

Bob Henry, Business Development, CREE, Inc.

"If you want to know what's happening in the LED industry - this is the place to be."

Sonja Djuricic, Program Manager, MICROSOFT

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LEDs 2004

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8 Reasons To Attend This Pivotal Event

1. Find out what lighting designers expect from LEDs, what metrics they require, and how the LED community can assist them in implementing innovative LED systems on a large scale.
2. Discuss and debate with industry leaders the potential for LEDs in the \$12 billion general illumination market and the barriers that continue to plague the industry.
3. Find out how developments in MOCVD, MBE and other thin-film process and metrology tools are improving LED production.
4. Learn about how developments in quantum dots and quantum dot composites are revolutionizing LEDs through the creation of specialty and tunable colors.
5. Get a comprehensive assessment of LED markets and growth rates through 2008, projected revenues, and which applications are garnering market share fastest.
6. Get briefed on the recent developments in white LEDs and how these developments will accelerate the use of LEDs in lighting.
7. Get updated on the latest developments in LEDs for display backlighting, microdisplays, large video wall displays, and architectural and transportation applications.
8. Get updated on the status of LEDs in interior and exterior automotive lighting, including brightness and color requirements, packaging, and standards.

Learn About Emerging Markets and Technological Advancements for LEDs

LEDs are a \$3 billion dollar global industry, growing 20% per year. Due in part to increased demand for handheld applications, the LED industry continues to show overwhelming growth potential. CAGR rates are expected to continue in the 20% range through 2007 and industry size is expected to reach 4 to 5 billion dollars in 3 years - moving in synch with the growing cell phone industry where LEDs are used as backlighting and keypad illumination. The cell phone industry alone - which accounts for up to 30% of LED revenues - grew by 30% last year.

Success in handheld applications is not the only market where LEDs are making progress. For years the automotive industry has embraced LEDs in rear and interior lighting systems, but has been unable to integrate LEDs in front lighting systems due to insufficient light output and design challenges. This may finally be changing. Recent announcements from Lumileds/Audi and OSRAM/Ford to break into this market signals a coming wave of new solid state lighting applications and opportunities.

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"The excellent quality of planning & organization attracted a very high-quality audience of attendees - which clearly added value for our company both for networking and for exhibiting."

Jill Sanders, Marketing Manager, SOLVAY ADVANCED POLYMERS
.....

LEDs also have significant growth potential in traditional large screen and projection displays, aviation and architectural/contour lighting markets, as well as non-traditional industries such as in clothing and fabrics. While burgeoning demand and significant progress in developing white LEDs bode well for the industry, certain challenges must still be overcome. The \$12 billion general illumination market will remain largely untapped unless improvements can be made in thermal management, optics, and packaging.

By attending **LEDs 2004**, you will hear updates on how these and other challenges are being addressed while having unmatched opportunities to meet industry leaders and view the latest developments in the industry in the exhibit area. The exhibit area, the largest to date with space for 55 tabletops, will serve as the main networking area and will also be the location for the first ever Lighting Design Forum. The Forum, which will be held during the evening reception on October 21st, will offer attendees a chance to view innovative lighting solutions by international designers. Plan to join us in San Diego in October for the most comprehensive meeting yet. *Register Today!*

INTERTECH CONSULTING: COMPREHENSIVE, OBJECTIVE, TIMELY, PRACTICAL

Intertech is a leading international consulting firm, focusing on displays, lighting, electronic materials and high performance pigments. We work with clients to penetrate new markets, develop new products, solve existing problems and assess emerging technologies. Our team of international specialists and resident analysts provides a complete approach that dovetails business, technology and intellectual property strategies to strengthen our clients' competitive advantage. We offer an international, interdisciplinary approach to strategic business planning, including:

- market assessment and forecasts
- business development
- new product development
- merger and acquisition studies
- market entry studies
- technology evaluations
- competitive benchmarking
- SWOT analysis

For more information contact ggiordano@intertechusa.com



Mark Your Calendar

for these upcoming Intertech events:

OLEDs 2004

November 15-17, San Diego, CA

Smart Fabrics

February 7-9, 2005, Barcelona, SPAIN

Phosphors Global Summit

February, San Diego, CA

Flexible Displays & Electronics

June 20-22, 2005, San Francisco, CA

Pre-Conference Seminars

Wednesday, October 20
(additional fee required)

1. Bridging the Gap: The Path to LEDs in General Lighting

8:30 am

This seminar will examine the status of the global lighting industry, the technologies that comprise the market, the applications, and how LEDs are competing in this marketplace. Seminar participants will get a comprehensive overview of the gap that exists between the lighting market and the providers of solid state light sources, and how best to bridge, and eventually close, this gap. Lumileds' Luxeon Network, which was designed to aid designers and manufacturers seeking solutions using High Flux LEDs, will also be described. Key topics to be addressed include:

- The anatomy of the lighting market - from specification to delivery
- Competitive light sources and technologies
- Bridging the gap - where LEDs meet the real world
- A case study analysis
- The Luxeon Lighting Network and certified Luxeon Luminaire Manufacturers

This seminar is geared toward those in the Solid State industry who are interested in learning more about the traditional lighting market and how Solid State Lighting (SSL) can transition towards general lighting. A number of timely topics will help educate participants about the key challenges facing SSL as it "disrupts" the traditional lighting market.

Instructors: This seminar is headed by a team of industry experts from TIR Systems and Lumileds Lighting. **A. Brent York**, P.Eng., MBA, MIES, is TIR's Chief Technology Officer, who has worked in illumination technology for 20 years. He has developed lighting systems for a broad range of applications, including roadway and transportation, hazardous areas, aerospace, biological, medical, military, solar, residential, commercial, and industrial sites. **Grant Harlow**, P.Eng., is Director of Product Marketing at TIR and has over 14 years experience in product development, applications engineering, product management, business management and market strategy. **Keith Scott** is the Business Development Manager for Lighting at Lumileds Lighting.

2. Light Emitting Diode Source Modeling for Optical Design

1:30 pm

This seminar will examine LED light source modeling for optical design and methods for concentrating and collecting LED radiation using Fresnel Lenses. Background information in optics and photometry will be presented, as well as design considerations for detailed accurate simulation techniques. Seminar participants will have the opportunity of learning and applying equations for lens design and advanced methods for those interested in formulating their own solutions. Participants will also find out how to use some of the most advanced LED die models to design packages.

Key topics to be discussed include:

- A overview of LED light source models
- Applicability, advantages, and disadvantages for each type
- Raytracing and source modeling for optical design
- LED light source simulation

Instructors: **Douglas Kreysar** is Vice-President of Operations at Radiant Imaging, Mr. Kreysar manages Corporate Operations, including the oversight of production, engineering, and product development. He is responsible for resource allocation and planning as well as the set-up and implementation of corporate, manufacturing, and product development processes and procedures. **Art Davis** is the Senior Optical Engineer at Reflexite Display Optics where he designs microstructured optical components and manages the company's applications Laboratory. His prior experience includes designing monochromators and spectrographs at Spectronic Instruments. He received a Masters degree in Optics from the University of Rochester.

Wednesday, October 20

- 8:30am **Pre-Conference Seminar 1** (additional fee required)
Bridging the Gap: The Path to LEDs in General Lighting
- 1:30pm **Pre-Conference Seminar 2** (additional fee required)
LED Source Modeling for Optical Design
- 6:00pm **Welcoming Reception and Opening of Exhibit Hall**
Sign in for the conference and join fellow participants for a complimentary two-hour wine and cheese reception.

Thursday, October 21

- 7:00am **Registration & Coffee**
Enjoy a continental breakfast & informal discussion with your colleagues.
- 8:00 **Welcome & Co-Chair Introductions**
Patricia Kinzer - Intertech Conferences
Kathryn M. Conway - LED Consulting
Klaus Streubel - OSRAM Opto Semiconductors

Session Market & Industry Overview

- 8:15 **The Market for High Brightness LEDs Continues to Shine Brightly**
- Market overview
- Emerging applications for high brightness LEDs
- Demand drivers
- Market forecast
Jagdish Rebello, Senior Industry Analyst
iSUPPLI CORPORATION
- 8:45 **Roadmapping a Future for LED Industries in Europe**
- Standards for lower-cost higher-volume manufacturing
- Market sector opportunities
Tom Pearsall
EUROPEAN PHOTONICS INDUSTRY CONSORTIUM
- 9:15 **Optical Properties of LEDs for General Illumination and Standardization**
- Quantity and quality for evaluating optical properties of light sources
- Important optical properties of LEDs for general illumination
- Mismatching between solid state lamps and conventional vacuum system lamps
- Importance of standardization
Kohtaro Kohmoto, Technical Advisor
TEKNOLOGUE CO., LTD.
- 9:45 **The LED Market at the 'Bottom of the Pyramid': Opportunities to Transform the Market for the World's Poor**
Russell Sturm, Principal Projects Officer
INTERNATIONAL FINANCE CORPORATION

10:15 **Refreshment Break**

Session Processes & Materials

- 10:45 **High Quality White Light for General Illumination Using Red, Green, Blue and Amber LEDs**
- Design and performance of lamps containing red, green, blue and amber LEDs
- Intuitive user interface control of RGB LED spot lamps
James M. Gaines, Principal Engineer
PHILIPS LIGHTING
- 11:10 **Key Manufacturing Technologies for OLEDs and Inorganic LEDs**
Rainer Beccard, Director of Marketing
AIXTRON AG
- 11:35 **Advancements in MOCVD, MBE and Other Thin-Film Process and Metrology Tools to Lower the Cost of LEDs**
- Advancements in epitaxial equipment
- Use of atomic force microscopy to enhance growth processes
- Applying silicon manufacturing models to LED production
- Value of one-stop shop for integrated equipment solutions
David Reamer, Business Development Director
VEECO COMPOUND SEMICONDUCTOR, INC.

12:00 **Lead-Free Eutectic Die Attach Solder**
 - Applications for Bi/Ag in die attach process
 - Form factors
 - Flux or atmosphere - What works and what does not
 Mitch Holtzer, Global Product Manager
 COOKSON ELECTRONICS

12:25 **Lunch - Sponsored by Rohm Electronics**

Session 3 Communicating with LEDs: The Big Picture

2:00 **High Quality Microdisplays Based on Scanned LEDs**
 - Principles of scanned-beam displays
 - The use of LEDs in scanned-beam displays and challenges
 - LED based scanned-beam microdisplay architecture
 - LED performance data and image quality test results
 Randy Sprague, Director of Advanced Components
 MICROVISION, INC.

2:25 **LED Video Wall Developments**
 Herbert Van Hille, Int R&D Manager
 BARCO MEDIA & ENTERTAINMENT

2:50 **The LED Sign Market**
 Robert Klausmeier
 YOUNG ELECTRIC SIGN COMPANY (YESCO)

3:15 **Refreshment Break**

3:45 **LEDs for LCD Backlighting**
 Jong Tae Lim, Senior Engineer
 SAMSUNG ELECTRONICS CO., LTD.

4:10 **Integral Solid State Lighting in Smart Building Systems**
 - LEDs and general illumination
 - Implementation within current NEC regulations
 - Interdisciplinary innovation process: new market applications
 - Expanding the value proposition for solid state lighting
 Sheila Kennedy, Design Director, KVA
 KENNEDY & VIOLICH ARCHITECTURE

5:30 **Evening Reception and Lighting Design Forum**

Friday, October 22

8:00 **Mid-conference Summary and Announcements**

Session 4 LEDs & Emerging Technologies

8:15 **Thermal and Optical Strategies in High-Performance LED Packages**
 Tim Whitaker, Editor
 LIGHTING WITH LEDs

8:40 **High Power Packaged LEDs**
 Bernd P. Keller, Vice President/General Manager
 CREE, INC.

9:05 **Thin-Film Technology for Light Emitting Diodes**
 Klaus Streubel, Manager R&D
 OSRAM OPTO SEMICONDUCTORS

9:30 **Recent Technology Advancements in HB LEDs**
 James Creveling, Assistant Manager, Technical Support
 NICHIA CORPORATION

9:55 **Creating Signature Colors and White Light with Quantum Dot Composites**
 - New materials platforms
 - Enhanced color tuning
 - Material compatibility issue
 - Meeting market targets
 Michael LoCascio, Chief Technical Officer
 EVIDENT TECHNOLOGIES

10:20 **Refreshment Break**

10:50 **High Brightness LEDs in Automotive Applications**
 - Interior and exterior lighting: package forms, requirements for brightness and color
 Horst G. Lengning, Senior Manager, Product Marketing
 VISHAY SEMICONDUCTOR GMBH

11:15 **PLEDs: An Emerging Display and Lighting Solution**
 - Overview of PLED technology
 - Recent progress in device performance and process know-how
 - Current and future applications of PLEDs in displays and lighting
 Jonathan Halls, Strategic Technology Planner
 CAMBRIDGE DISPLAY TECHNOLOGY, LTD.

11:40 **PANEL DISCUSSION**

12:15 **Lunch - Sponsored by AIXTRON AG**

Session 5 Applications: Lighting System Needs & Solutions

1:45 **LEDs and the Architectural Lighting Design Community**
 - What are lighting designers looking for in LED products?
 - What are the metrics they need and recognize?
 - Who is a credible body to implement standards?
 - How can the LED industry help?
 Eddie Efron, LED Application Development Manager
 PHILIPS LIGHTING

2:10 **Wardrobe Malfunctions and Other Lessons Learned From Early Adopters of Illuminated Clothing Technology**
 - Overview of illumination methods applicable to clothing
 - Existing and emerging markets
 - Key features desired by consumers
 - Areas for future improvement in lighted clothing
 Janet Hansen, President
 ENLIGHTED DESIGNS, INC.

2:35 **LEDs and the Power of Digital Control**
 - The digital makeup of LED systems: how/why they're controllable
 - Applications today - Examples of sophisticated control in applications: how it works, why it's important
 - Technical considerations and challenges: Advanced control with simple interfaces.
 - Beyond the bulb culture - How control capabilities will allow completely new uses of light
 Kevin Dowling, VP Strategic Technologies
 COLOR KINETICS, INCORPORATED

3:00 **Refreshment Break**

3:15 **LED Illumination in Transportation: Aviation, Marine and Rail**
 - Application needs that are driving LED adoption
 - Benchmarking traditional lighting services
 - Benefits that LEDs can deliver today
 - Challenges - enabling broader adoption
 Michael Fusco, President
 LED SPECIALISTS, INC.

3:40 **LED Lighting for Avionic Applications, Achievable Performances and Technological Constraints**
 - Achievable performances vs. avionic specification requirements
 - Thermal dissipation issues
 - Reliability issues, large chip high power LEDs vs. small chip high brightness arrays
 - LED filtering for NVG compatibility
 Paolo Vanni, Technical Manager
 SIRIO PANEL SPA

4:05 **United States Navy Moves Towards LED Lights for General Illumination**
 - Trial period begins on USS Bremerton
 - Other LED initiatives underway in the Navy
 - Permanent lights are one step away
 Michael Raymond, Nuclear Director
 PEARL HARBOR NAVAL SHIPYARD & IMF

4:30 **Summary and Concluding Remarks**

4:45 **Conference Adjourns**

LEDs 2004

October 20-22, 2004

Sheraton San Diego Hotel & Marina, San Diego

San Diego, California



Nestled at the water's edge on spectacular San Diego Bay, the Sheraton San Diego Hotel and Marina offers panoramic views of the bay and the downtown city skyline. Some of the country's most unique attractions are within a 10-minute drive of the hotel, including Sea World, the world-famous San Diego Zoo, historic Old Town, Balboa Park, and Seaport Village. High speed internet access is available in all rooms and meeting rooms. The hotel also has an outdoor pool, fitness center and free airport transportation services.

Hotel Information A special room rate of \$189 is available for attendees who make their reservations by September 27. Please contact the hotel directly and be sure to mention the Intertech LEDs conference. Registrants are responsible for making their own hotel and travel reservations.

Sheraton San Diego Hotel & Marina

1380 Harbor Island Drive
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Hotel will sell out -
book early!

Please Note To guarantee your place, payment is required in advance of the conference. The conference proceedings, postconference CD, luncheons, refreshment breaks, receptions, and exhibit area access are included in the conference fee. Separate fees are charged for the pre-conference seminars. A written confirmation of your registration will be sent to you.

Substitutions & Cancellations Registration fees are fully refundable if cancellations are made in writing by October 12. After this date, there is a \$100 cancellation fee. Substitutions may be made at anytime at no charge.

Team Participation Sign up three or more colleagues from your company at the same time and SAVE \$200 on each registration! This is an excellent way for your entire team to get updated, meet potential customers and network with industry experts. Registrations must be submitted at the same time.

Update Your Library If you cannot attend, you can still take advantage of the important information. Order the conference proceedings, and receive a complete set of all papers presented at the meeting. To order, use the Registration Form or call 207.781.9618.

Sponsorships & Exhibits

Take this opportunity to increase your visibility before a highly qualified audience of key decision-makers. Sponsorships are still available for several functions at the conference, and we also offer tabletop exhibit space and advertising in the book of conference proceedings. Last year over 45 companies exhibited with room for 55 this year. For details on these opportunities, contact Brian Santos by email or telephone provided below.

5 Easy Ways to Register



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19 Northbrook Drive
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LEDs 2004 Registration Form

Please circle one: Mr. Mrs. Ms. Dr.

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Registration Fees (155-04)

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| <input type="checkbox"/> Conference Registration Fee | \$1495 _____ |
| <small>(fee does not include the preconference seminars)</small> | |
| <input type="checkbox"/> Academic/Government Rate | \$ 895 _____ |
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The Fifth Annual Strategic Summit for LEDs in Illumination
October 20-22, 2004
Sheraton San Diego Hotel & Marina, San Diego

What your colleagues said about LEDs 2003

"An excellent forum."

Yongchi Tian, *Technical Staff, SARNOFF CORPORATION*

"Attend or be left behind."

Bill Blackley, *VOSSLOH-SCHWABE*

"Very interesting, informative, and a good source for networking and industry contacts, as well as a comfortable atmosphere."

Donovan Henry, *Senior Manager, OPTO SYSTEMS*

"Broad spectrum coverage from LED chip manufacturing to end applications."

Johan van der Linden, *Patent Examiner, European Patent Office*



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