

2015 DOE Solid-State Lighting R&D Workshop Agenda

January 27–29, 2015 • San Francisco, CA

TUESDAY, JANUARY 27, 2015

7:00 a.m.	<i>Registration Opens and Continental Breakfast</i>
PLENARY SESSIONS	
8:00 a.m.	<p>KEYNOTE MIKE CARR, SENIOR ADVISOR AND PRINCIPAL DEPUTY ASSISTANT SECRETARY, OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY, U.S. DEPARTMENT OF ENERGY</p> <p>OPENING REMARKS SHUJI NAKAMURA, 2014 PHYSICS NOBEL LAUREATE, UNIVERSITY OF CALIFORNIA, SANTA BARBARA</p> <p>WORKSHOP INTRODUCTION JAMES BRODRICK, LIGHTING PROGRAM MANAGER, U.S. DEPARTMENT OF ENERGY</p>
8:30 a.m.	<p>REINVENTING LIGHTING</p> <p>We are in the midst of a lighting revolution comparable to the days of Edison. The LED lighting industry has made huge strides in terms of price and performance. Innovative new products and features continue to broaden the appeal and energy-saving impact of SSL. And leading-edge lighting companies are reinventing lighting as we know it. This talk will share insights on how an innovative, vertically integrated LED company marries R&D and manufacturing, and how R&D investments and product innovations contribute to U.S. competitiveness.</p> <p>JOHN EDMOND, CREE</p>
9:15 a.m.	<p>THE CASE FOR SSL</p> <p>Walmart has been a pioneer in the use of LED lighting systems in retail, and early installations helped to lay the groundwork for the company's current strategy for implementing energy-efficient lighting solutions in stores worldwide. Learn more about Walmart's vision for transforming retail lighting, and how that impacts energy use, the environment, and the bottom line.</p> <p>JOHN DAVIDSON, WALMART</p>
10:00 a.m.	<i>Refreshment Break</i>
10:30 a.m.	<p>INNOVATIONS IN LEDS</p> <p>The pace of innovation in today's lighting industry is staggering, and shows no sign of letting up. This talk will share a unique perspective on the past, present, and future of LED lighting, and highlight technology challenges that remain on the path of continued growth, and the road to 250 lm/W.</p> <p>GEORGE CRAFORD, PHILIPS LUMILEDS</p>

11:15 a.m.	<p>GLOBAL LED MANUFACTURING</p> <p>Insights from Epistar offer a global perspective on LED manufacturing, the evolution of LED technology, and the use of mid-power and high-power LEDs in lighting.</p> <p>BJ LEE, EPISTAR</p>
<i>Noon</i>	<i>Lunch</i>
1:00 p.m.	<p>PANEL NEW DIRECTIONS IN LIGHTING</p> <p>SSL is already saving energy today in many traditional lighting applications. But advances in controls, color tuning, spectral content, and form factors are revolutionizing how light is being delivered and used. This panel will explore innovative applications of LED lighting that save energy and offer value-added benefits for users.</p> <p>MODERATOR: STEVE BLAND, SB CONSULTING SAEED SHAHMIRZAI, ZOOM ENGINEERING PETER ALSTONE, UNIVERSITY OF CALIFORNIA, BERKELEY ROBERT SPIVOCK, GE LIGHTING NEIL JOSEPH, STACK LIGHTING GEORGE YIANNI, PHILIPS</p>
2:30 p.m.	<i>Refreshment Break</i>
3:00 p.m.	<p>PANEL CREATING VALUE THROUGH CONTROLS</p> <p>The intersection of solid-state lighting, mobile devices, and advanced electronics and sensors will enable completely new ways to control lighting and increase the value of lighting to consumers. Industry and academic experts will share insights on new visions for the wall switch, the value of visible light communications, and feedback from lighting controls installations.</p> <p>MODERATOR: MONICA HANSEN, LED LIGHTING ADVISORS ETHAN BIERY, LUTRON KONSTANTINOS PAPAMICHAEL, CALIFORNIA LIGHTING TECHNOLOGY CENTER, UC DAVIS DAN RYAN, BYTELIGHT NAN ZHAO, MIT MEDIA LAB</p>
4:30 p.m.	<p>WORKSHOP MISSION</p> <p>The DOE SSL R&D Workshop provides an opportunity for stakeholders to provide input to the DOE program. This talk will recap the DOE R&D planning process, share highlights from a series of roundtables and meetings held in Fall 2014, and set the stage for in-depth discussions of basic science challenges and priority needs in the breakout sessions to come. Where does future R&D need to be directed to take that next step in SSL performance?</p> <p>MORGAN PATTISON, SSLS, INC.</p>
5:00 p.m.	<i>Adjourn</i>
7:00 p.m.	<p>OPTIONAL BUS TOUR (<i>Registration Required</i>)</p> <p>Guided tour of LED roadway lighting on the San Francisco–Oakland Bay Bridge East Span, plus LED and OLED vignette installations at Acuity’s Center for Light&Space.</p>

WEDNESDAY, JANUARY 28, 2015

7:30 a.m. *Continental Breakfast*

PLENARY SESSIONS

8:00 a.m. **GLOBAL LED LIGHTING TRENDS AND MANUFACTURER STRATEGIES**
 The increased popularity of LED lighting has revolutionized the entire lighting industry. Many Asian manufacturers have entered the LED industry as governments come up with relevant subsidy plans. The rise of Asian lighting producers has brought intense competition, and traditional lighting firms such as Philips and OSRAM have started to plot new strategies to correspond to the change. This talk will discuss future LED lighting trends through three aspects—LED market size, technology development, and vendor strategies.
 ROGER CHU, LEDINSIDE

8:30 a.m. **DOE SSL R&D PROGRAM DIRECTION**
 An overview of the DOE SSL R&D program direction, portfolio, budget, and areas of focus.
 JAMES BRODRICK, U.S. DEPARTMENT OF ENERGY

TRACK SESSIONS

9:00 a.m. **LED TRACK
 PANEL | LED RELIABILITY**
 The latest findings on LED component and system reliability and future areas of focus, including an update on the LED Systems Reliability Consortium’s efforts and a look at long-term field data from DOE outdoor lighting projects.
 MODERATOR: MONICA HANSEN,
 LED LIGHTING ADVISORS
 RALPH TUTTLE, CREE
 LYNN DAVIS, RTI INTERNATIONAL
 BOB DAVIS, PACIFIC NORTHWEST NATIONAL LABORATORY

**OLED TRACK
 THE OLED LANDSCAPE**
 An overview of OLED technology progress, plus a look at early markets for OLED products.
 NORMAN BARDSLEY, BARDSLEY CONSULTING
 MIKE LU, ACUITY BRANDS

10:00 a.m. *Refreshment Break*

10:30 a.m. **PANEL | DEVELOPMENTS IN RED EMITTERS**
 While the performance of LED lighting systems has improved significantly over the past five years, the development of a high-efficiency, narrow-band red emitter has been elusive. This panel will look at different technology solutions focused on improving the red emission in LED lighting systems.
 MODERATOR: MORGAN PATTISON, SSLS, INC.
 ASHISH TANDON, PHILIPS LUMILEDS
 PETER SCHMIDT, PHILIPS LUMILEDS
 ANANT SETLUR, GE GLOBAL RESEARCH
 KEITH KAHEN, LUMISYN

PANEL | OLED MATERIALS AND DEVICE DESIGN
 A look at open science questions related to designing the organic stack, and issues surrounding charge injection and losses in the transport layers and emitter host materials.
 MODERATOR: LISA PATTISON, SSLS, INC.
 FLORYAN DECAMPO, SOLVAY
 MICHELE RICKS, EMD CHEMICALS
 JUNJI ADACHI, KYUSHU UNIVERSITY
 STEVE FORREST, UNIVERSITY OF MICHIGAN

<i>Noon</i>	<i>Lunch</i>	
TRACK SESSIONS		
1:00 p.m.	<p>PANEL ADVANCED MATERIALS FOR LED LIGHTING</p> <p>This panel will explore the development of new materials and architectures for improved performance and functionality in various areas of the LED package and luminaire system.</p> <p>MODERATOR: STEVE BLAND, SB CONSULTING ERIC HAUGAARD, CREE RAVI BHATKAL, ALPHA, AN ALENT PLC COMPANY JOEL MCDONALD, DOW CORNING MARC HUEBNER, AUER LIGHTING</p>	<p>PANEL OLED PANEL INTEGRATION CHALLENGES</p> <p>This panel will explore challenges surrounding OLED panel integration, and progress on improved encapsulation techniques for both rigid and flexible panels.</p> <p>MODERATOR: LISA PATTISON, SSLS, INC. DIPAK CHOWDHURY, CORNING GREG COOPER, PIXELLIGENT RAHUL GUPTA, CAMBRIOS CHRIS BROWN, KATEEVA</p>
2:30 p.m.	<i>Refreshment Break</i>	
PLENARY SESSIONS		
3:00 p.m.	<p>PANEL SSL MANUFACTURING CONCEPTS</p> <p>Ongoing improvements to LED product designs have enabled dramatic cost reductions while maintaining or even improving performance. While considering product designs for improved manufacturability, companies can also make design decisions that impact the feasibility and economics of domestic manufacturing. This panel will examine how LED chip, package, and luminaire designs are evolving to remove costs, as well as trends in OLED manufacturing and the impact on U.S. competitiveness.</p> <p>MODERATOR: MONICA HANSEN, LED LIGHTING ADVISORS IAIN BLACK, PHILIPS LUMILEDS PAUL PICKARD, ECOSENSE LIGHTING MARK HAND, ACUITY BRANDS PIM GROEN, HOLST CENTRE</p>	
4:30 p.m.	<p>A BROADER LOOK AT GOVERNMENT SUPPORT</p> <p>The DOE SSL Program plays a central role in guiding many related government-supported SSL R&D efforts. This panel will provide an update on the SSL Program’s solicitation process, key changes for FY15, and the new OLED testing opportunity, plus a closer look at the Small Business Innovation Research (SBIR) programs funded by DOE and the National Science Foundation, and efforts funded through DOE’s Advanced Manufacturing Office (AMO).</p> <p>MODERATOR: JAMES BRODRICK, U.S. DEPARTMENT OF ENERGY JOEL CHADDOCK, NATIONAL ENERGY TECHNOLOGY LABORATORY MANNY OLIVER, U.S. DEPARTMENT OF ENERGY STEVEN KONSEK, NATIONAL SCIENCE FOUNDATION MARK JOHNSON, U.S. DEPARTMENT OF ENERGY</p>	

5:30–
7:30 p.m.

RECEPTION/POSTER SESSION

Project posters will be presented by research team representatives, providing an opportunity for one-on-one discussions with SSL’s leading scientists.

POSTER PRESENTERS

Argonne National Laboratory
Arizona State University
Carnegie Mellon University
Cree
Eaton Corporation
Fairfield Crystal Technology
iBeam Materials
Innotec
KLA-Tencor Corporation
Lumisyn
MicroContinuum
MoJo Labs
Momentive Performance Materials Quartz
Navigant Consulting
National Energy Technology Laboratory
OLEDWorks
Philips Lumileds Lighting
Philips Research North America
Pixelligent Technologies
PPG Industries
Princeton University
RTI International
Solution Deposition Systems
Soraa
TivraCorp
University of California, Los Angeles
VoltServer

EXHIBITS

GE Lighting
Innotec
Lutron
MoJo Labs
OLEDWorks
Rensselaer Polytechnic Institute
RTI International
Solution Deposition Systems
Stack Lighting
VoltServer

THURSDAY, JANUARY 29, 2015

7:30 a.m. *Continental Breakfast*

PLENARY SESSION

8:00 a.m. **THE PHYSIOLOGICAL IMPACT OF LIGHTING**
 The key function of indoor lighting has always been to enable our visual perception. However, studies have shown that light has effects well beyond visual perception. It stimulates cognitive centers in the brain and drives our inner clock. It also stimulates the receptors in the eye, which can have an activating effect and boost concentration. Light, therefore, has a tremendous influence on our well-being. This talk will discuss recent studies on the impact of LED lighting on human health and performance in a variety of use environments.
 ANDREAS WOJTYSIAK, OSRAM

TRACK SESSIONS

8:30 a.m.	<p>PANEL ONGOING LED R&D CHALLENGES A look at ongoing challenges for LED lighting, and what is needed to develop next-generation lighting. MODERATOR: STEVE BLAND, SB CONSULTING PETER BLAIS, KEMET JAKOAH BRGOCH, UNIVERSITY OF HOUSTON STEVE DENBAARS, UNIVERSITY OF CALIFORNIA, SANTA BARBARA NATHAN GARDNER, GLO-USA</p>	<p>PANEL OLED MANUFACTURING CHALLENGES A look at OLED panel manufacturing status and trends, and what is need for future growth. MODERATOR: NORMAN BARDSLEY, BARDSLEY CONSULTING JOHN HAMER, OLEDWORKS YIQIANG ZHANG, TROVATO MANUFACTURING MIKE MASTROPIETRO, NOVACENTRIX</p>
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10:00 a.m. *Refreshment Break*

10:30 a.m.	<p>LED TOPIC TABLES LED attendees will break into small groups to discuss a variety of topics considered key to furthering SSL technology advances. Each table will focus on a specific R&D topic, allowing for more detailed exploration of the topic and related issues.</p>	<p>OLED PRIORITIES OLED attendees will have an opportunity to review R&D priorities considered key to furthering OLED technology advances. Input will guide the choice of priority R&D topics and other updates to metrics and milestones in the DOE R&D Plan.</p>
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Noon *Lunch*

1:00 p.m.	<p>TOPIC TABLE REPORTS AND DISCUSSION Each group will share a brief report of key points related to their topic, with an opportunity for further discussion with the larger group.</p>	<p>PANEL OLED LUMINAIRE PRODUCT DEVELOPMENT This panel will share various perspectives on early markets for OLED luminaires. MODERATOR: LISA PATTISON, SSLS, INC. MELANIE KIMSEY-LIN, BOEING BASAR ERDENER, WAC LIGHTING NANCY CLANTON, CLANTON & ASSOCIATES</p>
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2:30 p.m.	<i>Refreshment Break</i>
PLENARY SESSION	
3:00 p.m.	<p>PANEL DRIVING ADOPTION: KEY SSL TRADE-OFFS</p> <p>SSL represents a rare opportunity to simultaneously provide high-quality, cost-effective, and energy-saving lighting, but there are trade-offs. The SSL industry faces some big questions. How much do we have to choose between quality, efficacy, and price? Can we achieve 200 lm/W with good color quality at a reasonable price? How much more will consumers pay for energy savings, lighting quality, and controls? How can efficacy, lighting performance, and value be optimized for total energy savings and long-term value?</p> <p>MODERATOR: MORGAN PATTISON, SSLS, INC. DENNIS BRADLEY, GE LIGHTING MIKE MCGARAGHAN, ENERGY SOLUTIONS PETER NGAI, ACUITY BRANDS STEVE PAOLINI, NEXT LIGHTING MARTIN WITTMANN, OSRAM OPTO SEMICONDUCTORS</p>
4:30 p.m.	<i>Adjourn</i>