

## WORKSHOP AGENDA

### 2013 DOE Solid-State Lighting R&D Workshop

January 29–January 31, 2013 • Long Beach, CA

#### DAY 1 — Tuesday, January 29

11:00 a.m. *Registration Opens*

1:00 p.m. **Welcome & Introduction**

In 2003, LED traffic signals, exit signs, and holiday lights were gaining a foothold—and white light suitable for general lighting was off on the horizon. Ten years later, the skyline of Los Angeles is transformed by LED streetlights, LED bulbs are sold in big box retail stores, and we are truly on the verge of a major transformation in lighting. New approaches and novel form factors broaden the appeal and energy-saving impact of SSL. So what will it take to reach 250 lm/W? What will tomorrow's lighting solutions look like, and what is needed to accelerate market adoption?

*James Brodrick, U.S. Department of Energy*

1:30 p.m. **One City's Vision: Los Angeles' LED Program**

The City of Los Angeles launched an ambitious program in 2009 to convert 140,000 streetlights to LED. As of late 2012, 106,000 fixtures have been installed, resulting in \$4.8M in annual energy savings. The latest phase will implement adaptive controls to further increase the energy and cost savings. What can we learn from L.A.'s experiences, and how can further technology innovation increase the energy-saving impact of LED street lighting?

*Ed Ebrahimian, City of Los Angeles*

2:15 p.m. **SSL Today and Future Impacts**

The National Academy of Sciences recently completed a study on solid-state lighting, conducted by a prestigious committee of independent experts. Learn about key findings related to the current status of SSL development and areas that need to be addressed, either through research or coordinated action by industry.

*John Kassakian, Massachusetts Institute of Technology*

3:00 p.m. *Refreshment Break*

3:30 p.m. **Panel 1: Pathways to Deeper Energy Savings and Broader Market Adoption**

Just as SSL products for general lighting have gained a foothold in the market, the conversation has shifted to focus on the next leap forward. In this panel, lighting industry experts will share their views on what's next for LEDs and OLEDs. How do we maximize the energy savings, and what value-added features will accelerate adoption?

*Moderator: James Brodrick, U.S. Department of Energy*

*Brian Chemel, Digital Lumens*

*Mike Lu, Acuity Brands*

*Susanne Seitinger, Philips Color Kinetics*

5:00 p.m. **Discussion of Workshop Process and Objectives**

7:00 p.m. **Optional Bus Tour of LED Lighting Installations**

Guided tour of L.A.'s residential and arterial roadway lighting featuring adaptive controls, with a visit to a field operations center and street lighting museum. Registration required; \$20 transportation fee.

**DAY 2 — Wednesday, January 30**

7:30 a.m.	<i>Continental Breakfast</i>
8:00 a.m.	<p><b>Panel 2: Collaborating for Success</b>  As the market matures, the questions get more intricate and details matter. Some remaining issues—improving lifetime and reliability, standardizing interfaces, moving OLEDs into the mainstream—are difficult and complex. Learn how pooling resources in collaborative efforts can accelerate the search for solutions and hasten adoption of SSL.</p> <p><i>Moderator: Morgan Pattison, SSLS Inc.</i>  <i>Dennis Bradley, GE Lighting</i>  <i>Lynn Davis, RTI International</i>  <i>Sebastian Reineke, Massachusetts Institute of Technology</i></p>
9:30 a.m.	<p><b>DOE SSL R&amp;D Program Direction</b>  An overview of the DOE SSL R&amp;D program direction, portfolio, budget, and areas of focus, with recognition of project teams making significant contributions in 2012.</p> <p><i>James Brodrick, U.S. Department of Energy</i></p>
10:00 a.m.	<i>Refreshment Break</i>
10:30 a.m.	<p><b>Invited R&amp;D Presentations</b>  Invited talks highlight a sampling of DOE-funded R&amp;D projects tackling particularly tough challenges.</p> <p><b><i>High Efficiency Colloidal Quantum Dot Phosphors</i></b>  <i>Keith Kahen, University at Buffalo (SUNY)</i></p> <p><b><i>Semi and Nonpolar LEDs on Bulk GaN Substrates</i></b>  <i>Mike Grundmann, Soraa</i></p> <p><b><i>High Power Warm White Hybrid LED Package for Illumination</i></b>  <i>Wouter Soer, Philips Lumileds</i></p> <p><b><i>Low-Cost Integrated Substrate for OLED Lighting</i></b>  <i>AB Bhandari, PPG Industries</i></p>
Noon	<i>Lunch</i>
1:00 p.m.	<p><b>A Broader Look at Government SSL Support</b>  The DOE SSL program plays a central role in guiding many related government-supported SSL R&amp;D efforts. This talk will provide a quick view of several programs that will be represented at this evening’s poster session, including DOE SSL market support efforts, the DOE Small Business Innovation Research (SBIR) program, the Advanced Research Projects Agency–Energy (ARPA-E), the Advanced Manufacturing Office (AMO), and the Energy Frontier Research Centers (EFRCs).</p> <p><i>Joel Chaddock, National Energy Technology Laboratory</i></p>
1:30 p.m.	<p><b>DOE Environmental Impacts Study</b>  Learn the latest results from a three-part DOE study to assess the life-cycle environmental impact in the manufacture, transport, use, and disposal of LED lighting products.</p> <p><i>Marc Ledbetter, Pacific Northwest National Laboratory</i></p>

2:00 p.m.      **Reframing the Plan**  
 This talk will explore potential updates to the DOE SSL R&D Multi-Year Plan, sharing feedback from a series of roundtables held in Fall 2012, and setting the stage for further discussions to follow. Where does future R&D need to be directed to take that next step in SSL performance?  
*Fred Welsh, Radcliffe Advisors*

2:30 p.m.      *Refreshment Break*

3:00 p.m.      **LED/OLED Track Sessions: Critical Research Issues**  
 Experts share their views on research needs and strategies to take LED and OLED lighting to the next level, as well as on unresolved science challenges that need to be addressed. Introductory presentations will be followed by group discussion, and will set the stage for more in-depth discussions on these issues and other key topics tomorrow.

**LED Track**

*Moderator: Steve Bland, SB Consulting  
 Wouter Soer, Philips Lumileds  
 Christian Wetzel, Rensselaer Polytechnic Institute  
 Nathan Gardner, Glo-USA, Inc.  
 Steve Paolini, NEXT Lighting*

**OLED Track**

*Moderator: Norman Bardsley, Bardsley Consulting  
 Ray Ma, Universal Display Corporation  
 Paul Magill, Rambus  
 David Maikowski, Guardian Industries  
 Hongmei Zhang, Plextronics*

5:00–7:00 p.m.      **Poster Session/Reception for DOE-Funded Research & Development Projects**  
*Sponsored by the Next Generation Lighting Industry Alliance*  
 Project posters will be presented by research team representatives, providing an opportunity to browse and ask questions of America's leading scientists.

**Presenters:**

AB Bhandari, PPG Industries	Brian Liebel, The Lighting Partnership
Bob Biefeld, Sandia National Laboratories	Ray Ma, Universal Display Corporation
Richard Bonner, Advanced Cooling Technologies	Angelo Mascarenhas, National Renewable Energy Laboratory
Dan Dapkus, University of Southern California	Joanna McKittrick, University of California–San Diego
Aurelien David, Soraa	Charles Neft, Teledyne
Lynn Davis, RTI International	James Novak, Applied Nanotech
Mark D'Evelyn, Soraa	Lewis Rothberg, University of Rochester
Mike Grundmann, Soraa	Franky So, University of Florida
Dan Harburg, Dartmouth College	Wouter Soer, Philips Lumileds
James Ibbetson, Cree	Eric Teather, WhiteOptics
Keith Kahen, University at Buffalo (SUNY)	Anand Upadhyay, Philips Lighting
Purushottam Kumar, Sinmat	Karen Waldrip, Sandia National Laboratories
Marc Ledbetter, Pacific Northwest National Laboratory	Christian Wetzel, Rensselaer Polytechnic Institute
Eli Leland, City University of New York (CUNY) Energy Institute	Yifan Zhang, University of Michigan
Jian Li, Arizona State University	

**DAY 3 — Thursday, January 31**

7:30 a.m.	<i>Continental Breakfast</i>
8:00 a.m.	<p><b>A Lighting Designer's View</b> Hear a lighting designer's perspective on where LED lighting solutions make sense, where and how they fall short, and what designers wish they could do with today's LED products.</p> <p><i>Scott Rosenfeld, Smithsonian American Art Museum</i></p>
8:30 a.m.	<p><b>Panel 3: Color Perception and Spectrum</b> This panel will explore issues around light spectrum and color perception. What is white? What does blue do? Will discrete spectrum work? Lighting experts will discuss how light is perceived and the consequences for lighting design and efficiency.</p> <p><i>Moderator: Morgan Pattison, SSLS, Inc.</i> <i>Jean Paul Freyssinier, Rensselaer Polytechnic Institute</i> <i>Cameron Miller, National Institute of Standards and Technology</i> <i>Brian Liebel, The Lighting Partnership</i></p>
10:00 a.m.	<i>Refreshment Break</i>
10:30 a.m.	<p><b>LED/OLED Topic Tables</b> Attendees will have an opportunity to talk in small groups about a variety of topics considered key to furthering SSL technology advances. Each table will focus on a specific R&amp;D topic, allowing for more detailed exploration of the topic and related issues.</p>
Noon	<i>Lunch</i>
1:00 p.m.	<p><b>LED/OLED Topic Table Reports and Discussion</b> Each group will share a brief report of key points related to their topic, with an opportunity for further discussion with the full LED or OLED group.</p>
2:30 p.m.	<i>Refreshment Break</i>
3:00 p.m.	<p><b>Panel 4: Manipulating Light—Electronics and Controls</b> Controls offer the potential to significantly increase the energy savings achievable with LED lighting. This panel will look at how dimmers, drivers, and controls can provide additional opportunities for energy savings, along with related issues that need to be addressed to maximize those opportunities.</p> <p><i>Moderator: Fred Welsh, Radcliffe Advisors</i> <i>Mark Hand, Acuity Brands</i> <i>Anand Upadhyay, Philips</i> <i>Bruce Kinzey, Pacific Northwest National Laboratory</i></p>
4:30 p.m.	<i>Wrap-Up and Adjourn</i>