2019 U.S. DEPARTMENT OF ENERGY SOLID-STATE LIGHTING R&D WORKSHOP AGENDA

January 29–31, 2019 • Dallas, TX

TUESDAY, JANUARY 29

7:00 a.m. *Registration Opens and Continental Breakfast*

PLENARY SESSIONS

8:00 a.m. **WELCOME**

JAMES BRODRICK, U.S. DEPARTMENT OF ENERGY

8:30 a.m. **PLENARY 1: MATERIALS DESIGN FOR LONG-WAVELENGTH LEDs**

There has been great progress in improving efficiency in blue LEDs the past decade, though long-wavelength LEDs (green, amber, red) have not followed a similar trajectory. New materials design and selection are needed to improve LED emitters over today's efficiency levels. This talk will provide a computational viewpoint on developing new or improved emitter materials with an advanced fundamental understanding of materials-synthesis-performance relationships for LEDs.

CHRIS VAN DE WALLE, UNIVERSITY OF CALIFORNIA, SANTA BARBARA

9:15 a.m. **PLENARY 2: THE PATH FOR OLEDs IN LIGHTING**

The major challenges faced in OLED lighting are stable blue emitters, efficient light extraction and cost reduction. This talk will discuss whether these challenges can be met through extensions of current R&D or whether radically new approaches are needed.

STEVE FORREST, UNIVERSITY OF MICHIGAN

10:00 a.m. *Refreshment Break*

TRACK SESSIONS

10:30 a.m.

LED TRACK I: CHIP AND MATERIALS

Expert panel leads technical discussion on LED chip and materials advances.

OLED TRACK I: MATERIALS AND STACK

Expert panel leads technical discussion on OLED materials and stack advances.

Noon *Lunch*

1:00 p.m.

LED TRACK II: DEVICES AND PACKAGES

Expert panel leads technical discussion on advances in LED devices and packages.

OLED TRACK II: PANELS AND ENCAPSULATION

Expert panel leads technical discussion on advances in OLED panels and encapsulation.

2:30 p.m.	*Refreshment Break*
3:00–5:00 p.m.	**POSTER SESSION** Project posters will be presented by research team representatives, providing an opportunity for one-on-one discussions with SSL's leading scientists.

WEDNESDAY, JANUARY 30

7:00 a.m.	*Continental Breakfast*

PLENARY SESSIONS

8:00 a.m.	**PLENARY 3: INNOVATIONS IN SOLID-STATE LIGHTING** The pace of innovation in today's lighting industry shows no sign of slowing. New products with advanced features continue to broaden the appeal and energy-saving impact of SSL. As LED efficiencies continue to climb, other features including quality of light, unique spectrums, and light density continue to be important research areas. Beyond the performance levels, the lifetime of LEDs and system quality will be discussed. ERIK SWENSON, NICHIA
8:45 a.m.	**PLENARY 4: TRENDS IN LIGHTING TECHNOLOGY AND APPLICATIONS** Mulinsen (MLS) has emerged as a leading LED packaging company and one of the top five global suppliers. The strength of this core business and the purchase of LEDVANCE have enabled the company to expand downstream, selling a wide range of lamps and luminaires in over 140 countries. This talk will outline the challenges in the transformation of the global lighting industry and identify R&D opportunities to increase the benefits of solid-state lighting. LAWRENCE LIN, MLS
9:30 a.m.	*Refreshment Break*
10:00 a.m.	**PANEL 1: NEW DIRECTIONS IN RELIABILITY** New directions in LED technology – including tunable sources and new applications – combined with the use of OLEDs have resulted in new considerations for SSL reliability. This panel will cover new elements of SSL system reliability and updates to previous considerations.
11:30 a.m.	*Lunch*

TRACK SESSIONS

12:30 p.m.

LED TRACK III: LUMINAIRE CONCEPTS

Expert panel leads technical discussion on advances in LED chip and luminaire optics.

OLED TRACK III: LIGHT EXTRACTION

Expert panel leads technical discussion on advances in OLED light extraction.

2:00 p.m. *Refreshment Break*

2:30 p.m.

LED TRACK IV: MANUFACTURING R&D

Expert panel leads technical discussion on advances in LED manufacturing R&D.

OLED TRACK IV: MANUFACTURING R&D

Expert panel leads technical discussion on advances in OLED manufacturing R&D.

RUMP SESSIONS – Open Discussion and Q&A

4:30 p.m. Rump sessions enable open discussion and Q&A on multiple lighting science topics of the day.

6:00 p.m. *Adjourn*

THURSDAY, JANUARY 31

7:00 a.m. *Continental Breakfast*

PLENARY SESSIONS

8:00 a.m.

PLENARY TALK 5: DESIGNING LED LIGHTING SOLUTIONS FOR NEW APPLICATIONS

LEDs are enabling entirely new lighting applications, which require entirely new designs that employ the latest lighting science. This talk will examine the process of developing an efficient lighting solution for an entirely new application. Considerations include spectrum, optical distribution, intensity, reliability, and cost. Application barriers and R&D opportunities will also be covered.

ROGER BUELOW, AEROFARMS

8:30 a.m.

PANEL 2: RETHINKING LIGHTING APPLICATION EFFICIENCY

This expert panel will consider the efficiency of the holistic lighting system, including optical delivery efficiency, spectral efficiency, intensity suitability, and source efficiency. Participants will discuss a new methodology to evaluate trade-offs between all elements of lighting application efficiency.

10:00 a.m. *Refreshment Break*

10:30 a.m.	**PANEL 3: EFFICACY AND SAFETY WITH SSL** A better understanding of the safety impacts of lighting will enable development of lighting solutions that are both safe and efficient. This panel will discuss how lighting affects safety and where more research is needed.
Noon	*Lunch*

PLENARY SESSIONS

1:00 p.m.	**PANEL 4: EFFICIENT LIGHTING FOR VISION AND WELL-BEING – CURRENT STATE OF UNDERSTANDING** This panel of experts will examine generally agreed upon scientific findings related to light and vision interaction and explore yet unknown aspects. The discussion will also cover how epidemiological results can be interpreted to guide lighting practice to ensure there are no unintended consequences or unnecessarily increased lighting energy use.
2:30 p.m.	*Refreshment Break*
3:00 p.m.	**PANEL 4: EFFICIENT LIGHTING FOR VISION AND WELL-BEING – ENGINEERING FUTURE LIGHTING SOLUTIONS** Part 2 of this discussion will examine the challenges in engineering lighting systems for vision and well-being. These systems can be complicated and costly, and often show unclear results. This panel will discuss the challenges, best practices, energy impacts, and what future research is needed to ensure lighting is optimized for both health and energy efficiency.
4:30 p.m.	*Adjourn*