Light in ACTION

Attendees at SPIE Optics+Photonics will see solid-state light technologies in action.

Solid-state lighting technology, widely adopted for auto headlights, computers, medical devices, and various electronics, has the potential to greatly reduce energy consumption if its use in indoor and outdoor lighting gathers speed.

SPIE's efforts to accelerate the transition from inefficient incandescent bulbs to more efficient, lower-maintenance lighting converge at Optics+Photonics this year with numerous demonstrations, conferences, events, and discussions of SSL technology in action.

SPIE Optics+Photonics, held 1-5 August in San Diego, CA (USA), will celebrate advances in SSL with the 10th International Conference on Solid State Lighting; a timeline featuring the history of the technology on display in the exhibition hall; and several plenary talks.

Solid-state technology will be shown in action, along with photovoltaics, display, and remote-sensing technologies, at the Solid State Lighting + High-Tech Car Pavilion. This special area of the Exhibition Hall will provide an opportunity for attendees to see all the technologies covered by the four symposia at SPIE Optics+Photonics (Nanoscience + Engineering, Solar Energy + Technology, Photonic Devices + Applications, and Optical Engineering + Applications) combined into a single product. Cars from BMW, Land Rover, Audi, and Tango will be on display in the exhibition hall, demonstrating this integration of light-based technologies.

SSL plenary talks

Several plenary talks provide another forum for seeing just how far SSL and other light technologies have come and the remaining hurdles that need to be addressed with efficiency, life, and color for the broader adoption of this technology.

Jeffrey Tsao, principal member of the technical staff at Sandia National Labs, will present a symposium-wide plenary discussion on the science, technology, and economic perspectives of SSL Sunday, 1 August. Tsao will review the underlying advances in physics and materials that have enabled the current performance abilities of SSL, some potentials of this technology, and some of the scientific challenges for widespread future adoption.

Another plenary featuring SSL is SPIE member Ian Ferguson's talk "What Would Edison Do with Solid State Lighting?" Ferguson, professor and chair of electrical and computer engineering at University of North Carolina at Charlotte (USA), will discuss rapid advances in SSL over the last few years.

Saving the planet

Other plenary speakers at this year's Optics+Photonics will provide examples of additional light technologies in action, especially ways that these technologies might help save our planet. Newly elected SPIE Fellow Niyazi Serdar Sariciftci, professor of physical chemistry at Johannes Kepler University Linz (Austria), will discuss real-world applications in his talk on Monday, 2 August, "Organic and Hybrid Nanostructures for Solar Energy Conversion: From Photovoltaic Electricity to Synthetic Fuels Using CO_2 Recycling."

"Wind turbines and solar cells convert the wind or solar energy to electricity with fluctuations; hence storage of energy is needed," Sariciftci says. "Carbon-based fuels are very appealing for this as they show high energy densities. However, the produced fuel should be CO_2 neutral. By using atmospheric CO_2 as a carbon source for fuel production, this can be achieved."

Sariciftci says a university spinoff company, Solar Fuel (www.solar-fuel.com), has developed a device that converts atmospheric CO_2 into methane. Sariciftci will discuss how this type of artificial-photosynthesis fuel production could simultaneously solve the energy storage and energy transport problems of photovoltaic electricity.

John F. Wager, professor of electrical engineering at Oregon State University (USA), will present a plenary discussion on "Transparent

LEDs on the streets

More than 250 cities from across the United States have applied for membership in a new government-organized consortium, led by Seattle City Light, whose goal is the widespread installation and testing of LEDs for street lights. The group is expected to create standards and best practices for municipalities interested in massive installations of LEDs.

The Department of Energy estimates the country has more than 34 million street lights that could be converted to energy-efficient LEDs.

Elsewhere, the European Union implemented a ban on the sale of 100-watt and 75-watt conventional incandescent light bulbs last year. The United Kingdom and Italy have become leading adopters of LED lighting, according to a 2009 study by Frost & Sullivan. China is already the world's biggest producer of LED lighting products, and aims to become the largest consumer of the technology as well.

More on LED street lights in the SPIE Newsroom: spie.org/led-green

Electronics and Emerging Solar Opportunities," also on Monday, 2 August. Wager will introduce some of the uses for transparent electronics and discuss how they apply to photovoltaic energy. "We've come upon some lower-cost ways of doing photosynthesis in organic film," Wager says.

Wager also says that transparent electronics are finding an exciting niche within the display industry, and are being looked at as the next generation technology. "What's more important is not the transparency but their efficiency," says Wager, since transparent electronics can transmit more information in a much smaller space than current LCD technology. "It's looking like these technologies, not just because they're transparent, are going to impact that market and may become an even more important market," he says.

Security and solar applications

Marco DiCapua of the National Nuclear Security Administration (USA) will discuss "21st Century Radiation Detector Challenges for National Security Applications," in a plenary discussion on Wednesday 4 August. DiCapua will talk about solutions and concerns of detection from threats posed by nuclear proliferation, improvised nuclear devices, radiation dispersal devices and other forms of nuclear terrorism.

A panel discussion on commercialization of emerging photovoltaics technologies will be moderated by Loucas Tsakalakos, senior scientist/program leader at GE Global Research, NY; and Sean E. Shaheen, associate professor at University of Denver, CO, at 10:30 am Tuesday 3 August.

Women in Optics speaker

The Women in Optics speaker, Felice Frankel, believes that visual communication is one of the best ways to explain some of the most complicated scientific phenomenon and concepts, and she combines different scientific principles in creative ways. Frankel has made a career out of creating captivating scientific photographs and images and using them to inform and educate others.

One of her projects is Picturing to Learn, an effort to study how student-created representations assist in teaching and learning. The program includes a database of over 4000 drawings created by students from MIT, Harvard, and Duke, all attempting to visually explain difficult scientific concepts. Her latest book, co-authored with chemist George M. Whitesides, is *No Small Matter: Science on the Nanoscale*.

"Coming up with a truly communicative visual expression of one's data or concept is not trivial and should be part of the research process, even from the very beginning," Frankel says. Her talk, "More Than Pretty Pictures," will be about her work in photography and using it to promote scientific knowledge and understanding across disciplines and differing educational levels. The presentation and reception will be at 5 pm, Monday, 2 August.

Student events in San Diego

The student events at SPIE Optics+Photonics also provide an opportunity for hands-on application of science and engineering. The keynote speaker at the Student Chapter Leadership Workshop is Noah Finkelstein, associate professor of physics education research (PER) at University of Colorado, Boulder (USA). Finkelstein's research involves understanding how people learn physics and the importance of learning in context.

"How and what students learn depends not only on traditionally conceived content but also upon the formation of tasks, class environments, and broader institutional structures in which the content is embedded," he says. Finkelstein will discuss some of his research and how researchers can become better learners. "Students who do research and take courses in PER, learn how to learn," he says, "and are more effective researchers, educators, and frankly more empowered citizens."

The workshop, held Saturday 31 July and Sunday 1 August, will be facilitated by career development expert Alaina G. Levine, president of Quantum Success Solutions. Levine will facilitate an interactive, informative, and guaranteed hilarious workshop which will address all the essential skills needed by students to establish themselves as scientific and engineering leaders.

Prototypes and demonstrations

Among the many opportunities to see technology in action will be a demonstration of prototype devices hosted by Risø National Laboratory (Denmark), Friedrich-Alexander-Universität Erlangen-Nürnberg (Germany), Konarka (USA), and other groups at 5:30 pm Wednesday 4 August, in conjunction with a poster session.

Another place to see new prototypes firsthand is on the exhibition floor, open from Tuesday through Thursday, 3–5 August. The SPIE Optics+Photonics exhibition has always been a prime location for spotting technologies and future application trends.

In addition to exhibitors showing off their own latest technologies and devices and the High-Tech Car Pavilion, an "in-action" booth will show the latest technology applications in cell phones, traffic lights, flashlights and other products. There will also be information booths from the non-profit organizations Engineers without Borders and Light Up the World Foundation and a "policy booth" dedicated to helping interpret the latest policies and regulations relating to optics and photonics. ■

–Beth Kelley

Member benefits

Take advantage of your SPIE member discount when registering for SPIE Optics+Photonics.

Meet up with fellow members at social and networking events in San Diego, including an awards reception for Charles Townes, 2010 recipient of the SPIE Gold Medal Award. Read more on page 24.

A members-only reception will be held at 7 pm Tuesday 3 August, following the SPIE annual meeting.

Network with peers and industry leaders at a no-ties reception for early career professionals (7 pm Sunday, 1 August) and a Student Lunch with the Experts (12:30 pm Monday 2 August).

GREEN PHOTONICS

SPIE Optics + Photonics is a leading conference on green photonics technologies such as energy, sustainability, conservation, and environmental monitoring.