



## Light quality and efficiency of consumer grade solid state lighting products

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## Everything's gone green...

...and photonics is at the heart of much of it. Steve Eglash explains the thinking behind the "virtual" Green Photonics symposium at Photonics West.

### How far-reaching is the scope of the Green Photonics symposium?

The Green Photonics symposium has incredible breadth. Green photonics is all about the pursuit of sustainability and using photonic technologies in a way that will allow future generations to live a similarly healthy and comfortable life to our own. As you would expect, we have presentations on the latest technical developments in solar energy, but the scope of the symposium extends much further than photovoltaics (PV).

Attendees will find Green Photonics presentations split into four categories: solid-state lighting (SSL) and displays; laser-assisted manufacturing and micro/nano fabrication; communications; and renewable energy generation: fusion and photovoltaics.

Just to give a flavor, we have papers discussing high-power ultraviolet LEDs emitting at 260nm [paper number 8641-37]; consumer-grade SSL [8641-44]; intelligent management of wind turbines [8601-100]; ultra-thin solar cells [8620-10] and natural daylight illumination systems [8620-67 and 8620-68].

*It is both the best of times and the worst of times for the solar industry.*

### How important was it to introduce the Green Photonics symposium into the Photonics West program?

Green photonic technologies and sustainability have become hot topics in recent years, and interest in this area spans the optics and photonics community in general. We realized, however, that the work being done overlapped with all of the traditional BIOS, LASE, OPTO and MOEMS Photonics West symposia.

Rather than launch an entirely new symposium, the virtual Green Photonics symposium was created. This gives attendees a single portal from which to hear about every paper related to green photonic technologies, regardless of what traditional strand of Photonics West they are a part of.

### How do you assess the current state of the global solar industry?

It is both the best of times and the worst of times for the solar industry. It is the best of times because several manufacturers of silicon solar panels, mostly in China, are producing some of the world's best and most efficient panels at some of the lowest costs and prices that we have ever seen. In fact, the energy generated from such panels is now very close to grid parity.

We are seeing an explosion of solar energy projects worldwide because of the availability of these cheap panels. So for utilities, consumers and developers, the

solar energy industry has never been better. The rate of installations in the US right now is more than doubling every year.

But on the other hand, it is the worst of times for solar panel manufacturers that don't have competitive cost and performance with the industry-leading Chinese manufacturers. For these manufacturers, including most in Japan, the US, and Europe, it is a very difficult time indeed. They can't sell as much of their product as they would like, and what they can sell, they can only sell at a loss.

### What's your prognosis for the solar sector?

I think we will see more of an explosion of a truly worldwide PV industry, much like today's automotive industry. By that I mean that the different components of a PV module will be manufactured and assembled where it makes the most sense to do so. This rests on innovation and invention driven by science and engineering as well as smart decisions about manufacturing and assembly.

Many innovative technologies, such as the development of ultra-thin solar cells and lasers to make manufacturing processes more efficient, will be discussed at Photonics West. In addition, we may be seeing the very early trends of manufacturing coming back to the US. In December, there was a lot of publicity when the CEO of Apple announced an investment of \$100 million to bring the manufacture of Apple computers partially back to the US.



Steve Eglash Credit: Stanford University

### Which technologies do you see solar companies currently investing in?

Many of the largest companies in the US, such as GE, DuPont and Corning, are taking a long-term view and are continuing to make major investments in solar energy despite the tough times wherever possible. These investments are twofold. First, into thin-film technologies, and these may turn out to be the wave of the future.

Second, there is an investment into particular parts of the module that can be used to enhance the performance of silicon solar cells. You do not need to be a completely vertically integrated manufacturer of entire PV modules to play in this field. A company can play in the PV industry without building the entire module. As large as the solar industry is now, it is likely to grow to 10 or 100 times its current size in the years ahead.

### Solid-state lighting (SSL) is another key "green photonics" topic: is it now just a question of reducing cost, or is there still a need for innovation?

Today, there is no doubt that the penetration of LED-based SSL will continue to expand and that prices will continue to come down. It is no longer a debateable subject in my eyes. We are past the tipping point and it is now just a question of the rate at which volumes will go up, prices will come down and exactly how the industry will evolve. While there is still a need for research, all of this is now aimed at enhancing and improving what is already a viable product.

JACQUELINE HEWETT

## GREEN PHOTONICS SYMPOSIUM HIGHLIGHTS:

**Green Photonics Awards** — awards recognizing green photonics research in four distinct application areas will be presented at the OPTO and LASE plenary sessions.

### OPTO Awards (Tuesday morning):

- Solid State Lighting and Displays
- Communications
- Renewable Energy Generation: Fusion and Photovoltaics

### LASE Awards (Wednesday morning):

- Laser-assisted Manufacturing and Micro/Nano Fabrication

**Panel session** — Energy Growth Opportunities in Sustainable Technology:

Tuesday 5 February, 3:30-4:30 pm

### Moderator:

Stephen J. Eglash

### Panelists:

Patricia Glaza, Arsenal Venture Partners  
Thomas Baer, Stanford Photonics Research Ctr.

Aaron Knobloch, GE Global Research  
Jyoti Bhardwaj, Philips Lighting Lumileds  
Eric Crosson, Picarro Inc.