

ESTD

Engineering Science &  
Technology Division

## Solar Technologies Program

### Technology Overview

ORNL has developed a multifunctional & adaptive solar energy system that has the potential to use sunlight both directly and indirectly to more efficiently leverage the entire solar spectrum. This system is called Hybrid Solar Lighting (HSL). HSL currently transports sunlight into buildings to illuminate interior spaces. Roof-mounted collectors concentrate sunlight into optical fibers that carry it inside buildings to "hybrid" light fixtures that also contain electric lamps. As the two light sources work in tandem, control systems keep rooms at a constant lighting level by dimming the electric lights when the sunlight is bright and turning them up as clouds move in or the sun sets. As a result, HSL is close to an order of magnitude more efficient than the most affordable solar cells today and has many advantages over conventional daylighting approaches.

### Solar Technologies R&D

Current research and development for the Solar Technologies program include Hybrid System Components – control board, fiber optics, etc., Buildings Integration, Hybrid Solar Lighting, and Photovoltaic Material. Several groups at ORNL significantly contribute to the solar program – groups from the Engineering Science & Technology Divisions include the Photonics group, Analog and Digital Systems group, Residential Building and Equipment group, and the Materials Processing group from the Material Science & Technology Division.

These groups and divisions offer unique facilities that enable modeling, processing, testing and characterization of PV materials. Our unique capabilities in this area include our High Temperatures Materials Laboratory (a DOE National User Facility), our Pulse Thermal Processing Lab, and our Nanoscience, Engineering, and Technology Lab. We also use an environmental chamber with an electronic load bank to perform cyclic voltammetry on fuel cells. The same system can be used to evaluate small PV modules to characterize their performance at a variety of wavelengths.

### Awards and Recognition

- Excellence in Technology Transfer Award from the Southeastern Region of the Federal Laboratory Consortium, October 2006
- R&D Magazine 2006 R&D 100 Award
- Article in Forbes Magazine, "The Control of Light," October 2005, Vol. 176, Issue 9
- Article in Scientific American magazine, September 2005, pages 22-24
- MSNBC Article on Hybrid Solar Lighting: Bringing a little sunshine into our lives March 2005
- Cover Story in Lighting Design and Applications Magazine July 2003 Issue
- Named Technology of the Year, Industry Week Magazine and Finalist - 2002 Discover Award

### Point of Contact:

Melissa Voss Lapsa, Manager  
Solar Technologies Program  
Engineering Science and Technology Division  
Oak Ridge National Laboratory  
P.O. Box 2008  
Oak Ridge, TN 37831  
Phone: 865-574-8620, FAX: 865-576-0279  
E-mail: [lapsamv@ornl.gov](mailto:lapsamv@ornl.gov) Website: [www.ornl.gov/solar](http://www.ornl.gov/solar)

