

Solid-state lighting promises to transform the way we light the world.

That promise is found in solid-state lighting's ability to save energy, reduce maintenance and change our entire lighting infrastructure. The light-emitting diode (LED), the primary solid-state lighting technology, has been tapped by scientists, government agencies and others as the next generation light source for general illumination in homes and offices.

Much work is needed, however, before we reach the pinnacle of this lighting transformation. The Lighting Research Center's Solid-State Lighting Program conducts research and education needed to help this technology overcome some of the barriers it currently faces in gaining widespread acceptance. The LRC's multidisciplinary team is focusing its efforts in several key areas, ranging from basic lab science to field applications research.



Lighting Systems Research

Solid-state lighting system performance depends not only on the performance of individual components, but also on how they interact. Poor integration can lead to premature failure of LED-based lighting systems. The LRC is analyzing interactions between components such as LEDs, encapsulation materials, power supplies, optics, heat sinks and housing. The LRC team also is designing new ways to package LED systems for better light output, higher luminous efficacy and longer life. The goal is to optimize integrated system performance so that solid-state lighting systems ultimately live up to their promise of long life, energy savings and reduced maintenance.

Applications Demonstration

Although solid-state lighting technology may not yet be ready for general lighting use, each incremental improvement in its development opens doors to more applications where it can replace less efficient light sources. The LRC is identifying and evaluating innovative ways to use LEDs in architectural lighting applications. The LRC conducts field demonstrations and case studies to show where this technology can offer significant benefit compared to traditional lighting technologies and to develop best practices for applying solid-state lighting.

Human Factors Study

For solid-state lighting to gain wide acceptance for general illumination, it must meet people's expectations and needs. LRC scientists are conducting psychophysical and physiological research to understand how people perceive and react to different lighting conditions. The effects of spectrum, intensity, and spatial and temporal distribution are studied to determine the optimum characteristics of a solid-state lighting system.

Education

Education plays an important role in solid-state lighting gaining acceptance for general illumination. As users better understand the strengths and weaknesses of this rapidly evolving technology, successful solid-state lighting applications will grow. The LRC conducts seminars, workshops and short courses to educate and train lighting fixture designers and manufacturers, lighting specifiers, architects and other professionals interested in learning more about LEDs and solid-state lighting.

Industry Collaboration

The Alliance for Solid-State Illumination Systems and Technologies (ASSIST) was established in 2002 to advance the effective use of energy-efficient solid-state lighting and speed its market acceptance. As a collaboration between researchers, manufacturers and government, ASSIST works to identify and reduce the major technical hurdles facing solid-state lighting. On behalf of ASSIST, the LRC conducts research, demonstration and educational activities. Beyond technical research, ASSIST fosters discussions between traditional luminaire manufacturers and LED manufacturers. Through this work, ASSIST is helping LEDs gain widespread use in lighting applications. Sponsors include Cree, Federal Aviation Administration, Lite-On, GE Lumination, New York State Energy Research and Development Authority, OSRAM SYLVANIA, Philips Lighting, Photonics Cluster (UK)/The Lighting Association, Seoul Semiconductor, and U.S. Environmental Protection Agency.

About the Lighting Research Center

The Lighting Research Center at Rensselaer is the world's leading university-based research and educational institution devoted to lighting. Based in Troy, New York, the LRC's staff of 30 researchers, designers and educators is working to advance the effective use of lighting to create a legacy of positive change for society and the environment. The multidisciplinary team includes physicists, architects, engineers, designers, psychologists, biophysicists and communications specialists.

Since 1988, the LRC has collaborated with industry, government, academia and public advocacy groups to make a positive impact on lighting manufacturing, design, specification, installation and use through research, application, education and market transformation. LRC facilities include a fully equipped photometry laboratory, climate-controlled lamp and electrical testing laboratories, a human factors laboratory for researching how people perceive and are affected by lighting, and an engineering workshop to produce fully functional prototypes and models.

For More Information

For details of research projects, a bibliography of LRC publications and a list of upcoming events, please visit the LRC Solid-State Lighting Program Web site: www.lrc.rpi.edu/programs/solidstate

For more information about project sponsorship or the ASSIST program, contact:
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