Selections Made in National Laboratory Call for Core Technologies

The National Energy Technology Laboratory (NETL), on behalf of the US Department of Energy (DOE) is pleased to announce the selection of four (4) applications in response to National Laboratory Call DE-PS26-04NT42103 entitled *Research and Development to Support Solid-State Lighting Core Technologies.* The objective of the Laboratory Call is to support multiple enabling or fundamental solid-state lighting technology areas for general illumination applications. The four selections are anticipated to significantly contribute to the goal of the SSL program:

> *By 2015, develop advanced solid-state lighting technologies that compared to conventional lighting technologies, are much more energy efficient, longer lasting, and cost competitive by targeting a product system efficiency of 50 percent with lighting that accurately reproduces sunlight spectrum.*

The present selections are among the first in a series that may span the next decade. The selections are expected to fill key technology gaps, provide enabling knowledge or data, and represent a significant advancement in the SSL technology base. The knowledge gained from the new selections will contribute to SSL technology maturation, helping to advance SSL from applied research to market acceptance, as targets for efficiency, cost, longevity, stability, and control are demonstrated in a product environment.

The selections are summarized below (subject to negotiation):

Recipient: Los Alamos National Laboratory
Title: Material and Device Designs for Practical Organic Lighting
Project Value: $2,018,369 **Duration:** 36 months
Summary: This project will combine theoretical and experimental study to methodically address key materials challenges for eventual OLED use in general illumination applications. The project will systematically advance the physical and chemical understanding of how previously identified materials-related phenomena can be altered to eventually make very high efficiency, low voltage, stable, inexpensive, and reliable devices. Fundamental knowledge gained from this work is expected to be readily applied to product development...
POC: Darryl Smith (505) 667-2056

Recipient: Pacific Northwest National Laboratory
Title: Novel Organic Molecules for High Efficiency Blue Organic ElectroLuminescence
Project Value: $2,400,000 **Duration:** 36 months
Summary: This three-year project will explore the potential of using established phosphorescent quantum mechanical methods to dramatically increase the internal efficiency of blue electroluminescence. Blue is thought by many to be the color that limits efficacy of white OLED devices. Developing this novel method to substantially increase the yield of photonic processes (instead of producing wasteful heat inside devices) will have a huge impact on near-term products.
POC: Susan Bauer (509) 375-3688

Recipient: Sandia National Laboratories
Title: Ultrahigh-Efficiency Microcavity Photonic Crystal LEDs
Project Value: $1,200,000 **Duration:** 24 months
Summary: This is a two-year project that will leverage work already supported under a FY03 EE Science Initiative (EESI) award. In the laboratory, two-dimensional photonic crystal and its three-dimensional sibling, the photonic lattice, have demonstrated the potential to dramatically increase the efficiency of near UV to blue emissions of certain types of LEDs. However, devising a way to manufacture such complex devices at the feature resolutions needed and with the appropriate ratio of feature size to lattice noise has remained a challenge, inhibiting incorporation of this technology into LED production. This project will build upon modeling work completed under a previous Building Technologies (BT) project to double the external quantum efficiency of existing nitride devices grown on sapphire substrates.
POC: Arthur Fischer (505) 844-6543

Recipient: Sandia National Laboratories
Title: Improved InGaN Epitaxy Yield by Precise Temperature Measurement
Project Value: $350,000 **Duration:** 24 months
Summary: This project will address the production of efficient green LEDs, which are currently the least efficient of the primary colors. Building upon the internationally recognized expertise of the Sandia researchers, this work will advance IR pyrometry to include real time corrections for surface emissivity. Within a very short time, this project could realistically generate a production tool that would have a large impact on LED yield in commercial reactors. Increasing wafer yield would dramatically reduce high brightness LED costs and accelerate the commercial manufacture of inexpensive white light LEDs with very high color quality.
POC: J. Randall Creighton (505) 844-3955