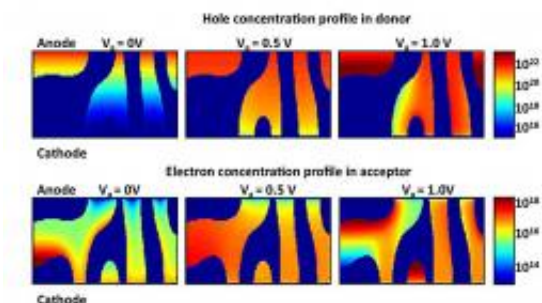


# New center to create models, simulations to improve solar cells

July 27 2010, by Emil Venere

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This graphic shows color-coded simulation results from advanced computational models used to characterize the properties of materials used in organic photovoltaic solar cells in efforts to better understand the physics involved and to improve the technology. The new Network for Photovoltaic Technology research center led by Purdue University and funded by the Semiconductor Research Corporation, aims to develop such computational capabilities for broad range of PV technologies for higher efficiency and reduced manufacture cost. (B. Ray, P. Nair, E. García, and M. Alam, Purdue University)

Purdue University will lead a new research center to improve photovoltaic solar cells as part of a national effort to bring alternative energy technologies to the marketplace.

The work is funded by the Semiconductor Research Corporation, a university-research consortium for semiconductors and related technologies. The SRC has established a \$5 million energy research

initiative, teaming companies with university research centers to work on alternative energy technologies.

The new Network for Photovoltaic Technology will be led by Ashraf Alam, professor of electrical and computer engineering, and Mark Lundstrom, the Don and Carol Scifres Distinguished Professor of Electrical and Computer Engineering.

Work in the center, based at the Birck Nanotechnology Center at Purdue's Discovery Park, will address performance, cost, reliability and manufacturing challenges of [photovoltaic cells](#), which convert sunlight into electricity.

"The center will take advantage of Purdue's extensive modeling and simulation expertise and our national Network for Computational Nanotechnology," said Richard Buckius, Purdue's vice president for research. "The NCN provides analytical models and simulation tools for photovoltaic manufacturers, much as Purdue has done for the [semiconductor industry](#)."

Photovoltaics is a clean energy source, and few other power-generating technologies have as little environmental impact. However, the technology faces several hurdles, primarily costs relating to power generation and transmission. Researchers are working to develop new cells that are less expensive to manufacture, which would reduce costs associated with photovoltaics.

In addition to the photovoltaics center, the initiative includes a smart grid research center at Carnegie Mellon University to support the incorporation of renewable energy resources and provide modeling, simulation and control tools needed to manage, optimize and secure the power grid.

Research in the Purdue-based center will initially address the need for new modeling and [simulation](#) tools to support the development of improved photovoltaic devices.

Since the 1960s, the semiconductor industry has been developing advanced computational models and simulations, which have become critical for the design of electronic devices and have enabled industry to develop new technologies and products.

"We want to do the same thing for photovoltaics," Lundstrom said. "This will be the first center to emphasize the role of models and simulations in this area, and we will seed knowledge gained in this work to industry and other research centers. We're getting in on the ground floor."

The work will include research to precisely characterize the properties of materials used in photovoltaic cells in efforts to better understand the physics involved. Computational models and simulations will enable researchers to test concepts and reliability and also to accelerate the aging of [solar cells](#) to see how long they will last.

"Any estimate of the cost of photovoltaics assumes the cells will last for 20 to 30 years, but what if they're more likely to last 60 years? The cost landscape among competing clean technologies can be altered dramatically as a result," Alam said.

The work builds on previous modeling research led by Alam and Lundstrom to develop advanced models for predicting the performance and reliability of new designs for silicon transistors. The same sort of modeling will now be used for photovoltaics. The initiative also aims to train and educate students, providing them with the expertise and skills needed to transition these new methods into the marketplace.

The work is associated with an interactive Web site called [nanoHUB.org](http://nanoHUB.org),

which makes available scientific simulations, seminars, interactive courses and other specialized nanotech-related materials. It is operated by the NCN, a six-university network funded by the National Science Foundation and based at Purdue. The Intel Foundation also provides support.

Provided by Purdue University

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