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The Business of Micro and Nanotechnology

2004

Best of Small Tech Awards

- Product
- Company
- Researcher
- Innovator

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- Lifetime Achievement

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China: Breaking through the wall to emerging markets

Scotland's Saxl: Assembling a global nano network

U.S. patents: Finally, a way to know what's nano

SMALL TIMES MAGAZINE
2004 RESEARCHER OF THE YEAR: RUNNERS-UP

HERMANN GAUB

Light, 'scope, action! Several years ago German biophysicist Hermann Gaub observed that a photosensitive polymer would contract when exposed to optical pulses. He proved he had a molecular workhorse by attaching one end of a single molecule to a glass slide and the other to the tip of an atomic force microscope. A few pulses of light prompted the molecule to



Photo courtesy of University of Munich

move the tip.

The chair of applied physics at the University of Munich, Gaub predicted at the time he would spend years teasing out the intricacies of this optical-mechanical behavior before photosensitive molecules could be put to use as nanoscale motors or switches. This year he continued to pioneer AFM-based methods to accomplish that goal.

NAOMI HALAS

Rice University's Naomi Halas once described her invention of gold nanoshells as meaty, "with a lot of neat stuff that it was obvious we could pursue." Among that neat stuff has been a noninvasive method for killing cancer cells. This year she and fellow runner-up Jennifer West found nanoshells destroyed tumor cells in mice, and that the mice remained cancer-free.



Photo by George Craig

A chemistry and electrical engineering professor, Halas explores the particle-wave properties of nanomaterials. Understanding light-energy interactions has helped Halas fine-tune nanoshells. Nanoshells absorb near infrared light, which can penetrate flesh without harming it. They then heat up, cooking cancer cells they attach to. Halas also develops tools to identify viruses and proteins.

JOHN ROGERS

Rogers specializes in soft lithography techniques and the use of polymers, liquid crystals and biological materials for flexible electronics and other applications. This year his group unveiled a process for printing silicon structures onto a plastic substrate as well as stamping techniques for making organic transistors.



Photo courtesy of the University of Illinois at Urbana-Champaign

His research interests include flexible displays and tunable microfluidic optical fibers. His publications this year have ranged from work on organic semiconductors to organic light-emitting devices to stamp designs for nanotransfer printing to a phase-mask technique for making complex, 3-D nanostructures. He joined the University of Illinois at Urbana-Champaign in 2003 as a professor in the material science and engineering department.

JENNIFER WEST

West and her research partner Halas (mentioned above) teamed up several years ago to find medical applications for Halas' nanoshells. A bioengineering professor at Rice University, West brought an understanding of how to wed nanomaterials with biology, and how to best conduct animal trials to test the material. She and Halas co-founded Nanospectra Biosciences



Photo by George Craig

in 2001 to commercialize their technology.

Besides her work this year in cancer therapies, she has looked into diagnostic approaches that use nanoshells for molecular imaging and as contrast agents. She won a \$50,000 prize in October for her work in nanotechnology and tissue engineering, where she is exploring applications such as vascular grafts and replacement blood vessels.



Panelists

Researcher

• **Daniel Leff**, executive vice president and managing director at Harris & Harris Group Inc.

• **Terry Michalske**, director of the Center for Integrated Nanotechnology at Sandia National Laboratories

• **Ji-Ung Lee**, Nanotechnology Advanced Technology Program scientist at General Electric's Global Research Center

• **Daniel Hyman**, co-founder and president of XCom Wireless

• **Richard Jones**, physics professor at the University of Sheffield and author of "Soft Machines: Nanotechnology and Life"