Rice nanophotonics lab gets $3 million training grant

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Rice University's Laboratory for Nanophotonics (LANP) has been awarded a highly competitive, five-year, $3 million federal grant for a program to prepare students in the design and fabrication of nanoscale optical components and their applications in emerging technologies.

Nanophotonics, the development of new ways to generate and manipulate light using ultrasmall, engineered structures -- some as tiny as a strand of DNA -- is one of the fastest growing fields in nanotechnology. Nanophotonics spans the disciplines of physics, chemistry, electrical engineering and bioengineering, and it holds promise for important technological advances in industries as diverse as microelectronics, magnetic recording, biomedicine, environmental remediation and homeland security.

The purpose of the training program is to create leaders with the technical and professional skills needed to achieve research breakthroughs in this emerging area and to apply them to a broad range of advanced technologies. The grant was awarded by one of the National Science Foundation's (NSF) most competitive programs, the Integrative Graduate Education and Research Training (IGERT) program.

"Rice has long been known for cross-cutting interdisciplinary research in emerging fields such as biomedicine, information technology and nanotechnology," said LANP Director Naomi Halas, the Stanley C. Moore Professor of Electrical and Computer Engineering and professor of chemistry. "Nanophotonics is proving to be a highly valuable new

approach in advancing all these technologies. Our nanophotonics program includes leading theorists and experimentalists in both the basic and applied sciences, and the IGERT award recognizes that we have one of the nation's top programs."

A major focus of Rice's program is graduate training in the design, fabrication, and use of nanoscale optical components that are compatible with living systems. Key program elements include a core curriculum for all trainees including research methodology and scientific ethics, the opportunity for participants to work with dual advisors from different departments, internship options at a range of industrial and national laboratories and a seminar series featuring internationally renowned visiting speakers.

The program also aims to extend Rice's successful undergraduate recruitment program for Hispanics and other underrepresented minorities into nanophotonics through a new, multiyear summer research program called the CONJUNTO Scholars & Mentors Program.

"One of the strengths of our program is an industrial internship program that will provide our students with opportunities to pursue collaborative projects at some of the leading companies in this young field, including IBM's Research Division, Becton-Dickinson, Quantum Dot Corp., and others," Halas said.

Formed in 2004, LANP's mission is to invent, understand, develop, simulate, control, optimize and apply nanoscale optical elements, components and systems. The laboratory features a strong interdisciplinary research program in three primary areas: metal-based nano-optics, known as "plasmonics", nanoparticle-enhanced sensing and spectroscopy, and nanophotonics applications in biomedicine. The biomedical applications of nanophotonics include the use of nanoshells, a nanoparticle invented by Halas at Rice, in cancer diagnostics and

therapeutics.

NSF's IGERT program was initiated in 1997 to meet the challenges of educating U.S. Ph.D. scientists, engineers, and educators with the interdisciplinary backgrounds, deep knowledge, and technical, professional, and personal skills to become leaders and creative agents for change. The program is intended to catalyze a cultural change in graduate education, for students, faculty, and institutions, by establishing innovative new models for graduate education and training in a fertile environment for collaborative research that transcends traditional disciplinary boundaries.

Halas credits her co-principal investigators with playing an instrumental role in the development of LANP's training program, citing their contribution of numerous strong and innovative ideas. Co-PIs include Peter Nordlander, professor of physics and astronomy and in electrical and computer engineering; Jason Hafner, assistant professor of physics and astronomy and of chemistry; Rebekah Drezek, the Stanley C. Moore Assistant Professor of Bioengineering and assistant professor of electrical and computer engineering; Bruce Johnson, distinguished faculty fellow in chemistry and executive director of the Rice Quantum Institute. Key grant participants include Yehia Massoud, assistant professor in electrical and computer engineering; Yildiz Bayazitoglu, the Harry S. Cameron Professor in Mechanical Engineering and Materials Science; Junichiro Kono, associate professor of electrical and computer engineering; Rebecca Richards-Kortum, the Stanley C. Moore Professor of Bioengineering, professor of electrical and computer engineering and department chair in bioengineering; and Pernilla Wittung-Stafshede, associate professor of biochemistry and cell biology.

Source: Rice University