McCormick Dimension

Robert R. McCormick School of Engineering and Applied Science
Northwestern University

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Leading researcher directs quantum device center

Manijeh Razeghi, one of the world's most respected researchers in the field of semiconductor devices, especially fiber optic telecommunications systems, has joined the faculty at the McCormick School as the Walter P. Murphy Professor of Electrical Engineering and Computer Science. She is best known for the development of new semiconductor compounds and the construction of devices from these materials. Long distance telephone systems in this country and in Europe widely use components that she invented.

Razeghi will head the newly established Center for Quantum Devices, which she predicts will become "a center of gravity for the world of optoelectronic devices." Razeghi was recruited by Dean Jerome B. Cohen from her position as head of the Exploratory Materials Laboratory of Thomson CSF in Orsay, France. During her 10-year tenure at Thomson she was awarded the 1987 IBM Europe Science and Technology Prize, considered the most prestigious physics award in Europe.

"She has been the leading researcher in Europe in this field," said Lester Eastman of Cornell University. "It's a delight to have her here in America. She has devised lasers to generate the light, photodetectors to receive the signal, and transistors to amplify it." He added, "There will be wider applications for her work."

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Noting how dynamic and energetic she is, Venky Narayanamurti, vice president for research and exploratory technology at Sandia National Laboratories, predicted that "Northwestern will not be the same place." He has been following Razeghi's work closely for the past decade, he added.

"She is one of the outstanding materials scientists," said Leo Esaki, Nobel prize-winning physicist at IBM's Watson Research Center. "I admire her."

Razeghi said she was attracted to Northwestern by the environment created for her by Dean Cohen and by the number of leading researchers in physics, chemistry, and materials science as well as in electrical engineering. "It's a real challenge to create the kind of atmosphere at this center that will attract the very best creative minds," she said.

The addition of Razeghi to a faculty already strong in the fields of optics and optoelectronics should make Northwestern a leading research center in that area, according to Abraham Haddad, chair of the department of electrical engineering and computer science.

Razeghi said she is installing the reactor she developed at Thomson that carries out metallorganic chemical vapor deposition, a process that permits a high degree of control over the deposition of specialized materials for high-speed photonic and electronic devices. She also will be installing optical characterization systems, she said.

The center will develop new quantum photonic and electronic devices such as lasers, photodetectors, modulators, and transistors and assemble them into novel optoelectronic integrated circuits, she said. Razeghi has developed a number of semiconductor structures used in advanced photonic and electronic devices, which are widely used in telecommunications systems.

She holds more than 30 patents and is the author of *The MOCVD Challenge*. In the introduction to this book, Pierre Aigrain, then France's minister of education, wrote that Razeghi has accomplished "astonishingly brilliant results." She is the author and coauthor of more than 350 papers.

Razeghi studied nuclear physics at the University of Teheran and received her doctorate in physics from the University of Paris. Two years later she received a doctor of science from the University of Paris, the highest degree awarded in that country. She has been a visiting professor at the University of Michigan and the École Polytechnique in Lausanne.

In 1990 Razeghi chaired the International Conference on Physical Concepts of Materials for Optoelectronic Device Applications held in Aachen, which drew 500 of the world's leading researchers. "She called and told me I had to be there, so I was," said Eastman.

She is coeditor of the *Journal of Applied Physics A* and a member of the editorial boards of *Semiconductor Science and Technology* and the *Journal of Optoelectronics*.

A "superlattice," to be used as a quantum well laser. It consists of 10 alternative layers of gallium indium arsenide and indium phosphide, each layer measured in millionths of a centimeter. Professor Razhegi was the first to construct this type of quantum well using the new method of metallorganic chemical vapor deposition.