McCormick Dimension

Robert R. McCormick School of Engineering and Applied Science
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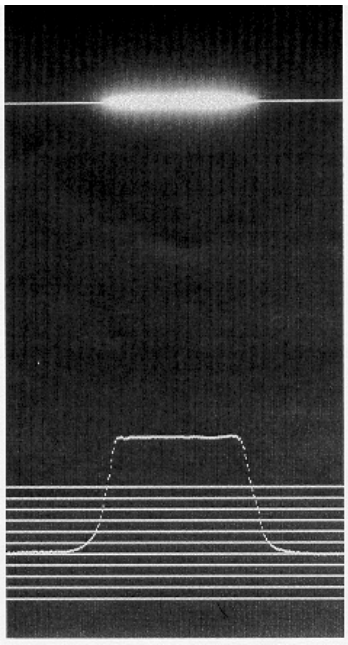

Far left, Manijeh Razeghi, Walter P. Murphy Professor of Electrical Engineering and director of the Center for Quantum Devices, in her characterization lab at the Technological Institute; at left, an image from infrared spectroscopy of a 0.98 micron laser, constructed in Razeghi's lab. The laser is so tiny a microscope is used to study its properties. The line at the bottom indicates the uniformity of the laser's intensity.

New optoelectronic chip built at Northwestern

Researchers at Northwestern University have succeeded in building what are believed to be the most precise and long-lasting lasers ever constructed on a silicon base. The achievement is an important step toward the marriage of electronics and photonics on a single computer chip.

The lasers, so small they are almost invisible to the human eye, were built layer by layer in a specially constructed pressurized chamber. They were built directly on a silicon substrate, the same base that is used throughout the electronics industry.

The research paves the way for a new generation of devices that can combine electronic and photonic features in the same integrated circuit. Photonic, or laser-based, devices are much faster than electronic devices and are expected to play an increasingly important role in computing and communications systems.

The research was presented at the Semiconductor Laser Conference in Takamatsu, Japan, on September 28 by Manijeh Razeghi, Walter P. Murphy Professor of Electrical Engineering and Computer Science and the director of the Center for Quantum Devices at McCormick. An article on the findings will appear in a forthcoming issue of *Electronics Letters*.

"This is enormously important to the future of electronic systems," said George Wright, program director for the electronics division in the Office of Naval Research. "For years they've been trying to put indium phosphide on silicon. Now it appears she has found a way to do it." Indium phosphide is the material now used, in conjunction with gallium arsenide(InGaAsP/InP), to make the most precise and durable lasers for computing and long-distance optical fiber communications systems.

Currently, there are optoelectronic devices that can perform the same basic functions of lasing, detection and, in the case of long-distance fiber optics systems, boosting the signal. But the devices are a costly blend of elements, each built on its own substrate and held together awkwardly.

"It's an important technological achievement," said Lester Eastman, professor of electrical engineering at Cornell University and a leading researcher in the field.

He noted that computer companies in particular are attempting to move to higher speeds and that this kind of integrated circuit is one of the most promising approaches to achieving that increased efficiency.

Razeghi has been a leading researcher in optoelectronics for the past decade, for most of that time as the head of the exploratory materials laboratory of Thomson CSF in Orsay, France. In 1987 she won the IBM Europe Science and Technology Prize. She joined the faculty at the McCormick School of Engineering one year ago.