BERKELEY'S TINY LASERS ANOTHER STEP IN LONG PATH TOWARD USABLE PRODUCT

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LOS ANGELES, June 11, 2001 - Berkeley is beaming about what it's calling the world's tiniest laser, but some experts say there is still a long way to go before the research translates into a real product.

Peidong Yang, assistant professor in the department of chemistry at the University of California, Berkeley and his colleagues at Lawrence Berkeley National Laboratory have developed a laser that is about a thousand times smaller than a human hair. The nanoscale device could be used to store more information on high-density compact discs, analyze chemicals on microchips and be used in medical applications such as eye surgery.

But experts are saying that as wonderful as it sounds, it's not time to herald a breakthrough - at least, not yet.

"You wouldn't call it the first nanolaser," said Jim Heath, professor of chemistry at University of California, Los Angeles.

"Peidong's work is nice and beautiful, but it really isn't that different than the Los Alamos and MIT work. Taking these tiny quantum structures and putting them in some material that causes them to become lasers is not that different from work that has already been done."

In October, through a collaboration led by Victor Klimov of Los Alamos National Laboratory and Massachusetts Institute of Technology, lasers were made from spherical particles. Yang's group used little rods instead, but the nature of the technology is not that different, Heath said.

Yang said that his nanocylinders are larger than the spherical clusters used in the MIT research, but the collection of clusters is larger than his individual nanocylinders.

To make the lasers, Yang and his team deposited thin-cut sapphires on a substrate. A thin layer of gold was placed over them to act as a nanowire growth catalyst. Zinc oxide and oxygen vapors were added, causing a chemical reaction and condensation and crystals to form. Within two to 30 minutes, the crystals grew nanowires, Yang said. Once they were made, another laser was used to excite the electrons in the nanowires, and they emitted photons or light in short blasts.

He said the technology, which took two years to research and cost $500,000, is the first generation of a useful nanodevice.

But that's also up for debate.

"I wouldn't jump up and down with this as the invention of the century," said Michael Tan, project manager of optical electronics at Agilent Technologies in Palo Alto, Calif. "It's just a lab curiosity. In terms of practicality, they'll have to demonstrate that you can inject electrical current into the lasers instead of pumping it with another laser. ... If they show that, then it might pique people's interest."

It would take about two years to regulate the light coming out of the lasers. "Then we could think about using it in photonic computers," said Yang, who said he has been talking with a few companies about investments.

Because the materials Yang used were different from the ones used in the MIT and Los Alamos collaboration, Yang's device could potentially emit light with a different class of properties. The result would be different functional applications, Heath said.

Yang's nanolaser emits short-wavelength ultraviolet light that could be useful for internal communication between two parts of a computer chip. However, it would have a tough time finding a niche in the optical data communications arena, where a longer wavelength is needed to move data through glass optical fibers.

Researchers are trying to produce low-energy-threshold lasers that are very simple and easy to operate. The lower the energy, the more flexible the operations.

"If it takes a whole lot of voltage, you can't put it in very many places; but if it takes very little you can imagine it in all kinds of environments," Heath said. "If the various people working in these areas can demonstrate low voltage and high flexibility then this can become a real technology with commercial applications."

But that won't be for a while, say five years or so. And then the applications may be broad. If the technology proves to be efficient and capable of emitting white light, laser light may flood the marketplace and replace basics like household light bulbs, Tan said.