

Miniature lasers could help launch new age of the Internet

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Sabine Freisem, a senior research scientist who has been collaborating with Deppe for the past eight years, works on lasers in their UCF lab. Credit: UCF

A new laser device created at the University of Central Florida could make high-speed computing faster and more reliable, opening the door to a new age of the Internet.

Professor Dennis Deppe's miniature [laser diode](#) emits more intense light than those currently used. The light emits at a single wavelength, making it ideal for use in compact disc players, laser pointers and optical mice for computers, in addition to high-speed data transmission.

Until now, the biggest challenge has been the failure rate of these tiny devices. They don't work very well when they face huge workloads; the stress makes them crack.

The smaller size and elimination of non-semiconductor materials means the new devices could potentially be used in heavy data transmission, which is critical in developing the next generation of the Internet. By incorporating laser diodes into cables in the future, massive amounts of data could be moved across great distances almost instantaneously. By using the tiny lasers in optical clocks, the precision of GPS and high-speed wireless data communications also would increase.

"The new laser diodes represent a sharp departure from past commercial devices in how they are made," Deppe said from his lab inside the College of Optics and Photonics. "The new devices show almost no change in operation under stress conditions that cause commercial devices to rapidly fail."

"At the speed at which the industry is moving, I wouldn't be surprised if in four to five years, when you go to Best Buy to buy cables for all your electronics, you'll be selecting cables with laser diodes embedded in them," he added.

Deppe and Sabine Freisem, a senior research scientist who has been collaborating with Deppe for the past eight years, presented their findings in January at the SPIE Photonics West conference in San Francisco, where *PhysOrg.com* participated as a media sponsor.

Deppe has spent 21 years researching [semiconductor lasers](#), and he is considered an international expert in the area. sdPhotonics is working on the commercialization of many of his creations and has several ongoing contracts.

"This is definitely a milestone," Freisem said. "The implications for the future are huge."

But there is still one challenge that the team is working to resolve. The voltage necessary to make the laser diodes work more efficiently must be optimized

Deppe said once that problem is resolved, the uses for the laser diodes will multiply. They could be used in lasers in space to remove unwanted hair.

"We usually have no idea how often we use this technology in our everyday life already," Deppe said. "Most of us just don't think about it. With further development, it will only become more commonplace."

Deppe joined UCF in 2006 after several years at the University of Texas at Austin. He has a Ph.D. in Electrical Engineering from the University of Illinois, and he has earned many prestigious awards. He was the 1999 Optical Society of America Nicholas Holonyak Award winner and was named a fellow by the OSA and Institute of Electrical and Electronics Engineers in 2000.

Freisem has a Ph.D. in Physics from Leiden University in the Netherlands. She worked with Deppe at UT before moving to UCF in 2006.

Provided by University of Central Florida

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