

# Scatterings



(Left) Sensors Unlimited's Gregory Olsen is taking his company's near-infrared camera to space. (Below) Olsen will conduct experiments on the International Space Station.

I always had a fascination with space. I never dreamed I'd get there, until a year ago."

The Sensors Unlimited near-infrared camera has a wavelength sensitivity of 0.9 -1.7  $\mu\text{m}$ . "It will undoubtedly be the smallest, lightest weight, least power, highest sensitivity, uncooled infrared camera—all of which are critically important to space applications," Olsen said. "We plan to observe the Earth, its atmo-

sphere, looking at things like 'airglow,' which allows night vision, and I also plan to do some astronomy with the help of our partners at the University of Virginia."

Olsen also plans to carry out work in the area of crystal growth during the voyage. "The current furnace on the NASA module goes up to 850 Celsius max," he said. "Check your handbooks and you will see that this limits the choice of semiconductor crystals, since many—like our beloved InGaAs—melt well above this temperature. One material that fits the bill here is InGaSb, which could make detectors around the 5- $\mu\text{m}$  cutoff. I'm currently working with Bill Bonner of Crystallog and Alex Ostragorsky of RPI to design appropriate experiments. While still in the planning stage, if we pull this off, these could be the biggest ternary bulk crystals of InGaSb ever grown, thanks to the microgravity environment only available on the space station."

Olsen currently is being trained for life in space at the Yuri Gagarin Cosmonauts Training Center in Star City, Russia. His official launch date is April 2005, but there's a chance he could leave as early as October. "Going into space is like starting a company: it's never a one-man show, but depends on good people and great teamwork. The Sensors Unlimited employees will play a big role in my space mission and deserve a lot of the credit for it happening in the first place."

## Research That's Out of This World

An optical scientist is buying a seat to space. Gregory Olsen, chief executive officer of the Princeton, N.J.-based firm Sensors Unlimited, plans to become the next civilian to visit the International Space Station. He is paying \$20 million to ride on Russia's Soyuz spacecraft, where he will work with his company's near-infrared camera, grow crystals and, he hopes, inspire some kids back on Earth to take an interest in physics.

"I taught physics in graduate school and miss doing it," he said. "I used to love going into my daughters' elementary schools and making batteries out of lemons and magnets out of batteries and

wires. I think physics is really fun ... it just has to be presented in a positive, receptive way. I was no genius; I almost flunked out at one point, yet somehow I persevered on to get a Ph.D. I'd like to motivate other kids to do likewise."

Indeed, a moral of Olsen's story is that perseverance pays off. He says he was a high school "screw-up" who almost

didn't make it to college. He eventually received a doctoral degree in materials science from the University of Virginia, where he was trained in metal physics and crystal defects. "I put this to use at RCA Laboratories growing compositionally graded layers of InGaP and GaAsP to study dislocations. I did hydride vapor

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phase epitaxy of materials like InGaAs and InGaAsP and grew some of the first cw lasers and photodetectors using this technique. I guess this is where my interest in optics began."

In 1992, he founded Sensors Unlimited, a developer of shortwave infrared imaging products. In 2000, he sold the company to Finisar Corp. for \$700 million; his team bought it back after the telecom bust in 2003 for \$7 million.

So a \$20 million field trip is well within Olsen's reach. He will be the third civilian to buy a ticket to space through the Virginia-based company Space Adventures. "I remember Sputnik vividly. I was in the seventh grade.

## Laser Light Pulses Pinpoint Electrons

Scientists at the Vienna University of Technology, the Max Planck Institute for Quantum Optics and the University of Bielefeld have developed a kind of ultrafast stopwatch that measures atomic processes with an accuracy of fewer than 100 attoseconds.

The team accomplished this by precisely controlling hyperfast oscillations in a short laser pulse and synchronizing these pulses with a string of ultrashort X-ray pulses.

"A 250-attosecond X-ray pulse initiates the atomic process to be measured and the attosecond stopwatch at the same time," according to a Max Planck statement released earlier this year.

"This new measuring method now allows for the first time observation of ultrafast processes in the electron shell of atoms."

Taking snapshots of fast-moving microscopic particles is useful for researchers working in a range of fields,



(Left to right) Eleftherios Goulielmakis, Andrius Baltuska, Reinhard Kienberger and Matthias Uiberacker used a laser system to help develop an ultrafast stopwatch.

from chemistry to biology, said the team's Ferenc Krausz.

"It's impossible to shorten pulses of visible light below 1 femtosecond, so we

have arrived at a limit set with lasers in the visible spectra range," he said. "So the question arose: Are there potential applications that require even shorter pulses? Is there any point in moving any further?"

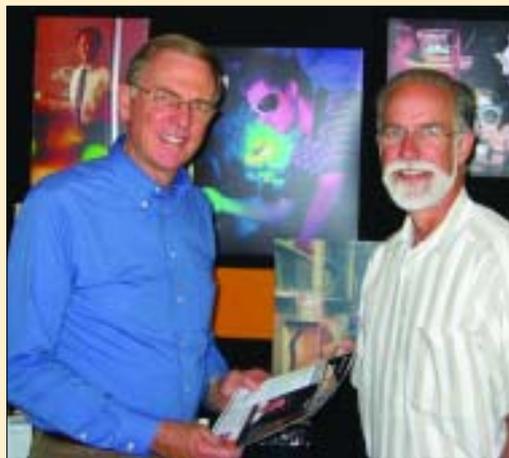
The answer was yes, Krausz said, because "the motion of atoms in molecules is not the only motion we can be interested in. There is motion inside atoms, electrons circling around the core. These electrons are by more than a factor of a thousand lighter than the entire atom. Consequently, they are able to undergo transitions between quantum states much faster than atoms can change their positions in molecules: the durations of these transitions is measured in tens to hundreds of attoseconds."

The processes that take place amongst the excited electrons can provide information that might lead to the development of new materials, and perhaps also to the design of a compact X-ray laser, Krausz said.

Articles in "Scatterings" are written by Kim Douglass, assistant managing editor of *Optics & Photonics News*. Do you have a story idea? Write her at [kdougl@osa.org](mailto:kdougl@osa.org).

## DID YOU KNOW?

The University of Central Florida's School of Optics: CREOL & FPCE (Center for Research and Education in Optics and Lasers/Florida Photonics Center of Excellence) has hired an associate director to build business partnerships and cultivate additional funding sources. James Pearson most recently served as executive director of the Instrumentation, Systems and Automation Society. Previously he was executive director of the International Society for Optical Engineering (SPIE). In 2003, CREOL received \$10 million in state funding to strengthen research in areas such as imaging and displays, biophotonics and nanophotonics. In the newly created post, Pearson will also serve as a special assistant to the vice president for research, focusing on relationships between UCF researchers, industry and other universities. "CREOL has a well-deserved reputation for being very capable in partnering with industry and for understanding industry priorities," Pearson said. "I hope to build on that base."



CREOL's James Pearson (left) and Director Eric Van Stryland. Van Stryland will be OSA's president in 2006.