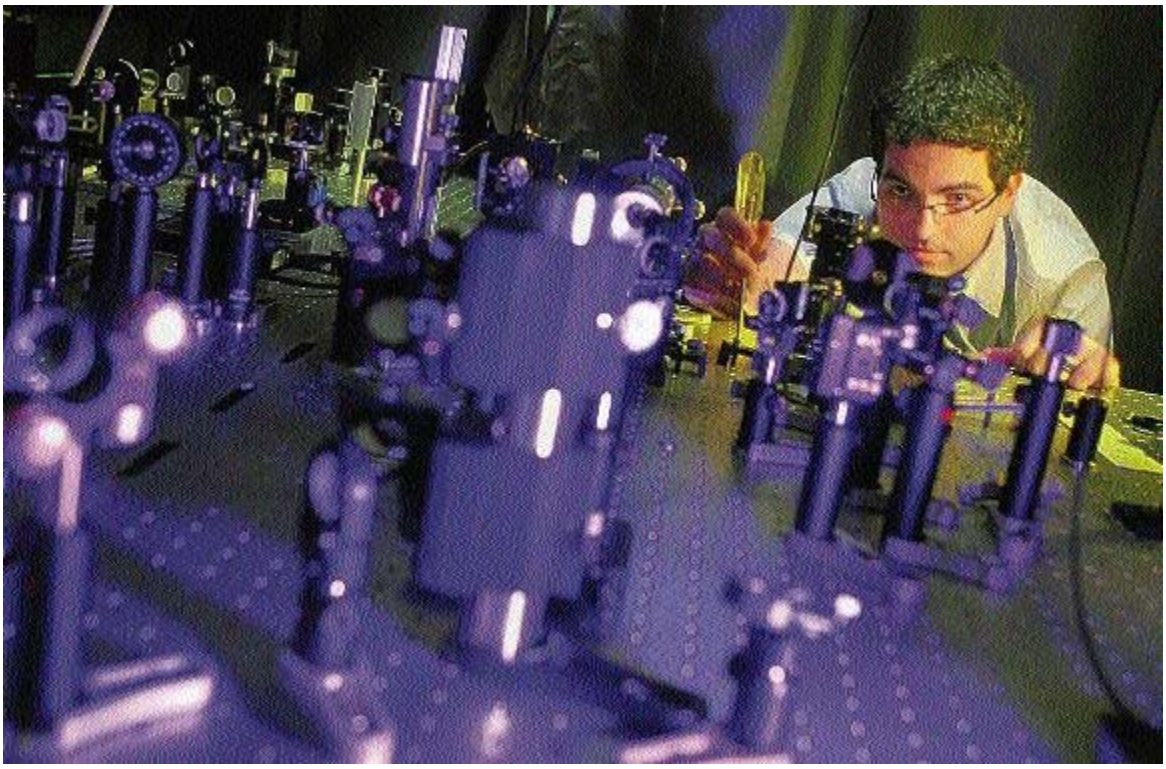
New laser shines light on live cells

NRC lab negotiates deal to commercialize breaking technology

BY TOM SPEARS, THE OTTAWA CITIZEN DECEMBER 30, 2009



Graduate student Adrian Pegoraro adjusts the optics and mirrors used to better the image of a cell sample in the CARSlab microscope.

Photograph by: Julie Oliver, The Ottawa Citizen, The Ottawa Citizen

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It's nearly three years since this newspaper picked Albert Stolow as someone to watch in 2007, one of a group of Ottawa people doing exciting things.

Someone has been watching, it turns out.

In Japan.

Stolow's lab at the National Research Council has just negotiated a deal to commercialize technology he invented: a microscope that uses lasers to show the insides of live cells.

Olympus, a Japanese maker of cameras, microscopes, and other optical equipment, will manufacture and sell the laser microscopes.

What Stolow gets out of the deal is a little more unusual. With the microscope Olympus built from his technology, Stolow's lab on Sussex Drive is becoming a place for medical researchers to bring their problems.

It isn't even a medical lab. Albert Stolow is a physicist. Sometimes, though, the road through a physics problem can take some funny turns.

It's called CARSlab. (The initials stand for Coherent Anti-Stokes Raman Scattering.) The idea is that all molecules vibrate slightly in distinct ways, based on their structure. The microscope can detect vibrations from certain types of molecules, especially the fatty ones called lipids. This makes all the lipid molecules stand out in the image.

Since lipids make up everything from cell membranes to the outer coating on nerves, and even the bad stuff that blocks your arteries, it's useful to examine in many fields of research.

Back to 2007.

"We showed (Olympus) the images we were getting, and they wrote to us and said, 'How do you do that?' Because they couldn't do that," Stolow recalls.

"It took about a year to negotiate, and they were pretty tough negotiators, but eventually we came out with an agreement," says Stolow, whose lab now has a machine he can make available to medical researchers in Canada.

"A scientist from Carleton or Toronto or Queen's or anywhere can come and use this.

"We'll provide the technical infrastructure and also training. So there's going to be an annual workshop where medical people who may even be familiar with microscopy, but don't know this technique, can come to this lab.

"People can bring their microscope slide with their problem on it."

Last month, the lab held an open house to show its new technology. They expected 50 visitors and got 200. (Olympus, which put on lunch, had to keep ordering extra food.)

The advantage to this technique is that the Stolow microscope can show living cells at work without having to add dyes that make individual cell parts visible against the overall grey background. Dyes make things look good, but they also change the chemistry inside a cell.

"We can do microscopy without additives," Stolow says happily. "These (diseases) are complicated things. You're not sure what's going on, so you want to study the natural system" without adding chemicals.

"Scientists always like to say, 'This technique is the greatest thing since sliced bread,' and most of the time it turns out not to be true. So what's important about this is it wasn't just a bunch of physicists saying, 'Look, we invented this doohickey.' There are actual medical researchers" using it.

Eric Marcotte, the associate director of the Regenerative Medicine and Nanomedicine Initiative of the Canadian Institutes of Health Research, says CIHR is funding the work because it's an exciting innovation.

One medical researcher who has toured the lab is David Courtman, who studies vascular disease at The Ottawa Hospital Research Institute.

"I'm excited about anything that can give us better understanding of cells in their real-lifetime

environment," Courtman says.

"This is one of those tools that could do that for us," both with the microscope and other optical work Stolow is pursuing.

It may be optimistic to say that biologists will come to the Stolow lab in large numbers, Courtman believes, but the new technique is welcome, and the job is to tell biologists about it.

"What we often miss in biology is that physical (i.e. physics-based) expertise."

Stolow notes that his commercialization didn't follow a pre-mapped path.

"I've spent a long time thinking about this. Why did we come up with this? Harvard had been working on this for 10 years. Why did it happen at NRC?"

Because his funding allowed him to do what scientists call "basic" research, he says. That means asking fundamental questions about how things work without trying to develop a product from the start.