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## Rensselaer Licenses Microscope Technology To Thorlabs

### Adaptive Scanning Optical Microscope automates challenging laboratory tasks

Troy, N.Y. — An innovative microscope technology invented by researchers at Rensselaer Polytechnic Institute has been licensed by Thorlabs Inc., a manufacturer of photonics products. The device, which is called the Adaptive Scanning Optical Microscope (ASOM), provides the ability to view large areas of a sample without sacrificing image resolution. It is especially suited for automating difficult tasks in biological laboratories, from diagnosing cancer to discovering new drugs.

The technology was invented at the Center for Automation Technologies and Systems (CATS) at Rensselaer by Ben Potsaid, John Wen, and Yves Bellouard, based in part on funding from the National Science Foundation. Thorlabs has donated equipment to CATS in the past and also actively supports the Smart Optics Laboratory, one of several labs at CATS, where the ASOM research is continuing.

"We are very excited about this license and technology transfer," said Wen, who is also director of the CATS. "We have had an ongoing relationship with Thorlabs, and we look forward to working with them to help accelerate the development of the ASOM to market."

Alex Cable, Thorlabs founder and CEO, said of the new collaboration, "I see great potential for a myriad of new applications that will evolve from the Adaptive Scanning Optical Microscope technology. I feel we are uniquely positioned to bring this technology to market in a manner accessible to researchers worldwide. Additionally, the opportunity to support the Smart Optics Laboratory at CATS is another building block in our mission to provide support to researchers in the U.S. and abroad."

"Rensselaer's ASOM technology opens new opportunities throughout the world of microscopy, from biomedical research to industrial inspection, and we are delighted to partner with Thorlabs to realize its full potential," said Ron Kudla, executive director of the Office of Intellectual Property, Technology Transfer and New Ventures at Rensselaer.

Laboratory workers have benefited greatly from automated microscopes that can outperform even the most skilled human operators. These systems can capture information that can be difficult or tedious for humans, such as tracking moving organisms or processing large numbers of samples automatically. But there is an inherent tradeoff between field-of-view and magnification — as you zoom in on a subject, the amount of area you can see in the viewfinder gets smaller and smaller. This means that large regions of a sample cannot be imaged at high resolutions without moving the sample or microscope, potentially causing undesirable disturbances, according to Potsaid, who also leads the Smart Optics Lab at CATS.

The ASOM overcomes this obstacle by scanning a mirror over the sample, while a camera captures a series of small, distinct snapshots. These images are then assembled into a mosaic, providing a much larger field-of-view at very high resolution, without the need to switch lenses or move the sample.

The challenge with this method is that when the mirror is not looking straight down onto the sample, it introduces blurriness. CATS researchers fixed this problem by employing an adaptive optic element, in this case a “deformable” mirror that changes shape to correct for the off-axis aberrations that cause the blurring. The device, which functions much like a dynamic funhouse mirror, is made up of tiny Microelectromechanical Systems (MEMS), allowing the ASOM to operate 10-100 times faster than current automated microscopes without disturbing the specimen.


The ASOM offers other advantages as well. The microscope can be programmed to quickly scan specific regions of interest in the sample, bouncing back and forth between tracking multiple moving objects. This feature could be useful for observing live microorganisms or in monitoring microscale industrial processes.

Rensselaer’s technology will initially be marketed by Thorlabs as a benchtop instrument for biological laboratories and microrobotics research. In the future, it could be used in industrial quality assurance and automated medical diagnostics.

A paper by Potsaid, Wen, and Fern Finger, assistant professor of biology at Rensselaer, was awarded best paper at the IEEE Conference on Automation Science and Engineering in Shanghai Oct. 9, 2006.

#### **About Thorlabs**

Thorlabs Inc. is a broad based optical technologies company. Its product portfolio covers an extensive array of products ranging from simple optical and mechanical components, to integrated test and measurement systems. Thorlabs catalog products are produced in manufacturing centers in the USA, Germany, Japan, Sweden, and the UK. As photonic devices push into new markets, Thorlabs’ plan is to enter early with support equipment and services that are required to ensure the ultimate success of our customers.

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#### **About Rensselaer**

Rensselaer Polytechnic Institute, founded in 1824, is the nation’s oldest technological university. The university offers bachelor’s, master’s, and doctoral degrees in engineering, the sciences, information technology, architecture, management, and the humanities and social sciences. Institute programs serve undergraduates, graduate students, and working professionals around the world. Rensselaer faculty are known for pre-eminence in research conducted in a wide range of fields, with particular emphasis in biotechnology, nanotechnology, information technology, and the media arts and technology. The Institute is well known for its success in the transfer of technology from the laboratory to the marketplace so that new discoveries and inventions benefit human life, protect the environment, and strengthen economic development.

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