

PHOTONICS TODAY

1st Quarter, 2003

Institute for Ultrafast Spectroscopy and Lasers
New York State Center for Advanced Technology in Ultrafast Photonics at The City University of New York

Northrop-Grumman Continues Support for CAT

Research Funding in Biohazards Detection

Industrial Partner Northrop-Grumman of Bethpage, New York continued its support the CAT with an unrestricted donation for research in the general area of biohazard

detection. Northrop-Grumman is a leader in the field of biohazard materials detection, and has received major funding from the United States Post Office for ongoing development

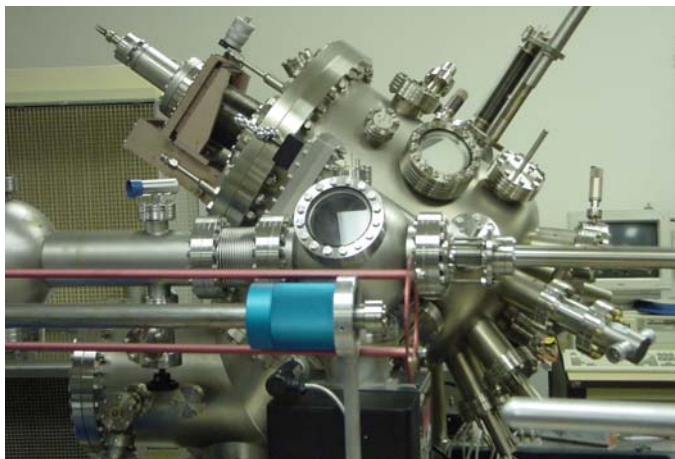
of its Bio-Agent Detection System. This important application is a major focal point of CUNY's ongoing photonics research.

Contribution of MBE Equipment

Northrop-Grumman has also donated a large Molecular Beam Epitaxy (MBE) setup to the CAT. The equipment consists of two MBE growth chambers, one (Riber) that has previously been used for the growth of II-VI materials, and another (DCA) that was used for GaAs growth. Ultra-high vacuum (UHV) modules interconnect the two chambers. In addition, there is a third chamber, also connected by UHV, which houses key surface analysis tools, including Auger, XPS and SIMS. The chambers are being installed in the Marshak Building at CCNY. One will be dedicated to II-VI materials to complement the existing work

in this area at City College. The second one is being outfitted to grow GaN-based compounds. They will greatly enhance our

nanostructure materials growth capabilities and will contribute directly to the research of several CAT projects.



One Chamber of the MBE Equipment Donated by Northrop-Grumman

OIDA's Future Vision Workshop Recognizes CUNY Photonics

CUNY Photonics research was highlighted at the Defense Advanced Research Projects Agency (DARPA) sponsored Technology Roadmap Workshop entitled "Future Vision: The Next Generation Optoelectronics Technologies and Markets" which was organized by the Optoelectronic Industry Development Association (OIDA) and held in Rochester, NY in late October, 2002.

The CAT's Paul Roehrenbeck presented the our research in the general area of Biophotonics, and participated in the panels which considered specific application areas and their likely impact on, and need for, optoelectronic devices. One of the highlights was the presentation of the "Photonics Pill" being developed under a grant from the Infotonics Technology Center in Rochester, NY.

The one-and-a-half-day roadmapping workshop brought together top representatives of industry and academics from a broad range of optoelectronics specialties and applications. The intent was to formulate recommendations for government and industry to eliminate the roadblocks to new uses for optoelectronics products and to identify activities that will lead to future growth of the industry.

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Infotonics University Day Marks Opening of Center

The Infotonics Technology Center marked its official opening in Rochester with a University Day on October 29, 2003. CUNY CAT Business Development Manager Paul

Roehrenbeck joined other representatives of the New York State universities which have received Infotonics grants in a series of presentations on the photonics projects which

are being funded. CUNY CAT's Compact Photonic Explorers project was one of three research grants in the area of "remote health detection."



"The designation of a NASA University Research Center would further New York State's growing reputation as a national leader in academic research."

George E. Pataki
Governor, New York State
From letter of support to NASA

CAT Director and Faculty Awarded \$6M NASA Grant to Establish Center for Optical Sensing and Imaging at CCNY (COSI)

The City College of New York (CCNY) has been awarded a \$6 Million 5-year NASA grant to establish a Center for Optical Sensing and Imaging (COSI) under the direction of CAT Director Robert R. Alfano and CAT faculty member Sam Ahmed.

The mission of COSI is to develop methods and instruments for sensing and imaging of the earth and environment and to train underrepresented minority students in related sciences and engineering.

Support for creating the Center has been tremendous. New York State Governor George E. Pataki, who provided \$350,000 in matching funds to be used for researcher salaries, student training, and outreach, has said "The designation of a NASA University Research Center would further New York State's growing reputation as a national

leader in academic research."

City University and City College have provided over \$2 Million in matching funds to the Center, including over \$800K in cash support for new equipment purchases, salaries and other direct costs, and over \$1,200,000 in in-kind support for staff salaries. According to CCNY President Greg Williams, "The City College is proud of its history in training talented students from underrepresented ethnic groups for careers in the sciences." He adds, "The Center will produce high-quality, cutting-edge research with significant economic and social impacts and at the same time train minority students to become the scientists of tomorrow."

The scientific and technological objectives of COSI include development of optical techniques and instruments (for in-situ and

ground- and satellite-based remote applications) for: atmospheric and ocean monitoring; imaging targets and transmitting optical signal through clouds, fog, ice, and rain; development of lasers and detectors for use in remote sensing and optical communications; detection of vegetation and land cover; measurement of the temperature of ocean waters; and, sensing microorganisms (e.g., bacteria) in the environment.

The research and training will boost the CUNY CAT's efforts by expanding research capabilities, providing support for students and staff members, and allowing purchase of permanent equipment. The technologies to be developed by COSI are of interest to CAT industrial partners who have formally supported this program and will serve on the Center's Advisory Board.

Molecular Detection Patent has Bio-Hazard Application

CAT Director Robert Alfano's patent #5,474,910, *Method and Device for Detecting Biological Molecules and/or Microorganisms Within a Desired Area or Space* has attracted interest from several companies who are interested in developing bioterrorism detection tools.

The real time method involves the illumination of a designated space or area with specific wavelengths of light and measuring the resultant fluorescence light which emanates from biological molecules and microorganisms which may be present.

The patent also sets forth

specific illumination wavelengths associated with various molecules along with the resultant fluorescence emissions.

This technology has potential for a portable instrument for use in real time detection of bacteria and viruses in urban areas and battlefields.

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City College National Ranking Noted

U.S. News and World Report, in its 2003 "America's Best Colleges" issue, reports that City College moved up from Tier 3 to Tier 2 among northern

colleges and universities offering the undergraduate and master's level programs. City College President Williams Gregory H. Williams stated "This is an

outstanding achievement and shows that our improvement is gaining national recognition."

The Supercontinuum Laser Source

The Supercontinuum Laser Source, edited by R. Alfano (Springer-Verlag, New York, 1989) has been used as the basis for a forthcoming special issue of *Applied Physics B: Lasers and Optics*. Supercontinuum Generation, edited by Aleksei Zheltikov of the International Laser Center at Moscow State

University, will survey the newest developments in the study of the supercontinuum. Since the supercontinuum's discovery by Dr. Alfano, many advances have been made in its description and the development of its many diverse applications. Laser pulses have been significantly shortened in the

femtosecond region, and new fiber families have been developed, capable of supercontinuum generation for communication at very low energy levels. These developments have combined to open new horizons in ultrafast science, with short (attosecond) pulse generation, and new applications.

Optics Letters Notes Prof. Alfano Contributions

CAT/IUSL Director Professor Robert Alfano was listed among the most prolific contributors to the prestigious journal *Optics Letters*, in an article in *Optics and*

Photonics News. Alfano was fourth in the ranking, having authored 73 papers for the journal. He was also listed among the most cited

contributors, with over 1,162 citations to his *Optics Letters* papers.

CUNY Photonics People

Anthony M. Johnson, PhD, is one of America's leading researchers and educators in the field of ultrafast optics and optoelectronics. He was 2002 President of the 15,000 member Optical Society of America (OSA) and is a Distinguished Professor and Chairperson of the Department of Physics at the New Jersey Institute of Technology (NJIT) in Newark. Professor Johnson spent 15 years in the Research Division of AT&T Bell Laboratories (now Lucent Technologies) before being recruited to Chair the Physics Department at NJIT. Most recently, NJIT announced his appointment as a Foundation Professor of Optics and Photonics at a gala event. He received a PhD in Physics in 1981 from City College of the

City University of New York (CCNY) with support from a Bell Labs Cooperative Research Fellowship. Professor Johnson had the remarkable opportunity to perform his dissertation research, the first investigation of ultrafast electronic transport in amorphous silicon using picosecond photo-conductivity, in the laboratories and under the joint supervision of two world renowned figures in the field of ultrafast phenomena—Dr. David H. Auston of Bell Laboratories and Distinguished Professor and CAT Director Robert R. Alfano of CCNY. Professor Alfano supported Johnson's completing his course work at CCNY and performing the experimental portion of the dissertation with Dr. Auston. He was one of only four

African-Americans to receive a PhD in Physics in the United States in 1981, and the third of 45 PhDs assisted by Professor Alfano. At Professor Alfano's urging, Professor Johnson has served as a secondary mentor and thesis advisor to several members of the African-American community at CCNY. Professor Johnson reports that he enjoyed a nurturing environment at CCNY in which he made several lifelong friends. At Bell Labs, he had the unusual opportunity of having full-time access to a complete laser system and a corner of Dr. Auston's lab. Professor Alfano, he says, provided an environment that made for a smooth transition from CCNY to Bell Labs.

"This is an outstanding achievement and shows that our improvement is gaining national recognition."

Gregory H. Williams
President, CCNY



Anthony M. Johnson, Ph.D.

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About the CUNY CAT...

"Ultrafast photonics for real-world applications" is the central theme of the Center for Advanced Technology in Ultrafast Photonic at the City University of New York (CUNY CAT). The CAT, designated in 1993, is one of 15 New York State Centers for Advanced Technology. The mission of the center is to promote economic development in the state by generating and disseminating knowledge in photonics technology, encouraging industrial competitiveness, and producing future leaders in photonics technology through educational and research programs.

The CAT assists New York State companies to reduce expenses, increase productivity and efficiency, improve staff capabilities, and create and retain jobs. To accomplish this, the CAT conducts high-level research; establishes technology transfer mechanisms; provides the photonics industry with access to CUNY technology, research equipment, testing facilities and faculty expertise; trains workers for the photonics industry; works with other organizations to promote New York as an attractive home to photonics-based companies and their employees; and, assists companies to obtain grants and start-up funds.



CCNY Undergraduate Misu Paul (left) and Dr. Rabindra Halder working on tissue-welding.

About the IUSL ...

The Institute for Ultrafast Spectroscopy and Lasers (IUSL) of the City University of New York (CUNY) is a world-renowned multidisciplinary research laboratory devoted to promoting research and education in photonic and laser technologies for scientific, engineering, medical, and industrial applications. The IUSL was established in 1982 with strong support from the administration of the City College of New York (CCNY) to serve as a steeple of excellence for research and education in modern laser optics and spectroscopy. From its very inception IUSL has attracted faculty members, graduate students and undergraduate students from the Physics, Chemistry, Biology, Chemical Engineering, Computer Science, Earth and Planetary Sciences, and Electrical Engineering departments of CCNY, senior research scientists, postdoctoral research associates, and visiting scholars from around the globe. Basic and applied photonic research in the areas of laser imaging and medical diagnosis, tunable solid-state lasers and amplifiers, semiconductors, and nonlinear optics are currently being pursued. The IUSL serves as an incubator and testing ground for new research ideas. Those with commercial potential are introduced to company partners through the CAT.

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