

Inquiry. Exploration. Discovery. Research at the University at Albany is expanding knowledge and building expertise to better the human condition in the 21st century.



discovery



A close-up photograph of a person wearing a white lab coat, a white hairnet, and safety glasses. The person is looking through a circular opening, possibly a microscope or a specialized camera lens. The background is dark, and the lighting is focused on the person's face and the opening. The text is overlaid on the left side of the image.

Experts say nanotechnology, or the science of manipulating matter at the atomic scale, could revolutionize every area of our lives over the next several decades. The College of Nanoscale Science and Engineering is at the center of this revolution.

The first college in the world devoted exclusively to the study of nanoscale scientific and engineering concepts, the College of Nanoscale Science and Engineering (CNSE) is located in the most advanced research complex of its kind at any university. The \$3 billion, 450,000-square-foot complex attracts corporate partners from around the world and offers students a one-of-a-kind academic experience, and it is growing. The complex is also home to CNSE's New York State Center of Excellence in Nanoelectronics.

The research under way includes efforts to develop: magnetically doped semiconductors with the potential for faster computer processing speeds with lower power consumption; the creation of sensor chips that can instantaneously and non-invasively check the bloodstream for glucose levels, as well as disease; working models of products that employ alternative power technologies, such as fuel cells, microturbines, and solar cells; and NEMS (nanoelectromechanical structures) that enable chips to exercise 'decision-making' capabilities. These projects are just a few of many.

The CNSE complex, financed through more than \$500 million in governmental support and over \$2.5 billion in corporate investments, houses the only pilot prototyping facilities in the academic world for the two standard sizes in computer chip design, the 200-millimeter (or 8-inch) wafer, and the 300-millimeter (or 12-inch) wafer.

In 2005, CNSE had 115 U.S. and worldwide partners, including some of the world's largest semiconductor and semiconductor-related tool manufacturing companies.



Whether the goal is to track down terrorists, secure cyberspace, or streamline government, the tools of the information age are vital for success. University at Albany researchers are leaders in harnessing them.

UAlbany's Institute for Informatics, Logics and Security Studies (ILS) builds applications to provide better intelligence about threats to the U.S. and explores new ways to outwit cybercriminals and computer viruses. At the Center for Technology in Government (CTG), researchers focus on ways information technology can be used to improve government services. Other faculty researchers in computing and information are assessing how teachers use information technology to help their students learn, and addressing other information age challenges.

ILS, led by Tomek Strzalkowski, is developing advanced information retrieval systems to help intelligence analysts quickly sift through mountains of news and field reports and extract relevant clues and accurate intelligence. A research group that is part of ILS, the Center for Information Forensics and Assurance (CIFA), focuses on securing cyberspace through research and specialized courses.

CIFA researchers work on real-life information security problems. Key to assuring that both the problems and the solutions reflect reality are the two state CIFA partners: the Computer Crime Unit of the New York State Police Forensic Investigation Center and the state Office of Cyber Security and Critical Infrastructure Coordination. Its research partner, the Center for Education and Research in Information Assurance and Security at Purdue University, adds extra depth to its efforts.

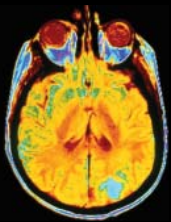
Inquiry. Exploration. Discovery. Through explorations of coral reefs in Fiji (such as the one shown on the cover), University at Albany scientists are gaining new insights into climate over time periods as long as thousands of years ago. Closer to home, in state-of-the-art cleanrooms and laboratories, UAlbany researchers are exploring ways to increase computer processing speeds and stop the spread of cancer cells. These explorations are just a few of the research projects that are attracting growing levels of external support and are, at the same time, creating new knowledge and expertise to better the human condition. Inquiry, exploration, and discovery are truly the seeds of success in today's fast-changing knowledge economy. By sowing those seeds, UAlbany researchers are "growing" knowledge; revitalizing the economy; and serving the people of the Capital Region, New York State, the country and the world.



Kermit L. Hall
President



Lynn Videka
Interim Vice President for Research



Researchers aim to stop metastatic growth of cancer cells.

Advancing Understanding of Cancer

More than half of cancer patients die from metastatic disease that develops months, years or even decades after primary tumor removal. Finding ways to stop the metastatic growth of cancer cells is the focus of just one of several UAlbany research efforts aimed at advancing our understanding of cancer.

Investigations by scientists at UAlbany's Gen*NY*Sis Center for Excellence in Cancer Genomics also include studies of how chemotherapeutic medicines called "alkylating agents" work in different types of cancer cells and how bioinformatics analysis and identification can help determine which genes to focus on.

A \$1.5 million grant from the National Institutes of

Health, National Cancer Institute is supporting the research by Julio Aguirre-Ghiso into the mechanisms that govern metastatic growth, most importantly the induction of dormancy of metastasis. He is particularly interested in a newly identified "stress" signaling mechanism and gene programs that are selectively activated in dormant carcinoma cells and that are essential for the maintenance of dormancy.

In the past, cancer researchers often focused on one gene, one type of cancer. By contrast, the Gen*NY*Sis center, directed by Paulette McCormick, uses high-throughput, multi-modal approaches that apply to many different cancers with many different causes. The research goal is rapid translation of basic research findings into clinical treatments for multiple cancer types.



New center focuses on the intersections of science and the humanities.

Bringing Humanities and the Sciences Together

UAlbany's College of Arts and Sciences has launched the interdisciplinary Center for Humanities and TechnoSciences (CHATS) to foster exchange between the sciences and the humanities, and to provide a forum where the University and the Capital Region community can pursue intellectual and aesthetic innovation and outreach.

CHATS was a co-sponsor of "Frankenstein: Penetrating the Secrets of Nature," a traveling exhibit funded by the National Endowment for Humanities, the National Library

of Medicine, and the American Library Association. The exhibit, on campus in 2005, encouraged audiences to examine the intent of Mary Shelley's *Frankenstein*, and to explore the novel from literary, social, historical, and political points of view.

CHATS's initial project, in 2003, was "The Technology Plays," which featured works by Pulitzer Prize-winning author and UAlbany Professor of English William Kennedy and playwright/television writer Richard Dresser, and attracted coverage by media throughout the United States, including *The New York Times*.

New Strategies to Aid Young Readers

Getting youngsters off to a good start as readers is the goal of a major research project led by UAlbany professors Donna Scanlon of the Department of Reading and Frank Vellutino of the Department of Education and Counseling Psychology.

"Preventing Reading Difficulties Through Implementation of the Interactive Strategies Approach" aims to implement an approach to preventing long-term reading difficulties that the researchers have been developing

and testing for more than a decade. It is based on several previous studies indicating that children who struggle with reading at the end of first grade are likely to experience reading difficulties throughout their school careers, and that youngsters at risk for difficulty in early literacy development can be identified at kindergarten entry. The earlier research also noted that certain instructional practices can reduce the number of young children who experience difficulty in early literacy development, and that teachers' knowledge and ability are critical to students' academic success.



Specific approaches by teachers can help young readers.



The science of weather helps explain its impact.

Unlocking the Mysteries of Weather and Climate

From the Hudson Valley to the South Pacific to the deserts of Africa, UAlbany researchers are unlocking the mysteries of climate and its impact upon human populations.

Through the work of Braddock Linsley of Earth and Atmospheric Sciences and his colleagues at other institutions, Pacific Ocean coral skeletons are yielding clues about climate over time periods as long as thousands of years. The researchers are analyzing massive coral skeletons of several specific species to reconstruct surface oceanographic conditions, such as temperature and salinity, near Fiji, Tonga, and Samoa.

A team led by Atmospheric Sciences Research Center scientists David R. Fitzjarrald and Jeffrey M. Freedman is investigating great climatic variations over small distances in the Hudson Valley. The scientists gathered and are analyzing extensive weather and climate data for the region to explain the variability. The project is supported by a \$625,000 National Science Foundation grant.

Another UAlbany atmospheric scientist, Christopher Thorncroft, is one of two U.S. researchers coordinating an international effort to better understand the variability and impact of the West African Monsoon in a region where widespread hunger and the loss of farmland to deserts are recurrent problems.



Depression is among the most common mental disorders in later life.

Reducing Depression in Homebound Older Adults

Older homebound people with medical problems are often susceptible to depression. Now, UAlbany researcher Zvi Gellis is working with colleagues from Cornell University's Weill Medical College, Albany Medical College and St. Peter's Hospital to study and evaluate a depression treatment program for this vulnerable population.

UAlbany's Center for Mental Health and Aging, led by Gellis, had conducted a previous study at St. Peter's Health Care Center which revealed that high rates of depressive symptoms were found in 27.5 percent of

community-dwelling homecare patients. The new study, which is being supported by a five-year, \$1 million grant from the National Institute of Mental Health (NIMH), is building upon those findings.

Depression and anxiety are among the most common mental disorders in later life, and depressed mood, isolation, loneliness, lack of social supports and declining physical abilities are some of the probable factors, according to Gellis, a School of Social Welfare assistant professor. As the population ages, the number of older adults with significant psychiatric disorders is expected to increase considerably within the next ten years.



A special family of proteins sheds light on neurodegenerative diseases.

Focusing on Neurodegenerative Diseases

Patients with Parkinson's, ALS and other neurological disorders may benefit from research conducted by Li Niu and his colleagues in UAlbany's Department of Chemistry.

The researchers are studying a special family of proteins – glutamate receptors – whose functions link to such brain activity as memory and learning. Abnormal functions of receptors have been implicated in such neurodegenerative diseases as Parkinson's disease and Lou Gehrig's disease, also known as amyotrophic lateral

sclerosis (ALS). In the disease state, the receptors are excessively active, causing the neurons that harbor these receptors to die. Niu and his colleagues are using a laser to study, in a split second, the receptors embedded in the membrane of a single live cell, and gain information about the receptors' structure and function and the mechanism of drug-receptor interaction. Their findings could lead to the development of better therapeutics to treat these diseases. The researchers have identified RNA inhibitors that exhibit fascinating properties as promising templates for drug design. Their work has attracted about \$2 million in funding.



Public health challenges today include threats such as bioterrorism.

Addressing Public Health Threats

Through its centers and continuing education programs, UAlbany's School of Public Health advances research-based solutions for current and emerging health threats.

The School's Center for Public Health Preparedness (CPHP) offers a monthly satellite broadcast series and online and other educational programs that help prepare the region's public health and healthcare workforce to respond to such threats as bioterrorism and infectious disease outbreaks. The center, funded by a \$5 million grant from the federal Centers for Disease Control and Prevention, is one of 23 such programs in the nation.

A National Institutes of Health-supported Biodefense and Emerging Infectious Diseases Program, led by Distinguished Professor Marlene Belfort and Kathleen McDonough of the Department of Biomedical Sciences, also focuses the School's research expertise on today's public health challenges. The program provides fellowships for outstanding doctoral and post-doctoral fellows and includes seminars and course work in biodefense, infectious diseases, and epidemiology and genetics, as well as laboratory-based training. Students and post-doctoral fellows perform research at the Wadsworth Center, the New York State Department of Health's public health laboratories.



English is the language of choice for children and grandchildren of Latino immigrants.

Bilingualism Persists, but English Dominates

How quickly and how well do immigrants assimilate to U.S. culture? A report from UAlbany's Lewis Mumford Center for Comparative Urban and Regional Research found that English remains the overwhelming language of choice for the children and grandchildren of Latino immigrants.

Using U.S. Census data from 2000, the study, led by Mumford Center Director and Distinguished Professor of Sociology Richard Alba, analyzed the languages spoken at home by school-age children in Asian and Latino households. While 85 percent of second-generation Hispanic youngsters being raised in immigrant households speak some Spanish at home, 92 percent speak English well or very well, the study found.

Among Asians, 96 percent are proficient in English, and 61 percent also speak an Asian mother tongue. For the third and subsequent generations, children generally speak only English at home.

The bilingualism study is one example of the population research underway at the Mumford Center and the University's Center for Social and Demographic Analysis (CSDA). More than 40 UAlbany faculty from 14 campus units are associated with the centers and conduct population-related research in areas as varied as fertility, criminology, and epidemiology. A three-year, \$1.08 million grant from the National Institute of Child Health and Human Development (NICHD) is strengthening the research infrastructure that supports the population studies.



When two or more arteries are diseased, bypass is safer than stent.

Bypass is More Effective than Stent

Cardiac bypass surgery is safer than stent procedures and associated with higher rates of long-term survival for patients with two or more diseased arteries, according to a study led by Distinguished Professor Edward Hannan of the School of Public Health. The stent, a device made of wire, is commonly used to reduce blockages in coronary arteries.

Hannan's research team evaluated the records of nearly 60,000 New Yorkers who underwent bypass and stent procedures from 1997 to 2000. The researchers found that the death rate was 24 percent lower during the

three-year period for the 37,000 patients who had had bypass surgery for multiple blockages than it was for the 22,000 who had had stents implanted. The results were reported in the *New England Journal of Medicine*.

Hannan is nationally recognized for bringing evidence-based medicine to the attention of practicing clinicians. He has developed the use of clinical and administrative databases for cardiac surgery, angioplasty, trauma care, carotid endarterectomy, cancer and hip fractures. His databases have been used to identify risk factors related to mortality and complications, to predict the occurrence of these adverse events, and to assess provider performance.

Center Aims to Eliminate Minority Health Disparities

Statistics make clear that there are significant disparities in the health status of minorities, from life expectancy to infant mortality rates. A new center, bringing together researchers from the College of Arts and Sciences and the schools of Education, Public Health and Social Welfare, aims to eliminate those disparities.

The Center for the Elimination of Minority Health Disparities (CEMHD) is focusing on the problem of minority health disparities in smaller cities in upstate New York. The center's working theory is that communities of disadvantaged persons in smaller cities

and towns differ in important ways from large minority populations in very large cities – and thus may require different remedies.

Center researchers are working with community partners to better understand the multiple determinants of health disparities in smaller cities. Together, they are aiming to identify community needs and focus on barriers to utilization of prevention programs and health care. The center also plans to begin specific projects with community groups to test programs that may reduce barriers and improve utilization. The center's efforts are being funded by a \$1.24 million grant from the National Institutes of Health.

Studying the Impact of Environmental Contaminants

UAlbany researchers are shedding new light on the connections between our health and what we eat, drink, and breathe, through a number of studies – including one that spawned international interest.

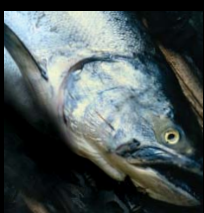
Institute for Health and the Environment Director David Carpenter and several other U.S. and Canadian researchers analyzed filets from about 700 farmed and wild salmon purchased in 16 North American and European cities. "The Downsides of Aquaculture: Contaminants in Farmed Salmon," published in *Science* and reported by media outlets worldwide,

noted that concentrations of cancer-causing substances and other health-related contaminants were significantly higher in farm-raised salmon than in wild salmon, and that consumers should therefore consider restricting consumption of the fish.

Lawrence M. Schell of Anthropology and Epidemiology is investigating the possible effects of such endocrine-disrupting environmental contaminants as polychlorinated biphenyls (PCBs) on human physical and psychological development. The project, conducted in partnership with the Mohawk Nation at Akwesasne in upstate New York, is funded by a \$2.7 million grant from the National Institute of Environmental Health Science (NIEHS).



CEMHD focuses on health of minorities in smaller cities.



Contaminants were found to be higher in farm-raised salmon than in wild salmon.

Awards Received by University at Albany Faculty

Fiscal Year '05

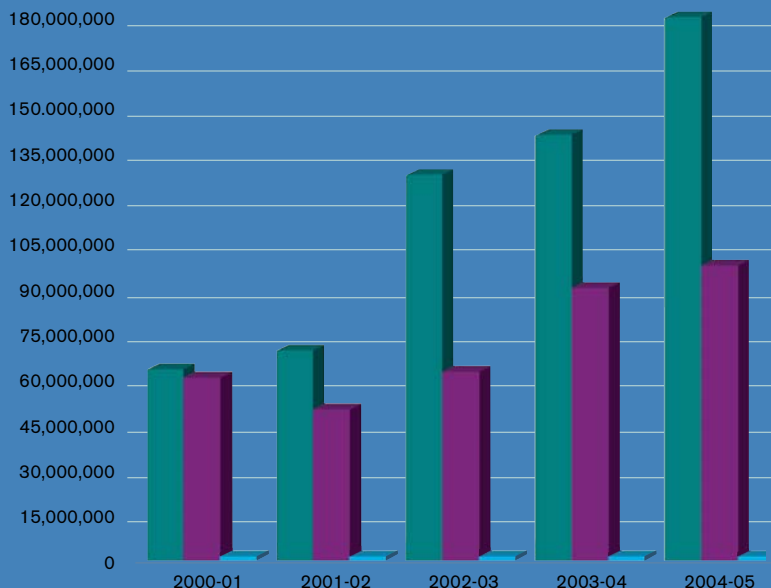
Fiscal Agent	Amount
Research Foundation of SUNY for University at Albany	\$180,910,564
Health Research Incorporated*	98,354,138
New York State: Office of the Aging Project at the University at Albany	233,112
New York State: Center for Technology in Government	1,527,995
TOTAL	\$281,025,809

*Total awards received by Health Research, Inc. for School of Public Health faculty who are employees of the New York State Department of Health. Health Research, Inc. (HRI) a not-for-profit corporation affiliated with the New York State Department of Health. HRI's mission is to assist the Health Department to effectively solicit and administer financial support for projects and to disseminate the benefits of Health Department expertise through programs such as technology transfer.

The Research Foundation of State University of New York is a private non-profit educational corporation chartered by the State of New York to fiscally manage sponsored awards from external sponsoring agencies on behalf of the State University of New York campuses.

Total Awards Received by University at Albany Faculty and Staff

\$



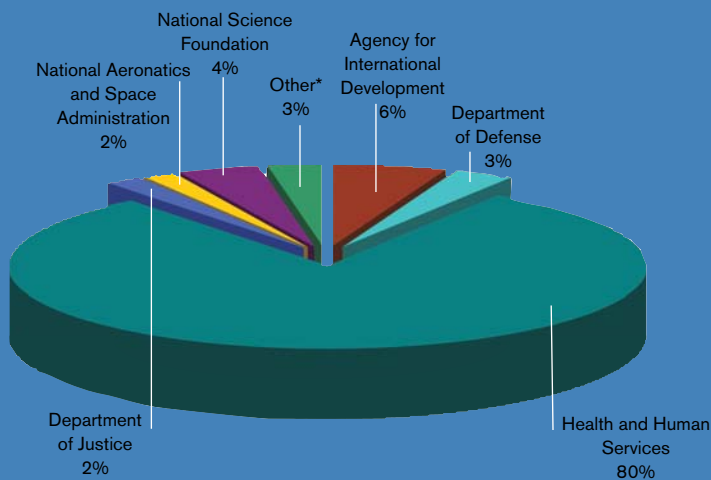
■ Research Foundation

■ HRI

■ Other

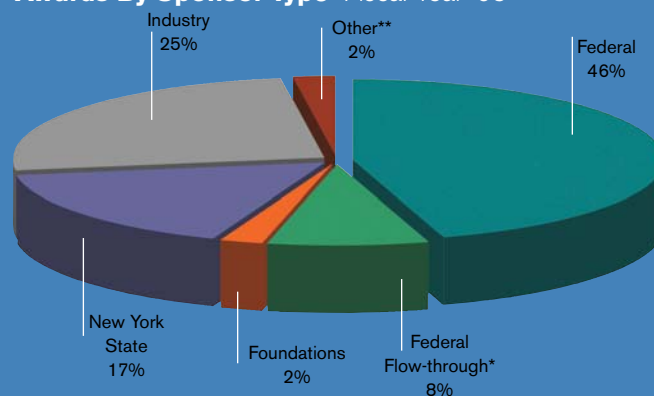
Federal Sponsorship

Research Foundation/Health Research Inc. Fiscal Year '05



*includes federal sponsors whose percentage of total is less than 1%: Corporation for National and Community Service, National Endowment for the Humanities, National Oceanic and Atmospheric Administration, Small Business Administration, U.S. Department of Agriculture, U.S. Department of Education, U.S. Department of Energy, U.S. Department of the Interior, U.S. Department of Justice, U.S. Department of Transportation, U.S. Department of Veterans Affairs, U.S. Environmental Protection Agency.

Awards By Sponsor Type Fiscal Year '05

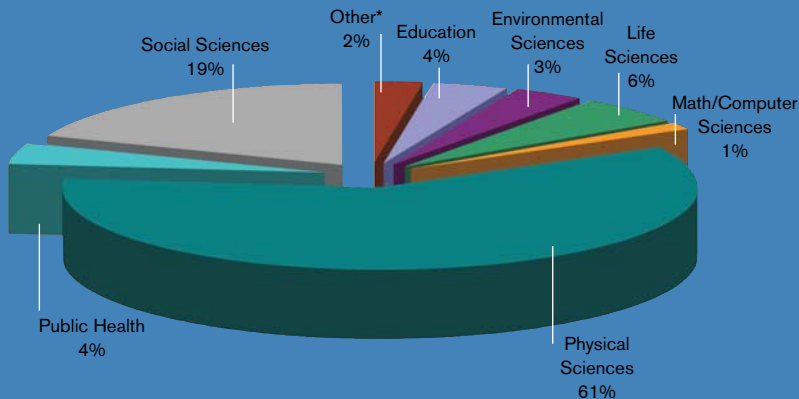


*federal funds awarded through a non-federal agency.

**includes colleges & universities, foreign sponsors, health organizations, local government, states other than NYS, and deposits made to multiple sponsor accounts.

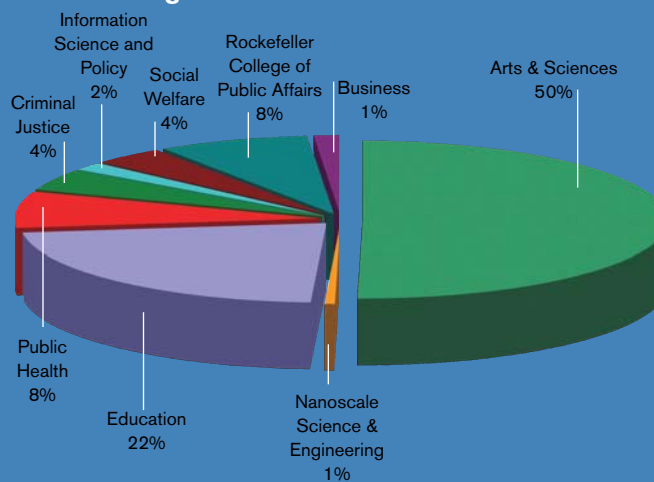
Expenditures By Discipline

Research Foundation Fiscal Year '05



*includes School of Business, Humanities Disciplines and administrative units.

Doctoral Degrees Awarded Fiscal Year '05



Faculty Recognized for Research Accomplishments

State University of New York Chancellor's Awards honored University at Albany researchers in three categories:

Excellence in the Pursuit of Knowledge, Kajal Lahiri, Distinguished Professor, Department of Economics;

First Disclosure Awards, Michael Carpenter, Bai Xu, Gregory Denbeaux, and James Reynolds, College of Nanoscale Science & Engineering; Ben Szaro, Dmitry Belostotsky and Sho-Ya Wang, Department of Biological Sciences; Li Niu, Department of Chemistry; and Carolyn MacDonald, Department of Physics; and

First Patent Award, James Castracane, College of Nanoscale Science and Engineering.

The highest honor bestowed by the Research Foundation of SUNY, the **Research and Scholarship Award**, was given to two UAlbany scholars, Henryk Baran, Department of Languages, Literatures and Cultures, and Sho-Ya Wang, Department of Biological Sciences.

Other faculty recognized for outstanding research achievements include:

Thomas Begley, who received NYSTAR's prestigious James D. Watson Investigator Award for promising early-career scientists, and Julio Aguirre-Ghiso, who won the Samuel Waxman Cancer Research Foundation award, both of whom are with the Department of Biomedical Sciences in the School of Public Health and Gen*NY*Sis Center for Excellence in Cancer Genomics; and

Distinguished Professor Judith Langer, School of Education, who received an honorary doctorate from the University of Uppsala in Sweden.



Goldwater Scholar

For Edgardo Sosa, UAlbany's opportunities for undergraduate research led to a prestigious Barry M. Goldwater Scholarship. Working in the lab of Associate Professor of Biology Caro-Beth Stewart, he explored the molecular basis for adaptive evolution in complex organisms by using primates as the comparative system. A goal of the research is to

understand why some primate species are resistant to SIV/HIV and AIDS, while others are susceptible across a wide range of primate species. The Goldwater awards program, which provides \$7,500 per year to recipients, was established by Congress to encourage exceptional students to pursue careers in mathematics, the natural sciences, and engineering. Sosa says his award was a "dream come true," and his goal is to continue his studies in a combined M.D./Ph.D. program.

Inventions

UAlbany faculty and their research partners were awarded patents for inventions that have applications in such fields as nanoscience, telecommunications, and energy conservation.

Patent No. 6,534,133

"Methodology for In-Situ Doping of Aluminum Coatings," issued March 18, 2003, to inventors Alain Kaloyeros, Andreas Knorr, and Jonathan Faltermeier.

Patent No. 6,542,791

"Load Controller and Method to Enhance Effective Capacity of a Photovoltaic Power Supply Using a Dynamically Determined Expected Peak Loading," issued April 1, 2003, to inventor Richard Perez.

Patent No. 6,586,056

"Silicon Based Films Formed from Iodosilane Precursors and Method of Making the Same," issued July 1, 2003, to inventors Alain Kaloyeros and Barry Arkles.

Patent No. 6,613,924

"Silver Precursors for CVD Processes," issued September 2, 2003, to inventors John T. Welch, Silvana C. Ngo, and Kulbinder K. Banger.

Patent No. 6,701,036

"Mirror, Optical Switch, and Method for Redirecting an Optical Signal," issued March 2, 2004, to inventor James Castracane.

COVER: University at Albany paleoclimatologist Braddock Linsley and colleagues work on a massive *Porites lutea* coral colony in Fiji. Corals build their hard skeletons from calcium carbonate, a mineral extracted from seawater, at a rate of about one centimeter per year, accreting annual growth bands (analogous to tree rings). The cores extracted from this colony off the island of Vanua Levu, Fiji, reflect growth from 1619 to 2001, and can be used to determine the temperature and salinity of the water during that time and to provide insights into past climate. Here Linsley and his team are cleaning the coral and plugging the drill hole with live coral tissue to facilitate post-drilling healing. (Photo: courtesy of Braddock Linsley)



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For more information about research at the University at Albany, visit www.albany.edu or contact: Lynn Videka, Interim Vice President for Research, at (518) 437-4960 or lvideka@uamail.albany.edu.

Produced by University at Albany
Office of Media and Marketing

Editor: Mary Fiess
Art Direction: Kerry Gavin
Photography: Mark Schmidt; GettyOne
Writer: Carol Olechowski