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THE WHISTLE

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Tech renews ties with French government

Georgia Tech hosted French Minister for Foreign Trade Christine Lagarde, who was on a short tour of the United States last week. She spent a large part of her day at Tech's Enterprise Innovation Institute, discussing the progress of economic development projects between Georgia, the French region of Lorraine and France as a whole.

As a member of the prime minister's cabinet, Lagarde is responsible for all trade matters and many other globalization issues. The French Embassy maintains a large economic mission in the United States that is based at its consulate in Atlanta.

Familiar alumni leaders make major investments

Dan Treadaway
Institute Communications and Public Affairs

A. Russell Chandler

John P. Imlay Jr.

As the quiet phase of Georgia Tech's comprehensive campaign progresses, volunteer leaders are showing their support for the Institute through significant acts of philanthropy. Two longtime supporters of the Institute recently made such commitments, which will benefit intercollegiate athletics and the Ivan Allen College of Liberal Arts.

A. Russell Chandler III has committed an additional $2 million to his existing commitments benefiting the Institute in general and intercollegiate athletics in particular. Of that total, $1 million will be added to an unrestricted endowment for Institute use, while another $1 million will provide for the chaplaincy program under the auspices of the Athletic Association.

An additional $100,000 year-end gift was received for immediate use within the chaplaincy program.

Chairman and CEO of The Whitehall Group, an Atlanta-based private investment firm, Chandler is a member of the Georgia Tech Foundation Board of Trustees. He previously served on the Georgia Tech Advisory Board, the Alexander-Tharpe Fund Board of Trustees and the

Gifts continued, page 2

Instant replay technology captures the cause of behavior

Assists caregivers of children with autism and other developmental disorders

Elizabeth Campell
Institute Communications and Public Affairs

Every parent at some point has wished they had instant replay technology to figure out who really started a disagreement between the kids while their heads were turned. Georgia Tech researchers have created an easy-to-use, instantaneous video capturing system called Behavior Imaging (BI) Capture. Designed for use initially by behavioral consultants and special education teachers in schools, as well as by parents in the home, BI Capture allows users to selectively archive an incident.

BI Capture was developed at Tech and is now commercially available.

Gregory Abowd, professor in the School of Interactive Computing, researches human-computer interaction — the study of how best to design computer systems and applications to be useful to people.

He was motivated to develop BI Capture because he has two children with autism. He has seen firsthand the need for being able to capture evidence of behavioral problems without imposing any further burden on caregivers.

"As a scientist, I wondered if the therapy sessions my oldest son was receiving were effective because much of the discussion with his therapists about his progress was subjective," Abowd said. "And, as a parent, I wanted to be able to see what triggered certain behaviors such as tantrums or why some therapy sessions were less successful."

Once Abowd began videotaping his

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Ocean creatures provide foundation for electronics

Researchers convert shells of diatoms to silicon for sensors, electrodes

John Toon
Research News

The three-dimensional shells of tiny ocean creatures could provide the foundation for novel electronic devices, including gas sensors able to detect pollution faster and more efficiently than conventional devices.

Using a chemical process that converts the shells' original silica (silicon dioxide, SiO2) into the semiconductor material silicon, researchers have created a new class of gas sensors based on the unique and intricate three-dimensional (3-D) shells produced by microscopic creatures known as diatoms. The converted shells, which retain the 3-D shape and nanoscale detail of the originals, could also be useful as battery

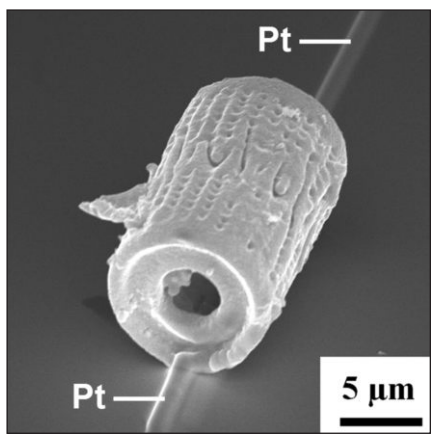

Image shows a sensor created from a microporous silicon structure converted from the shell of a single diatom.

electrodes, chemical purifiers and other applications requiring complex shapes that nature can produce better than humans.

Diatoms continued, page 2

"QUOTE-UNQUOTE"

"If you could have so many little things working for you, there is a great possibility that you could have significant impact on the properties of the soils."
—Carlos Santamarina, a professor in the School of Civil and Environmental Engineering, on so-called geotechnical construction — techniques that use the bacteria present in soil to improve the ground for sturdier building. (Sacramento Bee)

Georgia Tech

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Institute Communications and Public Affairs
Wardlaw Center
177 North Avenue
Atlanta, Georgia 30332-0181

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Diatoms, cont'd from page 1

"When we conducted measurements for the detection of nitric oxide, a common pollutant, our single diatom-derived silicon sensor possessed a combination of speed, sensitivity and low voltage operation that exceeded conventional sensors," said Kenneth Sandhage, a professor in the School of Materials Science and Engineering. "The unique diatom-derived shape, high surface area and nanoporous, nanocrystalline silicon material all contributed towards such attractive gas-sensing characteristics."

The unique devices, part of a broader long-term research program by Sandhage and his research team, were described in the March 8 issue of the journal Nature.

Scientists estimate that roughly 100,000 species of diatoms exist in nature, and each forms a microshell with a unique and often complex 3-D shape that includes cylinders, wheels, fans, donuts, circles and stars. Sandhage and his research team have worked for several years to take advantage of those complex shapes by converting the original silica into materials that are more useful.

"Diatoms are fabulous for making very precise shapes, and making the same shape over and over again by a reproduction process that, under the proper growth conditions, yields microshells at a geometrically increasing rate," Sandhage noted. "Diatoms can produce three-dimensional structures that are not easy to produce using conventional silicon-based processes. The potential here is for making enormous numbers of complicated 3-D shapes and tailoring the shapes genetically, followed by chemical modification as we have conducted to convert the shells into functional materials such as silicon."

Materials Science and Engineering Professor Sandhage and his research collaborators would like to conduct such conversion reactions on genetically-modified diatoms that generate microshells with tailored shapes. However, to precisely alter and control the structures produced, further research is needed to learn how to manipulate the genome of the diatom.

Silicon is normally produced from silica at temperatures well above the silicon melting point (1,414 degrees Celsius), so that solid silicon replicas cannot be directly produced from silica structures with such conventional processing. So the Georgia Tech researchers used a reaction based on magnesium gas that converted the silica of the shells into a composite containing silicon and magnesium oxide. The conversion took place at only 650 degrees Celsius, which allowed preservation of the complex channels and hollow cylindrical shape of the diatom.

The researchers then connected individual diatom-derived silicon structures to electrodes, applied current and used them to detect nitric oxide. The highly porous silicon shells, which are about 10 micrometers in length, could also be used to immobilize enzymes for purifying drugs in high-performance liquid chromatography (HPLC) and as improved electrodes in lithium-ion batteries.

"Silicon can form compounds that have a high lithium content," Sandhage said. "Because diatom-derived silicon structures have a high surface area and are thin walled and highly porous, the rate at which you can get lithium ions into and out of such silicon structures can be high. For a given battery size, you could store more power, use it more rapidly or recharge the battery faster by using such structures as electrodes."

Though Sandhage and his collaborators have demonstrated the potential of their technique, significant challenges must be overcome before they can produce useful sensors, battery electrodes and other structures.

A ceramist by training, Sandhage would now like to work directly with electronics engineers and others who have specific interests in silicon-based devices.

"We can target diatoms of a certain shape, generate the right chemistry, and then work with applications engineers to get these unique structures into practice," he said. "We are now at the point where we have a good idea of the chemical palette that is accessible with the conversion approaches we have taken. The next step is really to start making packaged devices."

For more information...

Genetically Engineered Micro/nanodevices (GEMs)
www.gems.gatech.edu

Gifts, cont'd from page 1

Centennial Campaign Steering Committee. He is an emeritus member of the School of Industrial and Systems Engineering Advisory Board.

John P. Imlay Jr. recently made a gift of $1 million that will support various campus units. Of that total, $250,000 is designated for addition to the endowment for the school chair in the Sam Nunn School of International Affairs (honoring his friend, former U.S. Senator Sam Nunn); $250,000 is designated for the Athletic Director's Discretionary Fund in the Athletic Association; and $250,000 is designated for the Dean's Discretionary Fund within the College of Computing. The designation of the remaining $250,000 is currently undetermined.

Imlay is chairman of Imlay Investments. He and his wife, Mary Ellen, live in Atlanta. A member of the Campaign Georgia Tech Steering Committee, Imlay is a trustee emeritus of the Georgia Tech Foundation Board of Trustees. He is an honorary member of the College of Computing Advisory Board and has served on the Georgia Tech Advisory Board and the Leadership Gifts Committee for Georgia Tech's Centennial Campaign. The Imlay Foundation, which he founded in 1989, has made grants to numerous worthy causes in the metro Atlanta area.

"Georgia Tech is fortunate indeed to have friends such as Russ Chandler and John Imlay," said President Wayne Clough. "These men have been loyal and active members of the Tech community for many years, and their most recent acts of philanthropy will be a tremendous benefit for both our academic and athletic enterprises. They have set a wonderful example of thoughtful, strategic philanthropy for all Tech alumni."

Games get serious at annual symposium

On Thursday, March 29, Georgia Tech presents "Living Game Worlds III: Playing with Reality," bringing together game developers, international scholars and activists for a day-long discussion on nonfiction and documentary games. Participants will explore special challenges and opportunities presented by games that tackle real world topics ranging from the Columbine shootings to international conflicts in Palestine and Darfur.

Presented by Georgia Tech's GVU Center and the School of Literature, Communication and Culture, Living Game Worlds is an annual symposium exploring emerging questions in design and theory in the production and critique of video games. For more information, visit **gameworlds.gatech.edu**.

New GRA chair supports critical energy research

Dan Treadaway
Institute Communications and Public Affairs

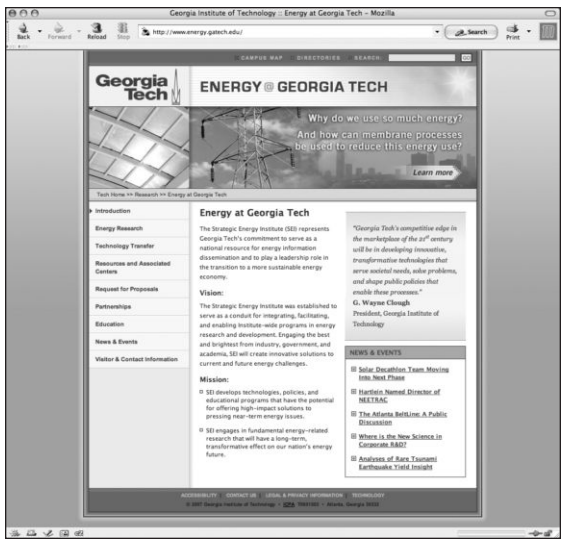
Steadily rising energy prices and ongoing unrest in the oil-rich Middle East pose a clear threat to America's long-term security and economic health. The good news in this scenario is that this threat has sparked significant interest in research that could broaden and diversify the nation's energy resources.

With this overarching strategy in mind, Georgia Tech and the Georgia Research Alliance (GRA) have partnered to create an endowed chair in energy, designed to foster a broad-based research and instructional program in energy including alternative and sustainable energy sources.

To date, the GRA Eminent Scholars Program has recruited more than 50 renowned scholars to Georgia universities, 22 of whom serve on the Georgia Tech faculty. GRA has a history of funding cutting-edge technology and research that leads to an economic development impact in Georgia. With energy being seen as an area for research growth and innovation, establishing an eminent scholar position in energy makes economic and academic sense.

The GRA provides half the cost of the chair endowment for eminent scholar positions. Georgia Tech is responsible for raising the other half through private philanthropy. In addition, funding for start-up laboratory costs is usually provided. The new chair augments the $400,000 in energy-related research grants that the GRA has already awarded to Georgia Tech and the University of Georgia so far in fiscal 2007.

"The energy field is broadly defined as encompassing areas within energy conversion, distribution and efficient utilization, and underlying technologies," said Roger Webb, professor emeritus, former chair of the School of Electrical and Computer Engineering and chair of the search committee for the new energy chair. "The chair holder will be expected to initiate new programs in energy sciences and technology while enhancing the portfolio of ongoing energy initiatives that are currently under way at Tech via the Strategic Energy Institute (SEI). The chair should also foster interaction between the energy industry and



The strategic energy initiatives at Georgia Tech are documented in an interdisciplinary Web portal (www.energy.gatech.edu) **highlighting the teaching and research activities on campus in this area. interdisciplinary research in strategically critical**

Georgia Tech to promote technology transfer."

The chair will be expected to draw outstanding students to the program, define and stimulate innovative research and serve as a team leader and mentor for other faculty. The chair holder will hold a tenured academic appointment in the appropriate school and will also be affiliated with the SEI.

The salary for the GRA Eminent Scholar will be provided from Institute funds, allowing funds generated by the endowment to be utilized almost entirely for program development.

"Devoting significant resources to ensuring long-term, affordable and environmentally sustainable sources of energy is not only a wise investment, but also a national imperative," said Michael Cassidy, president and CEO of the Georgia Research Alliance. "We are very excited about the potential of this new chair in energy and the talent it will bring to bear on this long-standing challenge. Our partnership with Georgia Tech has borne much fruit so far, and we look forward to exceptional results in the field of energy."

BI, cont'd from page 1

oldest son's therapy sessions, he and his research team noticed variations in his performance that appeared to be linked to subtle differences in the way therapy was being delivered. For example, the location of the therapist relative to his child seemed to matter for the teaching of some skills.

Behavioral professionals agree that these details matter, and it is often difficult to gather this evidence without them being there to observe it live. BI Capture, and other solutions developed in Abowd's lab, simplify the recording practices in support of better communication amongst caregivers. The relatively inexpensive solutions pay for themselves in terms of saved time of professionals and more effective interventions for children with special needs.

Special education teachers find BI Capture useful in their classrooms as well. Whenever they sense an incident or altercation has occurred, they click a button on a keychain remote that tells the BI Capture system to record a pre-set amount of time prior to the button being pressed and a pre-set amount of time after. Later, teachers can review the video of the incident on their computers to see what actions led up to the incident — such as whether another student provoked the situation or something else triggered the event. Teachers can add notes to the system to further explain or comment on the situation for later review.

An early prototype of the BI Capture system was tested in classrooms in a metro-Atlanta suburban school system, and the teachers found it useful to document students' behaviors, quantify the number of incidents in a week and share the information with the child's caregivers, rather than relying on memory or hastily written notes.

"I really do feel that the quality of data that (the prototype) provides, along with the graphing capabilities, is invaluable," says Carina De Fazio, teacher, Technical Assistance for Severe Behavior (TASB), Cobb County at H.A.V.E.N. Academy in suburban Atlanta. "It allows us to 'see' things that normally we would not as well as present up-to-date, concrete information to parents about what their children are doing in school. This allows for better, quicker treatment decisions."

For more information...

Autism Research Group
home.cc.gatech.edu/autism

IN BRIEF:

Request for proposals

The National Science Foundation is soliciting proposals for its Nanotechnology Undergraduate Education (NUE) in Engineering program, which aims to introduce nanoscale science, engineering and technology through a variety of interdisciplinary approaches into undergraduate education.

The focus is on nanoscale engineering education with relevance to devices and systems and/or on the social, economic and ethical issues that surround nanotechnology.

Only one proposal may be submitted by any U.S. academic institution as the lead institution with the following exception: a second proposal is allowed only if it is focused on the societal, ethical, economic and/or environmental implications of nanoscale science and engineering.

The Office of the Vice Provost for Research is requesting three-page proposal summaries. A faculty committee will determine which proposals will represent Georgia Tech.

Proposals must be submitted electronically by April 6 to kathy.mims@carnegie.gatech.edu. Additional program information can be found at: **www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf07554**.

GT Auto Show

The 4th Annual Georgia Tech Auto Show will be held Saturday, March 31, on the Georgia Tech campus. Motor vehicles of all types owned by students, former students, faculty, staff, alumni, fans, and corporate sponsors of Georgia Tech will be on display.

The 2007 speaker is expected to be Bryan Nesbitt, current chief of the General Motors European Design Center. The show is open and free to the public for viewing the cars on display. Prizes will be awarded to the best cars and motorcycles of various categories. Those interested in showing a car may enter by visiting **www.gatechautoshow.com**.

Earth Day committee seeks campus input

The planning committee of Georgia Tech Earth Day 2007 reminds the campus that it is collecting unwanted office supplies for its annual exchange program, to be held along Skiles Walkway during the April 20 campus celebration.

Bring your supplies to the Office of Solid Waste Management and Recycling between 11 a.m. – 1 p.m. any Monday, Wednesday or Friday until April 6. The supply exchange is open to Georgia Tech students, staff and faculty only.

The committee also seeks nominations for its Environmental Leadership Award, given annually to a student, faculty member, staff member, retiree or alumnus who is a leader in recycling, clean air initiatives, water conservation, pollution control or other environmental issues. Nominations are due by March 31.

For more information on any activities related to Earth Day, visit **www.earthday.gatech.edu**.