Ray of light
Self-clearing, low-reflectivity surface could improve PV cells

JOHN TOON
RESEARCH NEWS

Using two different types of chemical etching to create features at both the micron and nanometer size scales, Tech researchers have developed a surface treatment that could boost the light absorption of silicon photovoltaic cells in two complementary ways. The surface treatment increases absorption both by trapping light in three-dimensional structures and by making the surfaces self-clearing—allowing rain or dew to wash away the dust and dirt that can accumulate on photovoltaic arrays. Because of its ability to make water bead up and roll off, the surface is classified as superhydrophobic.

“More sunlight that goes into the photovoltaic cells and the less that reflects back, the higher the efficiency can be,” said C.P. Wong, Regents’ professor in the School of Materials Science and Engineering. “Our simulations show that we can potentially increase the final efficiency of the cells by as much as 2 percent with this surface structure.”

Supported by the National Science Foundation (NSF) and the National Electric Energy Testing Research and Applications Center (NEETRAC) at Georgia Tech, the research was described March 24 at the Spring 2009 National Meeting of the American Chemical Society in Salt Lake City. The silicon etching treatment mimics the superhydrophobic surface of the lotus leaf, which uses surface roughness at two different size scales to create high contact angles that encourage water from rain or condensation to bead up and run off. As the water runs off, it carries with it any surface dust or dirt—which also doesn’t adhere because

From April 1 to May 1, the Strategic Research Institute seeks near-term energy technologies and ideas for funding. Selection will focus on proposals that can either be commercialized or streamline the process of innovative energy options implementation in three to five years.

www.energy.gatech.edu

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Researchers develop flow sensors based on blind fish hair structures

A blind fish that has evolved a unique technique for sensing motion may inspire a new generation of sensors that perform better than current active sonar.

Although members of the fish species Astyanax fasciatus cannot see, they sense their environment and the movement of water around them with go-covered hairs that extend from their bodies.

These hair cells are like well-engineered mechanical sensors, similar to those that we use for balance and hearing in the human ear, where the deflection of the jelly-encapsulated hair cell measures important flow information,” said Vladimir Tsukruk, a professor in the School of Materials Science and Engineering.

New approach used to profile anthrax genome

Scientists at Tech have used a new approach, known as RNA-Seq, to profile the gene expression of the bacterium that causes anthrax, Bacillus anthracis.

Their study, published March 20 online by the Journal of Bacteriology, marks the first time any bacterial transcriptome—the complete collection of mRNA produced by a bacterium as it expresses different genes—has been comprehensively defined, and provides a much more detailed view of how bacteria regulate their gene expression.

“Sequencing a bacterial genome has gotten to be pretty routine, but going to a deeper level and defining its transcriptome has been a much more difficult task,” said Nicholas Bergman, assistant professor in the School of Biology and senior research scientist in the Electro-Optical Systems Laboratory at the Georgia Tech Research Institute.

Researchers identify genes for thioestreptone, a powerful antibiotic

Researchers at Tech have identified the genetic machinery responsible for synthesizing thioestreptone, a powerful antibiotic produced by certain bacteria. Though effective against the dangerous MRSA (methicillin-resistant Staphylococcus aureus) and vancomycin-resistant enterococci, thioestreptone currently has only limited applications in humans because it is not water soluble.

Identification of the gene cluster responsible for producing thioestreptone sets the stage for genetic manipulations that could make the drug more useful by improving its water solubility, potentially providing a new tool in the fight against bacterial infections.

Beyond the possible medical applications, the research produced a scientific surprise: thioestreptone is derived from a genetically encoded peptide that undergoes no fewer than 19 different modifications, one of the most complex such processes known—and a surprising capability for a single-celled bacterium.

In Brief . . .

Tech participates in national survey

Tech has elected to participate in the “Great Colleges To Work For” survey program conducted for The Chronicle of Higher Education. Beginning on April 4, the sample of 600 employees will receive an invitation to participate in the Web-based survey process. Results will be compiled for a special edition of The Chronicle this summer, highlighting best practices and policies in work environments among institutions in higher education.

Donate office supplies

Through April 3, students, faculty and staff with extra, unused or unwanted office supplies can donate the items to the Office Supply Exchange Program at Tech’s Earth Day Celebration. Those who donate can use their Buzzcard and “shop” for free from 10 a.m. to 2 p.m. on April 17 at the Skiles Courtyard. Items can be dropped off at the Office of Solid Waste Management and Recycling, located at 947 Atlantic Drive.

CEO, continued from page 1

is the feasibility of “near-term” solutions. “We want to find a way for this to be relevant in the near term,” she said. “What can we do now, and how can we apply it?”

Collaborative and interdisciplinary research are encouraged. Proposals can be submitted from April 1 to May 1, and a review panel designated by both SEI and Senior Vice Provost for Research and Innovation Mark Allen will select grant recipients. Funding will be awarded in June.

“This is part of Tech’s strategic plan,” Hunt said. “We are looking at every option for implementing energy technology that will be economically viable, useful and environmentally sustainable.”
reducing emissions makes the City of Atlanta a leader in the state and region and well ahead of federal action on climate change."

"We know that the opportunities to reduce our emissions are great, particularly now with the federal administration's focus on green job creation and green energy," Franklin said. "With funding from the recently passed American Recovery and Reinvestment Act, Atlanta's sustainability efforts will focus on energy efficiency and renewable energy initiatives that will create jobs, save money and protect our environment."

Determining the city's carbon footprint coincides with the release of the inaugural Sustainability Report for Atlanta. Produced by Sustainable Atlanta (a non-governmental partner to the city's Office of Sustainability), the report compiles readily available data to create benchmarks for measuring Atlanta's sustainability efforts, including the city's carbon footprint. The report also provides best practices, context, proposed strategies and action in the areas of water; energy and climate change; parks and green space; recycling and materials management.

City of Atlanta Mayor Shirley Franklin meets with Associate Professor Valerie Thomas and doctoral students Joy Wang and Seth Borin. The Tech team assisted in calculating the city’s ‘carbon footprint.’

"The Sustainability Report for Atlanta is both a tool and a template," said Lynnette Young, executive director of Sustainable Atlanta. "It is a snapshot of Atlanta's current status as it relates to sustainability and a context for future measurement and opportunity, determining what we can do together to help the city advance sustainable lifestyles for everyone."

Launched in 2008 with support from the Kendeda Fund, the Atlanta Office of Sustainability is working across city departments to “green” operations and at the same time, maximize efficiencies. Sustainable practices implemented at City Hall are already generating a 20 percent drop in electricity use, with a forecast of nearly $135,000 in annual operations cost savings.

With the municipal carbon footprint established, the next step will be to develop the Atlanta Climate Action Plan. "The Climate Action Plan will be our blueprint to guide all city departments so that current initiatives and near-term objectives are aligned with achieving the 2012 emissions reduction goal," said Mandy Schmitt, Atlanta's director of sustainability. "This strategic effort to reduce our greenhouse gas emissions supports the ultimate goal of making Atlanta a community that lives within the self-perpetuating limits of its environment and functions at a high level of efficiency to embrace sustainability goals."
In memoriam
Former Dean of Students James Dull dies

Micheal Hargrave
Communications & Marketing

James Edward Dull, who served Georgia Tech as its dean of students for 34 years, died on March 22. He was 80.

In his time at Tech, Dull oversaw virtually every aspect of student life including not only disciplinary processes but also most activities—housing, fraternity affairs and student media to name a few—outside of the curriculum. Over the course of his tenure, he served nine seated or acting presidents.

Enrollment grew from 5,200 to 13,000. In 1968, he was credited with finding and purchasing the 1930 Model A Ford coupe, the vehicle that leads the football team onto the field before every home game.

Tech students often cited his ability to connect with everyone, guided by his extraordinary powers of perception. Rich Steele, who earned his bachelor’s degree from Tech in 1985 and is now director of its Student Center, recounted his experience.

“He had an uncanny way of sizing up a person,” Steele recalled. “One day he asked if I grew up on a farm—which I did. Astounded as to how he came to ask me that question, he stated that I walked with a certain gait and with my feet spread apart—as someone would walk through a cow pasture. He used that skill to know how to best encourage the brightest student leaders and to know how to best deal with the student in need of discipline. That skill served him well.

As a tireless advocate of students, Dull understood that each individual required different kinds of support in order to succeed.

The James E. Dull Overall Fraternity award is used as a resource to gauge scholarship, leadership and philanthropy in participating fraternities, recognizing members of the Greek community in their involvement around campus in non-Greek activities.

When he retired in 1991, approximately 80 percent of the living alumni had been students during his career. His passion for and legacy of support for the arts was honored in 1992, when the black box theater at the back of the First Center for the Arts was named for him.

Dull is survived by his wife, Gay, two sons: Dr. John R. Dull and wife, Beth, of Atlanta and David A. Dull and wife, Cindi, of Winter Springs, Fla., granddaughter Grant and granddaughter Taylor. A memorial service will be held on Sunday, April 5, 2 p.m., at Peachtree Christian Church, 1380 Peachtree St., N.W., Atlanta, Ga. 30309.

In lieu of flowers, the family suggests donations be made to the Peachtree Christian Church Columbarium or the Peachtree Springs, Fla., grandson Grant and granddaughter.

For more information, visit www.gatech.edu.

Robert Nesmith
Communications & Marketing

Landscape Services crew members are gearing up to assist in the student-organized Tech Beautification Day, scheduled for Saturday, April 4. More than 800 students have volunteered to spread pine straw, wood chips and clean up.

Students, faculty and staff members will work around campus from 9 a.m. to noon to help with landscaping projects and litter clean-up.

For 12 years, students have planned the annual event. Landscape Services provides the materials—three tractor-trailers’ worth of pine straw, for example—and people to help and advise and check on projects. “Landscape provides the proper tools and materials for them to accomplish their work,” said Horticultural Donna Chronic. “We have everything on site for the groups.

by that morning.” Landscape Services works two weeks in advance to prepare the sites and gather items. Parking and Transportation works with them, providing parking lot areas to stage the materials, typically on the Friday before.

According to Chronic, the Tech Beautification Day student committee begins planning the annual service project in January. Working with Facilities, they identify different areas around campus for cleaning up. “The students requested a few projects,” Chronic said. “[They wanted to clean up] the hill beside the Baker building and a picnic site on Dalney and 10th Street.”

So far, Chronic said, more than 800 students have signed up for this year’s event. Faculty and staff are welcome to join, she said. The deadline for online registration is April 3, but the group will take “walk-ups” from 8:30 a.m. on the day of the event, at the registration table located at the campanile.

While students will be planting some trees this year, the majority of the work will consist of cleaning up and beautifying. Because the event falls a bit earlier this year and because of the drought, there will not be as much planting as in the past. “It’s too early to plant annuals,” said Landscape Services Manager Hyacinth Idie. “If we get another cold snap, it won’t all be for nothing.”

April 18 has been selected as a “storm” date. Volunteers keep working through the rain, says Chronic, who has been involved with the event since its 1998 inception. “About every other year, it rains, and it doesn’t seem to slow anybody down.”

This year, volunteers will help clean up parts of Home Park and English Avenue in what Chronic calls “overflow” projects. Sidewalks and debris-clearing will be the focus of these projects.

“We recognized that students who participate take ownership of the campus, and take better care of it as a result,” Chronic said.

For more information
www.gttbd.org

Robert Nesmith
Communications & Marketing

Keeping it clean
Students and the Institute team up for annual Tech Beautification Day

Michael Hargrave
Communications & Marketing

Theater. He retired in 1991.

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