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From: ASEE [FirstBell@asee.custombriefings.com]
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FIRST BELL

TODAY'S ENGINEERING AND TECHNOLOGY NEWS PREPARED EXCLUSIVELY
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Customized Briefing for Prof. John Rogers

October 7, 2008

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Leading the News

University of Illinois researchers develop ultra-thin photovoltaic solar cells.

The [New York Times](#) (10/7, D3, Fountain) reports that, although "photovoltaic cells, the basic building blocks of solar panels, are more efficient and less costly than ever," manipulating and incorporating the cells "into different panel designs is not necessarily easy." However, John A. Rogers of the University of Illinois, Urbana-Champaign, "and colleagues have come up with a novel method for creating extremely thin solar cells that can be combined in flexible, even partially transparent, arrays." The technique as described in *Nature Materials*, "may allow the fabrication of solar arrays with a variety of characteristics. For example, the researchers say it would be possible to print the cells on rollable plastic sheets that would be easy to transport and install." Solar arrays built into household windows could also be created by "printing the cells on glass in different densities."

The U.K.'s [Daily Mail](#) (10/6, Bates) explained the technique that Rogers and his team use to create the ultra-thin solar panels. First, the team "uses a special etching method that slices chips off the surface of a bulk silicon wafer. The sliced chips are 10 to 100 times thinner than the wafer, and the size can be adapted to the application." After the chips are sliced, a device picks them up "'like a rubber stamp' and transfers them to a new surface material, Rogers said." He added, "These silicon solar cells become like a solid ink pad for that rubber stamp." The last "step is to electrically connect these cells to get power out of them." According to the Daily Mail, the "technology has been licensed to a startup company called Semprius Inc. in the U.S."

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Higher Education

Utah higher education enrollment increases by 8.5 percent.

Utah's [Deseret News](#) (10/7, Stewart) reports that "fall enrollment is significantly up" at Utah's colleges and universities during a

"time when higher education is facing budget cuts." According to the Deseret News, "this year's fall enrollment rose by 11,896 students, an increase of 8.48 percent, from fall 2007." One education expert pointed out that "the poor economy, a different way of counting enrollment, and a recent push in the importance of a college degree all are contributing factors to the increase." Salt Lake Community College's enrollment increased by "4,722 students, many of whom are in career and technical training classes." Weber State University (WSU) in Ogden "experienced an enrollment increase of 3,368." The Deseret News notes that "higher education officials encouraged colleges and universities to include their concurrent enrollment numbers into the mix this year." WSU Provost Michael Vaughan said, "Concurrent enrollment is a high priority for WSU because it serves the needs of area students and local school districts."

Research and Development

Canadian researchers develop new technology for CO2 capture.

[UPI](#) (10/7) reports, "Scientists at the University of Calgary say they have developed a technology to capture carbon dioxide gas directly from the air." According to David Keith, director of the university's Institute for Sustainable Energy, Environment and Economy, he and his team use "a relatively simple machine that can capture trace amounts of CO2 present in the air at any place on the planet.." He said, "The thermodynamics suggests air capture might only be a bit harder than capturing CO2 from power plants. We are trying to turn that theory into engineering reality."

U.S. contractor developing surface coating that could lead to sleeker aircraft.

[UPI](#) (10/7) reports that HRL Laboratories, "a U.S. defense contractor, is developing a new type of surface coating that one day could mean sleeker aircraft." Company officials say that "the technology, called holographic impedance surfaces, potentially could allow aircraft designers to place antennae flush to the fuselage." It could also "be used to get rid of radar blind spots by allowing radar waves to wrap around an aircraft," according to an official from the Air Force Office of Scientific Research, who added that "the Air Force intends to fund the research for at least another three years, though implementation could be years away."

Global Developments

Bad electrical connection cited as cause of LHC shutdown.

The [AP](#) (10/7, Higgins) reports, "A bad electrical connection likely caused the malfunction that sidelined the world's largest atom smasher days after it was launched with great fanfare." According to Lyn Evans, project leader of the Large Hadron Collider (LHC) at CERN, the European Nuclear Research Organization, "the fault was probably a poor soldering job on one of the particle collider's 10,000 connections." The AP notes, "It will take at least two months for the repair, meaning the collider cannot be restarted until spring, after its mandatory shutdown due to high electricity costs during the winter." Lyn Evans, LHC project leader, said that "he still hasn't been able to examine the damage because the collider is too cold to be opened." The atom smasher "operates at extremely cold temperatures to take advantage of superconductivity -- the ability of some metals to conduct electricity without any resistance near absolute zero degrees."

Eco-friendly technology being built, implemented in Japanese factories.

The [Japan Times](#) (10/7, Masuda) reports that "major industrial companies with factories in the Kansai region, including Osaka, are aiming to turn out new high-tech products related to new energy and energy-saving as well as the reduction of carbon dioxide emissions." This is causing eco-friendly technology to flow into the Kansai region and its factories. Sanyo, for instance, "plans to introduce a mass production line system for lithium-ion batteries for hybrid vehicles at its plant in the town of Matsushige in Tokushima Prefecture." Meanwhile, Panasonic Electric Works Tatsuno Co. is seen as "conspicuous in [its] attempts to reduce greenhouse gas emissions from [its] factories. Tatsuno actually manufactured a wattmeter to measure electricity consumption and installed the device at its plant. The device has helped to reduce carbon dioxide emissions by about three percent."

Industry News

Funding for algae-to-fuel research "skyrocketing."

The [Seattle Post-Intelligencer](#) (10/7, Stiffler) reports that the "amount of money being invested in algae-to-fuel research by venture capitalists is skyrocketing." Algae startups "are snapping up graduate students knowledgeable about the aquatic plants before they've even finished their degrees, and they're hustling to form alliances with algae academics who for years toiled

without much notice." Rose Ann Cattolico, a University of Washington (UW) algae expert, "was recently recruited to start a business to work on algae-derived fuels. The company, called AXI, is a partnership between the UW and Allied Minds, an investment firm." She "was sought by the investors for her 30 years of algae expertise and wide-ranging knowledge of species." According to the Post-Intelligencer, "in 2007, \$32 million in venture capital was pumped into businesses working on algae fuel." And "so far this year, that number has reached \$184 million worldwide, according to Cleantech Network, which tracks environmental industries." However, "many estimates predict it could be 10 years until algae fuel can be produced on an affordable, large scale."

Wave, tidal energy draws renewed interest.

The [Wall Street Journal](#) (10/7, R6, Ordóñez) reports, "Dozens of companies...have invested in or" are weighing "the potential of technology designed to harness electrical energy from waves, tides, and currents." New Jersey's Ocean Power and New York's Verdant Power Inc. "are among the firms that already have built or plan to build wave- and tidal-power stations in oceans or adjacent waters. Others, such as Chevron, are seeking government approval to study the feasibility of such projects." Kim Copelin, a spokeswoman for Chevron said that the energy company "is monitoring ocean-energy technology and considering how it might be integrated into [its] operations." Chevron "is seeking a permit from the Federal Regulatory Energy Commission to start researching a possible tidal-power project in Alaska's Cook Inlet." The Journal noted that such "projects represent a rebirth of interest in the ocean and other waters as a source of energy, which intensified during the 1970s oil crises but fizzled in the 1980s when the price of oil dropped." Now, as concerns "about global climate change, foreign-oil dependency, and rising commodity prices" are growing, "companies and governments are taking another look."

Engineering and Public Policy

NRC delays decision on request to import radioactive waste.

The [AP](#) (10/7, Vergakis) reports, "The Nuclear Regulatory Commission (NRC) said Monday it is delaying a decision on whether to allow EnergySolutions Inc. to import the largest-ever amount of nuclear waste into the U.S." The NRC's ruling opens "the window for Congress to block all foreign waste before the decision is made." The agency "said it will wait until a federal court decides whether an interstate compact can block disposal of the waste in Utah before deciding on the company's import application." EnergySolutions "wants to bring the 20,000 tons of low-level waste from Italy through the ports of Charleston, S.C., or New Orleans for processing in Tennessee." The freight "would primarily consist of contaminated metals, wood, paper, plastic, liquids and ion-exchange resins." After processing, roughly "1,600 tons would be disposed at the company's dump in the western Utah desert." However, "the proposal has drawn a record number of public comments -- most opposing the plan."

South Dakota State University awarded NSF grant for solar cell research.

South Dakota's [Argus Leader](#) (10/6) reported that "South Dakota scientists' work building next-generation devices to harvest solar energy will be easier thanks to a" \$250,000 National Science Foundation (NSF) "grant for state-of-the-art equipment." Mahdi Farrokh Baroughi, assistant professor in South Dakota State University's (SDSU) Department of Electrical Engineering and Computer Science, said that the "grant will help researchers at SDSU, as well as the South Dakota School of Mines and Technology, and the University of South Dakota." Baroughi explained that "there are two immediate uses for the new equipment. One is to make a variety of cost-effective solar cells that can better convert sunlight to electricity." The second use for the equipment is to make "large-area electronic devices such as high-resolution and high-power displays, high-resolution X-ray detectors, and next-generation scanners and photocopiers." The Argus Leader noted that the "new equipment will allow South Dakota scientists to continue their push to develop photovoltaic devices using new materials that may be able to harvest a wider range of sunlight."

Elementary/Secondary Education

Texas program seeks to determine how much science knowledge kindergartners should already possess.

Texas's [Austin Business Journal](#) (10/7) reports that a \$2 million grant from the National Science Foundation will help fund the University of Texas (UT) Center for Science and Math Education's Building BLOCKS for Science program. This education initiative "seeks to determine what young people should know about science by the time they enter kindergarten," the Business Journal explains. "To gather the information, a research team from the college and participating Austin area teachers of four-year-olds will work together to assess students." Researchers will "observe a variety of school settings, including public and

private preschool classrooms, head start programs and day care facilities." UT maintained that "little research has been done on appropriate science instruction for young children." The grant "will offer a unique opportunity to investigate the boundary between pre-kindergarten and kindergarten-to-second grade science understanding."

Also in the News

Apple rumored to be developing new MacBook manufacturing process.

[PC World](#) (10/7, Nichols) reports that "the rumor mills have been running at full capacity to figure out the mystery behind a new Apple product called the MacBook Brick." According to PC World, an "Apple insider revealed that the Brick is in fact a new manufacturing process" that "is based around using lasers and water-jets to carve a single block of aluminum into a MacBook chassis." If "the rumor is plausible," such a factory "could mean a lot" to consumers. "Since the MacBook chassis would be carved there wouldn't be any need for bending the metal, which can often create weak points for breakage." In addition, a chassis made of a "single piece of aluminum" would make "for an overall smoother MacBook. And most importantly, while the factory to take advantage of the Brick process might be expensive, the process itself is relatively cheap, meaning that the MacBooks produced will cost less while still being more durable."

[Mac News World](#) (10/7, San Miguel) quoted Gartner analyst Mark Margevicius, who said that "he's still waiting for evidence to reverse his initial skepticism" of the rumor. Margevicius said, "One of the things that's intrigued me with aluminum is that it's heat-dissipating. ... If the case ends up being a heat sink of some sort, that to me would be pretty innovative." However, Margevicius disagreed with the assertion by one blog that the brick process would be "a game-changer." He said, "I have a hard time believing that if I save three or four ounces on a notebook, that it's a game-changer. ... The hype around this company can be pretty extreme at times."

Report ranks states on energy efficiency.

The [AP](#) (10/7) reports that the American Council for an Energy-Efficient Economy (ACEEE), an advocacy group, "ranks California, Connecticut, and Oregon at the top of a list of states improving energy efficiency." The ACEEE's [report](#) (pdf), released Monday, "rated Idaho as the most improved state in this category, moving from 25th two years ago to 13th. California, Connecticut, and Oregon were followed in the top 10 by Vermont, New York and Washington state." Additionally, "Minnesota and Massachusetts were tied, and New Jersey made the top tier of states." The report "examined the states on areas such as building codes, transportation and land-use policies, utilities' efficiency programs, financial incentives and support for research." Indiana NBC affiliate [WTHR-TV](#) (10/7, Walker) and the [Ohio News Network](#) (10/7) also cover the story.

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