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University of Florida, Nuclear Science Building, Room 202-A, Gainesville, FL 32611

www.floridaenergy.ufl.edu

352.392.0947

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Upcoming Events:

Renewable Energy Storage & Capacity Symposium—
June 12-15, 2013
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Summer Institute on Sustainability and Energy—
August 5-7, 2013
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Algae Biomass Summit 2013 Student Travel Grants—
October 4, 2013
Read more

FSU: Researchers Develop new Metric to Measure Destructive Potential of Hurricanes

Researchers at Florida State University have developed a new metric to measure seasonal Atlantic tropical cyclone activity that focuses on the size of storms in addition to the duration and intensity, a measure that may prove important when considering a hurricane's potential for death and destruction.

Just ask the survivors of Hurricane Sandy.

The 2012 hurricane was only a Category 2 storm on the often referenced Saffir-Simpson scale when it became the largest hurricane on record, killing 285 people in its path in seven different countries and becoming the second costliest in U.S. history. Likewise, Hurricane Katrina was a weaker storm than 1969's Camille but caused much more destruction even though the two hurricanes followed essentially the same path.

The new metric, called Track Integrated Kinetic Energy (TIKE), builds on the concept of Integrated Kinetic Energy (IKE) developed in 2007 to more accurately measure the destructive potential of a storm. IKE involves using kinetic energy scales with the surface stress that forces storm surge and waves and the horizontal wind loads specified by the American Society of Civil Engineers. TIKE expands the concept by accumulating IKE over the lifespan of a tropical cyclone and over all named tropical cyclones in the hurricane season.

"Representing the activity of an Atlantic hurricane season by a number is a very difficult task," said Vasu Misra, an associate professor of meteorology in the Department of Earth, Ocean and

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Atmospheric Science and FSU's Center for Ocean-Atmospheric Prediction Studies (COAPS). "TIKE gives a succinct picture by taking into account the number of tropical cyclones in the season, the duration of each tropical cyclone and the time history of the wind force over a large area surrounding each tropical cyclone. This makes TIKE much more reliable as an objective measure of the seasonal activity of the Atlantic hurricanes than existing metrics."

Misra developed TIKE through a collaboration with Steven DiNapoli, a former COAPS data analyst, and Mark Powell, a National Oceanic and Atmospheric Administration atmospheric scientist currently stationed at COAPS who created IKE with a colleague six years ago. Their paper, "The Track Integrated Kinetic Energy of the Atlantic Tropical Cyclones," was published in the American Meteorological Society's Monthly Weather Review.

Misra, DiNapoli and Powell calculated TIKE for each hurricane season, including all named tropical cyclones in the Atlantic from 1990 through 2011, and found larger TIKE values during La Niña conditions and warm tropical Atlantic sea surface temperature conditions. The information will help them in developing a model that can predict TIKE for an entire season — a prediction that could help emergency managers, businesses and residents with preparedness.

"I look forward to the global climate models improving enough to allow skillful predictions of storm size, which will help us predict TIKE for an upcoming season," Powell said.

TIKE is not intended as an alternative to existing metrics but as a complimentary tool, the researchers said.

The need for more information about the potential for destruction was brought home during the 2012 season. The Integrated Kinetic Energy calculation that TIKE is based on was more than 300 terajoules for Hurricane Sandy. The figure, which represents units of energy, was the largest IKE measurement for any hurricane between 1990 and 2006.

"That means that Sandy actually had more wind forcing over a large area than Hurricane Katrina," Misra said. "If the public was aware that this number was so high, which is an indication of the large potential for damage from storm surge and waves, some of them might have been able to make better life- and property-saving decisions."

New Energy Discovery Boosts Performance of See-through Solar Cells, Able to Generate Electricity on Glass Windows

New Energy Technologies, Inc. (OTCQB: NENE), developer of see-through solar cells for generating electricity on glass windows, today announced that researchers have successfully achieved faster fabrication time, improved transparency, and a two-fold increase in power conversion efficiency. Researchers achieved today's advances by way of a novel, patent-pending breakthrough, which enables fabrication of large-scale mini-module SolarWindow(TM) devices, important to commercial deployment of the world's first-of-its-kind glass window capable of generating electricity.

Generating electricity on glass windows is possible when New Energy researchers spray ultra-small, see-through solar cells on to glass surfaces. These novel spray-on techniques have been pioneered, advanced, and unveiled in operating prototypes by scientists who initiated early research efforts with New Energy

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Solar Cells continued from page 2 Technologies under a Sponsored Research Agreement at the University of South Florida (USF). The Company's SolarWindow(TM) technology has since progressed significantly beyond early research, and is now in advanced product development.

Meanwhile, today's announcement is the outcome of spray-related improvements achieved during the completion phase of New Energy's early Sponsored Research at USF, led by Dr. Xiaomei Jiang. Researchers report that these latest spray-on techniques have successfully:

-- Boosted power conversion efficiency of each individual cell by two-fold compared to previous fabrication methods, leading to overall power output improvement of SolarWindow(TM);

-- Reduced fabrication time from several days down to only a few hours, or 1/6th of the time normally required;

-- Improved the transparency or 'visual light transmission' of SolarWindow(TM) modules, creating a widow 'tint' effect; and

-- Achieved an aesthetically attractive, uniform coating on to glass

-- important to consumer appeal.

Specifically, these performance improvements result from spray advancements which control fabrication of various layers of coatings on glass; collectively, these layers make up the architecture of SolarWindow(TM) modules. Among other functions, the various layers allow the glass to absorb the sun's energy, generate electricity, and direct the electricity for collection and use.

Researchers are hopeful that today's breakthrough in mini-module spray-on device fabrication leads to improved spray-on techniques for large-scale devices, a precursor to the Company's product for commercial launch.

"This latest breakthrough is an exciting testament to our ongoing efforts as we continuously work to improve the quality and performance of our SolarWindow(TM) mini-modules," explained Mr. John A. Conklin, President and CEO of New Energy Technologies, Inc. "Moving forward, we remain devoutly focused on producing large surface area prototypes which are compatible with high-speed production methods, important to commercialization of SolarWindow(TM)."

Currently under development for eventual commercial deployment in the estimated 85 million commercial buildings and homes in America, SolarWindow(TM) technology is the subject of fourteen (14) patent filings and is the world's first-of-its-kind technology capable of generating electricity on see-through glass windows.

SolarWindow(TM) is a 'building integrated photovoltaic' (BIPV) technology. BIPV products are expected to achieve compound annualized growth of 41%-plus through 2016, according to Pike Research.

About New Energy Technologies, Inc.

New Energy Technologies, Inc., together with its wholly owned subsidiaries, is a developer of next generation alternative and renewable energy technologies. Among the Company's technologies under development are:

-- MotionPower(TM) roadway systems for generating electricity by capturing the kinetic energy produced by moving vehicles -- a patent-pending technology, the subject of 45 US

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Solar Cells continued from page 3 and International patent applications. An estimated 250 million registered vehicles drive more than six billion miles on America's roadways, every day; and

-- SolarWindow(TM) technologies, which enable see-through windows to generate electricity by 'spraying' their glass surfaces with New Energy's electricity-generating coatings -- the subject of 14 patent applications. These solar coatings are less than 1/10th the thickness of 'thin' films and make use of the world's smallest functional solar cells, shown to successfully produce electricity in a published peer-reviewed study in the Journal of Renewable and Sustainable Energy of the American Institute of Physics.

Through established relationships with universities, research institutions, and commercial partners, we strive to identify technologies and business opportunities on the leading edge of renewable energy innovation. Unique to our business model is the use of established research infrastructure owned by the various institutions we deal with, saving us significant capital which would otherwise be required for such costs as land and building acquisition, equipment and capital equipment purchases, and other start-up expenses. As a result, we are able to benefit from leading edge research while employing significantly less capital than conventional organizations.

For additional information, please call Ms. Briana L. Erickson toll-free at 1-800-213-0689 or visit:

USF Assists in Generating Clean Tech Breakthrough

The University of California at San Diego issued the following news release: Using the Trestles supercomputer at the San Diego Supercomputer Center (SDSC) at the University of California, San Diego, chemists at the University of South Florida (USF) and King Abdullah University of Science and Technology (KAUST) have discovered a more efficient, less expensive, and reusable material for carbon dioxide (CO2) capture and separation than is currently used to prevent the greenhouse gas from entering the atmosphere.

The breakthrough could have implications for a new generation of clean-air technologies, and offers new tools for confronting the world's challenges in controlling carbon.

In the findings, published in a recent issue of the journal Nature, the international group of scientists has identified a previously underused material, hexafluorosilicate - also known as SIFSIX-1-Cu - that offers a highly efficient mechanism for capturing CO2. Trestles, as part of the National Science Foundation's (NSF) Extreme Science and Engineering Discovery Environment (XSEDE), helped to confirm experimental results suggesting the sorption properties (the physical and chemical process by which substances attach to each other) of the material.

The discovery represents more than an improvement over existing materials in terms of carbon capture, said USF Chemistry Professor Mike Zaworotko, noting that the material also is highly-effective at carbon capture even in the presence of water vapor, a standard that other materials have not been able to meet. This makes it a promising candidate for real-world applications. Water normally interferes with CO2 capture, but the material developed in the USF-KAUST project resists it.

"I hate to use the word 'unprecedented' but we have something unprecedented," Zaworotko said. "We sort of hit a sweet spot in terms of properties." The discovery addresses one the biggest challenges of capturing CO2 before it enters the atmosphere: energy costs associated with the separation and purification of industrial commodities currently consumes around 15 *Clean Tech Breakthrough Continued on page 5*

Clean Tech Breakthrough continued from page 4 percent of global energy production. The demand for such commodities is projected to triple by 2050, the researchers note.

The problem is pronounced in capturing CO2, which in addition to its notoriety with climate change, is an impurity in natural gas, biogas and other gas streams, they said.

The material is a crystal whose atoms form a three-dimensional lattice with holes that snare molecules of CO2 but allow other molecules in air to pass. SIFSIX-1-Cu is an adaptation of a material created more than 15 years ago and is named after the chemical component that leads to the special properties. Porous SIFSIX materials are built from combinations of inorganic and organic chemical building blocks and are part of a general class of materials known as Metal-Organic Materials, or "MOMs".

The work has been several years in the making and began with an undergraduate research project conducted by USF student Stephen Burd under Zaworotko's supervision. Now a graduate student in chemistry, Burd's initial testing of the material and discovery of its high-selectivity for CO2 then grew to involve an international research group involving USF chemists Brian Space, Shengqian Ma, Mohamed Eddaoudi (who is also a faculty member at KAUST) and graduate collaborator Patrick Nugent.

The research facilities at KAUST in Saudi Arabia combined with the multidisciplinary expertise in Eddaoudi's research group - which includes researchers Youssef Belmabkhout, Amy Cairns and Ryan Luebke - allowed the design of unique experiments that permitted the sorption properties of this class of materials to be unveiled.

To confirm their findings, the researchers ran simulations using the NSF's XSEDE resources. Space's team initially used Molpro on the Pittsburgh Supercomputing Center's Blacklight to simulate the behavior of small numbers of gas molecules with each other and with the MOM material. Predicting the exact behavior of even small numbers of molecules requires a huge amount of computer memory -- more than one terabyte, greater than the RAM memory in a thousand brand-new iPads. Such calculations are a specialty of Blacklight, the largest "shared memory" computer in the world.

The researchers then used the Blacklight results to simulate the behavior of the gasses and the MOMs in bulk by running a Massively Parallel Monte Carlo (MPMC) code on XSEDE computers Trestles at SDSC and Ranger at the Texas Advanced Computing Center.

"We work with the experimental groups in a back-and-forth process," Space said. "We tried to explain their data, and our results give them hints on how to change the way the material works." The group believes the material has three potentially significant applications: carbon-capture for coal-burning energy plants; purification of methane in natural gas wells; and the advancement of clean-coal technology. Some 20 to 30 percent of the power output at a clean-coal plant is consumed by cleaning process. The new material could make those plants more efficient and put more power into the grid, the scientists predict.

The next step is to collaborate with engineers to determine how the materials can be manufactured and implemented for real-world uses.

Solar Electric System Provides Emergency Power, Teaching Tool for Haines City High School

(Cocoa, FL) – Students, teachers and the community of Haines City will reap multiple benefits from the new 10,000-watt photovoltaic (PV) system at Haines City High School. The PV system with battery backup will provide emergency power during an outage, reduce daily electricity costs to the school, and serve as a learning resource.

The Florida Solar Energy Center (FSEC), a research institute of the University of Central Florida (UCF), held a dedication ceremony and solar workshop for teachers to celebrate the installation of the 42-panel PV system at Haines City High School on Wednesday, May 15th. Coordinated by UCF's Florida Solar Energy Center, the system, valued at $85,000, is the 85th PV system installed through the SunSmart Schools Emergency Shelter Program.

In conjunction with the dedication, a professional development workshop gave teachers from Haines City High School, Poinciana Academy of Fine Arts in Osceola County, Bloomingdale High School in Hillsborough County and Montessori World School in Orange County an opportunity to experience hands-on solar activities, showcasing the FSEC curriculum and a companion renewable energy kit. More than 250 teachers have participated in similar workshops, impacting more than 50,000 students statewide.

Not only does the PV system reduce electricity costs by up to $1,500 a year and serve as a generator when a power outage occurs, the system also reports performance data to FSEC; the data will be available on energywhiz.com in June. This site will allow students and teachers to analyze PV system performance data to better understand how the technology works. "We hope we never have to use the system as a generator, and we're excited about the hand-on learning application for our students and teachers. Being able to see the real -time data that our system produces will be a tremendous resource," said Stephen Scheloske, assistant principal at Haines City High School.

The success of the program is largely due to strong partnerships between the U.S. Department of Energy, the State of Florida, UCF's Florida Solar Energy Center, school districts, the Florida solar industry, and utilities. The E-Shelter Program's initial $10 million in funding was awarded by the U.S. Department of Energy, through the State of Florida's Department of Agriculture and Consumer Services. As the program gained momentum, however, utility partners – Progress Energy (now Duke Energy) and Tampa Electric (TECO) provided an additional $2 million in funding to expand the program and equip additional schools with PV systems. A total of 105 bi-modal PV systems in 46 school districts are now installed in Florida.

"Certain aspects of the program presented brand new challenges. Installing photovoltaics on schools is not a new concept, but adding batteries is," said SunSmart Program Manager Susan Schleith. The battery component increased the complexity of the installations significantly. An unprecedented number of tradespeople were involved to make the program a success. It is estimated that more than 60 different companies in Florida were involved in some aspect of this program. "We all should be proud of this accomplishment that will benefit Florida now and for generations to come," added Schleith.

For more information about the SunSmart E-Shelter Program, contact Susan T. Schleith at (321) 638–1017 or susan@fsec.ucf.edu.

FSU: Atlantic Research Expedition Uncovers vast Methane-Based Ecosystem

A marine research expedition that included a Florida State University researcher and was sponsored by the U.S. Bureau of Ocean Energy Management (BOEM) and the National Oceanic and Atmospheric Administration (NOAA) has led to the discovery of perhaps the world's largest methane cold seep by a research team of university and government scientists.

The seep, which is a fissure in the seabed, lies deep in the western North Atlantic Ocean, far from the life-sustaining energy of the sun. Mussels blanketing the seep rely on bacteria that use the methane to make energy. The process, known as chemosynthesis, constitutes the basis for life in the harsh environment and could help scientists better understand how organisms survive under these types of extreme conditions.

"We are still fumbling around in the dark, literally and figuratively, in understanding the deep oceans," said FSU researcher and co-chief scientist Sandra Brooke. "The fact that a massive cold seep, possibly the largest ever documented has only just been discovered less than 70 miles off one of the busiest U.S. coastlines is evidence of how much we have to learn."

The new seep discovery is only the third documented seep site on the U.S. Atlantic Coast, and by far the most extensive; the two seep areas at this site are estimated to be at least a kilometer long and in places hundreds of meters across. Sea cucumbers were also seen tucked into the tight mounds of mussels and shrimp swam above them. Many species of fishes, including some with unusual behaviors, were also common around the unique ecosystem.

Added Brooke, "Chemosynthetic communities use chemicals coming from beneath the seafloor for energy production. This dependence makes them vulnerable as they cannot simply move into another area if their habitat is damaged. With ever increasing human activities in the deep sea, it is important that we identify and conserve habitats that support unique, ancient or fragile communities, such as this new methane cold seep."

Stationed aboard NOAA's Ronald H. Brown research vessel, the research teams used the diverse and high-tech capabilities of the Woods Hole Oceanographic Institution's Remotely Operated Vehicle (ROV), Jason II, to document and study the newly discovered methane seep. The teams have been able to capture high definition video, sample the sediment at the site, collect live mussels for genetic and reproductive studies, collect large dead shells and rocks for aging analysis, take water samples to examine water chemistry, and sample associated animals to examine food webs.

The seep discovery could potentially play an important role in advancing scientific understanding of hydrocarbon resources and gas hydrates (important possible future energy resources) along the US continental slope.

Major funding for the research expedition was provided by the Bureau of Ocean Energy Management, with NOAA providing funding for the Ronald H. Brown and Jason ROV. U.S. Geological Survey and other collaborators also provided a variety of resources.

FSU: Study Finds Use of Dispersants can Increase Oil Penetration into Sandy Marine Sediments

A Florida State University researcher working as part of the Gulf of Mexico Research Initiative (GoMRI) investigated the effects of dispersants on the movement of crude oil through water-saturated marine sand and found that dispersants potentially facilitate penetration of oil components into the seabed, where oxygen concentrations may affect the degradation of the oil.

Experiments using sand-filled columns ranging from 10 to 50 centimeters in length found that the addition of dispersants caused hydrocarbons such as oil to penetrate deeper into sediment layers and potentially extend the time the hydrocarbons stay in the environment.

Based on these experiments, researchers postulate the deeper penetration of hydrocarbons may slow their degradation due to a decrease in oxygen in deeper sediment layers and thus extend the time the hydrocarbons remain in the environment. However, in fully oxygenated sand, a deeper penetration may increase the number of microbes involved in the biodegradation and decomposition of the hydrocarbons.

Researchers also concluded from the experiments that the presence of dispersants allow oil components to permeate faster and deeper into sands.

"There is relatively little information on the effects of dispersants on oil deposition and transport in water-saturated sandy sediments," said Markus Huettel, a member of the study team and a professor in the Florida State University Department of Earth, Ocean and Atmospheric Science. "This study shows that the use of dispersants can potentially have both positive and negative impacts, depending on the oxygen content of the sand."

Huettel, who worked with Alissa Zuijdgeest on the study, is among a number of GoMRI scientists studying the impact of the Deepwater Horizon oil spill. The research is made possible in part by a grant from GoMRI through the Florida Institute of Oceanography and Deepsea to Coast Connectivity in the Eastern Gulf of Mexico (DEEP-C) Consortium.

Recent Funding Opportunities

FESC office tracks the energy related funding opportunities, shares them with faculty and industry partners, facilitates the submission of multi-faculty, multi-SUS university competitive proposals in response to solicitations for major research programs. The most recent funding opportunities are listed below. For a complete list please visit the funding opportunities page on the FESC website.

- **DE-FOA-0000892: Nuclear Science and Nuclear Nonproliferation Research**
  Application due date: July 31st, 2013
  More Information

- **DE-FOA-0000683: Clean Energy manufacturing Innovation Institute**
  Letter of intent: July 7th, 2013
  More Information

- **DE-FOA-0000800: Cost-Shared Development of Innovative Small Modular Reactor Designs**
  Submission Deadline: July 1st, 2013
  More Information

- **DE-FOA-0000891-FY 2013 Methane Hydrates**
  Application due date: July 10th, 2013
  More Information