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Upcoming Events:

Gulf of Mexico Oil—January 21-23, 2013-New Orleans, LA
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Community College Energy Workshop—January 25, 2013-Florida Solar Energy Center-Cocoa, FL
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SEC Symposium—February 10-12, 2013-The Hyatt Regency, Atlanta, GA
Read more

National Ethanol Conference—February 18-20, 2013–The Wynn Las Vegas Resort. Las Vegas. Nevada
Read more

New Fort Myers Plant Creating Biodiesel out of Restaurants' used Cooking Oil

FORT MYERS — It's a dirty job.

But Christian Colarusso is happy to have it. He's one of several recent Florida Gulf Coast University graduates to land a job at a new state-of-the-art plant that's pumping out biodiesel in Fort Myers.

He operates the processors and equipment that turn used cooking oil into eco-friendly fuel that can run just about any diesel engine. His job is all about grease.

After graduating from FGCU in 2010 with a bachelor's degree in environmental engineering, Colarusso, 26, worked for a local waste water treatment plant. But he didn't find it challenging.

Now he's challenged, with the new biodiesel plant revving up a few weeks ago. The multimillion-dollar plant is owned and operated by FL Biofuels LLC, a start-up that now has more than a dozen employees.

"The conversion from waste cooking oil to biodiesel is from a chemistry perspective fairly simple," Colarusso said. "But to try to do it on a bigger

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scale is really tough."

Just beyond the plant's front office there's a long wall filled with calculations for the many "recipes" that have been developed to convert the dirty cooking oil to biodiesel. There are so many recipes they've spilled out onto a second wall in the training room.

It took about four years to get the plant open, primarily because of all the regulatory requirements. The company recently got its final permit from the U.S. Environmental Protection Agency.

The plant, including an office building, stretches more than 25,000 square feet and sits on 2.5 acres off Edison Avenue, a few blocks from the Lee County courthouse. It's the only plant of its kind in Florida operating at a state farmers' market, designed to help market local produce. One day, the owners hope to make fuel from energy crops, too, but the crops haven't taken off in Southwest Florida.

It cost nearly $10 million to get the plant up and running, with most of that money coming from the pockets of its three co-owners of FL Biofuels: Roy Benton II, his son Roy Benton III, and Dave Lageschulte, who co-owns about 20 Hooters and other restaurants in Florida.

The Bentons started looking into renewable energy after getting out of the commercial construction business in 2004.

"We're just one real small piece of a larger puzzle," said Roy Benton II, 62. "We just really need to get off fossil fuels, especially when we have to purchase it from people who really don't like us."

The fuel made at the plant is 100 percent biodiesel, but can be blended to make lower percentages, such as B5, B10 and B20. It's sold wholesale and the company doesn't have its own fueling stations.

One of the company's first buyers might be Lee County government, which has a contract to buy up to 500,000 gallons of the biodiesel to help run its vehicles over the next three years. Benton said he's been in talks with a large fuel distributor in the Southeast U.S. that could end up buying "all the fuel his company can make."

The plant can produce 4.5 million gallons of biodiesel a year, but it's running at half of its capacity, making two batches of fuel a day. One batch is about 3,100 gallons, so that's more than 6,000 gallons a day.

"We're still getting our feet wet," Benton said.

While it's not at full capacity, the plant still operates around the clock, with shift workers on duty 24 hours a day, seven days a week.

Cooking oil — called the feedstock — is trucked to the plant, coming from restaurants in Southwest Florida and elsewhere in the state, which sell it for a profit.

"What was once waste 10 years ago is now extremely valuable," Colarusso said.

The conversion from waste to biodiesel involves taking the moisture and sediment out of the cooking oil and removing the glycerin, which is sold to other companies to make everything from soap to medicine.

"There's really no such thing as waste here," Colarusso said.

There are only two other biodiesel plants like the one in Fort Myers in North America — one in San Diego and the other in Canada. Both of those are about half the size, Benton said.

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There are plenty of other biofuel refineries across the country, including a few in Florida, but they use different processing technology. The Fort Myers plant has a Swedish system that's used all over Europe to make biodiesel. Its processing system has a few modifications, including an ion exchanger built by Benton III, which removes magnesium and sulfur from the oil, making the fuel purer.

There's a maintenance room filled with hundreds of spare parts, some of them hard to find, to keep the plant operating.

The conversion to fuel takes about 12 hours. There are many tests along the way.

Lauren Barraco, another recent graduate of Florida Gulf Coast University in Estero, is a chemist for FL Biofuels. She regularly checks oil and fuel samples for water, methanol content and other attributes. She has a degree in chemistry and worked for a bank for seven months until she landed a job at FL Biofuels.During the conversion, there are half a dozen tanks to monitor inside the plant. There are more tanks sitting outside, with some used for storage.

The biofuel-making process uses very little water and the methanol used to break down the cooking oil is captured and can be used again, said Mindy Collier, quality control manager at FL Biofuels. More than 90 percent of the oil is converted to fuel. Murky brown oil becomes a honey-colored fuel you can see through.

The cooking oil comes from a broker, who gets it from restaurants as far south as Miami to north of Orlando.

"A lot of it comes from South Florida," said broker Wayne Whittaker, president and owner of IQC in Sarasota. "Here's the thing about used cooking oil. It's found where there's lots of people. You don't have a lot of fast food restaurants in the middle of Alligator Alley, so you have to go where there are lots of people and that is Miami, Orlando and Tampa."

He collects the oil from various suppliers, who pick it up by the truckload at chain and mom-and-pop eateries. Chinese and taco restaurants are particularly popular pick-up points.

Outgoing Lee Commissioner Ray Judah is thrilled to see the plant finally open.

"Grease and waste vegetable oil create maintenance problems in our sewer system and more importantly it's a wonderful alternative to fossil fuel that can be used in our fleet of buses, at LeeTran," he said. "Eventually, it could be used in school buses where the children would be far greater protected from the toxic fumes of diesel. The only complaint the kids might have is the school bus smells like french fries."

The plant is well-located because it's so close to the rail lines, opening up the opportunity to ship its fuel by train, Judah said.

He expects big things from FL Biofuels.

The biofuels market continues to grow. Pike Research, a research firm based in Colorado, predicts the global market for biofuels will grow to a value of $185.3 billion by 2021, up from $82.7 billion in 2011. By 2021, the company forecasts that biofuel production will reach 65.7 billion gallons a year.

Lee County helped Florida Biofuels qualify for a $500,000 U.S. Department of Energy grant from stimulus funds for the project, through the American Recovery and Reinvestment Act.

"As long as the government makes it a requirement that biodiesel be blended with diesel fuels, these guys will have a market and they have the potential for growing," Whittaker said.

University of Florida Chemists Pioneer new Technique for Nanostructure Assembly

GAINESVILLE, Fla. — A team of researchers from the University of Florida department of chemistry has developed a new technique for growing new materials from nanorods.

Materials with enhanced properties engineered from nanostructures have the potential to revolutionize the marketplace in everything from data processing to human medicine. However, attempts to assemble nanoscale objects into sophisticated structures have been largely unsuccessful. The UF study represents a major breakthrough in the field, showing how thermodynamic forces can be used to manipulate growth of nanoparticles into superparticles with unprecedented precision.

The study is published in the Oct. 19 edition of the journal Science.

"The reason we want to put nanoparticles together like this is to create new materials with collective properties," said Charles Cao, associate professor of chemistry at UF and corresponding author of the study. "Like putting oxygen atoms and hydrogen atoms together in a two-to-one ratio – the synergy gives you water, something with properties completely different from the ingredients themselves."

In the UF study, a synergism of fluorescent nanorods, sometimes used as biomarkers in biomedical research, resulted in a superparticle with an emission polarization ratio that could make it a good candidate for use in creating a new generation of polarized LEDs, used in display devices like 3-D television.

"The technology for making the single nanorods is well established," said Tie Wang, a postdoctoral researcher at UF and lead author of the study. "But what we've lacked is a way to assemble them in a controlled fashion to get useful structures and materials."

The team bathed the individual rods in a series of liquid compounds that reacted with certain hydrophobic regions on the nanoparticles and pushed them into place, forming a larger, more complex particle.

Two different treatments yielded two different products.

"One treatment gave us something completely unexpected — these superparticles with a really sophisticated structure unlike anything we've seen before," Wang said.

The other yielded a less complex structure that Wang, and his colleagues were able to grow it into a small square of polarized film about one quarter the size of a postage stamp.

The researchers said that the film could be used to increase efficiency in polarized LED television and computer screens by up to 50 percent, using currently available manufacturing techniques.

"I've worked in nanoparticle assembly for a decade," said Dmitri Talapin, an associate professor of chemistry at the University of Chicago who was not involved with the study. "There are all sorts of issues to be overcome when assembling building blocks from nanoscale particles. I don't think anyone has been able to get them to self-assemble into superparticles like this before."

"They have achieved a tour-de-force in precision and control," he said.

Florida Soil a Patchwork Quilt for Carbon Content, UF/IFAS Researchers Find

GAINESVILLE, Fla. — Florida is home to many types of soil and some of them lack carbon, meaning they could be used for carbon sequestration — but a new University of Florida study shows that variability in the state's existing soil carbon levels could make the task harder.

Carbon sequestration is the practice of storing carbon; one way to accomplish it is by adding carbon-rich material to soils. Carbon sequestration aims to slow the build-up of carbon-based gases in the atmosphere, a phenomenon believed to be a cause of global climate change. Some landowners may be able to make money by allowing their properties to be used as sites for carbon sequestration.

In a presentation today at the joint meeting of the American Society of Agronomy, Crop Science Society of America and Soil Science Society of America, researchers with UF's Institute of Food and Agricultural Sciences were to report early findings from a statewide study analyzing soil carbon content across areas the size of a football field.

The results confirm what researchers have suspected — that soil carbon content can vary widely on a small site, said Sabine Grunwald, a professor in UF's soil and water science department. That means efforts to amend soil with carbon-rich biomass will need to be tailored to local carbon levels.

The results also confirm that soil carbon variability has a lot to do with how the land is used and what material covers the land.

"Land use is highly correlated with soil carbon values," Grunwald said. "So if you know the land use for a particular area, you can predict the amount of soil carbon there."

The findings will help Grunwald and her colleagues develop new digital soil maps that offer greater resolution than past efforts, she said. The maps are needed for precision agriculture, the practice of growing crops using computer-assisted technology that compensates for variable growing conditions. Soil carbon content plays a major role in soil quality, fertility, crop yield and food production.

High-quality digital maps can also assist conservation efforts by giving an accurate assessment of subsurface conditions in an area, she said.

In the study, doctoral student Xiong Xiong took soil samples from five areas, each representing one of five types of land use and land cover commonly found in Florida. They are: pineland, dry prairie, improved pasture, mesic (moderately wet) mixed forest and xeric (dry) upland forest. Together, the five account for about 40 percent of Florida's surface area.

Three of the sites were located near Gainesville, one in the Panhandle and one in South Florida. At each, Xiong took 108 soil samples, starting with several at a home base. Then Xiong sampled at distances of about 2 yards, 8 yards, 25 yards and 75 yards from the home base.

The results showed that, in general, dry prairie and mesic mixed forest had the greatest capacity to store carbon, followed by improved pasture, while pineland and xeric upland forest had the least.

The statewide soil carbon assessment is one part of a three-year study funded by the U.S. Department of Agriculture, Grunwald said.

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MegaWatt Ventures Winner Joins USF Tampa Bay Technology Incubator

TAMPA, Fla.–Trash 2 Cash-Energy, LLC, (T2CE) winner of the 2012 MegaWatt Ventures competition has joined the Tampa Bay Technology Incubator (TBTI), part of USF CONNECT at the University of South Florida.

Founded in 2012, the USF spin-out company utilizes technology developed at the university for its novel process of converting landfill gas into liquid fuels. By integrating the technology into gas capturing systems at landfills, municipal solid waste (MSW) facilities are able to convert naturally produced gases, including methane and carbon dioxide, into liquid fuel, such as diesel.

The technology not only provides a renewable source of energy, but also greatly reduces the amount of greenhouse emissions of MSW facilities.

In September 2012, Trash 2 Cash-Energy received $100,000 as the first place winner of the 2012 MegaWatt Ventures program, an annual clean energy business plan competition sponsored by the U.S. Department of Energy.

"By coupling a patent-pending Fischer Tropsch eggshell catalyst to an innovative process design, it is possible to alleviate the problems associated with accumulating municipal solid waste in landfills, and provide a domestic, sustainable, green fuel," said John Kuhn, president of Trash 2 Cash-Energy.

The company will use the award to move forward with commercializing the technology.

Trash 2 Cash-Energy's proprietary system is 63 percent more efficient than current methods of generating electricity from landfill gas and provides an economic advantage to MSW facilities by delivering three times more revenue using the same amount of gas. The company plans to develop a full scale demonstration facility that will be used to market the technology to other MSW plants and landfills.

"T2CE is very excited to become part of the TBTI," said Kuhn. "We are hoping to make great progress in the renewable energy market and are excited to take this next step."

Tracey Swartz can be reached at taswartz@usf.edu.

Program Aims to Mentor Women Inventors

In her career working with technology companies, Jane Muir said she is often the only woman in the room.

The STEM fields - science, technology, engineering and math - have historically been dominated by men and less than 10 percent of venture-backed technology startups are headed by women, according to a press release from the University of Florida Office of Technology Licensing.

As director of the UF Innovation Hub, Muir started a program to address the disparities.

Empowering Women in Technology Startups - or eWiTS - featured 55 women mentored by local business women in how to form a company around university research inventions with at least one woman as co-inventor.

The program ended Tuesday with a business-plan competition judged by a panel of six female investors who came from as far as Ohio, North Carolina and South Florida.

Muir said the odds are "very high" that one or more companies will come out of the program, with one of the investors asking that some of the projects submit pitches to her firm.

In December, the tech licensing office will help interested teams incorporate, license technology and meet investors, she said.

The winning projects included a middle ear prosthesis to address hearing loss, a device that measures glucose levels in saliva and transmits the data to a clinician, and a flavor additive to improve the appetites of Alzheimer's and Parkinson's disease patients.

Participants included postdoctoral researchers and graduate students, engineers, scientists, Realtors and other professional women, with and without current jobs, Muir said.

"They're graduating from this program with training and skills that will empower them for the rest of their lives," she said. "From our perspective, we've developed a talent pool of potential entrepreneurs who will help the university commercialize research discoveries."

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-0000799: Fiscal Year 2013 Consolidated Innovative Nuclear Research** Pre-Application Due Date: January 28th, 2013
  More Information

- **DE-FOA-0000807: Nuclear Energy University Programs-Fellowship and Scholarship Support** Application Due Date: Continuously through November 30th, 2015
  More Information

- **DE-FOA-0000792: Solid-State Lighting Manufacturing Research and Development-Round 4** Application Due Date: February 21st, 2013
  More Information

- **DE-FOA-0000722: Electrochemical Storage Technologies Suitable for Automobile Industry Applications** Application Due Date: January 31st, 2013
  More Information

- **NSF-12-603: United States-Israel Collaboration in Computer Science (USICCS)** Full Proposal Window: January 18th-February 1st, 2013
  More Information

- **DE-FOA-0000661: Regional Test Centers: Validation of Photovoltaic Modules and Systems** Application Deadline: December 30th
  More Information

- **NSF-12-545: Research on the Science and Technology Enterprise: Statistics and Surveys R&D** Application Deadline: January 15th, 2013
  More Information

- **Particulate and Multiphase Processes** Full Proposal Window: January 15th, 2013- February 19, 2013
  More Information