FALL 2014

CLEMSON
CHEMICAL AND BIOMOLECULAR ENGINEERING

Dr. Anthony Guiseppi-Elie

Recognized for Several Achievements

One of the projects that helped a Clemson University professor secure a prestigious honor could allow doctors to inject chips into the muscle of trauma victims to determine whether blood loss is life-threatening. The "biochip" is one of many innovations that Anthony Guiseppi-Elie has advanced in an accomplished career spanning nearly four decades, including eight years at Clemson. A current Fellow of the American Institute for Medical and Biological Engineering, his outstanding achievements were recently recognized by the Royal Society of Chemistry. The London-based professional society admitted him as a fellow. "It says that Clemson researchers are amongst the best in the world," Guiseppi-Elie said. "Ultimately, it's not about me. I've had wonderful students – very productive, very smart students who have contributed to my work over the years."

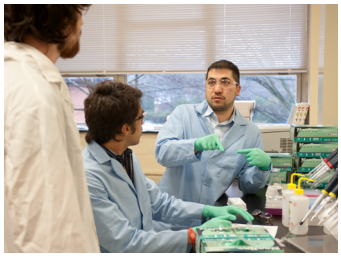
Guiseppi-Elie said he is continuing to advance the research the society cited when it made him a Fellow. The biochip Guiseppi-Elie is developing would "detect and report elevated lactate levels in trauma victims," he said. "When a patient is bleeding, lactate levels can be four or five times higher than normal." Such measurements would be far better than a blood test in determining whether the patient's life may be in jeopardy, he said. "A lot of the chemistry that's in the blood is in fact dictated by the chemistry in the muscles," Guiseppi-Elie said. "We would like to find out what's going on with a patient before the elevated chemistries appear in the blood. You have to make these measurements where the action is. The action is in the muscle. The chip could be injected into a patient at the scene of a traumatic injury, such as a car wreck or on the battlefield, and remain in the muscle for several weeks." But putting the chip in the body for an extended period presents another challenge. The body will eventually form a wall of fibrous tissue around any foreign object. The fibrous tissue would prevent the chip from taking proper measurements. Guiseppi-Elie said he is also developing electroconductive gels that would coat the chip to prevent the tissue from encapsulating it. "We borrow some of the chemistry from the human body itself, and we put that chemistry into the material that coats the chip," he said. "That makes it compatible so that the body recognizes the chip as itself rather than something foreign." Guiseppi-Elie is a professor in three of Clemson's engineering departments– chemical and biomolecular engineering; electrical and computer engineering; and bioengineering. He is also director of the Center for Bioelectronics, Biosensors, and Biochips. "Being named Fellow is a well-deserved honor," said Doug Hirt, chair of Clemson's Department of Chemical and Biomolecular Engineering. "It's a prestigious recognition that goes to the society's most accomplished members." Guiseppi-Elie said he is also working on a gel that can respond to the changing chemistry of a wound. The gel is designed for chronic wounds that refuse to heal, he said. "This gel material responds by releasing a drug," Guiseppi-Elie said. It will be especially helpful with pressure ulcers, also known as bed sores, he said. As life spans expand, more people will spend their final few years in bed, Guiseppi-Elie said. "This is a challenge we'll have to face," he said.

Anand Gramopadhye, dean of the College of Engineering and Science, said that being named a fellow of the Royal Society of Chemistry underscores the level of scholarship Dr. Guiseppi-Elie brings to Clemson. "The work that Dr. Guiseppi-Elie is doing exemplifies the high-level of research happening in the college," Gramopadhye said. "He has had a stellar career and still has some exciting work ahead of him. Congratulations to him." Being named a fellow comes on the heels of a separate award. Clemson University Libraries named Guiseppi-Elie "Researcher of the Month" in July, noting he has 136 publications and has been cited 3,526 times. "These two distinct and significant recognitions are richly deserved," said Tanju Karanfil, the college's associate dean for research and graduate studies. "With work like this, we will take Clemson research to the next level."

(Clemson University Media Release October 2, 2014 - Written by Paul Alongi, College of Engineering and Science)

Prof. Anthony Guiseppi-Elie working with graduate research assistant, Kayode Karunwi, in the C3B Lab at the Research Park.

FACULTY HIGHLIGHTS

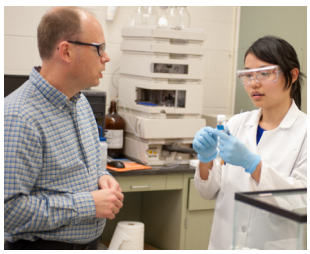


Prof. Mark Blenner received funding from the **National Science Foundation** to study novel ways to create **self-regulating metabolic pathways**. The project involves using an unsteady state model to predict metabolic and protein engineering to improve the production of biodiesel directly biosynthesized in E. coli. The interest is in leveraging biological feedback control schemes to improve how cellular pathways utilize substrates. Such self-regulating pathways may improve the robustness of cellular biomanufacturing and could improve bioprocess scale-up using molecular scale solutions. The three year award to Dr. Blenner is for $313,000. Dr. Blenner also received funding from the **Animal Coproducts Research and Education Center** to **study the ability of microorganisms to convert rendered animal fats into value added products** – including omega-3 fatty acids. His research will be featured in an upcoming issue of Render Magazine.

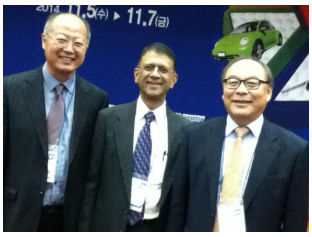
Profs. Rachel Getman and David Bruce received funding from the **National Science Foundation** for a project entitled **"Mechanism for Heterogeneously Catalyzed Sugar Alcohol Reactions: Hierarchical Modeling and Experimental Studies."** In addition, **Prof. Getman** recently received a new **Department of Energy EFRC** grant entitled **"Energy Frontier Research Center for Inorganometallic Catalyst Design,"** led by the University of Minnesota. This grant was one of only 10 new EFRC's that were funded.

Prof. Anthony Guiseppi-Elie has been named to the **Fulbright Specialist Roster** (2014-2019) of the U.S. Department of State's Bureau of Educational and Cultural Affairs (ECA) and the Institute of International Education's Council for International Exchange of Scholars (CIES). "A recommended Fulbright Specialist Roster candidate is eligible for consideration for two to six-week grant opportunities through the Specialist Program in response to requests made by foreign academic institutions interested in requesting a Fulbright Specialist. Under this program, grant support is provided to the Fulbright Specialist in achieving proposal goals of the foreign academic institution." Prof. Guiseppi-Elie has service appointments in Argentina, France and Uganda.

Prof. Scott Husson is a member of Clemson's new **Water-Energy Consortium**. Prof. Husson is already working on a project "focused on generating a new form of renewable energy where rivers flow into the sea. When two streams of different salinity mix, it creates energy." This project is explained in a press release on our website (clemson.edu/ces/chbe).



Prof. Amod Ogale was an invited international speaker at the **2014 Korean Carbon Society's Annual Conference** held in Jeonju, South Korea, at the opening ceremony on November 5, 2014. Prof. Ogale presented his Graffin Lecture, "Versatile Carbon: Fibers for Composite Materials." Pictured (L to R): Prof. Yang, Prof. Ogale, and Prof. (Emeritus) Ryu.



MESSAGE FROM THE CHAIR

Dear Alumni and Friends of the Department:

The vast majority of our alumni have taken unit-operations lab in Earle Hall. Then came 2002 – that is the year that the department opened up an international experience whereby students could take the senior-level unit-operations lab at the Technical University in Vienna, Austria. The program, which also involves students from the University of Wisconsin-Madison, was formalized by Prof. Steve Melsheimer and for the past eight years has been overseen by Prof. Scott Husson. The program is an intense four weeks with excellent lab facilities and an emphasis on connecting experimental data with theory as well as developing communication skills. In recent years we have had 10 student participants annually.

Our students now have an additional study-abroad option. Prof. Tony Guiseppi-Elie has developed a Summer Undergraduate Research Experience in Academic Entrepreneurship in a partnership between Clemson and L'École des Mines d'Alès (EMA), France's number one academic institution for industrial placement. Students spend 10 weeks in the program, five of which involve industrial placement within local French companies and five weeks in company-aligned or related entrepreneurial research with a faculty advisor in the research labs at EMA. The program involves entrepreneurial skills (industrial safety, business ethics, IP, etc.); industry-related environmental/sustainability sciences, including industrial ecology, risk analysis, risk mitigation, and risk management; and planned cultural and touring activities. The initial interdisciplinary cohort will launch the program this summer.

Go Tigers !!

Best regards,
Doug Hirt

BILL COBURN RECEIVES DEAN'S STAFF AWARD

Bill Coburn receives the Dean's Exceptional Staff Award from department chair, Dr. Hirt, and Dean Gramopadhye

During the College of Engineering and Science Staff Awards Luncheon at the Madren Center on December 4th, **Bill Coburn**, our Lab Technologist, was presented the **Dean's Exceptional Staff Award**. Bill received this award because of his exemplary service to the Chemical & Biomolecular Engineering Department.

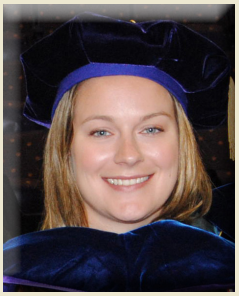
Bill has worked at Clemson for 19 years and is a key and vital employee to our department. He plays a major role in maintaining and supervising our Unit Operations Labs and assists our undergrad and graduate students during their experiments in the lab. In addition, he is the go-to person in our department for technical problems, supervises renovation projects for our research labs and building, along with computer and IT support.

Congratulations to Bill on this well-deserved award!!!

PhD GRADUATES

Dr. Becky Alway-Cooper
Dissertation: **"Structure-Property Relationship of Nanomodified Mesophase Pitch-Based Carbon Fibers"**
Advisor: Dr. Amod Ogale
Current Position: December Graduate

Dr. Heather Chenette
Dissertation: **"High-Productivity Membrane Adsorbers: Polymer Surface-Modification Studies for Ion-Exchange and Affinity Bioseparations"**
Advisor: Dr. Scott Husson
Current Position: Assistant Professor
Rose-Hulman Institute of Technology
Terre Haute, Indiana



Dr. Ashley Hart
Dissertation: **"Synthesis, Design, and Environmental Fate of Metallic Nanoparticles"**
Advisor: Dr. Christopher Kitchens

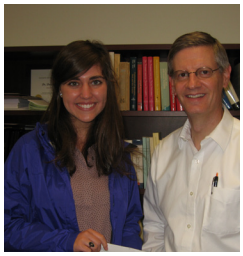
Dr. Jesse Kelly
Dissertation: **"Thermally Responsive Polymer Electrolytes for Inherently Safe Electrochemical Energy Storage"**
Advisor: Dr. Mark Roberts
Current Position: December Graduate

Dr. Sam Lukubira
Dissertation: **"Processing-Structure-Property Relationships of Meat and Bone Meal Derived Bioplastics"**
Advisor: Dr. Amod Ogale
Current Position: Post Doc
Chemical Engineering Department
Clemson University

Dr. Julian Velez
Dissertation: **"Solvated Liquid Lignins From Kraft Black Liquors: Phase Behavior and Molecular Characterization"**
Advisor: Dr. Mark Thies
Current Position: December Graduate

STUDENT HIGHLIGHTS

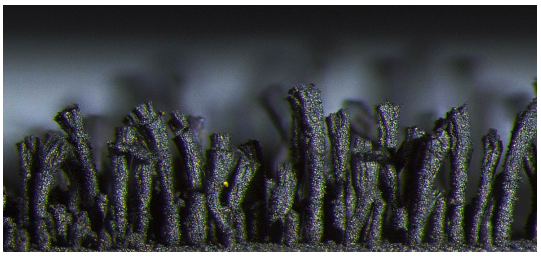
Graduate student, **Steven Weinman**, is the honored recipient of a National Science Foundation (NSF) Graduate Research Fellowship. He was selected based on his outstanding abilities and accomplishments! Steven's advisor is Dr. Scott Husson. This fellowship will entitle Steven to three years of stipend support along with professional development opportunities.

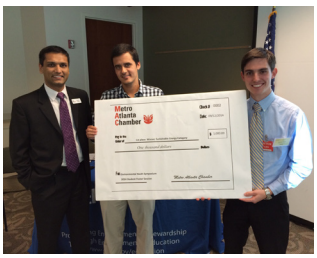


ChBE Senior, **Kaitlin Ailey**, was the recipient of the **"Eastman Award for Excellence in Chemical Engineering"** this year. Dr. Hirt presented her with a $2,000 check from Eastman Chemical for this award. Kaitlin completed an internship with Eastman this past summer. Congratulations!

At the recent AIChE Conference in Atlanta, undergrad student, **Mark Payne**, was a recipient of the prestigious **AIChE 2014 Donald F. & Mildred Top Othmer Scholarship Award**. Mark received a certificate and a check in the amount of $1,000. Awards are presented on the basis of academic achievement and involvement in student chapter activities. Only 15 of these are awarded in the entire USA to undergrads in Chemical Engineering!

Grad student, **Kryssia Diaz-Orellana**, participated in the Light Microscopy Contest hosted by the **Clemson Light Imaging Facility** this fall. Her photo entitled **"Extended Polymer Worm Family"** won first place overall!!! Congratulations, Kryssia!! Her advisor is Dr. Mark Roberts.

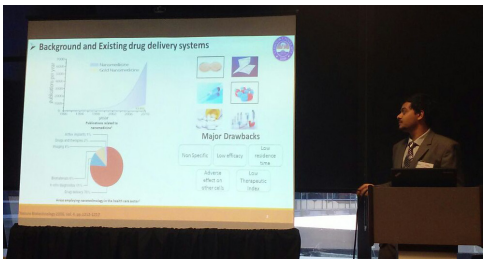


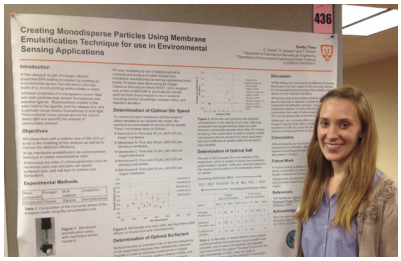


Graduate students, **Adam Klett and Julian Velez**, were awarded **1st Place in the Sustainable Energy Category at the EPA Environmental Youth Symposium** in Atlanta in September. Their poster was titled "Biofuels from Black Liquor for Greenhouse Gas Reduction" and they were awarded a $1,000 scholarship.

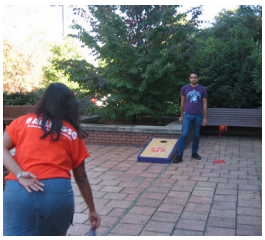
ChBE Senior, **Kimberley Owen**, was the **Homecoming Build Coordinator for the Habitat for Humanity** build again this year. During the 10 days leading up to Homecoming in October, 500 students helped to build a house on Bowman field, and has since moved to its permanent location. In addition, this 20-year tradition at Clemson was in jeopardy of not continuing due to lack of funding. Kimberley was also instrumental in helping the Pickens chapter raise over $65,000 to fully fund this year's home and secure funding for future years. Congratulations!!

The **2014 AIChE Annual Meeting** was held in Atlanta this year from November 16th through the 21st. The majority of our graduate students, and some undergrads, either presented research posters or gave oral presentations. Our faculty also participated in many of the sessions or served on committees. It was a valuable professional experience for all!!





ALUMNI



ChBE hosted its Annual Homecoming Alumni Drop-In tailgate before the football game against Syracuse on October 25th. We had classes represented from 1963 through 2014. For the last three years, the Class of 1976 has had the most representatives at our Homecoming Tailgate! Thanks again to everyone who stopped by - we enjoyed talking to you!! Please come back next year!!

Earlier this fall, Dr. Mark Thies and his wife, Evanne, visited ChBE alumni, **Silas and Sofia Wong** ('95 &'94) in Alaska. In this picture, they were hiking the Flattop Trail outside Anchorage. (L-R: Silas Wong, Mark Thies, Evanne Thies, and Sofia Wong; standing in front - friend Spencer and son Julian Wong.)

In August, the ChBE **Class of 1963** held their reunion. Some of the members are shown above during their tour of the West End Zone and athletic facilities. Attendees this year were: John and Carol Cromer, Chip and Marty Hurst, Larry Murdoch, Wade and Karen Ponder, and Jim and Judi Rushton.

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