

# CBEUPDATE

A Publication from the Department of Chemical & Biomolecular Engineering at the University of Tennessee

## CBE Department Dedicates Eastman Unit Operations Laboratory



The Ribbon-cutting Team at the Eastman Unit Operations Laboratory Dedication



**Dr. Sankar Raghavan**  
is New Eastman  
Professor of Practice



**Outstanding Faculty, Staff,  
and Students** Recognized at  
CBE Awards Banquet



**ChemE Car Team** Attends  
National Competition

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**CBE Update** • Department of Chemical & Biomolecular Engineering • Fall 2015

A project of the University of Tennessee College of Engineering Office of Communications and the Department of Chemical and Biomolecular Engineering

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PAN: E01-1391-003-16  
DOP: 11/15

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DEPARTMENT OF CHEMICAL & BIOMOLECULAR ENGINEERING

## Department Head's Message from Dr. Bamin Khomami

The Department of Chemical and Biomolecular Engineering (CBE) at the University of Tennessee, Knoxville, has experienced tremendous growth over the past several years in a number of key areas, including quantity and quality of undergraduate and graduate students, the size of our faculty, and the amount of dedicated educational and research laboratory space available to the department. I would like to take this opportunity to highlight each of these exciting areas of growth.

First, I would like to take this opportunity to welcome our newest faculty member, Eastman Professor of Practice Sankar Raghavan, who brings with him twenty-five years of industrial experience at Merck. Dr. Raghavan will assume responsibilities of our Unit Operations laboratory and industrial design courses, thus enhancing our current curriculum with a wealth of industrial expertise. In addition to this pivotal new hire, it is very gratifying that our other recent investments in new young faculty members are now paying dividends: each of our current assistant professors (Drs. Sangoro, Trinh, Laursen, and Dalhaimer) have recently obtained large research grants from national funding agencies, including a National Science Foundation (NSF) CAREER Award (Trinh). Their success enables our department to continue to play a major role in the College of Engineering's efforts to achieve a higher national profile.



Our recent initiatives at improving, updating, and augmenting our educational and research laboratory space have finally come to fruition. In the past two years we have completely renovated approximately nine thousand square feet of space on the basement, second, and sixth floors of the Dougherty Engineering Building, and we are now focused on finishing additional renovations on the second and third floors. Most importantly, however, is the opening of the new Eastman Unit Operations Laboratory in Dougherty, which was made possible by a generous donation from Eastman. This new laboratory is being used for the first time this fall, greatly enhancing the hands-on practical training of our undergraduate students. Indeed, all of the new facilities mentioned above will enable current and future undergraduate and graduate students to enjoy the best possible educational and research experiences for years to come.

The most exciting news, of course, is always about our students. CBE has grown to be the third largest department in the College of Engineering and the second largest degree program. Over four hundred undergraduate students and sixty-five PhD students have molded into a highly energetic community of academic scholars. CBE students continue to accomplish great things, winning multiple awards at the national level, including NSF Graduate Research Fellowship (Morgan Baltz now a PhD student in CBE at Cornell), an a Goldwater Scholar Award (Emma Hollmann), and numerous university awards, such as the university's Torchbearer Award received by Akshitha Yarrabothula. With such an amazing cadre of recent alumni carrying the torch into both industrial corporations and graduate schools, I believe that our continued progress is ensured.

Finally, I would like to sincerely thank all of our amazing alumni, donors, and corporate sponsors who have supported CBE over the past several years to enable the tremendous growth described above. With your generous help, we have continued to develop and implement many new initiatives aimed at our primary mission: to educate leaders and innovators, not just technically skilled specialists. I believe that we are now well-positioned to benefit from the remarkable progress we have made over the past five years, and I am looking forward to realizing the full impact of this progress on the department's and college's commitment toward achieving Top-25 status among public university engineering programs nationwide.

**Bamin Khomami**  
*Granger & Beaman Distinguished University Professor*  
CBE Department Head



The ribbon-cutting team for the dedication of the Eastman Unit Operations Laboratory in the Dougherty Engineering Building (left to right): J. Parker Smith; John D. Tickle; Edna Kinner; Steve Crawford; Wayne T. Davis; Bamin Khomami; Mark Cox; and Etta Clark.

## CBE Dedicates Eastman Unit Operations Laboratory

Eastman in Kingsport, Tennessee, has long been a strategic partner for UT's College of Engineering.

The new Eastman Unit Operations Laboratory was officially dedicated on Thursday, April 9, 2015, in a ceremony that took place in a tent just outside the Nathan W. Dougherty Engineering Building. The ribbon-cutting team included COE Board of Advisors Member and Vice President and General Manager, Manufacturing Support and Quality, Eastman, J. Parker Smith; UT engineering alumnus and Strongwell Chairman, John D. Tickle; Vice President, Human Resources, The Americas, Eastman, Edna Kinner; UT alumnus and Senior Vice President and Chief Technology Officer, Eastman, Steve Crawford; COE Dean, Wayne T. Davis; Granger and Beaman Distinguished University Professor and Department Head, Bamin Khomami; UT alumnus and Senior Vice President and Chief Manufacturing and Engineering Officer, Eastman, Mark Cox; and UT alumna and Vice President, Global Public Affairs and Policy, Eastman, Etta Clark.

The event celebrated the latest example of the Eastman-College of Engineering partnership, bringing business and education together to enable students to be successful in the workforce and to allow faculty to conduct valuable innovative research.

Dr. Bamin Khomami welcomed guests. After remarks by COE and Eastman officials and dignitaries, guests enjoyed conducted tours of the laboratory.

"Eastman's support of our college is certainly important to our growth and success," said Wayne Davis, dean of the college. "The opening of this lab is a key moment for us, one that would not have been possible without this partnership."

The lab offers state-of-the-art facilities for engineering students to learn real-world practices.

Unit operations labs are designed to help chemical engineering students take theoretical knowledge from the classroom and put it to use under monitored conditions.

In particular, students can go through the process of converting raw materials into finished products, something that helps them prepare for employment after college.

"Having a lab such as this will allow us to expose our students to the practices and experience that are so critical to success after college," said Khomami.

For a Fortune 300 company like Eastman, being approximately one hundred miles away from UT has provided them with one of their most critical resources: people.

While funding and mentoring provided by Eastman help the college, having such a highly skilled group of graduates in their area is one of the significant ways that the COE returns the favor.

"Having the best engineering college possible benefits the region, not just Eastman," said Clark. "Our relationship is about collaboration and teamwork, and developing a solid foundation for students to succeed in the workforce. When those students secure local jobs, it benefits everyone."

In addition to the lab itself, Eastman also has sponsored a commons area in Dougherty, where students study or relax; three professors of practice positions; and the HITES—High School Introduction to Engineering Systems—camp. This support is part of Eastman's most recent commitment of \$2 million to the college.



Granger and Beaman Distinguished University Professor and Head of the Department of Chemical and Biomolecular Engineering, Dr. Bamin Khomami, greets guests and dignitaries at the dedication of the Eastman Unit Operations Laboratory in the Dougherty Engineering Building.



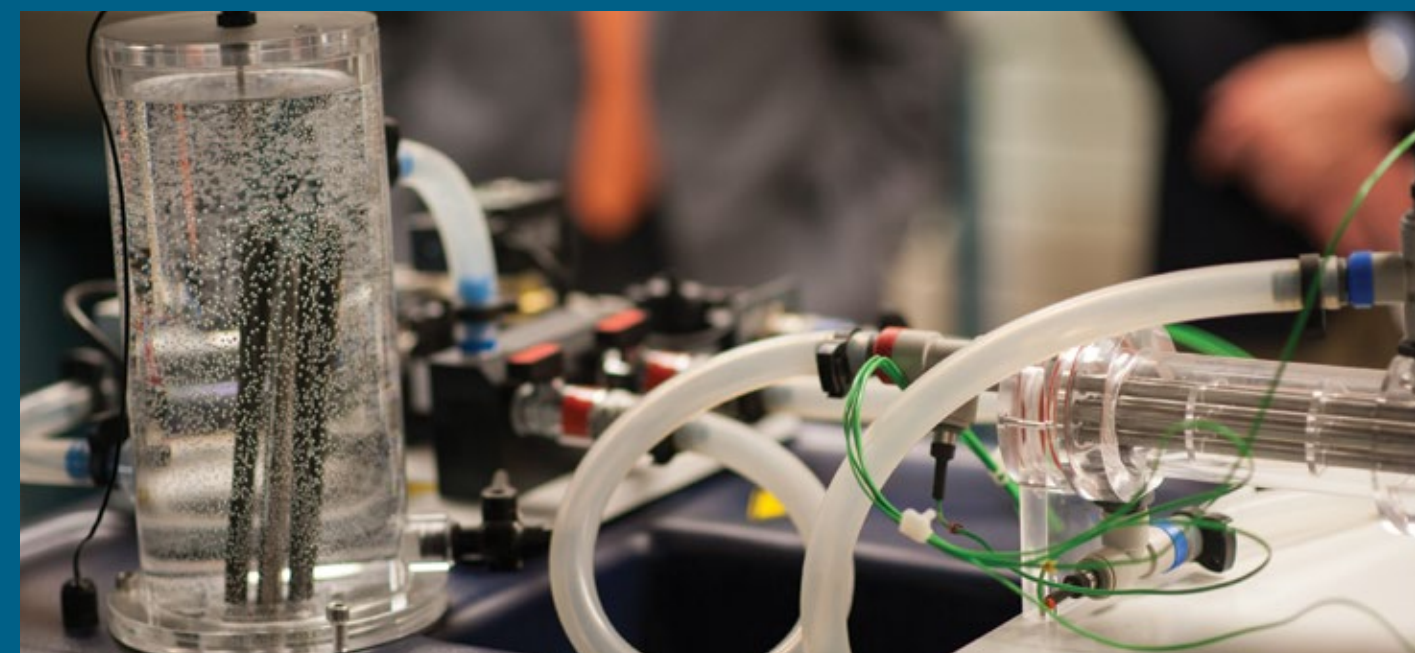
COE donor and supporter, John Tickle, discusses the importance of the new Unit Operations Laboratory at the dedication event.



Steve Crawford, Senior Vice President and Chief Technology Officer, Eastman, speaks at the lab dedication.



COE Dean, Wayne Davis, addresses the crowd at the Eastman Unit Operations Laboratory dedication.



New laboratory equipment in the Eastman Unit Operations Lab.

## Faculty News



### Royal Academy of Engineering Selects Two CBE Professors for Distinguished Visiting Fellowships



Dr. Stephen Paddison

The United Kingdom's Royal Academy of Engineering recently awarded Dr. Stephen J. Paddison, TN-SCORE faculty member and the UT Gibson Endowed Chair in Engineering, and Dr. Thomas Zawodzinski, TN-SCORE Co-PI and Governor's Chair Professor in Electrical Energy Storage, Distinguished Visiting Professor Fellowships.

A small number of these prestigious awards are made annually, and only a few are made to faculty in US universities. It is a rare accomplishment that two awards are made in the same year to researchers at the same institution and in the same department. The program was established to develop capacity and facilitate collaborations by distinguished international experts with universities in the United Kingdom.

Zawodzinski spent part of last summer visiting the laboratory of Professor Nigel Brandon of the Department of Earth Science and Engineering at Imperial College in London to continue collaborative work.



Dr. Thomas Zawodzinski

Paddison, who is a member of the Royal Society of Chemistry, spent the month of June in the Department of Materials Science and Metallurgy at the University of Cambridge. He also presented lectures and seminars on the multiscale modeling of materials for batteries and fuel cells.

Both professors will work on research proposals to create connections and establish collaborations between UT and select institutions in the United Kingdom.

For more information on the Royal Academy of Engineering, visit <http://raeng.org.uk>.



Dr. Bamin Khomami

### Khomami Elected AIChE Fellow

The American Institute of Chemical Engineers recently bestowed a top honor on the College of Engineering's Dr. Bamin Khomami, as the group's board of directors announced his election as an American Institute of Chemical Engineers (AIChE) Fellow.

Khomami, who is the Alvin and Sally Beaman Professor, Amour T. Granger Memorial Professor, and a Distinguished University Professor and head of the Department of Chemical and Biomolecular Engineering, was selected for the honor based on what the AIChE said was "the high esteem with which your colleagues and peers view your distinctive professional achievements and accomplishments."

Khomami, who came to UT in 2006, was named the outstanding faculty member for the College of Engineering in his first year at UT, was elected a fellow of the American Physical Society in 2009, won a national teaching award in 1993, and was named a National Science Foundation Presidential Young Investigator in 1991.

Khomami's studies of everything from complex fluids and polymers to nano- and micro-structured materials have opened up new avenues and possibilities, particularly in the ever-important fields of medicine and energy.

Khomami has also served as the director of UT's Sustainable Energy Education and Research Center since 2008.

He has published one hundred and forty archival journal publications and has participated in more than one hundred invited speaking engagements and presentations around the world.

Khomami was formally inducted at the group's November meeting in Salt Lake City.

For more information, visit <http://www.aiche.org>.



### CBE's Sangoro Recognized as One of Top 100 Reviewers by Science Journal

Dr. Joshua Sangoro, an assistant professor in the Department of Chemical and Biomolecular Engineering, has been recognized as a Top 100 reviewer by *Macromolecules*.

The journal, a publication of the American Chemical Society, is the premier journal in polymer science and engineering, areas where Sangoro and his team have their expertise.

Sangoro's research focuses on three main areas:

**Transport properties of materials**—Particularly the role of ions and their use in applications such as electrolytes.



Dr. Joshua Sangoro

**Confinement of materials**—A study of how the properties of materials change when confined to thin films and nanopores.

**Eutectic materials**—Research into materials that, when combined, produce substances with lower melting points than the pure materials.

The research could impact everything from energy to pharmaceuticals. Sangoro joined the CBE faculty in 2013 after a stint at Oak Ridge National Laboratory.



Sangoro also received a NSF Fellowship to attend and present a talk/poster at POLYCHAR 23, the 23rd World Forum on Advanced Materials, held at the University of Nebraska-Lincoln, Lincoln, Nebraska, from May 11-15, 2015. This fellowship was a participation stipend that was used to cover costs of attending the short course and conference.

Tyler Cosby, one of Dr. Sangoro's PhD research students, has also received a similar NSF Fellowship.

### Dr. Zhanhu Guo Joins CBE Faculty

Dr. Zhanhu Guo has recently joined the CBE faculty. He received his PhD from Louisiana State University and his research areas include multifunctional nanocomposites; nanomanufacturing; advanced nanocomposite membranes; fuel efficiency improvement and energy usage efficiency enhancement; electrochromic, strain sensing, and magnetic field sensing devices; electromagnetic wave shielding materials; environmental sustainability and remediation; and industrial/civilian safety materials.

Guo received the Presidential Faculty Fellowship in Support of Undergraduate Research/Creative Activity in 2014 and was an invited lecturer at the 55th anniversary of Beijing University of Chemical Technology in 2013. He was also an invited plenary speaker at the National Association of Corrosion Engineers (NACE)-Corrosion Society in 2013.



Dr. Zhanhu Guo

### Governor's Chair Zawodzinski Receives Honors

Dr. Thomas Zawodzinski, the Governor's Chair in Electrical Energy Storage in the Department of Chemical and Biomolecular Engineering, has been selected as a Poly Fellow by the American Chemical Society Division of Polymer Science. This prestigious award recognizes service and contributions to the field of polymer science. Zawodzinski was honored with a plaque at the Spring ACS National Meeting during the POLY/PMSE Award reception in March, 2015 in Denver, Colorado.

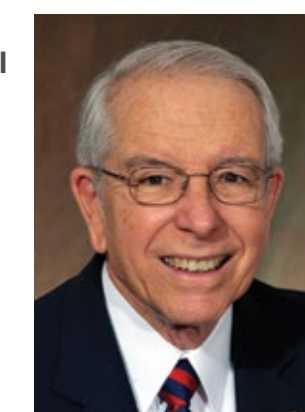


Dr. Thomas Zawodzinski

### East Tennessee Section of the American Chemical Society Honors Prados



The East Tennessee Section of the American Chemical Society (ETC-ACS) recently honored University Professor Emeritus Dr. John Prados, who has reached over sixty years of service with the organization. Prados was recognized at the ETC-ACS Awards Night Banquet on April 30<sup>th</sup> of this year.



Dr. John Prados

## Special Faculty Feature: Dr. Sankar Raghavan, Eastman Professor of Practice



Dr. Sankar Raghavan (center) discusses an experiment in the Eastman Unit Operations Laboratory with chemical engineering seniors (from left) Taylor Forrest and Bradley Hannah.

Dr. Sankar Raghavan's lifelong interest in academic pursuits led him to pursue a second career in teaching after working as a chemical engineer for almost thirty years. He left Merck & Company in Danville, Pennsylvania, and lectured at Johns Hopkins University and at Bucknell University for a short time before joining the Department of Chemical and Biomolecular Engineering (CBE) in fall 2015 as the Eastman Professor of Practice.

"I consider myself fortunate in landing the position of the Eastman Professor of Practice, as it gives me the opportunity to pursue my interest in bringing a practical flavor to teaching students," said Raghavan, who teaches a laboratory course on chemical engineering unit operations to senior students in the new Eastman Unit Operations Laboratory. He seeks to bring his years of industry experience into his teaching.

"I try to demonstrate through examples in my courses that there is nothing more practical than a good theory, and the students should be comfortable applying the lessons from UT in their working life and continue to learn lifelong," said Raghavan. "My approach is to frame open-ended problems, provide the students with broad outlines of the solutions, and give them the opportunity to develop a solution. I try to encourage interactions among the students as they learn from each other the best."

He is also focused on the continued enhancement of possibilities for the Unit Operations Lab, refurbished in 2015 with funds from Eastman.

"There are already many excellent laboratory experiments that are part of the current course," he said. "We are looking at augmenting this substantially. For example, we are working on adding continuous distillation and gas chromatography to the list of experiments. We are working

with the engineers from Eastman in setting up this experiment."

Raghavan looks forward to collaborating on the CBE's senior design course in upcoming semesters.

"When I get a break, I try to think of a few good problems for that course," he said. "I am looking for ways to collaborate with industries in the area and other researchers."

While his current focus is teaching, as time permits Raghavan likes to investigate systematic, yet rapid, methodologies for process development.

"My interest stems from my experience in the pharmaceutical industry, where it is important to bring products to the market in the shortest possible time," he said. "I am also interested in exploring continuous processing methods in the pharmaceutical and specialty chemicals manufacturing arena, currently dominated by batch processes."

His first semester with CBE has been quite busy, but Raghavan has enjoyed getting to know the campus and Knoxville area. He has found time to take walks with a meet-up group, visit parks, play tennis, and follow the UT Vols football season. He also likes to read, play bridge, and has tried a bit of gardening. He and wife, Sandhya, look forward to visits from son Rahul, a resident at Johns Hopkins Hospital in Baltimore, Maryland, and daughter Priya, who is a medical student at Drexel University in Philadelphia, Pennsylvania.

"At the university, I have enjoyed attending seminars by invited speakers and interacting with my colleagues at the department," said Raghavan. "It has been a joy working with the UT students. I find them very eager to learn. I have been uniformly impressed with the quality of the people, the friendly atmosphere, and the many outdoor activities that are available at UT."



Dr. Sankar Raghavan (left) looks over equipment in the Eastman Unit Operations Laboratory with chemical engineering senior Preston Flowers (right).

## CBE Hosts Troy C. Trotter Distinguished Lecture Series in Chemical and Biomolecular Engineering

The Department of Chemical and Biomolecular Engineering (CBE) presented the 2014 Troy C. Trotter Distinguished Lecture Series featuring Dr. David Sholl on Tuesday, October 28, 2014, from 4-5 pm in the 622 Min H. Kao Electrical Engineering and Computer Science Lecture Hall. Over sixty-seven faculty, staff, and students from the university attended the event.

Sholl is the Michael E. Tennenbaum Family Chair, GRA Eminent Scholar in Energy Sustainability, and Department Chair of the School of Chemical & Biomolecular Engineering at Georgia Tech. He has held this position since January 2008. Prior to his appointment at Georgia Tech, Sholl was on the faculty at Carnegie Mellon University for ten years. Sholl's research uses computational materials modeling to accelerate development of new materials for energy-related applications, including generation and storage of gaseous and liquid fuels and carbon dioxide mitigation. He has published over one hundred and eighty peer-reviewed papers. He has also written a textbook on Density Functional Theory, a quantum chemistry method that is widely applied through the physical sciences and engineering. Sholl is a Senior Editor of the ACS journal *Langmuir*, and is an Associate Director of Georgia Tech's Strategic Energy Institute. More information on Dr. Sholl's research group is available from [www.chbe.gatech.edu/sholl](http://www.chbe.gatech.edu/sholl).

Sholl's lecture, "Using High Throughput Computation to Accelerate Development of Materials for Scalable Energy Technologies," presented the concept that computational modeling of materials can be a powerful complement to experimental methods when models with useful levels of predictive ability can be deployed more rapidly than experiments. Achieving this goal involves judicious choices about the level of modeling that is used and the key physical properties of the materials of interest that control performance in practical applications. Sholl discussed two examples of using high throughput computations to identify new materials for scalable energy applications: the use of metal-organic frameworks in membranes and gas storage and the selection of metal hydrides for high temperature nuclear applications. These



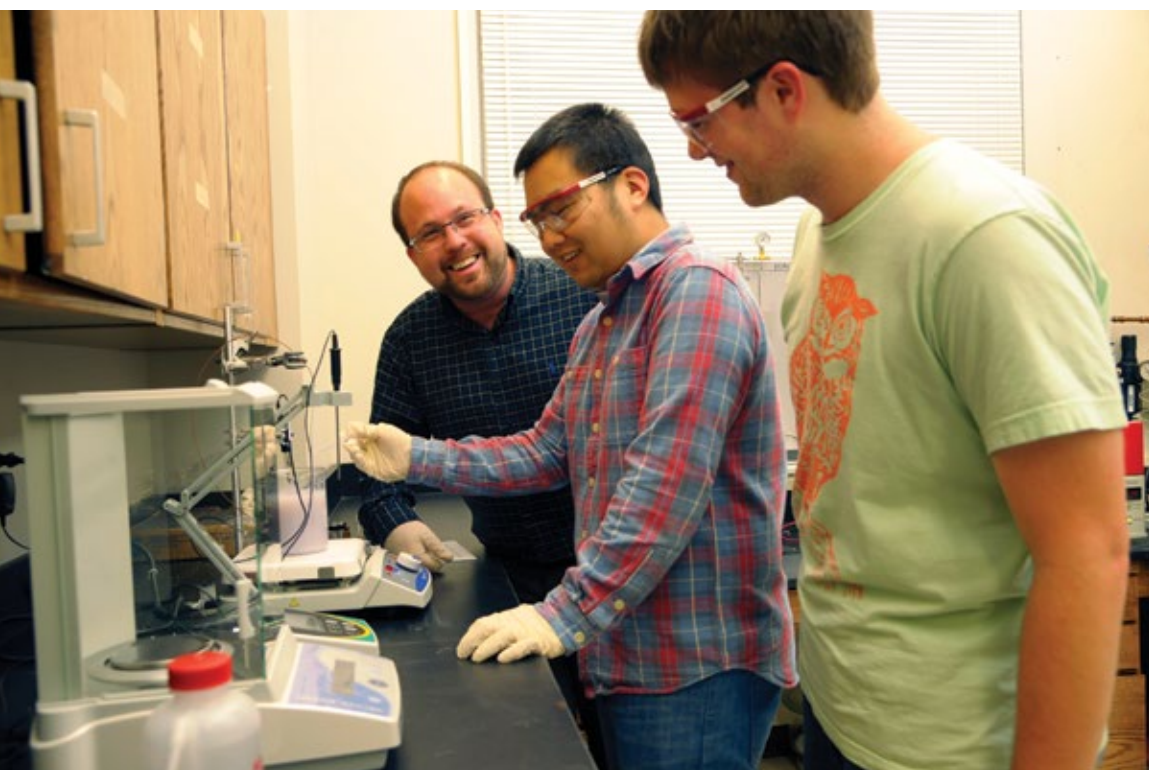
Dr. Bamin Khomami (right) CBE department head, recognizes Dr. David Sholl as the 2014 Troy C. Trotter Distinguished Lecture Series speaker.

examples highlighted the challenges of generating sufficiently comprehensive material libraries and the potential advantages and difficulties of using computational methods to examine large libraries of materials.

The Troy C. Trotter Distinguished Lecture Series was established by the Trotter Family to provide the College of Engineering Department of Chemical Engineering with the opportunity to annually invite a nationally recognized expert in an area of interest to the field of chemical engineering to the University of Tennessee, Knoxville, for the benefit of students, faculty, and the local professional community. The series recognizes and honors Troy C. Trotter, who received a B.S. in chemical engineering from the College of Engineering in 1947.

Past Trotter lecturers include Dr. Arup K. Chakraborty, the University of California, Berkeley, in 2004; Dr. James C. Liao, the University of California, Los Angeles, in 2007; and Dr. Juan de Pablo, the University of Wisconsin-Madison, in 2011.

## Research Focus: Dr. Siris Laursen



Dr. Siris Laursen (left), graduate student Yang He (center), and undergraduate student Shean Hubbard (right) work to synthesize a gold and TiO<sub>2</sub> catalysts in Laursen's lab.

For Dr. Siris Laursen, an assistant professor in the Department of Chemical and Biomolecular Engineering (CBE), the rewards of being a university teacher and scientific researcher are "immeasurable."

"My job is one of the only jobs in the world where one may elevate people to become great engineers and scientists through education and make a world-wide impact through cutting-edge research," Laursen said.

Laursen was fascinated by how the world works from a very young age, and wanted to understand how nature in general operated at the fundamental level. He was interested in the workings of everyday household appliances such as radios, heaters, and fans, and often spent time disassembling them to understand the complexity of their electrical and mechanical functions. He also worked with chemistry sets as a child, which revealed the amazing world of materials manipulation at the molecular level.

"Early childhood experiences combined with a scientifically-minded family made my decision to become an engineer an easy one to make," Laursen commented.

Laursen received his BS in chemical engineering from the University of Colorado, Boulder, and his PhD in chemical engineering from the University of Michigan, Ann Arbor. He was also a postdoctoral fellow in heterogeneous catalysis at the Polytechnic University of Valencia, Spain.

Laursen was interested in the University of Tennessee for a variety of reasons.

"The growing and improving CBE department at UT attracted my attention when I was searching for a faculty position," Laursen said. "The vibrant nature of the faculty and their ever-improving research portfolio indicated that this was a place to perform cutting edge research. This was further supported by the fact that UT was in such close proximity to Oak Ridge National Laboratory. The combination of quality resources and faculty at ORNL and UT made me decide to join the CBE department."

Laursen's research group aims to develop the molecular level fundamental understanding needed so that new and improved

catalytic materials can be developed for existing and new sustainable fuels and chemicals production processes. Catalysts are materials that accelerate and control chemical reactions. These materials function as the engines for the world's chemical industries. In the effort to realize the production of truly sustainable fuels and chemicals, Laursen's group works to rationally design catalytic materials that transform CO<sub>2</sub> and water into convenient fuels and chemical building blocks such as methanol, ethanol, CO<sub>2</sub>, H<sub>2</sub>, and ethylene and propylene. Advancements in this project indicate that renewable fuels produced from CO<sub>2</sub> and solar energy is possible in the near future. Catalytic production of biofuels from non-food organic waste is also a major aim of the research group. The project's goal is to transform a wide array of biomass waste—woody trees, bushes, and municipal plastic and organic waste—into fuels for automobiles and chemical building blocks for the production of consumer plastics, rubber, and foams.

Laursen is excited about the potential of this research.

"To date, our most interesting scientific discovery would be the production of higher hydrocarbons from just CO<sub>2</sub>, water, and sunlight," he commented. "Imagine an energy system that would transform sunlight and CO<sub>2</sub> captured from the atmosphere into gaseous or liquid fuels you could use to heat your house or power your automobile and electronics. The process would drastically reduce net CO<sub>2</sub> emissions and present a closed carbon cycle that would not detrimentally

impact our environment. The catalysts we are currently developing for CO<sub>2</sub> reduction exhibit the highest reaction rates reported worldwide. These advancements indicate that renewable fuels produced using solar energy are just around the corner."

The overarching goal of the Laursen group's research is to reduce the unfavorable footprint of the chemicals and fuels industries to promote a sustainable and pollution-free future for our society. Photocatalytic CO<sub>2</sub> reduction and biomass-to-fuels projects aim to open new avenues for fuels production. These advancements will allow valuable petroleum resources to be used for applications for which they are most suited—as chemical building blocks. Solving contemporary problems associated with catalysts for petroleum upgrading in existing processes is also a major aim. Improvements in existing processes will aid in comfortably transitioning between chemical economies that rely upon petroleum to those that utilize renewable material feedstocks. Taking into account both today and tomorrow's fuel and chemical production and use needs, the Laursen group aims to help realize truly sustainable chemical technologies.

Laursen said that both graduate and undergraduate research assistants are critical to moving his research projects forward. The research performed during the summer break is dominantly driven by undergraduate researchers. In the summer of 2014, the research group consisted of three graduate students and over ten undergraduate research assistants.

"Two of our more advanced undergraduate researchers, Greg Tate and Nick Barth, have developed cutting edge transition metal sulfide, phosphide, and selenide synthesis procedures that have formed the basis for much of our work in fuel cell and CO<sub>2</sub> photoreduction catalysis," Laursen said. "One undergraduate research assistant alumni indicated that he learned more in just three months in our laboratory than he learned in his three years at UT. Either through their performance or the accolades concerning the experience gained, the role of undergraduate research in furthering science and education is abundantly clear."

For more information on Dr. Laursen and his research, visit <http://www.engr.utk.edu/cbe/faculty/Laursen/default.html>.

## Student News

### Baker Martin and Morghan Parker Earn Eastman Fellowships for 2015-2016



Baker Martin



Morghan Parker

University of Tennessee, Knoxville, Department of Chemical and Biomolecular Engineering (CBE) graduate students Baker Martin and Morghan Parker were named the Eastman Fellowship recipients for 2015-2016. A UT CBE selection committee put forth several candidates and the recipients were chosen after careful consideration by Eastman. The Eastman Fellowship was established in 2009 and is part of an effort by Eastman to create stronger ties with graduate students in the department who study in areas of chemical engineering that are relevant to the work done at Eastman.

Baker Martin is a PhD candidate in chemical engineering where he studies photoactive proteins for sustainable

energy applications. For Martin, receiving the Eastman Fellowship holds special significance because he grew up close to the company's Kingsport headquarters in nearby Bristol, Tennessee.

"I was extremely excited when I found out I would receive the Eastman Fellowship," Martin said. "Eastman is a household name and they've always been such an integral part of the community I'm from that it's a tremendous honor to get this."

Martin earned a degree in chemical engineering from Virginia Tech before becoming a PhD candidate in the CBE program.

Martin works as part of the research group under the direction of Dr. Paul Frymier, professor in CBE.

Morghan Parker is also a PhD candidate in chemical engineering. Her research will focus on heterogeneous catalysis and oxidation reactions, the application of which will be to make more efficient energy catalysts. Parker graduated with a degree in chemistry from Freed-Hardeman College in Henderson, Tennessee.

"I am so honored to receive an Eastman Fellowship," said Parker. "It's a challenge to live up to the Eastman name, but I'm excited and ready to go!"

Parker works as part of the research group under the direction of Dr. Siris Laursen, assistant professor in CBE.

## The Counce Research Group: Testing at FIPR



Dr. Robert Counce

Students and faculty from the Department of Chemical and Biomolecular Engineering (CBE) recently got a chance to put their knowledge to the test while improving the odds of finding a new source of rare earth elements (REE).

Doctoral student Dave DeSimone, and seniors Taylor Forrest and Nick Dement travelled to the Florida Industrial and Phosphate Research Institute (FIPR) to test a developmental process for rare earth

recovery from an alternative source as part of a project led in part by CBE Professor Robert Counce and CBE adjunct professors Jack Watson and David DePaoli.

These tests were made possible by collaboration between UT, Oak Ridge National Laboratory (ORNL)—where DePaoli works—as well as the Idaho National Laboratory and FIPR through the Critical Materials Institute of the Department of Energy (DOE). The project holds vast importance for the US, as highlighted by the DOE.

“The Department of Energy found that four clean energy technologies—wind turbines, electric vehicles, photovoltaic cells and fluorescent lighting—use rare earth elements that are at risk of supply disruption in the next five years,” said Counce. “The objective of our work is to evaluate possible routes for recovery of rare earth elements from waste streams from phosphate processing.”

Prior to the Florida investigation four teams of senior students developed conceptual processes and ranked the potential for recovery of REE from various waste streams from the phosphate industry, briefing ORNL and FIPR weekly and producing reports of their design and analysis activities.

“Our interaction with UT students on this project has been valuable in two ways,” said DePaoli. “The students have gained a vital educational experience, one that benefited the project through their analyses in prioritizing the



Chemical engineering seniors (from left) Taylor Forrest and Nicholas Dement test processes at the Florida Industrial and Phosphate Research Institute.

phosphate byproducts in terms of their potential as REE source materials.

Also, their recent tests have yielded valuable practical information toward the viability of REE recovery options that would not be accessible through typical laboratory experimentation.”

Rare earth elements, in contrast to their name, are not all that rare. The problem, and the real reason they are so named, is that unlike typical minerals they are rarely found in pockets or seams and are instead dispersed in low levels of concentration.

That wide dispersal makes obtaining them a venture with difficult profitability, but their importance to modern living makes their availability a necessary one. In addition to the high-end devices, they also play key roles in such everyday items as magnets, rechargeable batteries, mobile devices, and superconductors.

DeSimone, who leads UT’s student team, described the basic concept behind the breakthrough, noting that the phosphate industry uses sulfuric acid as part of their processes. By introducing a stream of solvent along side the acid, rare earth elements can be separated from the acid and brought into use. Doing so could potentially introduce a new source of rare earth elements while avoiding the need for new mining.

“That is one of the big pluses of this approach,” said DeSimone. “Tapping into byproducts of other processes to harness critical resources has been a major focus.”

Early results have been promising enough that more students—seniors Anna Zetterberg and Evan Falk and junior Michelle Lehmann—have begun work as well.

## ChemE Car Team Goes to National Competition, Will Host 2017 AIChE Conference



ChemE Car team members pictured, from left, are Aston Thompson, Christian Wilson, Samantha Medina, Matthew Sodl, Dr. Gabriel Goenaga (ChemE Car Faculty Advisor), Melanie Lindsey, Chris Neal, and Mary McBride.

Chemical engineering students and faculty had reason to be revved up this year, as their ChemE car team finished third at the American Institute of Chemical Engineers (AIChE) Southern Regional Conference in April 2015,

qualifying them for the national competition.

In the competition, small cars powered by means of an electrochemical reaction—such as batteries, fuel cells, or compressed gases—attempt to travel a specified distance, with the winning car being the one that comes closest to that distance.

Teams don’t learn what the distance will be until thirty minutes before the start of the event, leaving little time for adjustments and modifications.

“This might sound simple but it is very challenging because each team needs to know very well the speed of the car and to have a stopping mechanism that will get the car as close as possible to the finish line,” said Gabriel Goenaga, senior research associate in the department and the team’s faculty advisor. “Also, depending on where the competition takes place, the teams have to deal with different types of flooring, which can affect performance as well.”

Held in Clearwater Beach, Florida, the conference is the biggest regional event for the AIChE. Universities across the Southeast fielded twenty teams, with the top five teams earning the right to compete at the national 2015 AIChE Annual Student Conference in Salt Lake City, Utah, in November.

The UT AIChE Student Chapter also won the bid to host the 2017 AIChE Southern Regional Conference. Dr. Eric Boder is the AIChE advisor.

In addition to Goenaga, team members included seniors Aston Thompson and Christian Wilson; sophomores Melanie Lindsey, Mary McBride, Samantha Medina, and Matthew Sodl; freshman Christopher Neal; and Douglas Aaron, a senior research associate in the Department of Mechanical, Aerospace, and Biomedical Engineering, acting as safety advisor.

## CBE Students Shine at High Profile ORNL Gathering

A pair of students in the Department of Chemical and Biomolecular Engineering (CBE) got some good news recently, as the Center for Nanophase Materials Sciences (CNMS) at Oak Ridge National Laboratory (ORNL) chose their work for a pair of honors.

Tyler Cosby and Max Heres, both graduate students in chemical engineering, were singled out for the posters they presented at the event, held September 1 and 2 in Oak Ridge.

Cosby took a silver award for his presentation “Charge Transport and Hydrogen-Bonding in Imidazole/Carboxylic Acid Mixtures,” while Heres was honored as a finalist for his presentation “Charge Transport and Structural Dynamics in Ammonium Based Polymerized Ionic Liquids and their Monomeric Analogues.”

Cosby, in his third year as a doctoral student, said the honor was special because of the nature of the meeting where it occurred.

“The CNMS user meeting brings together scientists from all over the country doing a wide variety of compelling research,” said Cosby. “It is thrilling to be singled out from among this already select group.”

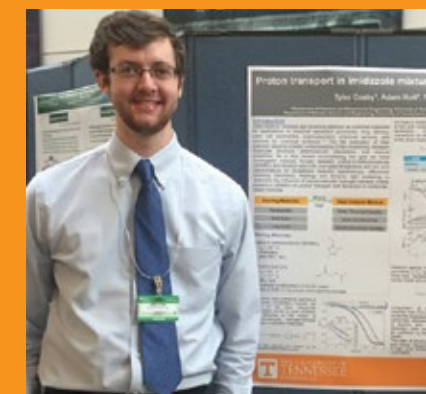
He and Heres both work as part of the Sangoro Research Group, under the direction of Dr. Joshua Sangoro, assistant professor in CBE.

It’s the latest in a string of high-profile successes for the group, with their recent work on soft materials earning a National Science Foundation grant. Sangoro himself was named both a top 100 reviewer by a leading science journal and a Faculty Trailblazer by UT. Despite the personal accolades, Sangoro prefers to keep the spotlight on students like Cosby and Heres.

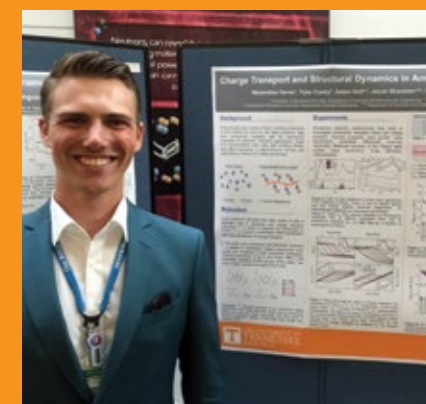
“I am delighted by their achievement and have no doubt that they will continue to excel in their research,” said Sangoro.

For Heres, the honor also came with gratitude for the partnerships UT has made.

“It was a great honor to be selected amongst so many great people representing the cutting edge of research,” he said. “We are fortunate to have research opportunities provided to graduate students by the close partnership between UT and ORNL, such as the CNMS.”



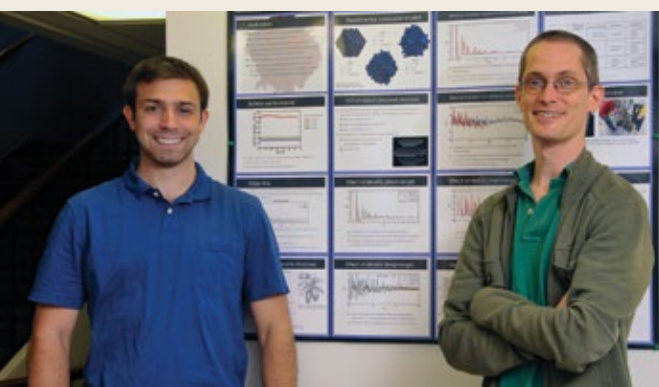
Tyler Cosby



Max Heres

## Grad Student Nick McNutt Noted by ORAU and ORNL for Research

Chemical engineering PhD student Nick McNutt was featured in the Oak Ridge Associated Universities (ORAU) 2014 annual report and also spotlighted on the Oak Ridge National Laboratory (ORNL) website for research conducted under the ORAU and ORNL High-Performance Computing Grant Program. He and his advisor, Dr. David Keffer of the Department of Materials Science and Engineering, collaborated with ORNL materials scientist Orlando Rios to build computational models by using ORNL supercomputers to test how the material’s structure affects its overall performance. The research produced a greater understanding of how the unique structure of lignin, a woody plant polymer, could be used as a battery anode. Their findings could lead to improved lithium-ion battery technology.



Nick McNutt, left, presents his poster outlining the results of computational research done at Oak Ridge National Laboratories. Dr. David Keffer, right, is his advisor.



Bryan Eldreth, at left, works on an engineering service project during an Alternative Summer Break trip in 2014.

### Brian Eldreth on Alternative Break

In August of 2014, chemical engineering major Bryan Eldreth traveled with three other College of Engineering (COE) students and Judith Mallory, COE international coordinator, to Bucharest, Romania, for an Alternative Summer Break organized by the Global Initiatives program. The group stayed two hours outside of Bucharest in a rural village called Valea Screzii in the Transylvania region. Eldreth helped on a service project to build a dormitory to house high school students, turning a three-hour round trip into a five-minute walk to school, which is around forty-five minutes away from Valea Screzii.

“We made and poured concrete for wall supports on the second floor,” said Eldreth. “We managed to get half of the supports done over two days. On another day, we worked in Valea Screzii, mixing and pouring concrete, this time to form a driveway.”

In their free time, Eldreth and the group were able to enjoy several Romanian cultural experiences, including a visit to the Carpathian Mountains, some castles, and the city of Bucharest.

“We got to hike to the top of a mountain, see Dracula’s castle, tour the second largest government building in the world, and meet some of the nicest people ever,” said Eldreth.

For more information about Global Initiatives, and to read Eldreth’s complete report, visit [www.engr.utk.edu/global](http://www.engr.utk.edu/global).



summer of 2015.

### Chris Barnes Spends Summer Study Abroad in Berlin

Chris Barnes, a senior in chemical engineering, enjoyed spending the summer semester of 2015 studying abroad at the Freie Universität in Berlin, Germany. He worked as a research intern in a biochemistry lab focused on blood vessel formation and effects that the BMP class of proteins had on that process.

“I liked the chance to spend an extended amount of time in Germany,” said Barnes. “I’m half German and lived there when I was younger. But that was the longest amount of time I had gotten to stay there since then. I also enjoyed speaking German there and being able to see what the research culture was like.”

On the UT Knoxville campus, Barnes works in Dr. Eric Boder’s lab, is the communications chair for the American Institute of Chemical Engineers (AIChE), and is a co-founder and organizer of TEDxUTK.

## CBE Awards and Recognitions

### CBE Celebrates Success at 2015 Awards Dinner

The Department of Chemical and Biomolecular Engineering (CBE) recognized outstanding achievement by students, faculty, and staff at the 2015 Awards Dinner on April 2, 2015 at Calhoun’s on the River.

The event was sponsored by AIChE Knoxville-Oak Ridge Chapter; Alpha Chi Sigma; The American Chemical Society; Tom and Ruth Clark; Dow Chemical Company; Eastman; Ginny Elliott; Jim and Sandra McKinley; John and Linda Shoemaker, Jr.; and the Professor Jack S. Watson Award contributors.

Granger and Beaman Distinguished University Professor and CBE Department Head Bamin Khomami greeted guests, outlined the evening’s program, and presented the undergraduate research poster awards:



Dr. Joshua Sangoro (left) with the 1st place undergraduate research poster awardee Logan Terheggen.



Dr. Thomas Zawodzinski (right) with 2nd place undergraduate research poster awardee Melanie B. Lindsey.



Dr. Steven Abel (right) with the 3rd place undergraduate research poster awardee Beini Chen.

### Faculty and staff awards were presented after dinner:



Amber Tipton (right) is presented with the Outstanding Staff Member Award by Dr. Bamin Khomami (left).



Dr. Brian Edwards (right) receives the Outstanding Advisor Award from Dr. Bamin Khomami (left).



Dr. Steve Abel (right) is presented with the Outstanding Teacher Award by Dr. Bamin Khomami (left).



Tom Clark (right) presents the Thomas and Ruth Clark Chemical Engineering Excellence award to Dr. Paul D. Frymier (left).



John (right) and Linda Shoemaker, Jr. (left) present the AIChE Service Award to Emma Hollmann (center).



Eastman Outstanding Scholar Award: Garrett Smith (right).



Christopher Walters, P.E. from the Dow Chemical Company presented the Dow Outstanding Junior Award to the following students:



Kelci Bryson (right) is presented with the Outstanding Junior Award by Christopher Walters (left).



William Hawks (right) is presented with the Outstanding Junior Award by Christopher Walters (left).



Konstantin Sedov (right) is presented with the Outstanding Junior Award by Christopher Walters (left).



Garrett Smith (right) is presented with the Outstanding Junior Award by Christopher Walters (left).

CBE Associate Department Head, Dr. Brian Edwards, presented the departmental student awards:



Kenneth M. Elliott Outstanding Senior Award: Emma Hollmann (right).



Jim and Sandra McKinley Outstanding Graduate Student Award: Donovan Layton (right).



Most Exceptional Student Award: Tyler Sprouse (right).



David Conner is presented the American Chemical Society Outstanding Senior Award by Dr. Al Hazari (right).



Alpha Chi Sigma Albert H. Cooper Memorial Scholarship Award: Megan Farell (right).

Paul Taylor presented the external student awards:



AIChE Outstanding Student Award: Bethany Dietz (left).



AIChE Outstanding Baccalaureate Award: Christopher Ludtka (left).

Dr. Khomami made the evening's closing remarks.

Professor Jack S. Watson presented the Professor Jack S. Watson Award



Professor Jack S. Watson presented the Professor Jack S. Watson Award for Excellence in Separation Research to Mark Moore (left).

## CBE Chancellors Honors Banquet Awardees

The Chancellors Honors Banquet is held each spring to recognize students, faculty, staff and friends of the University of Tennessee for their extraordinary achievements. The following 2015 Chancellor Citation recipients from the Department of Chemical and Biomolecular Engineering include:



Emma Hollmann

2015 Extraordinary Professional Promise honors are awarded to undergraduate and graduate students who demonstrate professional promise in teaching, research, or other contributions:

Megan Elizabeth Farell  
Julie Hipp  
Emma Katherine Hollmann



Tyler Sprouse

2015 Top Collegiate Scholar Award, honors undergraduates who exhibit extraordinary scholarship:

Tyler J. Sprouse



Michael A. Cantwell

2015 Scholar Athlete Award, honors students who excel exceptionally in both scholarship and athletics:

Michael A. Cantwell

For the fifth year in a row, CBE leads the College of Engineering in both number and percentage of Chancellor's Honors students with a total of twenty students.



CBE student Marti Bell (left) with her faculty mentor, Dr. Eric Boder (right).

The EURECA Awards are presented by the Office of Research and the College of Engineering to recognize outstanding research. CBE winners include:

Gold Office of Research and Engagement Award and College of Engineering 1st Place Award Project: "Autocatalytic Activation of the Hemagglutinin in Influenza"

Marti Bell  
Faculty Mentor: Dr. Eric Boder



CBE student Logan Terheggen (right) with his faculty mentor, Dr. Joshua Sangoro (left).

Bronze Office of Research and Engagement Award and College of Engineering 3rd Place Award

Project: "Charge Transport in Imidazole-based Deep Eutetic Mixtures"

Logan Terheggen  
Faculty Mentor: Dr. Joshua Sangoro

CBE faculty members on the judging team included Dr. Paul Dalhaimer and Dr. Joshua Sangoro.

## Outstanding Graduate Student: Donovan Layton



"I was very interested, looking into what his research was focused in—metabolic engineering and synthetic biology," said Layton. "After visiting UT and the CBE department, I liked the vision of the department head, Dr. Bamin Khomami, and I wanted to be apart of it."

He credits Dr. Laura Jarboe, a professor from his undergraduate years at Iowa State University, with steering him toward metabolic engineering. Since coming to UT, Trinh has offered valuable teaching and guidance as Layton's graduate advisor.

"He has guided me to become a better teacher, as well as with research ideas and their execution," he said.

Layton's favorite thing about chemical engineering is what he calls "the puzzle aspect."

"If a chemical or a job is feasible, we figure out how to successfully produce or complete the task," said Layton. He has particular interest in the way that some microorganisms can be engineered for new uses.

"We can engineer a microorganism to produce a chemical of interest that can utilize waste products to make chemicals that are useful and deemed renewable and sustainable," he said. "We can turn trash into treasure!"

Along these lines, Layton enjoyed a project that involved engineering microbes to convert waste acids and/or fermentable sugars into esters that can be used as flavor or fragrance additives.

"It is awesome, when opening a culture that had a foul smelling acid in it in the beginning, then having a sweet smelling ester in the end," he said. "We have engineered several different products that have unique sensation profiles, which can be used in many different ways."

Outside of his studies, Layton enjoys watching and playing any kind of sports, and outdoor activities ranging from hiking and fishing to scuba diving and skiing. He also enjoys attending church, time at the gym, music, and museums.

"I enjoy teaching and learning with others," he said. "I was a YMCA youth mentor during my undergraduate career for several semesters."

Layton hopes to obtain a job in industry and gain valuable, practical industrial experience to bring back to the classroom.

"I love to teach and believe the experience of being a practicing chemical engineer is invaluable to students and their education," he said. "I would like to become the head of a department or in a similar position, as people, and working with people, are my greatest passions."

Donovan Layton's interest in engineering first sparked way back in the fourth grade in his hometown of Holt, Missouri. His class was assigned to look up future career paths.

"I loved math and science so naturally I gravitated toward engineering," he said. Aerospace engineering caught his attention originally. "What kid didn't want to go to space at one time or another? It married my two favorite subjects, thus formed my first interest in engineering."

Layton stayed interested in aerospace engineering through his senior year of high school, until his chemistry teacher told him he had a talent for the subject and inspired him to shift direction.

"I looked at other forms of engineering and chemical engineering stood out," he said. "It resonated with me and that is what I wanted to become."

Layton's choice has paid off for him. He is now the 2015 Jim and Sandra McKinley Outstanding Graduate Student in the Department of Chemical and Biomolecular Engineering (CBE). He is a recipient of the Dennis and Connie Denihan Scholarship, and also a Graduate Assistance in Areas of National Need (GAANN) Fellow. He chose to attend the University of Tennessee after learning of research under way by Dr. Cong Trinh, who had just come to UT from the University of California at Berkeley.

## Outstanding Undergraduate Student: Garrett Smith

Chemical engineering senior Garrett Smith grew up in Kingsport, Tennessee, where his father is a chemical engineer for Eastman. Now Garrett is gaining on-site experience during his co-op assignment at Eastman. He credits his father with influencing his academic and career path.

"I saw how dad presented himself in our community," said Smith. "He always spoke logically and intelligently. He was humble in his demeanor and had the respect of everyone I knew."

Smith has made a respectable showing himself during his time as an undergraduate in the Department of Chemical and Biomolecular Engineering (CBE). He received the Eastman Scholarship, the Eastland Family Scholarship, and the Terry K. Begley Scholarship. These have helped support him in earning the Dow Junior Student Engineer Award and being named the Eastman Outstanding Scholar for 2015.

Smith's siblings study at UT, and he felt the university was also a good fit for him. He considered both mechanical engineering and computer science, but ultimately chose chemical engineering for its array of opportunities.

"It seemed to be very flexible, because I found that chemical engineers work in a wide variety of assignments," said Smith. "ChemE's work in manufacturing, research, business orgs, supply chain, patent law, process design, etc."

The rigor of the curriculum also drew his interest, and the challenge is one of his favorite things about the field.

"The difficulty of the material shaped how I approach life in almost all of its aspects," he said. "Going through the 'war' that is chemical engineering gave me a new personality and work ethic. It forced me to learn how to balance my social life with my work life. I could have picked an easier major and got through it without a real problem, but chemical engineering has developed me as a man and that has been the greatest pleasure."

The CBE faculty has helped Smith navigate the curriculum, and he says he has enjoyed working with all of them. Dr. Stephen Paddison has made a particular impression.

"The one that has really sat down and talked to me was Dr. Paddison," said Smith. "He got on a real level with me, and gave me some pretty great advice on life in general. I am glad to say that he really is a friend of mine."

Smith's co-op assignment at Eastman let him put his coursework into action.

"At school, you try constantly to understand the theory of the material," he said. "Understanding the math will get you the grades. But in the corporate environment all those numbers and letters become reality. You also

learn how to communicate what you are thinking and figure out 'what the real problem is' in the work environment."

Smith was able to put his education into action on one of his favorite projects during his co-op. He designed a recycle line that saves two pounds-per-minute of acetic acid in a production process, which adds up to a huge annual savings.

"The project got pushed through development, and they planned to put it in sometime this year," said Smith. "It was awesome to see a project that I worked on get put through and see the cost savings associated with my name. It made me feel as though I had finally 'earned a paycheck.'"

He is optimistic about the career possibilities available to him.

"My top consideration is obviously Eastman, but I have really enjoyed playing around with other ideas in my head," said Smith. "My kind of dream job would be to work in national security."

The dynamics of classwork and co-op keep him on the move, but Smith makes time to keep a well-rounded balance along the way. He feels that being a person of faith is vital to his success, and seeks to be an example of that to those around him. He is regularly involved at the Baptist Collegiate Ministry. He also keeps active with a variety of sports, board and video games, and reading.

"I love to play pick-up basketball and workout," said Smith. "I usually hit the gym daily, but engineering squelches that pretty quickly in the semester. I like to play guitar and try to sing (while in the car); read classic novels; program on the computer; and work crosswords. I recently took up caving and I dabble in climbing. I ran an Olympic Triathlon in April in St. Petersburg, Florida, and I have recently taken up amateur boxing."



## Faculty Feature: Dr. Steve Abel



Dr. Steve Abel (center) discusses projects with students (from left) Paul Mlynarczyk and Rob Pullen.

Dr. Steve Abel has always felt destined to become a chemical engineer. He follows in the footsteps of his father, who was a petroleum engineer, and Abel had early and positive exposure to the field of engineering.

“I used to enjoy looking through my dad’s engineering books and trying to decipher the equations,” Abel said. “I wrote an essay in the 9<sup>th</sup> grade entitled ‘Why I want to be a chemical engineer.’”

Abel was born and grew up in the suburbs of Houston Texas. His degree work at Rice University in Houston included a bachelor of science in chemical physics, a bachelor of science in mathematics, and a bachelor of science in physics.

Abel received his PhD in chemical engineering from Stanford University, and after graduate school was a postdoctoral associate at the Massachusetts Institute of Technology. He joined the Department of Chemical and Biomolecular Engineering (CBE) faculty as an assistant professor in 2013.

“CBE is a vibrant department with an active research program, and I felt a connection with the faculty here,” Abel said. “The department has strengths in both biomolecular engineering and computational research, two areas that my research spans.”

Abel’s group uses theoretical and computational methods to understand how biological cells interact with their environment. A great deal of the group’s interest is motivated by trying to understand how immune cells, such as T cells and B cells, identify and respond to pathogens. They focus largely on problems involving signal transduction (how information is propagated through a cell), cell membranes, and the cytoskeleton.

“For example, we would like to gain a deeper fundamental understanding of cell membranes, how they are spatially

organized, and how their mechanical properties influence a cell’s behavior,” Abel said. “The cell membrane is the part of a cell that controls the cell’s interactions with its environment—what material and information goes in and out, etc. A better understanding of membrane organization could impact a range of disciplines, ranging from immunology to drug design to the design of biomimetic materials.”

Abel enjoys interacting with students and his colleagues in the CBE department as well as working on a number of promising collaborations with individuals in other departments at UT and at Oak Ridge National Laboratory.

In the future, Abel would like to impact the fields of cell biology and synthetic biology by contributing fundamental understanding of cellular processes occurring near membranes. He also looks forward to graduating his first class of PhD students and having them contribute to the scientific/engineering community.

“I also hope to expand the role of theory and computation in the area of biomolecular engineering and establish collaborations both inside and outside of the department,” Abel added.

Abel received the CBE Outstanding Teaching Award this year, and he is also a member of the American Institute of Chemical Engineers and the Biomedical Engineering Society.

Abel is an accomplished cellist, and he was the principal cellist of the Stanford Symphony for several years. A highlight of his time with the group included a tour of New Zealand and Australia, with a concert at the Sydney Opera House.

In his time away from campus, Abel and his family enjoy the outdoors, including visits to parks, camping, and hiking.

## Alumni Feature

### Gerald & Linda King Invest In UT



Gerald and Linda King want to be Volunteers in action. To that end, the couple from Huntsville, Alabama, has set up an endowment to provide funding for the needs of the faculty of the college.

“We are indebted to the Kings for their leadership, support and investment in the faculty of our department and college,” said Granger and Beaman Distinguished University Professor and Head Bamin Khomami. “Gifts like this inspire others to give.”

Gerald is a 1983 graduate of the UT Knoxville in chemical engineering and currently serves as the Senior Vice-President of Intergraph Government Solutions in Madison, Alabama. Linda received a degree in communications from UT Knoxville in 1982 and is currently an IT Consultant in Huntsville.

“We just love the University of Tennessee,” said Linda. “Gerald and I actually met at UT Martin and

we both transferred to UT Knoxville to finish our degrees. Our time at UT has shaped our lives both personally and professionally in so many ways. It’s really an honor to be able to give back.”

But Gerald and Linda aren’t just content to give of their financial resources, they also plan to give back with their time.

“We really want to become involved in helping UT through our local alumni chapter here in Huntsville,” said Gerald. “There are a number of us here in upper Alabama and we want to make the UT presence felt. Professors from chemical engineering like Pete Counce taught me how to think like an engineer. There’s no place that thoughtful approach to problem solving applies more than in Huntsville. Linda and I want to help really advance UT here!”

## Special Feature: The Eastman HITES Program



HITES participants conduct an experiment with the help of chemical engineering students, standing at right, Tyler Cosby and Max Heres.

Eastman proved once again to be a vital partner in the College of Engineering's summer enrichment programs. The Fortune 300 company, headquartered in Kingsport, Tennessee, provided support by sponsoring the High School Introduction to Engineering Systems for 12th Graders—or HITES 12.

Through the camp, rising high school seniors get a chance to come to UT and see what engineering, the college, and the university have to offer.

"This is a way for us to highlight what UT is all about and to showcase some of the specific things we do here in the College of Engineering," said Travis Griffin, the director of engineering diversity programs, who oversees the camps.

"We talk to them about college life, about our departments and about what it's like to be a student here, in addition to the instruction they get from our faculty."

The HITES 12 camp introduces students to aerospace, biomedical, biomolecular, chemical, electrical, mechanical, and nuclear engineering, as well as computer science. Faculty members give students hands-on experience in several high-profile projects, ranging from modeling cancer to developing robots.

"The scenarios students choose to get involved with also bring home the real-world seriousness of the work that engineers do," Griffin explained.

Faculty involvement from the Department of Chemical and Biomolecular Engineering included Drs. Steve Abel, Siris Laursen, Joshua Sangoro, and Cong Trinh.

"I am very excited to see the growth of the Eastman HITES program since its inception in 2013, and have the unique opportunity to expose these kids to engineering



Dr. Cong Trinh discusses chemical engineering with students in the Eastman HITES program.

disciplines," said Trinh. "The most enjoyable experiences are to interact closely with these eager-to-learn young minds during hands-on workshops, and to sit back and listen to the presentation of their projects."

Trinh showed the students how synthetic biology can reprogram living microbes to produce unique molecules with applications ranging from biodiesel fuel to fragrances. Abel showed the students how computer modeling of cancer helps researchers understand and treat the disease. Laursen led a laboratory experience in harvesting solar energy in the form of chemical bonds. Sangoro's project taught the students about deep eutectic mixtures and their applications.

"The goal of this week is to show these kids that engineering means a lot of different things, all of which touch upon multiple aspects of the modern world," said Griffin.

Showing various aspects of engineering is also important for Eastman, which views the camp as a way to help the College of Engineering maintain its edge and attract top talent.

"It's important for us, as a company headquartered in East Tennessee, to have a strong pool of potential



Dr. Steve Abel leads HITES participants in a computational research project.

employees in our area," said Etta Clark, vice president of global public affairs and policy at Eastman. "Helping ensure that UT has world-class programs benefits both the college and our ability to hire the best and brightest talent in the region."

As part of the camp, students visited Eastman's operations and global headquarters in Kingsport and saw some of the engineering fundamentals they've been introduced to in practice. In addition to engineering knowledge, the camp also introduced students to student living, university housing, and how to apply for grants and financial aid.

## Alumni News



Dr. Donald B. Bivens

Dr. Donald B. Bivens, (BS/ChemE '62) was appointed Chair of the Research Administration Committee of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers for 2014-2015.



Dr. Heath E. Johnson

Dr. Heath E. Johnson (BS/ChE '08) earned his PhD in chemical engineering at North Carolina State University on January 5, 2015. His thesis was titled "Cytoskeletal and Signaling Dynamics Underlying Directional Persistence of Cell Migration." Johnson is now working as a postdoctoral research assistant at Princeton University.

## UB CBE Graduate Students Samar Fawaz and Mahmoud Ahmadi win RIT Earth Day competition



Mohsen Ghafari (CSEE), Mahmoud Kamal Ahmadi (CBE), Samar Fawaz (CBE), Alanna Olear (CSEE).

Mahmoud Ahmadi and Samar Fawaz won first place at the Earth Day NYWP21 research conference 2015. The New York State Pollution Prevention Institute at Rochester Institute of Technology announced the

winners of its annual Research and Development student competition and K 12 student poster competition, which provides students across the state the opportunity to promote ideas to create more sustainable schools and communities.

Open to colleges and universities throughout the state, the fourth-annual student competition, held on Earth Day, recognized both graduate and undergraduate level sustainability projects.

Teams from the University at Buffalo, Rensselaer Polytechnic Institute and Syracuse University earned top honors at the graduate level, with UB CBE's team capturing first place for retrieving precious metal from waste effluent at Precious Plate Inc. in Niagara Falls.

Samar Fawaz, UB CBE graduate student in the Blaine Pfeifer lab, was interviewed by local news station 10.

Samar Fawaz is a 2012 alumni of the University of Tennessee, Knoxville, CBE department.



THE UNIVERSITY OF  
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