



TEXAS TECH UNIVERSITY

Department of Chemical Engineering™

Fall 2012

Texas Tech University - Edward E. Whitacre Jr. College of Engineering

Message from the Chair

I am delighted to assume the position of department chair following the departure of Dr. M. Nazmul Karim to Texas A&M University. The department made great strides during Dr. Karim's eight-year tenure as chair, with substantial increases in research productivity and an influx of talented faculty members. It is my goal to uphold our strong commitment to teaching and the undergraduate program while we continue our quest to become one of the premier graduate programs in the country.

The undergraduate program went through the general accreditation by ABET last year. We passed with no concerns or weaknesses and received the full six-year accreditation. As part of our assessment and continuous improvement process, we survey alumni every three years – thanks to all of you who have taken the time to respond to these surveys – we do appreciate your feedback. The undergraduate program currently has over 350 undergraduates, and 33 students received their B.S.Ch.E degree in May 2012. We expect to graduate over 50 students in May 2013.

The graduate program and research productivity are closely tied. We had five graduate students successfully complete their degrees in 2012 and currently have 57 full-time Ph.D. students. The number of refereed publications has surpassed 50 articles for both of the last two years, and we are on track to do even better this year. Departmental faculty have been awarded over \$8,000,000 in research funding in the past three years, averaging over \$ 2.5 M per year in new awards. This substantial increase in funding is driven in part by the young faculty who have received numerous prestigious early career awards, including Dr. Siva Vanapalli's National Science Foundation CAREER Award, Dr. Micah Green's Young Investigator Award from the Air Force Office of Scientific Research, and Dr. Harvinder Gill's Young Faculty Award from the Defense Advanced Research Projects Agency.

I am also happy to announce that Dr. Carla Lacerda will be joining the faculty in the spring of 2013. Dr. Lacerda received her Ph.D. from Colorado State University in the area of bioengineering. Her research deals with the role of serotonin in heart valve pathology. Dr. Lacerda's arrival will increase the department size to sixteen tenured or tenure-track faculty.

In closing, I look forward to my tenure as department chair and to working with the students, faculty, staff, and alumni to strengthen our programs. Feel free to stop by and chat with me concerning how you can contribute to our efforts when you are in Lubbock.

Dr. Sindee Simon

P. W. Horn Professor and Whitacre Department Chair in Chemical Engineering

About Sindee Simon

Dr. Sindee L. Simon obtained a B.S. in chemical engineering at Yale University in 1983, and then worked at Beech Aircraft Corporation as a materials engineer on the all-composite Starship for three years. She obtained her Ph.D. in chemical engineering at Princeton University in 1992, and from there, she went directly to the University of Pittsburgh where she was an assistant professor of chemical engineering. In 1999, she joined the faculty of chemical engineering at Texas Tech as an associate professor. In 2004, she became a full professor, and in 2010, she received the university's highest academic honor, Paul Whitfield Horn Professor.

She took over her current duties as chair of the Department of Chemical Engineering in September 2012. In addition to her rapport with the students, she is also a highly acclaimed researcher. Her research interests include the physics of the glass transition, cure and properties of thermosetting materials, and properties and reactivity at the nanoscale. She has published 87 refereed journal publications, currently has over 1600 citations, and has garnered over \$ 6 M in research funding over her career. She has received numerous honors, including Fellow of the American Physical Society, Fellow of the Society of Plastics Engineers, Fellow of the North American Thermal Analysis Society, and the Texas Tech Bernie E. Rushing, Jr. Award for Distinguished Research.



Simon



At the AICHE Annual Meeting in Minneapolis, Minn. in October 2011, Abel Cortinas took first place in the National Student Paper Competition and the Texas Tech ChemE Car team won the Safety Award

Abel Cortinas Wins First Place in AICHE National Paper Competition

Chemical engineering senior Abel Cortinas of Floydada, Texas, won first place in the National Student Paper Competition at the AICHE Annual Meeting held in October 2011 in Minneapolis, Minn.



Cortinas

Cortinas conducted research on graphene-based nanocomposites under the mentorship of Dr. Micah Green, an assistant professor of chemical engineering.

He presented his paper, "Flow-Aligned Graphene/PVA Nanocomposite Films," at the AICHE Southwest Regional Competition at Texas A&M in March 2011, where he won first place and advanced to the national competition, the premier chemical engineering student paper competition in the nation.

Competing against students from universities such as MIT, Penn State, University of Kentucky and University of British Columbia, he took first place again. This accomplishment brings widespread recognition to Cortinas and to the undergraduate research efforts in the Department of Chemical Engineering at Texas Tech.

Cortinas' research, which is funded by Texas Tech and the Howard Hughes Medical Institute, is relevant to the development of low-density, high-strength materials for use in the aerospace industry.

After graduating in May 2012, he had an internship with Dow Chemical Company in Freeport, Texas, before beginning graduate studies in chemical engineering at MIT in fall 2012.

Student News

ChemE Car Team Wins Safety Award at AIChE National Competition



Texas Tech ChemE Car team with the award-winning vehicle.

The ChemE Car team of the student chapter of AIChE at Texas Tech won the Safety Award at the AIChE Annual Student Conference held in Minneapolis, Minn., in October 2011.

Team members Thomas Hoover (captain), Grant Creasman, Trent Lancaster, Jimmy Woods, Jay Whitaker, Scott Stanley and Jacob Orin took second place with their car, "The Dude", at the regional competition in the spring of 2011, qualifying for a spot in the national competition. Among the schools against whom the team competed at nationals were Georgia Tech, Missouri Science and Technology, Auburn University, University of California-Davis, and University of Houston.

The objective of the ChemE Car competition, sponsored by AIChE and Chevron, is for each team to design and build, within given size restraints, a chemically-powered car that is able to carry a specified cargo. The distance the car must travel and the specified cargo are not revealed until the time of the competition. The cars must meet rigorous safety standards to be able to compete. The safety evaluation occurs in two steps: a paperwork audit in which all of the safety features of the car design and operation are described and certified by the faculty advisor; and a physical audit conducted on-site at the competition. Any cars deemed unsafe by the audit team are automatically disqualified from the competition.



The Texas Tech 2011 ChemE Car

Although the team did not place at the national competition, winning the Safety Award is a major accomplishment for the ChemE Car team. The team's proposed improvements for their car include building a watertight and airtight galvanized cell casing, optimizing the safety of the car; and upgrading from a 3-V motor to a 6-V motor.

Chemical Engineering Freshman Selected for Congressional Internship

Aaron Carver, a 19-year old chemical engineering freshman from Mansfield, Texas, has been chosen to participate in the Government and Public Service Internship Program at Texas Tech.



Carver

Carver was one of 15 students selected from a pool of approximately 70 applicants university-wide. He will intern on Capitol Hill in Washington, D.C., during the Fall 2012 semester.

The primary objective of the Government and Public Service Internship Program, established in 1999 by then Texas Tech University President Donald Haragan, is to give Tech students an opportunity to observe and to contribute to the legislative process through sponsored internships in Lubbock, Austin, and Washington, D.C. Interns are matched with congressmen or senators based on interest in issues, hometown, personality and skills. Selected students are awarded a \$4,000 scholarship and are provided housing for the duration of their internship. As well as offering valuable learning experience for the students, the congressional internship provides positive visibility of Texas Tech in Austin and Washington, D.C.

Carver is a Chancellor's Top Scholar and a member of the Honors College. He entered Texas Tech with 24 AP credits and maintained a 4.0 GPA in his freshman year. He decided to major in chemical engineering because of the challenge and because of the variety of job opportunities for chemical engineers, and he looks forward to owning his own business in the future.

Chateaubriand Fellowship Awarded to Chemical Engineering Ph.D. Student

Xiguang Li, a graduate student working under the direction of Dr. Greg McKenna, has been awarded a Chateaubriand Fellowship by the French government to spend nine months at the Ecole Nationale Supérieure des Arts et Métiers (ENSAM) in Paris, France. There he will carry out research on a joint project between faculty at Texas Tech (McKenna) and the faculty at ENSAM (Miquelard-Garnier and Régnier) in the area of forced assembly of polymer nanofilms and graphene-based nanocomposites.



Li

Li joined the graduate program at Texas Tech in 2009 after completing a B.S. in chemistry at Nanjing University and a M.S. in chemistry at University of California-Irvine.



Faculty News

Gill Receives DARPA Award for Research in Novel Vaccine Delivery

Dr. Harvinder Gill, an assistant professor of chemical engineering, has received a \$300,000 Defense Advanced Research Projects Agency (DARPA) Young Faculty Award to fund his work in developing oral vaccines encased in pollen grains for oral delivery.



Gill

DARPA's Young Faculty Award (YFA) is given to junior faculty members in an effort to educate them about Department of Defense (DoD) needs and to recruit them into research efforts to meet these needs. The YFA Program funds, mentors, and provides industry and DoD contact to these faculty members early in their careers, with the long-term goal of producing the next generation of scientists, engineers and mathematicians who will devote a significance percentage of their research endeavors to solving DoD and national security issues.

The development of oral vaccines could be crucial in military settings in which soldiers are far from medical facilities and practitioners that can administer vaccine injections. Traditional vaccines are given by injection because oral vaccines, which are more easily administered, can be damaged or destroyed by stomach acids and digestive enzymes. Gill hypothesized that, if he could empty pollen grains of their natural contents and fill the shells with vaccine, the pollen shells would protect the vaccine as they passed through the acidic environment of the stomach. Once the pollen shells with vaccine reached the intestines, they could be absorbed directly into the bloodstream. In experiments with mice, he observed that mice that ingested these vaccine-loaded pollen grains did in fact show better immunity than mice that were fed the vaccine only.

Gill joined the Department of Chemical Engineering in 2009 after completing doctoral work at the Georgia Institute of Technology and post-doctoral work at Emory University.

Green Wins AFOSR Young Investigator Award

Dr. Micah Green, an assistant professor of chemical engineering, has received a \$360,000 Young Investigator Award from the Air Force Office of Scientific Research (AFOSR) for his work in the production of individual graphene sheets without altering their unique properties. He is one of 43 professors nationwide to receive a portion of the \$16,500,000 in grants awarded.



Green

The Young Investigator Program provides research grants to professors who have earned Ph.D.s within the last five years who show exceptional ability in conducting basic research. The program's objective is to encourage creativity research in

Vanapalli Receives NSF CAREER Award for Innovative Microfluidics Research

Dr. Siva Vanapalli, an assistant professor of chemical engineering at Texas Tech, has been awarded a \$400,000 NSF CAREER Award for his proposal, "Collective hydrodynamics of confined drops in microfluidic parking networks."



Vanapalli

The Faculty Early Career Development (CAREER) Award is one of the most prestigious grants from the National Science Foundation. The award is given to qualified professors early in their careers to promote high-quality research and novel educational initiatives.

He will use this five-year grant toward his research in developing microfluidic technology that is applicable to screening chemical compounds for potential pharmaceutical use and to optimizing therapeutic dosages of the effective compounds. Current techniques for screening and optimizing dosages require large quantities of chemical reagents, laboratory space, equipment, and time. Using microfluidic "lab-on-a-chip" technology for these same procedures will greatly reduce the amount of resources needed, thereby reducing cost of production that will, in turn, reduce the cost of new pharmaceuticals for the consumer. This technology also has the potential for accelerating the screening and dosage optimization processes, thus making newer, more effective drugs available to the consumer more quickly.

Vanapalli joined the chemical engineering faculty in the fall of 2008. He has taught undergraduate and graduate courses in fluid dynamics and biomicrofluidics. He holds a Bachelor of Technology degree in agricultural and food technology from the Indian Institute of Technology, a Master of Science degree in food science from Pennsylvania State University, and a doctoral degree in chemical engineering from the University of Michigan.

science and engineering and to bolster career development for promising young investigators.

Graphene is a low-density, high-strength nanocomposite material that has potential application in such fields as composite material development, electronics, solar cells, DNA sequencing, and desalination. Graphene sheets strongly adhere to each other and when separated, lose some of their unique chemical, mechanical and electrical properties. Green's research will involve finding alternate ways to produce and separate graphene sheets while maintaining the graphene's characteristics.

Green is an alumnus of the Texas Tech Department of Chemical Engineering. He earned a Ph.D. in chemical engineering at Massachusetts Institute of Technology, after which he participated in a post-doctoral program at Rice University. He returned to Texas Tech as an assistant professor in 2009.



TEXAS TECH UNIVERSITY

Department of Chemical Engineering™

Box 43121 | Lubbock, Texas 79409-3121

McCavit Presented with the Mary Kay O'Connor Process Safety Center Merit Award

Jack McCavit, an alumnus and a current member of the Department of Chemical Engineering External Advisory Board, has won the Mary Kay O'Connor Process Safety Center Merit Award.

The award is presented to individuals who make significant contributions to advancing research, education, and service projects related to safety processes and technologies.



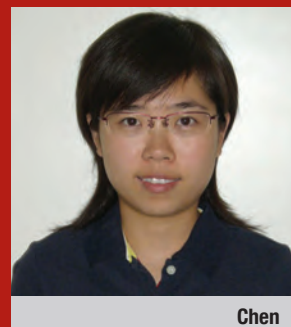
McCavit

Mary Kay O'Connor was a chemical engineer that was killed in an industrial explosion in 1989. The main goal of the Mary Kay O'Connor Process Safety Center, established at Texas A&M in her memory in 1995, is to make safety processes "second nature" in industry around the world in order promote accident prevention. The center also develops safer procedures, equipment, technology, and management strategies to reduce process industry losses while maintaining competitiveness.

McCavit is a 1970 graduate of the Department of Chemical Engineering. He was employed with Celanese for 35 years before starting his own consulting firm, J.L. McCavit Consulting, LLC, in 2005. He is a fellow and staff consultant for Center for Chemical Process Safety (CCPS), and chaired the CCPS committee that wrote "Guidelines for Risk-Based Process Safety."

Chen Wins Outstanding Dissertation Award

Dr. Yingying Chen, a recent graduate with a Doctor of Philosophy in chemical engineering, received first place in the Mathematics, Physical Sciences, and Engineering category of the Texas Tech University Graduate School's Outstanding Thesis/Dissertation Awards competition for her dissertation titled "An Analysis of Model Parameter Uncertainty on Online Model-based Applications." The dissertation was nominated by Dr. Karlene Hoo, a professor of chemical engineering.



Chen

Chen joined the Ph.D. program in the Department of Chemical Engineering in 2007, after earning a B.S. in thermal energy engineering and power engineering at Nanjing University of Science & Technology and a Master of Science in power machinery and engineering at Southeast University in China. Working under the direction of Hoo, her studies in closed-loop optimal control focused on understanding how model parameter uncertainties affect the model's prediction. This line of thought led her to investigate robust theory, control theory, system identification, statistics, and stability theory.

Chen graduated with a Ph.D. in May 2012 and is now employed by Johnson Matthey Inc. (JMI) in the Emission Control Technologies Division as a senior modeling scientist. She works on developing fundamental models for different catalyst systems to predict the catalyst performance for pollutant emission control.

Keeping in Touch

The Texas Tech Department of Chemical Engineering would like to know what is happening in your professional life. Visit the following website to update your information or let us know about your accomplishments: www.coe.ttu.edu/info