



## Message from the Chair

The new academic year is now underway, as is our progress towards becoming the undergraduate chemical engineering department of choice in Texas and one of the top research and graduate chemical engineering departments in the nation. Both our students and our faculty continue to receive recognition for their excellence through receipt of a variety of awards and honors. The department is currently ranked 68th in the U.S. News and World Report out of all chemical engineering programs in the country.



Simon

At the undergraduate level, 469 students are enrolled in the major this fall, a record high, with over 50 students in the senior class. At the graduate level, we have 75 current students enrolled, also a record, with 10 Ph.D.s graduating in 2013. The quality of all of our students continues to improve, despite the increase in our enrollments, and our students at both levels continue to get very good jobs, many with multiple offers. The graduate program is tied to external funding of our research programs, and this continues to be exceptionally strong. Restricted research expenditures from competitive grants in FY 2014 topped \$3.0M – also a first for the department – and we continue to lead the university in competitive research grant dollars per faculty member.

We have several exciting additions to the faculty: Dr. Wei Li and Chijuan Hu joined the department in January, and Dr. Jeremy Marston started this fall. Li performs interdisciplinary work at the interface of polymers and bioengineering focusing on a wide range of issues including the 3D microenvironment of cells, interactions between cells and surfaces, bio-imaging sensors, and cancer drug screening. Marston is a fluid dynamicist and expert in high-speed imaging; he is particularly interested in waterless cleaning technologies for solar panels, multiphase flows, and water and oil encapsulation of particulates. Hu has considerable industrial experience as a bioengineer and will develop and teach our undergraduate laboratory courses. Other changes in the faculty in the past year include the departure of Dr. Karlene Hoo to become the dean of the Graduate School at Montana State. Hoo joined the faculty in 1999 and played an important role in raising our visibility at the national and international levels, including several years of service at the National Science Foundation. Dr. Micah Green also left the department to join the faculty at Texas A&M University – he did an excellent job here and we wish both Micah and Karlene continued success in the future.

Our alumni continue to help the department through their generous donations – nearly one hundred alumni made gifts or pledges totaling nearly \$150k in FY 14, and 28 organizations donated an additional \$278k. The External Advisory Board development subcommittee led by Andrew Spangler with the help of Julie Jackson are working with college development officers to increase gifts for undergraduate scholarships, graduate student fellowships, laboratory and department renovations, and endowed professorships for both junior and senior hires. In addition to your financial support, alumni can contribute to the department by recruiting students, giving presentations to our student chapters, and serving on our advisory board.

Stay in touch and stop by when you are in Lubbock! I would love to show you what is going on and the exciting progress that we are making.

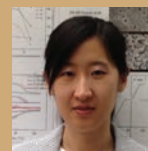
Dr. Sindee Simon  
P. W. Horn Professor  
Whitacre Department Chair in Chemical Engineering

## Student News

Several graduate students in the department had very strong showings at the International Polyolefins Conference held in Houston in February 2014. The conference attracted more than 600 participants and more than 40 poster presentations. Siyang Gao, a fifth-year graduate student in Dr. Sindee Simon's research group, won second place for her poster titled "The Experimental and Modeling Study of Reaction Kinetics of Cyclopentadiene Dimerization." Lan Ma, a fifth-year graduate student in Dr. Ronald C. Hedden's research group, won third place for her poster titled "Shape Memory Effects in Polyethylene/Carbon Black Nanocomposites and Polyethylene/Polypropylene Blends," and Ziniu Yu, a fourth-year graduate student also in Hedden's research group, won Honorable Mention for "Guest Molecule Behavior in Liquid Crystalline Networks: Comparison of A and ABA Type Plasticizers."



Gao



Ma



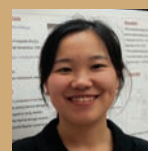
Yu

Wenqian Tao, a doctoral student supervised by Dr. Harvinder Gill, was awarded a Student Travel Achievement Recognition Award for her paper titled "Engineering and Evaluation of a Fully Synthetic Universal Influenza-A Vaccine Based on M2e-Conjugated Gold Nanoparticles," which she presented at the Society For Biomaterials' 2014 Meeting.



Tao

Rong Xu, supervised by Dr. Ted Wiesner, won first place in Engineering Division I of the 13th Annual Texas Tech Graduate Student Poster Competition in February 2014. Her research poster titled, "Reactor Design and Dynamic Model of a Two-step Iron Oxide Solar Thermochemical Cycle," detailed her work on a novel process that can sustain 24/7 hydrogen production from solar energy without fossil fuel backup.



Xu

Robert Fullerton, an undergraduate who worked with Dr. Micah Green for three years and who graduated in May 2014, is first author on a paper in the prestigious journal Carbon titled, "Graphene non-covalently tethered with magnetic nanoparticles." Robert also had an internship with the Army Research Lab in 2012 where he initiated a collaboration with coauthor Daniel Cole.



Fullerton

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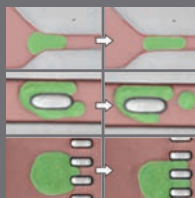


## Faculty News

Dr. Siva A. Vanapalli, an associate professor of chemical engineering, received two grants from the Cancer Prevention Research Institute of Texas (CPRIT) as the primary investigator.

One of the projects deals with new technology for screening tumor cells using a high throughput microfluidics device. The grant High-Impact/High-Risk Research Award of \$200k with co-PI Dr. Jian Sheng, a professor of mechanical engineering, and collaborator Dr. Wei Li, an assistant professor of chemical engineering. The second project, a \$675k award, deals with engineering microfluidic devices for multimodal mechanical phenotyping of tumor cells in flow will be performed with collaborators Dr. Boyd Butler (Department of Biological Sciences) and Evie Cobos (TTUHSC).

Vanapalli also received a \$200k National Science Foundation (NSF) grant in August for microfluidic dose response analyzer for cell-based assays.



Tumor Cell Transport



Vanapalli

### Additional New Funding

Dr. Rajesh Khare, an associate professor of chemical engineering, received \$103k from DOD/Battelle Memorial Institute to study the viscoelastic properties of polymer systems with heterogeneities.

Dr. Chau-Chyun Chen, Jack Maddox Distinguished Engineering Chair in Sustainable Energy and professor of chemical engineering, received a \$60k award from Savannah River to simulate the properties of DOE waste streams.

Dr. Ronald Hedden, an associate professor of chemical engineering, received \$30k from Microtech Laboratories to investigate microencapsulated phase change materials.

Faculty also continue to be involved in professional service with Dr. Greg McKenna, Horn Professor and John R. Bradford Chair in Engineering, serving as president of the Society of Rheology and Dr. Sindee Simon, Whitacre Department Chair and Horn Professor, chairing the Gordon Research Conference on Polymer Physics in July.

Simon will receive the Outstanding Achievement Award from the North American Thermal Analysis Society at the annual meeting to be held in Santa Fe, New Mexico, in September 2014. She also received the Society of Plastics Engineers (SPE) 2014 Research/Engineering Technology Award at the Annual Technical Conference (ANTEC) in May 2014 for research and technology developments in polymers and polymer composites and for her pioneering contributions in thermal analysis of polymers. This spring, she also was honored with an NSF Special Creativity Extension to study the glass transition at the nanoscale.



Khare



Chen



Hedden



McKenna

## Student News (continued)

Doctoral students Evelyn Lopez and Astrid Torres were awarded the Carl Storm Underrepresented Minority (CSURM) Fellowship to attend the 2014 Gordon Research Conference on Polymer Physics. Also honored were doctoral students Ran Tao and Astrid Torres who both presented invited talks at the preceding Gordon Research Seminar (GRS) on Polymer Physics, and doctoral student Siyang Gao who served as a discussion leader at the GRS. Dr. Greg McKenna supervises Torres; Dr. Sindee L. Simon supervises Gao, Lopez, and Tao.



Lopez

Torres



Tao

Doctoral students, Astrid Torres, Siyang Gao, Ran Tao, Heedong Yoon, and Xin Zhang received North American Thermal Analysis Society (NATAS) Student Travel Awards to present their work at the 2014 meeting of NATAS, to be held in Santa Fe, New Mexico, in September 2014. Dr. Greg McKenna supervises Torres and Yoon, Dr. Sindee Simon supervises Gao and Tao, and Dr. Brandon Weeks supervises Zhang.



Zhang



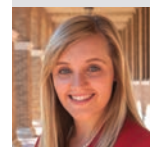
Yoon

Yanfei Li was invited to participate in the AIChE Excellence in Materials Engineering and Science Division Area 8a (Polymers) Graduate Student Research Award Symposium. He will compete with nine other students for the award at the AIChE Fall 2014 Meeting. Li is supervised by Dr. McKenna.



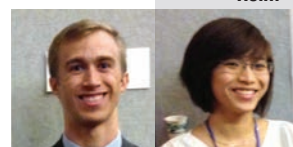
Li

Amber Helm, a May 2014 B.S.Ch.E. graduate, was named the recipient of the 2014 McAuley Distinguished Engineering Student Award. She graduated with a 3.93 GPA and Summa Cum Laude with Honors. Helm accepted a full-time position with Anadarko as a production engineer in Kermit.



Helm

Matt Kovalski won second place in the undergraduate student poster competition of the Fracturing Impacts and Technologies Conference, and master's student Nguyen Nguyen won second place in the graduate student poster competition. The conference was held in September 2014 in Lubbock and was sponsored by Texas Tech and the Air and Waste Management Association. Both students are supervised by Dr. Chau-Chyun Chen.



Kovalski

Nguyen



Simon receives the SPE 2014 Research/Engineering Technology Award





## New Faculty

Chijuan Hu joined the faculty as an assistant professor of practice in the 2014 spring semester.

She earned a Bachelor of Engineering in chemical engineering from Nanjing University of Technology. In 2008, she received a Master of Applied Science in chemical engineering from the University of Toronto. For her graduate thesis, she developed a double layer electrical capacitor based on the activated carbon derived from petroleum coke, a byproduct from petroleum refining processes.

After graduation, Hu started her industrial career as a research engineer at Mascoma Canada, a biotechnology firm in Toronto, and she initially worked on pilot-scale processes to convert cellulosic material to monomeric sugars and ethanol. She was then transferred to the company's research and development headquarters in Lebanon, New Hampshire. She initially led the effort to develop and modify chemical and physical characterization methods to support the pretreatment process design. She was then assigned to work in the Application Technology Group as an associate fermentation and application scientist. Her roles involved conducting fermentation in flasks and bioreactors to study the performance of genetically bioengineered yeast, providing technical support for commercial fermentation, performing quality assurance and quality control for the commercial yeast products, and simulating commercial yeast production process in bioreactor.

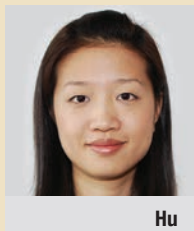
She is delighted to share her experience as a practicing industrial engineer with our students. Her primary teaching assignments focus on the two undergraduate laboratory courses. Her goals in these classes are to give students real hands-on experience with equipment and processes they may encounter in industry and to develop their teamwork and problem solving skills. In addition, Hu serves as the department safety officer and the chemical safety officer for the Whitacre College of Engineering.

Dr. Jeremy Marston joined the faculty as a tenure-track assistant professor in the 2014 fall semester.

Marston earned a Doctor of Philosophy in chemical engineering at the University of Birmingham in 2007. His doctoral thesis focused on the development of new experimental methods for the analysis of instability in curtain coating flows and high speed imaging of granular jet flows.

Following his graduate studies, Marston spent one and a half years as a research fellow at the Agency for Science, Technology and Research (A\*STAR) Institute of Chemical and Engineering Sciences in Singapore, followed by five years as a research scientist at King Abdullah University of Science and Technology (KAUST) in Saudi Arabia. His work at KAUST focused on experimental fluid dynamics with a focus on multilayer coating applications and granular impact phenomena.

Marston's research at Texas Tech will apply state-of-the-art high speed imaging to important problems in fluid mechanics and chemical engineering. He is particularly interested in waterless cleaning technologies for solar panels, multiphase flows, and water and oil encapsulation of particulates. He plans to teach undergraduate and graduate fluid mechanics and is interested in developing a graduate-level course focused on high-speed imaging.



Hu

Dr. Wei Li joined the faculty as a tenure-track assistant professor in the 2014 spring semester.

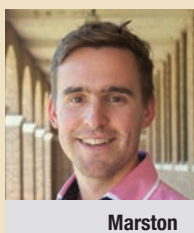
Li obtained a Doctor of Philosophy in polymer chemistry and materials at the University of Toronto in 2010. His doctoral thesis focused on the development of droplet-based microfluidic systems for complex reactions and processes. During his doctorate program, he obtained extensive experience in droplet microfluidics for the synthesis of various microparticles, surface modification of microfluidic devices, cell encapsulation, multiphase reaction kinetics, and micro and nano patterning techniques.

Following his graduate studies, he received a prestigious Natural Sciences and Engineering Research Council of Canada (NSERC) Postdoctoral Fellowship to work at the Massachusetts Institute of Technology (MIT) in the laboratory of Dr. Paula Hammond, where he learned a variety of techniques associated with the nanolayer assembly of biofunctional materials. His work at MIT included the development of a novel microparticle platform to investigate 3D cell microenvironments, the creation of a microfluidic device for the capture and non-invasively release of rare cancer cells, and the invention of high throughput preparation and screening of nano-layered biomaterials.

Li's research at Texas Tech will combine cutting-edge microfluidics and nanoassembly techniques to develop novel biofunctional polymer surfaces and microdevices for biological applications. He is particularly interested in 3D microenvironments for cells, interactions between cells and surfaces, bio-imaging sensors, and cancer drug screening. He is also excited to be in the classroom working with students and plans to teach courses related to materials and bioengineering, including the core engineering materials science course. Li is also interested in developing a graduate-level course focused on topics of micro and nano engineering for various biological applications.



Li



Marston

## Departing Faculty Members

Dr. Karlene Hoo left Texas Tech University at the end of 2013 to become the dean of the Graduate School at Montana State. Since her arrival at Texas Tech nearly fifteen years ago in fall 1999, Hoo played an important role in raising our visibility at the national and international levels. In addition to bringing in more than \$1.6M in external research funding, she spent several years as a program director at the National Science Foundation leading the program, Partnerships for Innovation: Accelerating Innovation Research, in the Directorate of Engineering. We thank her for her contributions, and wish her the very best in her new post.

Dr. Micah Green left the department in July 2014 to join the Department of Chemical Engineering at Texas A&M University. Green, a 2001 graduate of our department, received his Ph.D. at the Massachusetts Institute of Technology and then performed postdoctoral research at Rice University. He joined our faculty in 2009 and was an outstanding performer in both teaching and research, bringing in more than \$1.3M and winning a number of prestigious awards, including the National Science Foundation CAREER Award and the Young Investigator Award from the Air Force Office of Scientific Research. We look forward to his continued interactions with the department as an alumnus and wish him the best of success in the future.



TEXAS TECH UNIVERSITY

# Department of Chemical Engineering™

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## Recent Graduates



### Sanjoy Bhattacharia - 2013

*Dissertation Title* "Kinetics of Energetic Material: Investigation of Sublimation and Decomposition"  
*Advisor* Dr. Brandon Weeks  
*Current Position* Post-Doctoral Associate with Dr. Chau-Chyun Chen  
*Institution* Texas Tech University  
*Location* Lubbock, Texas



### Swastika Bithi - 2013

*Dissertation Title* "Engineering a Drop-Based Microfluidic Platform with Functionalities of Well Plates and Pipetting System"  
*Advisor* Dr. Siva A. Vanapalli  
*Current Position* Instructor  
*Institution* Texas Tech University  
*Location* Lubbock, Texas



### Brian Bullocks - 2013

*Dissertation Title* "Rapid Fault Detection and Mitigation Strategies in the Low Temperature PEM Fuel Cell"  
*Advisor* Dr. Raghunathan Rengasamy  
*Current Position* Co-Founder & Lead Engineer  
*Company* SysEng, LLC  
*Secondary Position* Research Professor, Clarkson University  
*Location* Potsdam, New York



### Sriya Das - 2014

*Dissertation Title* Dispersion and rheology of graphene colloids and gels  
*Advisor* Dr. Micah J. Green  
*Current Position* Logistic Technology Development Engineer  
*Institution* Intel Corporation  
*Location* Hillsboro, Oregon



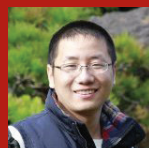
### Taskin Binte Karim - 2013

*Dissertation Title* "Surface Mechanical Properties of Amorphous Polymers Using Spontaneous Particle Embedment: Epoxy, Poly( - Methylstyrene), Polystyrene of Different Architecture, and Poly(Vinyl Acetate)"  
*Advisor* Dr. Gregory B. McKenna  
*Current Position* Postdoctoral Associate with Dr. John O'Haver  
*Institution* University of Mississippi  
*Location* Oxford, Mississippi



### Ketan Khare - 2013

*Dissertation Title* "Thermo-Mechanical Properties of Cross-linked Epoxy based Systems: A Molecular Simulation Study"  
*Advisor* Dr. Rajesh Khare  
*Current Position* Postdoctoral Associate with Dr. Shekhar Garde  
*Institution* Rensselaer Polytechnic Institute  
*Location* Troy, New York



### Zheng Li - 2013

*Dissertation Title* "Identification, Control, and Monitoring of Complex Chemical and Biochemical Systems"  
*Advisor* Dr. M. Nazmul Karim  
*Current Position* Engineer  
*Company* Genentech, Inc.  
*Location* San Francisco, California



### Yunzhe Ma - 2013

*Dissertation Title* "Microneedles for Drug Delivery into Oral Cavity"  
*Advisor* Dr. Harvinder Singh Gill  
*Current Position* Engineer  
*Company* Intel, Inc.  
*Location* Hillsboro, Oregon



### Jeevan Maddala - 2013

*Dissertation Title* "Design of Droplet Based Microfluidic Devices for Lab On Chip Applications"  
*Advisor* Dr. Raghunathan Rengasamy  
*Current Position* Co-Founder & Lead Engineer  
*Company* SysEng, LLC  
*Secondary Position* Research Professor, Texas Tech University  
*Location* Lubbock, Texas



### Weiting Tang - 2013

*Dissertation Title* "Modeling, Estimation, and Control of Nonlinear Time-Variant Complex Processes"  
*Advisor* Dr. M. Nazmul Karim  
*Current Position* Engineer  
*Company* Baker Hughes  
*Location* Tomball, Texas



### Jinhua Wang - 2013

*Dissertation Title* "The Viscoelastic Properties of Thin Films"  
*Advisor* Dr. Gregory B. McKenna  
*Current Position* Looking  
*Location* Milwaukee, Wisconsin



### Ben Xu - 2014

*Dissertation Title* Dynamics and Thermodynamics of Small Molecule Glass Formers, Polymers and Organic Crystals  
*Advisor* Dr. Gregory B. McKenna  
*Current Position* Senior Rheologist  
*Institution* Avery Dennison  
*Location* Mentor, Ohio



The Spring 2014 B.S.Ch.E. graduating class totaled 40 students, was an excellent class, and twenty percent took and passed the FE exam in their spring term. Eighty percent of the graduates had jobs before graduation, with half as process engineers. The average starting salary exceeded \$78,000. Several graduates are continuing their studies in chemical engineering at Texas Tech in the master's program.

## Keeping in Touch

We would love to hear from you. If you would like to write an article for the newsletter or if you have important news to share, contact Dr. Sindee Simon, and of course, keep your contact information up to date at this link: [www.coe.ttu.edu/info](http://www.coe.ttu.edu/info)