FACILITIES
Located in the 205,000 square-foot Jack. E. Brown Engineering Building, the department provides its students and faculty members access to the latest resources, including 88 research and teaching facilities, six general classrooms, 13 conference rooms and four computer laboratories. Also housed in the seven-story building is a 600 square-foot computer cluster room.

STUDENTS
ENROLLMENT (Fall 2014)
• Undergraduate: 739
• Graduate: 188
• Total Enrollment: 927

DEGREES AWARDED (2013)
• Bachelor’s – 147
• Master’s – 7
• Ph.D. – 28 (Chemical Eng.: 21 | Other: 7)

AREAS OF STUDY
• Biomedical | Biomolecular
• Complex Fluids
• Computational Chemical Engineering
• Environmental | Sustainability
• Materials
• Microelectronics
• Microfluidics
• Modeling | Simulation
• Nanotechnology
• Process Safety
• Process Systems Engineering
• Reaction Engineering
• Thermodynamics

FACULTY
• 17 Professors
• 5 Associate Professors
• 6 Assistant Professors
• 7 Lecturers/Senior Lecturers
• 5 Chair Holders
• 7 Endowed Professorships
• 2 Regents Professors
• 2 Endowed Faculty Fellowships

SCHOLARSHIPS
Undergraduate students received 245 scholarships in 2014 totaling $311,000

RESEARCH
• Direct Research Expenditures: $7.81M (FY 2013)
• Research Awards: $10.04M (FY 2014)
• Refereed Journal Publications: 197 (2013)

NATIONAL MERIT SCHOLARS (Fall 2014)
New Students: 40

UNDERGRADUATE RANKING
• 11th (Public)
• 16th (Overall)

GRADUATE RANKING
• 18th (Public)

ENGINEERING.TAMU.EDU/CHEMICAL

The mission of the Artie McFerrin Department of Chemical Engineering at Texas A&M is: to educate and prepare students for national and international leadership roles in industry, government and academia; to attract top students to chemical engineering; to define and develop new directions in chemical engineering fundamentals and practices, and in chemical engineering education and curricula; to be a valuable resource and service base to the state and to industry; and to provide leadership in solving problems of social and economic importance.
Greetings from the Department Head

Faculty Portfolio

Faculty News

Student News

ChEGSA Update

Two Mobile Apps

Discovery of Biomarker

Thermal Interface Materials

Counter Diffusion

Emerging Human Pathogen

Bendable Battery

2014 BASF Graduate Student Symposium

Mary Kay O’Connor Process Safety Center

Advisory Board Listing
Dear Reader,

Every fall, the occasion for reflection and thanksgiving begins to surface. With the changing seasons, breakthroughs and progress continue to be made, sweeping us into the new year—2015 will be incredible.

I am grateful for the opportunity to lead a department that is focused on promoting discovery and elevating human conditions through powerful reaches in science to solve intricate, grand challenges in energy, safety and diverse forms of modern-technology: advances that fuel curiosity and add opportunities for present and future generations. I am pleased that we do not tire of giving our all. Every day, the faculty, staff and students of our department-family display the very best of society: common sense instincts matched by genuine goodwill for each other.

Eight new faculty have joined us in 2014. Through the Chancellor’s Research Initiative, the College of Engineering’s 25 by 25 Initiative and our custom roadmap for continued improvements, we will recruit world-class faculty and students. Our undergraduate program was ranked 11th among public schools in 2014. The students who we serve come here from all over the world because they know we will give them an outstanding experience in education and real-world learning. My journey continues in positioning our department as a landmark destination for studying chemical engineering.

Truly,

Dr. M. Nazmul Karim
Professor | Department Head
T. Michael O’Connor Chair II
Faculty Portfolio

**Mustafa Akbulut**
Ph.D., University of California, Santa Barbara, 2007, Assistant Professor
Nanotechnology, thermal interface materials, enhanced oil recovery

**Perla Balbuena**
Ph.D., University of Texas, Austin, 1996, Professor
GSPA Professorship | First-principles simulation and design of materials: catalysis, interfacial phenomena and thermodynamics

**John Baldwin**
Ph.D., Texas A&M University, 1968, Senior Lecturer
Plant design, design research and career in industry

**Dragomir Bukur**
Ph.D., University of Minnesota, 1974, Professor
Joe M. Nesbitt Professorship | Applied catalysis, chemical reaction engineering and synthetic fuels

**Alim Dewan**
Ph.D., Washington State University, 2010, Lecturer
Alternative energy, biofuels and microfluidics

**Mahmoud El-Halwagi**
Ph.D., University of California, Los Angeles, 1990, Professor
McFerrin Professorship
Managing Director, TEES Gas and Fuels Research Center
Process integration, design, and optimization, sustainability and hydrocarbon processing

**Yossef Elabd**
Ph.D., Johns Hopkins University, 2001, Professor
Polymer synthesis for clean energy and water
Electrochemical processes, ion and molecular transport/thermodynamics

**Christodoulos Floudas**
Ph.D., Carnegie Mellon University, 1986, Chair Professor
Director, Texas A&M Energy Institute
Member, National Academy of Engineering
TIAST Faculty Fellow and Eminent Scholar
Multi-scale energy systems engineering, and interface of chemical engineering, applied mathematics, operations research, computer science and computational biology

**Gilbert Froment**
Ph.D., University of Gent, Belgium, 1957, Research Professor
Foreign Member, National Academy of Engineering
Kinetic and process modeling of hydrocracking, catalytic cracking and steam reforming

**Charles Glover**
Ph.D., Rice University, 1975, Professor
Associate Department Head | Asphalt materials rheological properties, binder oxidation on pavements

**Micah Green**
Ph.D., Massachusetts Institute of Technology, 2007, Associate Professor
Processing and applications of dispersed nanomaterials

**Kenneth Hall**
Ph.D., University of Oklahoma, 1967, Regents Professor
Jack E. & Frances Brown Chair | Thermodynamic properties of fluids and their mixtures, process and product design

**M. M. Faruque Hasan**
Ph.D., National University of Singapore, 2010, Assistant Professor
Multi-scale systems engineering for energy/environment, modeling and optimization

**James Holste**
Ph.D., Iowa State University, 1973, Professor
Measurement and correlation of thermodynamic fluid properties at high pressures

**Mark Holtzapple**
Ph.D., University of Pennsylvania, 1981, Professor
Biochemical engineering, sustainable technologies, food and feed processing, biofuels and water

**Charles Isdale**
Senior Lecturer | Unit operations lab, career in industry

**Arul Jayaraman**
Ph.D., University of California, Irvine, 1998, Professor
Associate Department Head | Ray Nesbitt Professorship
Director of Graduate Program
Systems biology and molecular systems biotechnology

**Hae-Kwon Jeong**
Ph.D., University of Minnesota, 2004, Associate Professor
Graduate Recruitment & Admissions Coordinator
Separation membranes and nanomaterials development

**Katy Kao**
Ph.D., University of California, Los Angeles, 2005, Associate Professor
Genomics, systems biology and biotechnology

**M. Nazmul Karim**
Ph.D., University of Manchester (U.K.), 1977, Professor
Department Head, T. Michael O'Connor Chair II
Biofuels and biotechnology, advanced process control and system design, optimization

**Costas Kravaris**
Ph.D., California Institute of Technology, 1984, Professor
Nonlinear process control, state estimation, dynamic model reduction

**Yue Kuo**
Ph.D., Columbia University, 1979, Professor, Dow Professorship
Nano and microelectronics, semiconductors and thin films

**Jodie Lutkenhaus**
Ph.D., Massachusetts Institute of Technology, 2007, Assistant Professor
William & Ruth Neely Faculty Fellowship
Polymers, thin films and energy storage

**M. Sam Mannan**
Ph.D., University of Oklahoma, 1986, Regents Professor
T. Michael O'Connor Chair I
Director, Mary Kay O'Connor Process Safety Center
Process safety and aerosol research

**Chad Mashuga**
Ph.D., Michigan Technological University, 1999, Assistant Professor
Process safety: Calorimetry, flammability, explosion hazards

**Ray Mentzer**
Ph.D., Purdue University, 1980, Senior Lecturer
Chemical process safety, industrial safety and health, oil and petroleum processing, career in oil and gas industry

**Estratios (Stratos) Pistikopoulos**
Ph.D., Carnegie Mellon University, 1988, Chair Professor
Associate Director, Texas A&M Energy Institute
Fellow, Royal Academy of Engineering (U.K.)
Process systems engineering, multi-parametric programming, model predictive control, modelling, design and optimization under uncertainty, sustainable energy systems, smart manufacturing and personalized healthcare engineering

**William Rogers**
Ph.D., The Ohio State University, 1976, Lecturer
Research Scientist, Mary Kay O'Connor Process Safety Center
Predictive models and applications of quantum chemistry

**Jorge Seminario**
Ph.D., Southern Illinois University, 1988, Professor
Lanatter & Herbert Fox Professorship
Nanotechnology, molecular simulation and computational chemistry

**Victor Ugas**
Ph.D., Northwestern University, 1999, Professor
Holder of the Charles D. Holland '53 Professorship
Associate Department Head | Director of Undergraduate Program
Chair, TAMU Professional Program in Biotechnology (PPB)
Microfabricated bioseparation systems

**Sreeam Vaddiraju**
Ph.D., University of Louisville, 2006, Assistant Professor
Organic and inorganic semiconductors, nanostructures, mass production, large-scale assembly of nanomaterials, device fabrication, thermoelectrics and solar cells

**Doug White**
Senior Lecturer, Departmental Safety Officer
Unit operations lab, career in industry

**Benjamin Wilhite**
Ph.D., University of Notre Dame, 2003, Associate Professor
Reaction engineering, chemical kinetics, transport processes and multi-layer catalysis

**Christin Wilson**
Ph.D., The Ohio State University, 2012, Lecturer
Technical writing, socio-historical linguistics and language processing

**Hung-Jen Wu**
Ph.D., Texas A&M University, 2006, Assistant Professor
Biosensors, nanotechnology, infectious disease screening and novel materials
El-Halwagi elected Fellow of AIChE

Dr. Mahmoud El-Halwagi has been elected as a fellow of the American Institute of Chemical Engineers (AIChE). El-Halwagi said that AIChE is “The premier organization for chemical engineers, both in academia and in industry,” for which he has been an active member for nearly three decades, presenting papers on a consistent basis at both the spring and annual meetings and having chaired numerous sessions. He has served as division chair of computing and systems technology (CAST) and participated in committees for energy initiatives and international programs. “I have enjoyed every bit of the collaboration and participation with AIChE. It is an organization that is very close to my heart,” said El-Halwagi, who also serves as faculty advisor for the local AIChE student chapter.

Balbuena awarded DOE grant

Dr. Perla Balbuena has been awarded $990,000 from the Department of Energy. Balbuena will lead a project to research design improvements and optimization of lithium-sulfur (Li/S) batteries in their application as plug-in electric vehicles (PEV) batteries. Her research will explore a phenomenon called the “internal shuttle effect” within the Li/S battery and evaluate a multitude of other impacts to the battery’s chemistry. Her research project is one of 19 sponsored by President Obama’s EV Everywhere Grand Challenge that seeks to equalize affordability and convenience in PEVs for consumers, in comparison to current gasoline-powered vehicles. “Our faculty members are consistently at the forefront of emerging technologies and cutting-edge research,” said John Sharp, chancellor of The Texas A&M University System.

Ugaz named C.D. Holland ‘53 Professor

Dr. M. Katherine Banks, vice chancellor and dean of engineering, appointed Dr. Victor Ugaz holder of the Charles D. Holland ’53 Professorship. “I am incredibly honored to receive this,” said Ugaz. His research focuses on harnessing the unique characteristics of transport and flow at the microscale to enable new chemical and biochemical analysis technologies.

New faculty

Joined the department in 2014

- Dr. Yossef Elabd
- Dr. Micah Green (Far Left)
- Dr. M. M. Faruque Hasan (Second from Left)
- Dr. Chad Mashuga (Third from Left)
- Dr. Christin Wilson
Jayaraman receives AFS award

Dr. Arul Jayaraman received the 2014 Texas A&M University Association of Former Students Distinguished Achievement Award. The university-level Distinguished Achievement Awards were first presented in 1955 and have since been awarded to 978 professionals (including this year’s recipients) who have exhibited the highest standards of excellence at Texas A&M. Jayaraman said one of his best practices is to keep his eyes and mind alert in adapting to students’ needs. “As a teacher, I have learned to watch out for “clues” on how the class is comprehending a specific topic or if a student is struggling on a particular problem. This has enabled me to become better at communicating material to the class.”

Nine faculty support new TEES Gas & Fuels Research Center

The Texas A&M Engineering Experiment Station (TEES) has established a Gas and Fuels Research Center (GFRC): a multidisciplinary research center involving 19 professors from Texas A&M’s main campus in College Station and the Qatar campus, that represents different engineering programs. Nine department faculty are involved in this initiative. In addition to Dr. Mahmoud El-Halwagi, managing director, other members include: Dr. M. Nazmul Karim, Dr. M. Sam Mannan, Dr. Kenneth Hall, Dr. Perla Balbuena, Dr. M. M. Faruque Hasan, Dr. Dragomir Bukur, Dr. Mark Holtzapple and Dr. Benjamin Wilhite. The center’s key objective is to lead the integrated research activities and the resources of Texas A&M to support shale gas and natural gas exploration, production and monetization activities both in the United States and in Qatar.

Agrawal named TIAS Faculty Fellow, chemical engineering

Dr. Rakesh Agrawal has been named a Faculty Fellow for chemical engineering, by the Texas A&M University Institute of Advanced Study (TIAS). Agrawal is the Winthrop E. Stone Professor of Chemical Engineering at Purdue University and is a recipient of the National Medal of Technology and Innovation, the U.S. government’s highest honor in those fields. He is a member of the National Academy of Engineering and has conducted extensive research regarding solar energy production issues, including how to fabricate low-cost solar cells based on nanotechnology. Considered a master inventor, more than 100 manufacturing plants with investments of billions of dollars incorporate his inventions, repositioning parts of the U.S. manufacturing sector for worldwide competitiveness.

New Faculty: World Scholars

Dr. Christodoulos Floudas (L) Dr. Stratos Pistikopoulos (R)
Faculty News

Floudas: 2014 Thomson Reuters Highly Cited Researcher

Dr. Christodoulos Floudas was selected as a 2014 Thomson Reuters Highly Cited Researchers for the period of 2002-2012. “[Thomson Reuters] introduced very stringent selection criteria which resulted in only 3,200 researchers across all disciplines,” said Floudas. “I feel honored and humbled by this selection, especially since the selected list has less than 30 researchers from chemical engineering worldwide. As a point of reference, in the list there are 27 faculty members from Princeton University, 13 faculty members from Texas A&M University, 12 faculty members from the University of Texas at Austin, four faculty members from the University of Houston, and 14 faculty members from Rice University.” Floudas is a member of the National Academy of Engineering.

Pistikopoulos Receives Honorary Doctorate

Dr. Stratos Pistikopoulos received the title of “Doctor Honoris Causa” from the University Politehnica of Bucharest.

New Video Series for Incoming Students

A series of department videos describing the academic experience of studying chemical engineering at Texas A&M will be available this fall. The video series will assist incoming students in their decision to declare a major. Topics include an in-depth look at the field, the curriculum and the careers available in the field—from industry to academia and everything in between.

Visit the department’s YouTube account via the channel: tamuchemicaleng
International Interns: Future Graduate Students?

International students from countries near and far interned in the department for a summer of study and research that concluded with a presentation of related accomplishments and for some, plans to return for graduate school.

“This international internship program focuses on recruitment of top students from some very well-known universities in the world, e.g. IIT Kanpur (India),” said Dr. M. Nazmul Karim. “The goal is to showcase our research projects in the cutting edge technologies, with the hope that these students will gain very positive interactions with their faculty mentors and would apply to our Ph.D. program in due course.”

Chemical Engineering Research Team Wins 2014 Odebrecht Award

A chemical engineering research team from Texas A&M placed first in the 2014 Odebrecht Award for Sustainable Development competition, receiving a check for $40,000. The project titled, “Production of Gasoline from Municipal Solid Waste by Carboxylate Fermentation” was led by Samarpita Roy, Victoria Ehlinger, Jeremy Seidel and Dr. Mark Holtzapple, advising professor.

“Three years of intense research and data collection established the outcomes of this particular project,” said Holtzapple, who has studied the waste-to-fuel field since 1978. “The technology produced in this project yields a low-capital solution that is versatile, robust and highly profitable. We plan to continue this line of research indefinitely. It is a rich subject area that has many opportunities for continued innovation. Eventually, when chemical markets are saturated, we will make gasoline.”

“It is a great honor to receive this award,” said Dr. M. Nazmul Karim.
The Craig C. Brown Outstanding Senior Engineer Award

The Craig C. Brown Outstanding Senior Engineer Award, the most prestigious honor bestowed on a graduating senior in the Dwight Look College of Engineering, was awarded to five undergraduate students—three of whom were from the Artie McFerrin Department of Chemical Engineering. The department recipients include: Laura Bolling, of Sugar Land, Texas; Lauren Lauher of El Paso, Texas; and David Quiroz of Houston. The award is based on outstanding scholastic achievement, leadership and character. This year’s recipients will each receive a $5,000 educational grant and cast medallion. Their names will also be added to the program’s recognition plaque.

Rob Bush, who graduated in August with a B.S. in chemical engineering, said of his student experience abroad, “I really felt like I was experiencing life through the eyes of a Chinese citizen.”

Thomas Fuller (left) is a sophomore and the recipient of the AIChE 2014 Donald F. & Mildred Topp Othmer Scholarship Award. The cash prize is $1,000. The award was presented at the annual AIChE meeting in November in Atlanta.
The new student officers of ChEGSA, from the back row, left to right: Sagar Lonkar, Martin Gomez Osorio, Pranav Kannan, Touseef Habib and Jose Leonardo Gomez-Ballesteros; front row, left to right: Yanpu Zhang, Susmitha Purnima Kotu, Monica Hwang, Dariya Reid and Elva Lorena Lugo (President).

Dr. M. Sam Mannan received the “2014 ChEGSA Service Award”

The award is bestowed to the faculty member who has contributed the most to ChEGSA’s success during the previous year.
Current statistics indicate over 900 mobile apps are created daily. Aashish Priye, a Ph.D. student studying chemical engineering at Texas A&M, and Nan Shi, who earned his Ph.D. in chemical engineering from Texas A&M, have created apps that are more than just statistics.

Priye’s app, “PCR To Go,” uses fluorescence analysis to photocopy DNA using the existing technology of a smartphone’s camera and optics. Shi’s app, “Brownian Dynamics,” offers a behind-the-scenes approach to learning in an interactive physics engine that can be used by teachers, researchers and science-minded youth.

“PCR To Go” is a free, portable solution that optimizes the tracking of data during convective flow polymerase chain reaction (PCR), the cycles of heating and cooling required in duplicating DNA—an important and common process in molecular biology.

Traditionally, large equipment and patience is often needed for photocopying DNA, but Priye asked, “Why not do this with something we have with us in our daily life?”

Since smart phone cameras often have a CMOS sensor, light can be detected as it enters the camera’s lens. “Normally, we don’t care about this, we just take pictures,” said Priye. “It’s a point-and-shoot kind of camera. But we can transform this handheld device into lab equipment.” Using inexpensive, clip-on microscopic lenses, the camera is outfitted to take images on a timer; the algorithms embedded in the app translate the data.

Over a period of six to seven months, Priye devoted his focus to preparing and publishing “PCR To Go,” which is currently available in the iPhone market with plans for an Android app in the future.

“Brownian Dynamics” uses technology similar to the highly popular app, “Angry Birds.” A video demonstration can be seen here.

“This is for education,” Shi said. “The major point I want to convey through this app, especially for the undergrads [is to discover] that math is cool and programming is cool because they can use this app to do cool things.

“Research should not be isolated to collegiate academia but can also have educational functions to high school kids and even younger kids.”

The app is newly released, having previously been in production for close to one year. The second edition of the app is also underway, utilizing newer iPad hardware.

Priye and Shi have performed research with Dr. Victor Ugaz.
Dr. Hung-Jen Wu connects industrial processes of membrane separation and molecular sieve technology to identify a new biomarker for iron regulator-related diseases and cancer. The biomarker is named hepcidin.

In his research alongside other colleagues, Wu captures small proteins and peptides from complex bodily fluids with well-engineered nanopores before evaluating them in a mass spectrometer for study and identification. Using a sieve, the target molecule (hepcidin) is separated from bodily fluids such as blood and urine, to better detect the target in the mass spectrometer.

Essential to the process is the development of the nanopore, which is a “very simple and stable fabrication by self-assembly of surfactants,” Wu said, that is based heavily in chemical engineering principles.

“We look at one hormone, hepcidin, which is an iron regulator that is associated with anemia, inflammation and even early-cancer detection, among many other different diseases. If you combine with other biomarkers, even greater [number of] diseases can be discovered,” said Wu.

The feature article, “Nanopore Film Based Enrichment and Quantification of Low Abundance Hepcidin from Human Bodily Fluids,” was published in the July 2014 edition of Nanomedicine: Nanotechnology, Biology, and Medicine, volume 10 (number 5), pages 879-888.

A new research grant for the discovery of tuberculosis biomarkers was awarded in July 2014. Wu will advance his research in collaboration with Dr. Victor Ugaz as well as Dr. Jeffrey Cirillo, professor in the Texas A&M Health Science Center and director of the Center for Airborne Pathogen Research and Tuberculosis Imaging.

(Below) Model of sieve separating the target molecule from compounds found in complex bodily fluids.
In the microelectronics world, the military and private sectors alike need solutions to technological challenges. Dr. Mustafa Akbulut and two students are leading a project funded by DARPA to create thermal interface materials (TIMs) that have a superior ability to transfer heat and a strong capacity to keep cool.

In evaluating a central processing unit, as an example, there are many pieces that individually need temperature management.

“As you get smaller and smaller, there is higher heat dissipation per unit area,” Akbulut said. “Locally, you have higher temperatures...you have a harder time operationally—you need better thermal interface materials. This is especially important for radars, laser systems and also for military electronics.”

Essentially and most critically, the device needs the ability to avoid overheating.

“Unless you cool it, it fails,” he said.

In evaluating an electronic device and a cooling system that need to be placed together as they function, if there is an absence of thermal material in between, the heat created by the electronic device can potentially erode the device. According to Akbulut, non-soft materials are considered less effective as a TIM because they do not adequately cover all interior openings or gaps, even though the naked eye may not detect this space.

“If you look at the very fine scale, [these two pieces] are not smooth,” Akbulut said. “If you look at these with an electron microscope, you see they are like mountains. If you bring these surfaces together, they do not have perfect contact. Thus, the objective of a traditional TIM is not fully met.”

Soft materials, including paste, often minimize the gap, said Akbulut. The invention of his new metal-based, soft material leads to high thermal conductive activity and because of its malleable nature, consistent contact is achieved. His research group has recently developed TIMs with thermal conductivities greater than 100 W/m-k and elastic modulus values in the order of 20 GPa, significantly advancing the current state of art for TIMs. As a comparison, this material is ten times softer than steel and three times more thermally conductive.

Using copper and nanomaterials together, Akbulut believes his new TIM can lead to greater optimization and large-scale implementation in the future.
Many people are familiar with the natural compound known as propane, used often as fuel, but less is discussed about propylene (or propene), with which propane is closely tied.

The central focus of the research team led by Dr. Hae-Kwon Jeong is an optimal isolation of propylene from propane, with the intention to produce only propylene. “There is a huge demand for propylene, but to separate these gas molecules takes a lot of energy,” said Jeong.

Propylene has many commercial purposes, including being a key compound in over two thirds of the world’s plastics. Intentional production of propylene in 2013 accounted for 12 percent of worldwide propylene production, compared to three percent in 2003, according to the IHS Chemical North American Propylene Supply Study. Furthermore, by 2023, the study finds that the amount of intentional global propylene production will grow from 90 million tons to 130 million tons.

In the production process, the gasses are converted into liquid and then distilled, utilizing the slightly different boiling points of propylene and propane. Then, the use of a membrane allows for the smaller propylene to be sieved (restricting the larger propane) in a metal-organic framework (MOF), said Jeong.

“This is the first report where we demonstrate that a very high selectivity and a very high flux of these gas molecules is possible,” said Jeong. “This is a simple technique that allows us to prepare high-quality, very-thin sieve MOF membranes in a potentially economic and scaleable manner.”

Jeong’s method of counter diffusion involves individual applications of metal ions and organic ligands (linkers that bond to the metal) to the support or film, as opposed to using a mixture to coat the film. The high metal ion concentration is inside the film while the ligands remain highly concentrated outside of the film and counter diffuse in different directions.

“This objective is to be able to make small, thin films in a rapid manner, but also to be able to make the grain boundary very intimate,” said Jeong.

This technique is not only more efficient, but also more environmentally friendly because less carbon-based fuels are required for distillation. “Up to 80 percent of energy costs go just to separating chemicals, often using conventional distillation,” said Jeong.

Jeong said that if the industry can replace some of the highly intensive energy processes with simple sieving techniques, great progress could be made.

“Opportunities of this research are tremendous. We are getting interest from industry and plan to continue the research,” said Jeong.
For the past two years, Dr. Katy Kao has studied a type of yeast known as *Candida glabrata*, with the objective of fundamentally understanding this “robust, opportunistic human pathogen,” said Kao.

*C. glabrata*, an organism found naturally on the skin and in the GI tract, has been used industrially since the 1990s by a company in Japan, to produce pyruvic acid. This strain of yeast is more closely related to baker’s yeast than *Candida albicans*, the major opportunistic human fungal pathogen.

In comparison, *C. albicans* has received more attention in terms of medical intervention and research focus, and this has impacted the presence and population of *glabrata* in dramatic ways. “Because *C. glabrata* is less effected by some common therapeautic treatments against *C. albicans*, *C. glabrata* is more frequently isolated in fungal infections, and this is why it is emerging,” explained Kao.

When asked if she intends to develop *glabrata* research for commercial purposes, Kao said, “I am not sure I would be comfortable using [*C. glabrata*] as an industrial producer. There’s so much more to know about the potential consequences of using it.” What Kao does know is that *glabrata* has an inherently higher tolerance for heat, acid and some alcohols, among other stressors.

From an academic perspective, Kao considers ways to engineer *glabrata* mutants in order to better understand them.

“The maximum level of robustness that we can achieve in one organism is going to be limited by its genome code. The more important a pathogen, the more effort will go into characterizing it. There have been fewer groups studying this organism. It is less characterized than *albicans* or baker’s yeast,” said Kao.

Ph.D. student Mian Huang will present the latest research on *Candida glabrata* at the annual AIChE meeting in November 2014, in Atlanta. Kao works closely with her research group on these studies and is collaborating with Dr. Arul Jayaraman on gaining a deeper understanding on the adaptation of this organism.
“By pursuing the master’s in safety engineering degree, I’ve gained valuable technical knowledge through academia while being able to practice in the workplace,” said Ryan Morton who graduated from the new distance learning program.

Realizing that my courses were covering the same content and challenges faced at work, I quickly gained confidence and credibility with how I approached problems and generated solutions. I learned philosophical aspects of engineering safety to be better equipped to influence organizations toward safer, engineered products and operations. This type of learning is difficult to find on the job. Another benefit I found was most companies have been interested in supporting this effort financially while working, making the argument to pursue very strong. For anyone who is interested, I suggest starting today and you’ll be done before you realize it.”

Morton is the first student to receive this degree by distance learning. He works as a senior technical safety engineer with Anadarko Petroleum.
One hundred and fifty students, faculty and industry experts participated in the second annual 2014 BASF Graduate Student Symposium, hosted and organized by the department of chemical engineering and the department of chemistry, with 34 different research groups represented.

“The event offered attendees opportunities to strengthen relationships and to recruit graduate students,” said Dr. Patrick Harmon, industrial manager for BASF.

“In the pursuit of collaboration and research, Texas A&M University is high on our list.” said Dr. Robin Thiele, head of chemical and process engineering for BASF. “The strategic partnership is significant.”

The event included 10 oral presentations and 60 poster presentations, along with presentations from BASF. The inter-department collaboration, execution and engagement from judges lent to the success of the event, said participants. Cash prizes were given to each of the top three poster presenters ($500, $400, $300, respectively) and one-year research awards for each the top three oral presenters ($4,000, $3,000, $2,000, respectively).

Two chemical engineering students placed in the oral presenter category. Aashish Priye received first place; he is mentored by Dr. Victor Ugaz. Third place was awarded to Hyuk Kwon, who is mentored by Dr. Hae-Kwon Jeong.

Sixteen chemical engineering faculty were involved in the symposium and several chaired sessions, including: Dr. Perla Balbuena, Dr. Mustafa Akbulut and Dr. Benjamin Wilhite, who also served as the university and department contact for the event.

“The collaboration between BASF and our department in these symposiums can provide industrial insights into the problems that are investigated at an academic level.”

“The BASF symposium is a tremendous opportunity for graduate students to present their research to industrial leaders,” said Mohamed M. B. Noureldin, graduate research assistant. “BASF is to be commended on the time and effort needed to organize such an event. The fact that senior management at the company attends shows how much the company values research and innovation.”

On the research front, UNIQUE is the name of a new funding initiative of BASF that was announced in late spring that exists to enable and support BASF’s relationship with strategic universities around the world, for which Texas A&M is one of only six university partners in the U.S.
Dr. M. Sam Mannan (left) was appointed as guest professor at Tianjin University in China. Simultaneously, he was appointed as distinguished visiting professor by the Research Institute of Safety Engineering in China.

Eamonn Naughton (below) presents his keynote lecture at the 17th Annual International Symposium in October.

Record Attendance: 17th Annual International Symposium

The Mary Kay O'Connor Process Safety Center drew record attendance at its 17th Annual International Symposium: "Beyond Regulatory Compliance, Making Safety Second Nature," held in association with the Institution of Chemical Engineers (IChemE). The three keynote lecturers included Brian Salerno, director of the Bureau of Safety and Environmental Enforcement (BSEE); Eamonn Naughton, group head of risk, learning, and HSSE at BP; and Dwight Johnston, vice president of safety, environment, and social performance in Shell's Deepwater business unit.

More than 640 participants from industry and academia, including representatives from 31 countries, attended the symposium, which serves as the conduit for process safety research and networking.

In addition to the highlighted keynote addresses, nearly 100 presentations were given on various safety-related topics, including safety culture/operational discipline, risk analysis, process management for safety and inherent safety. The symposium also featured exhibits from over 38 companies that demonstrated products, technology and software related to process safety.

The next symposium is scheduled for October 27-29, 2015 in College Station, Texas. The call for papers is open with abstracts due March 13, 2015. For more information, call: 979.845.5981 or 979.845.6884.
We would like to recognize and thank all the members of the Artie McFerrin Department of Chemical Engineering’s Industrial Advisory Board. Their leadership and vision continue to make the department one of the best programs in the country.

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