

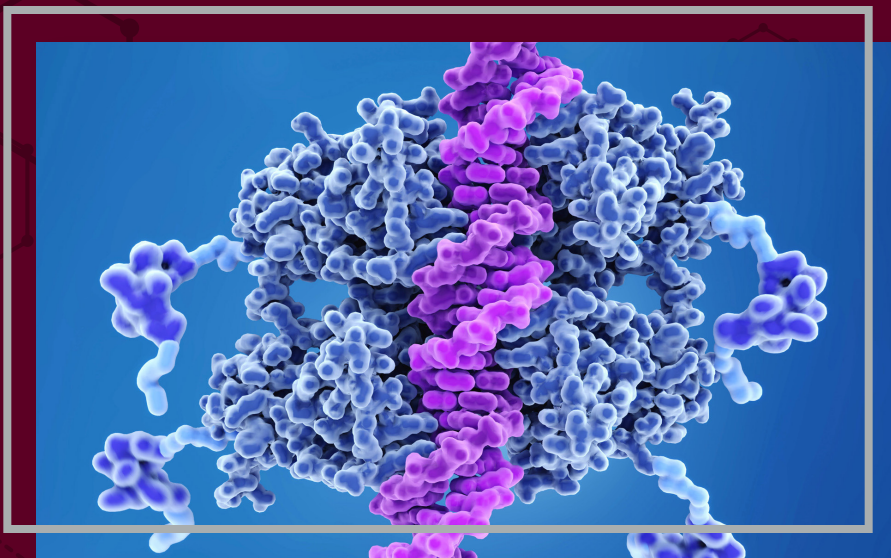


TEXAS A&M UNIVERSITY

Artie McFerrin Department of
Chemical Engineering

FALL 2026

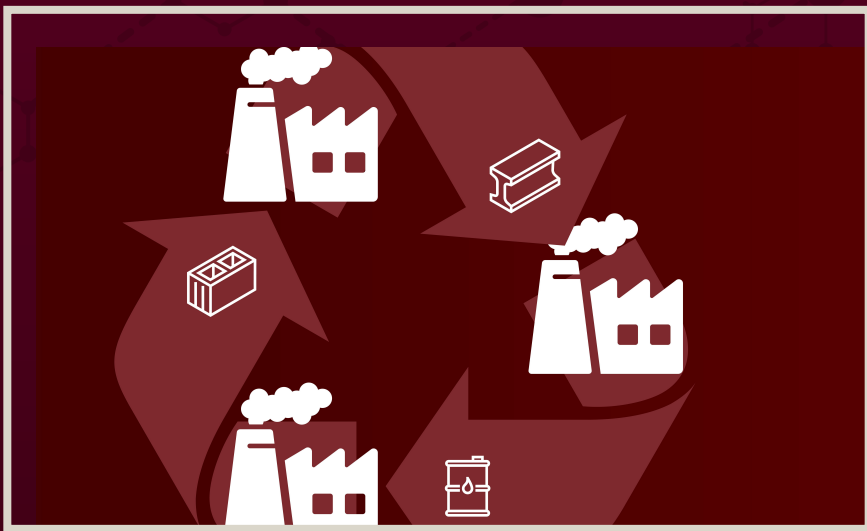
CHEMICAL ENGINEERING



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Letter from **the Department Head**

Dear fellow chemical engineering community members,

Howdy! I am thrilled to share the Spring 2026 newsletter from the Artie McFerrin Department of Chemical Engineering. Our faculty, students and alumni are making incredible strides, and I want to share a glimpse of the exciting work happening in our department.

Our researchers are solving some of the world's toughest challenges. Dr. Gregory Reeves and his team are decoding gene regulation to help prevent complex diseases like cancer. To combat severe droughts, Dr. Mustafa Akbulut's group has developed a method for creating highly water-repellent sand. Drs. Abdoulaye Djire and Perla Balbuena are using renewable resources to produce carbon-free ammonia, making agriculture more sustainable. Additionally, Dr. Mahmoud El-Halwagi and graduate student Meshal Aldawsari are developing smart systems to recycle emissions and hydrocarbon waste into valuable products.

Our faculty continue to earn recognition for their leadership and innovation. The Welch Foundation featured Dr. Jodie Lutkenhaus for her collaborative work on organic batteries and sensors. I am deeply honored to receive the American Society of Mechanical Engineers (ASME) Ayyub-Wiechel Risk Analysis Award for my contributions to safety engineering. We are also incredibly proud that Dr. Djire was named a 2026 Sloan Research Fellow, marking him as a top emerging scientific leader. Furthermore, Dr. Jeetain Mittal was elected to the American Institute For Medical and Biological Engineering (AMBE) College of Fellows for his computational research on biological systems.

Our students shine just as brightly inside and outside the classroom. Ashfaq Iftakher won the 2026 Texas A&M Distinguished Dissertation Award for combining machine learning with cleaner chemical manufacturing. Our Chem-E-Car team took third place at regionals with Maroon Pearl, a car perfectly powered and braked by a homemade aluminum-air battery and an iodine clock reaction. Graduate student Edwin Ochedikwu was also selected as a 2026-27 TEX-E fellow to help turn brilliant climate-tech ideas into real-world business solutions.

Finally, we remain deeply thankful to our generous alumni for paving the way for future engineers. Doug '78 and Donnice White funded vital Unit Operations Lab upgrades and created a scholarship for first-generation college students. Jim '70 and Maggie Fugitt also established an endowed scholarship, ensuring that future students can focus entirely on their rigorous coursework without financial worry.

Thank you to everyone who makes our department such a wonderful place to learn, research and grow. I cannot wait to see what we achieve together next!

Warm regards,

A fellow community member

Faisal Khan

Department Head, Professor, Chemical Engineering

Mike O'Connor Chair II

Director, MKO Process Safety Center

Director, Ocean Energy Safety Institute

Affiliated Faculty, Industrial & Systems Engineering, Multidisciplinary Engineering, Ocean Engineering and Petroleum Engineering

BY THE NUMBERS

RANKINGS (U.S. NEWS & WORLD REPORT, PUBLIC)

#13

UNDERGRADUATE (2026)

#14

GRADUATE (2026)

ENROLLMENT (Fall 2025)

745

UNDERGRADUATE

131

MASTER'S

180

DOCTORAL

DEGREES AWARDED

Degrees Awarded (Fall 2024, Spring 2025, Summer 2025)

184

BACHELOR'S

69

MASTER'S

21

DOCTORAL

FACULTY

6

ENDOWED
PROFESSORSHIPS

8

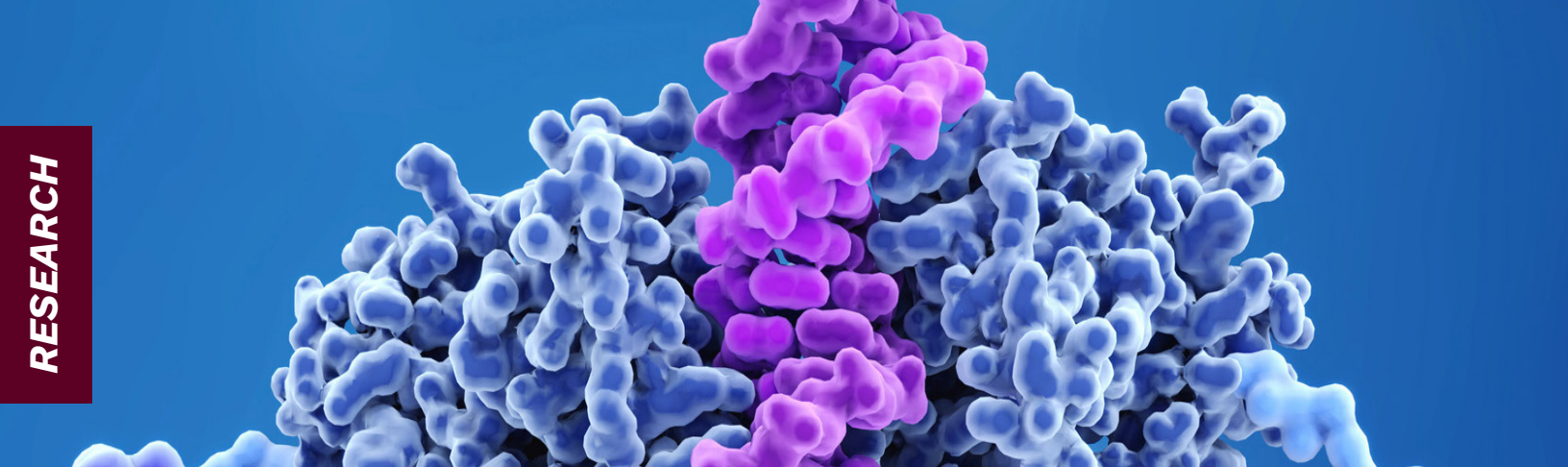
CHAIR
HOLDERS

8

ENDOWED FACULTY
FELLOWS

RESEARCH AREAS

- Biomedicine and Biomolecules
- Catalysis and Reaction
- Energy
- Sustainability
- Materials and Nanotechnology
- Process Systems
- Process Safety



REDUCING DISEASE *THROUGH GENE MANIPULATION*

To further the quantitative understanding of cellular decision making, Dr. Gregory Reeves and his team in the chemical engineering department have worked to interpret how a transcription factor dictates the alteration of gene expression in cells.

The team's work, recently published in *Science Advances*, focuses on a protein called Dorsal, which is a version of nuclear factor- κ B (NF- κ B) — a crucial transcription factor controlling cellular processes and decision making while regulating cell immunity and development.

"NF- κ B is involved in several medically relevant cellular behaviors, such as inflammation, innate immunity and wound healing," Reeves said. "This level of understanding could lead to the ability to control these cellular processes ourselves, because mistakes in NF- κ B activity can lead to disease states, such as cancer."

NF- κ B has various states inside the cell's nucleus. It has the potential to bind with DNA, clump together and be active or inactive. Reeves' team has shown that gene regulation is happening at this level.

"We can distinguish between the molecules that are moving slowly versus those that are moving quickly, as well as those not moving at all," Reeves said. "We can do this using a fluctuation spectroscopy method that shows us how much Dorsal is moving around."

The goal is to create a map that relates how much Dorsal is in the nucleus to how much of it is bound to DNA. Understanding this map of how Dorsal binds to DNA leads to a predictive level of understanding and can reveal how to manipulate this pathway for therapeutic purposes.

In using special imaging techniques to identify the different states of Dorsal in the cell, the team was able to obtain mathematical models that reflect an accurate picture of how much Dorsal binds to the DNA, as well as the amount of Dorsal clumped together.

In previous studies, Reeves' team was only taking snapshots with their imaging technique. They decided to view cells for a longer duration.

The work encompasses multiple length and time scales, allowing them to obtain a nucleus-wide view of the mechanism connecting Dorsal to DNA.

"When we looked at how much Dorsal is freely moving around, it seemed to be independent of how much was in the nucleus," Reeves said. "This map would reveal the free amount of Dorsal in the nucleus. Once we create it, others would be free to use it so they can advance their understanding of gene regulation."

The relationship between how much NF- κ B is in the nucleus versus how much of it does its job on DNA becomes straightforward when applying these methods. This allowed Reeves and the team to evaluate different parts of the embryos.

The team found that the amount of NF- κ B that is free to move around is constant in different parts of the embryo. The amount bound to DNA, however, is not constant. This means the relationship between the two is not linear.

"With this knowledge of how Dorsal is interacting with the DNA, we have a better understanding of how much we would need to activate the NF- κ B pathway, if we needed to intervene for therapeutic purposes," Reeves said.

REIMAGINING SAND: A NEW TOOL AGAINST DROUGHT

The Anasazi, a once-flourishing tribe in the American Southwest, lived on bounties of corn, squash and beans. In 1276 A.D., however, a long, unforgiving drought made agriculture untenable, forcing them to migrate away from their settlements. Droughts, even the catastrophic ones, are not figments of the past. With changing weather patterns, droughts are predicted to become more frequent and intense, thereby exacerbating their impact on global agricultural systems.

To support this effort, researchers at Texas A&M University have developed an innovative solution by chemically modifying sand into a highly hydrophobic material. When injected into soil just below the roots, the modified sand forms a hydrophobic layer that prevents the soil from draining quickly.

"In recent years, drought has become a bigger concern, particularly in southern states like Texas, where temperatures soar in the summer months," said Dr. Mustafa Akbulut, professor in the Artie McFerrin Department of Chemical Engineering. "One of the most important uses of water is irrigation, so we need clever management strategies to enhance water use efficiency. Our current research investigates the application of modified sand in enhancing water retention in dry soils."

The details of the study can be found in ACS Omega.

According to the United Nations for Disaster and Risk Reduction, the number and duration of droughts have risen by 29% since 2000. Although sophisticated irrigation methods are available today, droughts can impose heavy strains on irrigation water availability. Rising temperatures exacerbate droughts through increased evaporation, which dries out soil and water sources. In these conditions, improving the water-holding capabilities of soils, particularly those that are porous, becomes necessary.

In their research, Texas A&M engineers modified the surface chemistry of sand. To create hydrophobic soil, they exploited the natural surface chemistry of

silica, soil's fundamental building block. Particles of silica are abundantly studded with hydroxyl groups that are highly reactive sites. By chemically binding the hydroxyl groups on silica with compounds called organosilane, the researchers created a modified, hydrophobic sand.

"We only changed the surface chemistry of sand by using an extremely tiny layer, less than two nanometers," said Akbulut. "For context, our hair is around 10 micrometers, so a thousand times thinner than our hair."

They reasoned that a layer of this hydrophobic sand placed below regular topsoil will prevent water from draining quickly, allowing the soil to retain moisture for longer durations. To test their hypothesis, the researchers tried to mimic typical agricultural conditions for growing tomato plants. In plastic cups, they filled the lower layers with normal sand and the top layers with dry soil. In some cups, they included modified sand at the very bottom. Tomato seeds were then sown in each cup. The researchers irrigated each sample daily and collected drained water from each to measure water retention and the impact of hydrophobic sand on plant growth.

Upon analysis, they found samples with hydrophobic soil had less drainage of irrigation water compared to controls. They observed a direct positive correlation between the enhanced water retention caused by hydrophobic sand and the growth of tomato seedlings. Specifically, seedlings cultivated with the hydrophobic sand bed exhibited approximately twice the growth stature compared with those grown in unmodified soil.

"With our method, we envision using an injection system to modify a two-to-three-inch-thick layer of soil just below the root level," said Akbulut. "By targeting the sub-root layer, we can enhance water retention while minimizing changes to the soil chemistry in the root zone. Our modified sand is chemically stable, and the injection technology, when developed, will be minimally invasive."

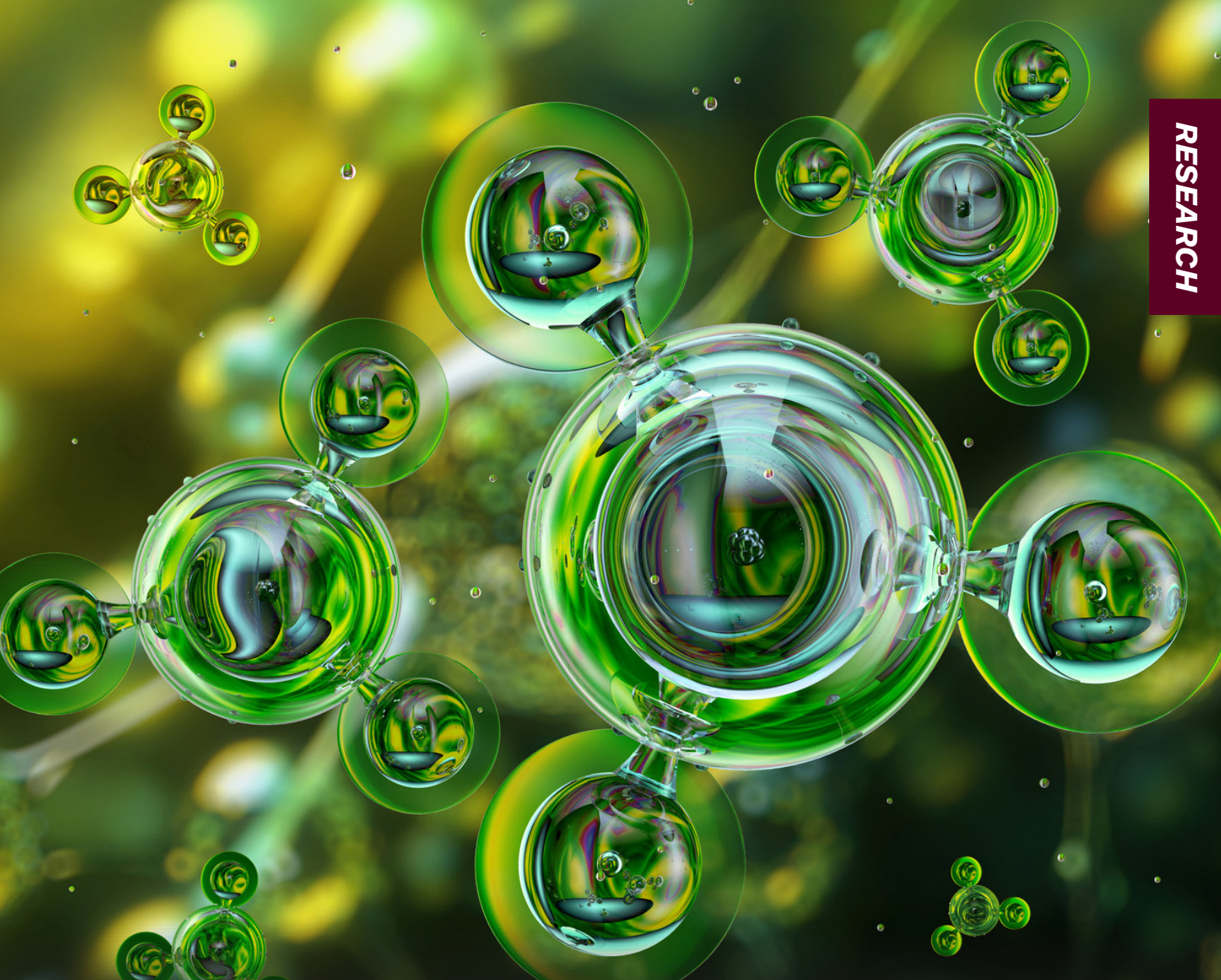
The need for this kind of technology will be most useful for porous soils, like sandy soils that require frequent irrigation and fertilization due to poor nutrient and water retention.

Other contributors to this research include Yashwanth Arcot, Ramya Srinivas and Minchen Mu from the chemical engineering department and Drs. Mahshad Maghousi and Luis Cisneros-Zevallos, both in the Department of Horticultural

Sciences at the Texas A&M College of Agriculture and Life Sciences. Cisneros-Zevallos also holds appointments with Texas A&M AgriLife Research and the Institute for Advancing Health Through Agriculture.

This work was partly funded by the U.S. Department of Agriculture (USDA) and by the USDA National Institute of Food and Agriculture through the Specialty Crop Research Initiative.



An abstract, artistic representation of a molecular structure. It features several large, translucent green spheres of varying sizes, some of which are interconnected by thin, metallic-looking rods. Inside these green spheres, there are smaller, more complex structures in shades of blue and green, suggesting a nested or multi-layered molecular model. The background is a soft, out-of-focus green with bokeh light effects, giving the impression of a microscopic or natural environment.

TRANSFORMING AMMONIA

FOR FOOD SECURITY AND ECONOMIC GROWTH

With a new electrochemical synthesis via an electrochemical nitrogen reduction reaction (NRR), achieving carbon-free ammonia production is closer to reality through work from Drs. Abdoulaye Djire and Perla Balbuena, chemical engineering professors at Texas A&M University, and graduate students David Kumar and Hao En Lai.

A topic outlined in their recent paper published in the *Journal of the American Chemical Society* (JACS) introduces NRR, which produces ammonia in a cleaner and simpler way by using renewable electricity.

The research branches off of the team's previous work, where they looked further into enabling two-dimensional materials in renewable energy.

"The current process of making ammonia is energy intensive and emits a lot of carbon dioxide, so if you can make ammonia electrochemically, then you can avoid these two negative effects," Djire said. "During the electrochemical NRR process, water provides the hydrogen atoms, which combine with nitrogen from the air to form ammonia, all powered by electricity."

Because nitrogen gas contains a strong triple bond, it is very difficult to convert it directly into ammonia. According to the team, it is necessary to introduce a catalyst that attracts nitrogen from the liquid environment and provides enough energy to weaken and break that triple bond.

"This process doesn't rely on coal or natural gas to produce hydrogen," Kumar said. "Instead, we use earth-abundant resources like water and atmospheric nitrogen. This is essential for building a sustainable future, especially for food production."

To get around this, the team used a two-dimensional titanium nitride called MNene that already contains nitrogen atoms within its crystal structure. During the reaction, some of these built-in nitrogen atoms are converted into ammonia, leaving tiny vacancies in the material.

Nitrogen gas from the air can then refill those vacancies, allowing the process to repeat, a mechanism the team has labeled "Lattice Nitrogen Mediated Ammonia Synthesis."

"Most catalysts struggle to activate nitrogen because the triple bond is extremely hard to break," Djire said. "Once a vacancy forms, it becomes an energetic hot spot, and when nitrogen gas from the air arrives, it naturally binds to that site. This binding weakens the nitrogen triple bond and eventually breaks it and allows the reaction to move forward."

The key was designing the MNene so that the bond between titanium and nitrogen is just right, strong enough to keep the material stable, but not so strong that lattice nitrogen can never be released as ammonia.

With these strategic designs, the team was able to synthesize and create the material that satisfied this requirement. Using spectroelectrochemistry, a technique that couples voltage-controlled reactions with real-time spectroscopic tools, they identified exactly where nitrogen reduction occurs.

The experimental work was complemented by first-principles theoretical calculations, performed by Balbuena and Lai, that provide mechanistic insights and details about the atomistic motion, bond breaking and forming, leading to surface and species evolution.

Atomistic simulations based on laws of nature demonstrated vacancy formation, molecular nitrogen binding to the surface, breaking of the nitrogen triple bond, and other reaction events that helped interpret the experimental outcomes and develop a clear understanding of the catalytic reaction.

"Our initial molecular dynamics simulations revealed a critical requirement at the MNene material's edge sites," Lai said. "We found that for the cycle to work, the nitrogen gas molecule must partially embed into the lattice vacancy. This specific configuration creates the necessary instability to weaken the strong nitrogen-nitrogen bond. If the nitrogen molecule embeds fully, it becomes trapped and slows down the reaction cycle."

An important factor is the electrolyte, typically a liquid solution characterized by specific acidity levels.

"When such a solution is in contact with the surface, depending on its chemistry, it can promote or impede the catalytic reaction," Balbuena said. "This effect is also complemented with the presence and strategic location of surface chemical groups."

These complexities were also captured with great fidelity using a combined experimental-theoretical approach.

One of the primary challenges in this field is that protons in the solution typically prefer to combine with each other to form hydrogen gas rather than reacting with nitrogen.

However, the team discovered that the lattice nitrogen on the MNene edges acts as a proton trap. The thermodynamics of the MNene material naturally favor the protonation of the lattice nitrogen over the hydrogen evolution reaction, which explains the high efficiency they observed experimentally.

"Our work challenges the traditional view that electrochemical reactions depend solely on the metal," Djire said. "We show that nonmetals, such as the nitrogen intrinsically built into our material, can also play an active role in electrochemical transformations."

A HYDROCARBON WASTE SOLUTION THROUGH A SYMBIOSIS NETWORK

Enabling collaboration to monetize emissions is becoming increasingly attainable as researchers explore enhancing integration within the industrial sector through work focused on Carbon-Hydrogen-Oxygen Symbiosis Networks (CHOSYN).

The primary emphasis of CHOSYN is to integrate industrial plants that utilize hydrocarbon processing, recently studied by Dr. Mahmoud M. El-Halwagi and graduate student Meshal Aldawsari in Texas A&M University's College of Engineering.

Their work, Resilience Assessment and Sustainability Enhancement of Gas and CO₂ Utilization via Carbon-Hydrogen-Oxygen Symbiosis Networks, dives deeper into converting emissions to value-added products through this network and was recently featured as the editors' choice in a special issue of the journal, Sustainability.

"This work is consistent with ongoing research activities in my group that regard various environmental problems as opportunities for converting waste materials to valuable products by using advanced chemical engineering and systems integration approaches," El-Halwagi said. "The CHOSYN concept was co-introduced by my former student, Dr. Mohamed Nouredin, about a decade ago".

This industrial network provides a link through units, which facilitate the exchange of carbon, hydrogen and oxygen-based materials for each to meet demands within the facility while also cutting waste.

Within the synergistic use of mass and energy resources, the network framework aims to maximize carbon utilization while minimizing emissions, cost and the number of processing steps within the industrial sector.

Nouredin believes the insights from CHOSYN can not only highlight opportunities but build networks

that utilize resources to best match the supply and demand.

"Society's most pressing challenges are linked through these basic atomic relationships. Where oxygen on CO₂ is an undesired part of the emissions problem, oxygen on H₂O is part of the solution to the world's need for fresh water," Nouredin said.

According to El-Halwagi, the CHOSYN framework will also lead to economic growth and job creation.

"It creates value-added products from waste streams discharged by hydrocarbon processing facilities," El-Halwagi said. "While each industrial facility may look at its waste as a burden, an intelligent integration of these waste materials can provide the feedstock to create valuable products."

The team observed challenges and opportunities within the industrial sector and looked for the most efficient way for facilities to trade off materials. What they found is that the more these plants depend on each other, the more vulnerable the system could be if one part fails.

"We need a resilient supply chain. When one part of the supply chain is affected, the impact can ripple and influence many other facets of life," Aldawsari said. "When a company designs a plant, it typically focuses on selecting a configuration that is profitable, environmentally responsible and safe, but resilience has to be part of that conversation, as well."

With that knowledge, the team introduced a flow dependency measure that quantifies how disruptions spread through the network and helped identify the most critical nodes. The results showed that even with the vulnerabilities and worst-case disruption scenarios, the CHOSYN designs can significantly boost carbon reuse and reduce the need for new raw materials.

"Since the symbiosis concept motivates several industrial facilities to collaborate, there is always concern about the reliability and resilience of these frameworks," El-Halwagi said. "It is necessary to safeguard against disruption, and if disruptions occur, they need to be resolved as quickly as possible."





Welch Foundation highlights impactful Texas A&M faculty member

Research by Dr. Jodie Lutkenhaus, chemical engineering professor at Texas A&M University, has been highlighted by The Welch Foundation in their 2025 annual report to showcase her studies in polymers.

Since 2021, her work has been supported by the foundation in a collaborative effort centered on creating more efficient organic batteries and sensors.

"The Welch Foundation has supported my group's research over the years in understanding the electrochemistry of polymers," Lutkenhaus said. "They support premier fundamental chemical research from some of the state's best minds. I am humbled and thrilled to be highlighted among them."

Based in Houston, the foundation is one of the nation's largest private funding sources for basic chemical research. They have contributed to the advancement of chemistry through research grants, departmental programs, endowed chairs and other special projects at educational institutions in Texas.

"By supporting investigators like Dr. Lutkenhaus, whose work deepens our basic understanding of chemical principles while training the next generation of scientists in Texas, we aim to strengthen the foundation on which future discoveries and applications are built," said Adam Kuspa, president of The Welch Foundation.

The Welch Foundation believes that Lutkenhaus' recent work demonstrates both scientific impact and a sustained commitment to advancing core chemical knowledge.

While the work emphasizes rigor and integration over flashiness, the combination of productivity, impact

and solid experimental strategy made Lutkenhaus a strong candidate for both support and visibility, according to the foundation.

"Dr. Lutkenhaus was selected for highlighting this year because her work exemplifies the kind of high-quality, curiosity-driven research that advances fundamental understanding while opening new directions for the field," said Kristin Roden Atmar, associate director of grant programs.

The specific research focuses on mixed ion-electron conduction in conjugated polymers, with an emphasis on redox-active polymers for low-temperature battery applications.

"Redox polymers are electrochemically active and can store charge, but they aren't as proficient at it as traditional metal-based batteries," Lutkenhaus said. "Our group is digging into how charge is stored and transferred in these materials to understand how to address the rate-limiting issues of using soft organic materials."

Although the desired outcome of chemical research may take a while to form in the general public, the foundation relies on investigators like Lutkenhaus to guide them toward the most important research to pursue.

"We believe that long-term scientific breakthroughs begin with sustained investment in fundamental research," Kuspa said. "Dr. Lutkenhaus has built a strong, productive research program with clear momentum, combining innovative conjugated polymer design with rigorous, multidisciplinary tools to probe redox behavior at a fundamental level."

Chemical engineering head earns risk analysis honor

Dr. Faisal Khan, head of the chemical engineering department at Texas A&M University, has received the Ayyub-Wiechel Risk Analysis Award. The distinction is presented annually by the American Society of Mechanical Engineers (ASME) as a way to honor significant contributions to risk, reliability and safety through research, teaching and leadership.

It was established in 2015 by the ASME Safety Engineering and Risk Analysis Division and ultimately developed into a society-level award, reflecting the growing importance of safety engineering.

"Receiving the Ayyub-Wiechel Risk Analysis Award is a deeply humbling honor," Khan said. "This recognition reflects the collective efforts and contributions of my students, colleagues and collaborators. It brings to mind our many long, critical discussions and late evenings spent developing and validating concepts and their applications."

With the award primarily connected to research and teaching, Khan believes it highlights the importance of continued attention to safety, strengthens opportunities for collaboration and helps inspire students and researchers to take on work that has a real and lasting impact on society.

In both research and the classroom, Khan emphasizes that engineering is not only about performance and efficiency, but also responsibility and ethics. His research is centered on improving safety and reliability in complex engineering systems and helping industry make better, safer decisions.

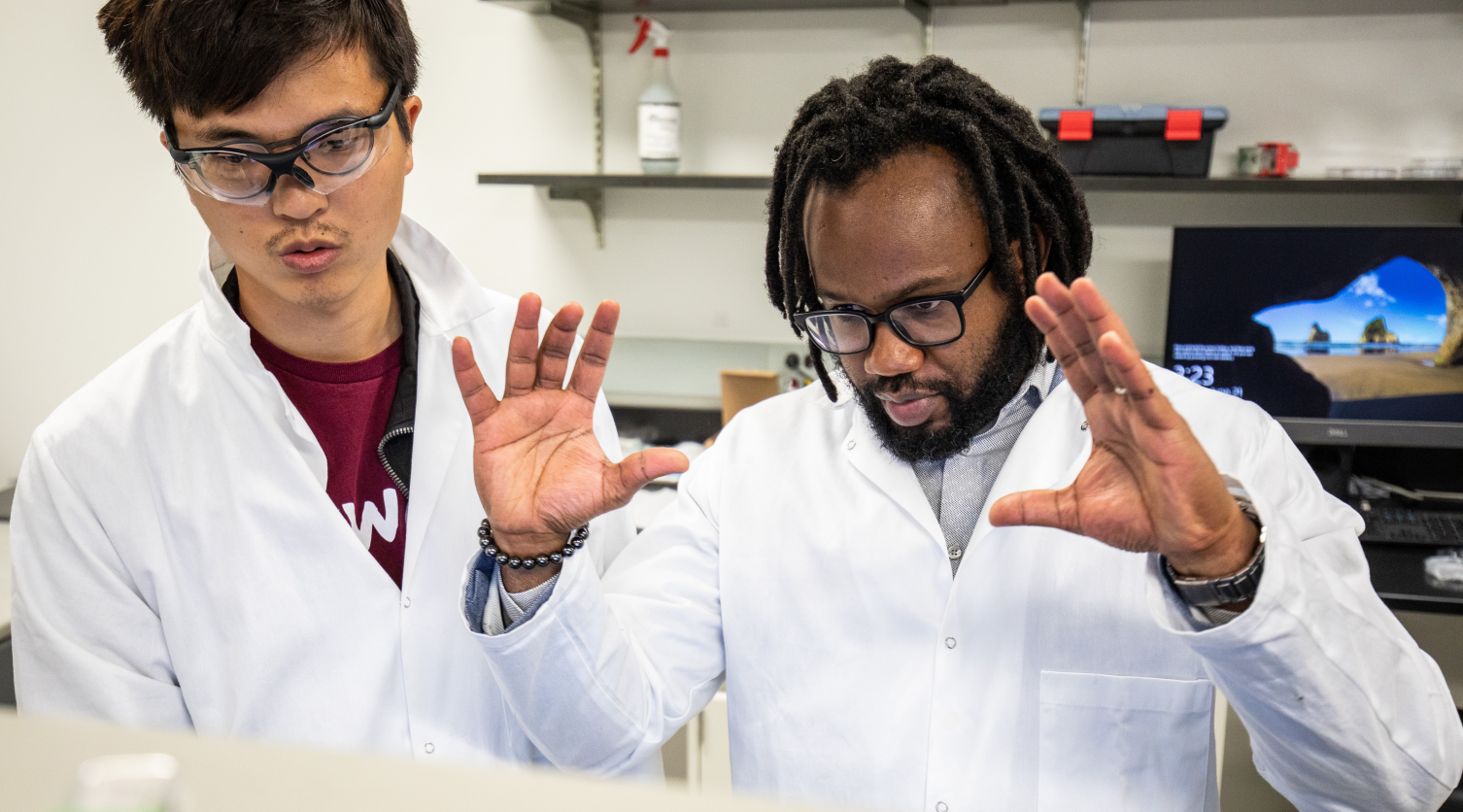
"My goal is not only to advance knowledge, but to help translate it into safer operations and better decisions," Khan said. "I remain focused on important challenges such as aging infrastructure, offshore safety, energy transition risks and the role of AI in safety management."

Khan hopes that by receiving the award he can inspire the next generation of engineers, as well as dedicate the honor to his students, whose contributions have been invaluable.

"More than anything, I hope this recognition helps encourage younger engineers and researchers to see safety engineering as a field where they can make a real and lasting difference," Khan said.

"Seeing my former students contribute across academia, industry and regulation is one of the most meaningful parts of my work."





Djire recognized among nation's top emerging scientific leaders

Dr. Abdoulaye Djire, chemical engineering professor at Texas A&M University, has been named a 2026 Sloan Research Fellow. The annual distinction represents the most promising scientific researchers working today. Their achievements and potential place them among the next generation of scientific leaders in the United States and Canada.

"Being selected for a Sloan Research Fellowship is deeply meaningful to me," Djire said. "The fellowship recognizes not only past accomplishments, but the originality and future potential for visionary research. It is especially rewarding because it affirms the risk I took in establishing multiple independent research directions."

The fellowship will support Djire's work in nitride MXenes and operando spectroelectrochemistry with \$75,000 over a two-year span.

He aims to establish new design principles for electrochemical synthesis and separations, with implications for sustainable chemical manufacturing and energy storage.

"We will expand the synthesis of new nitride MXenes and develop operando spectroelectrochemical tools to directly observe how nonmetal lattice atoms, such as nitrogen, actively participate in electrochemical transformations," Djire said. "It positions us to lead a new direction in materials electrochemistry."

According to Djire, the additional funding will enhance his research group's visibility and enable them to attract outstanding students, postdoctoral scholars and collaborators.

53 past fellows have gone on to receive Nobel Prizes. Others have shaped entire disciplines by becoming members of national academies and receiving major federal awards.

"The fellowship provides both validation and freedom," Djire said. "The flexible funding allows us to pursue ambitious, foundational questions that can redefine how we think about electrochemical materials."

Professors are nominated for the fellowship by senior faculty and evaluated by a panel of leading experts.

"Knowing that respected peers in the scientific community believe in the long-term trajectory of my work is particularly meaningful," Djire said.

Mittal joins prestigious biomedical engineering institute

The American Institute for Medical and Biological Engineering (AIMBE) has elected Dr. Jeetain Mittal, Texas A&M University professor in the Artie McFerrin Department of Chemical Engineering, as a 2026 member of its College of Fellows. Mittal was officially inducted at the organization's annual event in Washington, D.C. in April 2026.

Faculty members are nominated and peer-reviewed by leaders in the field, recognizing contributions to engineering and its impact on biology and medicine. Fellows represent the top two percent of the medical and biological engineering community, according to the institute.

Mittal also holds a joint appointment in the Department of Chemistry within the College of Arts and Sciences, where his work bridges disciplines and brings a molecular-level perspective to complex biological systems.

"It is a meaningful recognition from a broad interdisciplinary community," Mittal said. "I see it as validation of the direction of my work, especially efforts to connect fundamental molecular insights with biologically relevant outcomes. This recognition reflects the contributions of students, postdoctoral researchers and collaborators."

Mittal's research develops multiscale computational frameworks to understand how biomolecular

systems self-assemble, which aligns with AIMBE's focus on connecting engineering principles to biologically and medically relevant problems.

His work focuses on intrinsically disordered proteins and biomolecular condensates, which organize cellular processes and are increasingly linked to neurodegenerative disease. A central aim is to build predictive, mechanism-based connections between molecular interactions and emergent biological function.

Receiving this fellowship provides increased exposure for Mittal's work and creates opportunities to interact across disciplines.

"Dr. Mittal is profoundly deserving of this honor," said Dr. Faisal Khan, chemical engineering department head. "His career is defined by a legacy of transformative contributions, and this fellowship serves as a fitting tribute to his enduring impact. Our department is privileged to count a scholar of his caliber among our colleagues."

Mittal's recognition as an AIMBE Fellow highlights the importance of interdisciplinary research across the Artie McFerrin Department of Chemical Engineering and the Department of Chemistry in addressing complex challenges in health and disease.



Engineering student recognized for distinguished dissertation

Ashfaq Iftakher, a chemical engineering graduate student, has received the 2026 Texas A&M University Distinguished Dissertation Award in the mathematics, physical sciences and engineering category.

"This recognition reflects the guidance and environment in the Department of Chemical Engineering that made the work possible," Iftakher said. "I also hope this dissertation contributes, even in a small way, to advancing more sustainable approaches in chemical engineering. It is very rewarding to see work in this area receive this kind of recognition."

Iftakher was nominated by his faculty advisor and chemical engineering professor Dr. Faruque Hasan. His dissertation was then evaluated through a highly competitive, university-wide review process.

Iftakher's dissertation focused on the development of modeling and computational tools for computer-aided molecular and process design.

By combining machine learning to design chemicals and industrial processes more systematically, Iftakher looks to intersect optimization and process systems engineering. The research included methods relevant to areas such as refrigerant separation, recycling and broader low-carbon chemical manufacturing.

In building new computational frameworks, he hopes to apply them to important real-world problems in sustainable chemical engineering. His goal was to assess how to best identify these technologies that use less energy and reduce emissions.

"Ashfaq's dissertation reflects a thoughtful integration of optimization theory, machine learning and process systems engineering," Hasan said. "His work brings a combination of intellectual depth, originality and focused effort over the course of his Ph.D. I was fortunate to work with such a talented, dedicated and bright student."

The award will significantly enhance Iftakher's visibility through this research and several additional contributions in advancing computer-aided molecular and process design, Hasan said.

Iftakher hopes the distinction will translate to his future career as well as his upcoming opportunity as a postdoctoral researcher at the Massachusetts Institute of Technology.

"I think it will give visibility to my work and open doors for future collaborations as I continue to strive towards building an academic career," Iftakher said. "I see it as a personal milestone and a reflection of the research environment and people who helped me grow."



CHEMICAL ENGINEERING STUDENTS PLACE THIRD IN DESIGN CHALLENGE

Undergraduate students from Texas A&M University's Artie McFerrin Department of Chemical Engineering secured third place at the regional American Institute of Chemical Engineering Chem-E-Car Competition in March.

Hosted by the Southwest Student Regional Conference, the competition has teams design and build a small car powered by chemical reactions, competing in regional competitions and demonstrating precision, innovation and teamwork in one of the discipline's most rigorous student design challenges.

"We're very happy, because this stuff is just so finicky," said Lisette Torres '28. "One small thing going wrong can take down the whole car. The car moving in the first place was already exciting and receiving third was a relief from all the time we put into it."

The 10-team competition took place at Texas Tech University. The ultimate goal was to build a chemically-powered car that could move 26.3 meters. The team's car — Maroon Pearl — covered 13.3 meters, the third-best performance among all entries.

"Everything is chemical reactions," said Daniel Behringer '28, Chem-E-Car chair. "The propulsion reaction makes the motor spin, and the timing reaction tells the motor when to stop. For the timing reaction, we used an iodine clock reaction, where solution A mixed with solution B. At a certain point, it turned the solution color black. A photoresistor

installed in the car picked up the change in luminosity, so when the solution turned black, it cut power to the motor."

There were two rounds of the competition. In the first, the car did not move, triggering the team to rebuild the entire battery from scratch in a 20-minute period.

The battery uses an electrochemical reaction between aluminum and air to produce a voltage, turning aluminum into aluminum hydroxide while oxygen is reduced in the solution. By using 14 identical units, the team generated enough voltage to power the motor.

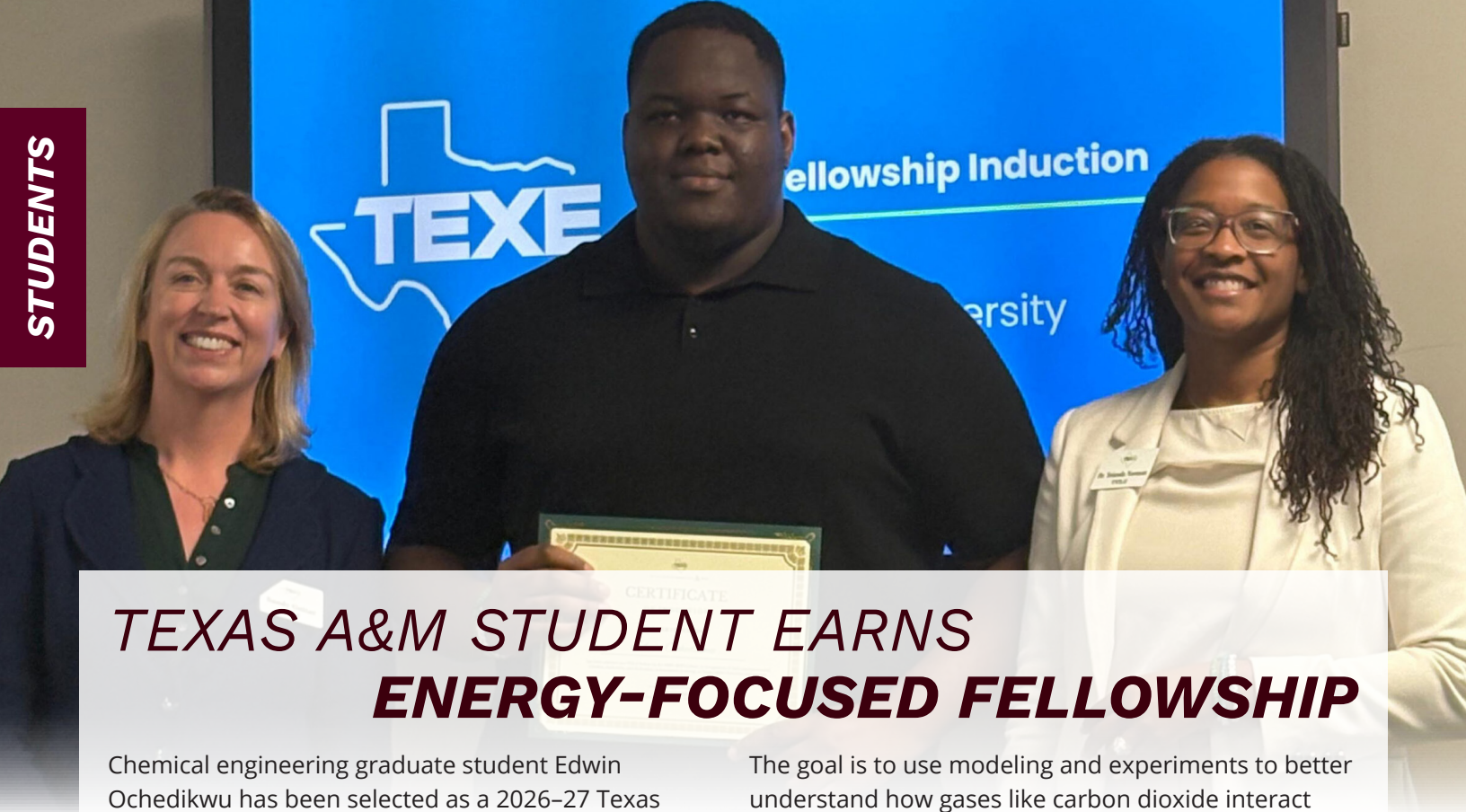
Eventually, the team ended up double-wrapping the paper towels, which is what made the car run on their second attempt, indicating internal shorting in the previous battery.

"It was a long road to get a working battery," said Juan Pablo Alvarez '28. "We dabbled in wet cathodes and catalysts, but eventually pivoted to a simpler design. We learned so much this year and got so much momentum out of this competition, and I feel like we're making big changes to the whole structure of Chem-E-Car procedures."

The team featured multiple committees that oversaw a different aspect of the car's operation. The mechanical committee designed the car and 3D-printed all of its parts. The controls committee integrated the propulsion system with the timing reaction to get the motor to stop.

"The propulsion committee generated 12 volts for the motor with a battery made from at-home supplies," said Tiago Sousa '28. "It was a few pieces of aluminum foil that we wrapped in a paper towel, which we then wrapped in steel wool and submerged in electrolyte solution. We used potassium hydroxide."





TEXAS A&M STUDENT EARNS ENERGY-FOCUSED FELLOWSHIP

Chemical engineering graduate student Edwin Ochedikwu has been selected as a 2026–27 Texas Exchange for Energy & Climate Entrepreneurship (TEX-E) fellow.

Ochedikwu was accepted into the fellowship in April 2026 with a goal to gain a deeper understanding of how it bridges entrepreneurship and renewable energy.

"I learned that we will most likely be given technology to develop over the course of the year," Ochedikwu said. "We are collaboration with industry leaders and entrepreneurs in the climate-tech and renewable energy space and will primarily work in project teams with other students and researchers from partner universities in Texas."

Partnering universities include the University of Texas at Austin, Prairie View A&M University, the University of Houston, Rice University and the Massachusetts Institute of Technology's (MIT) Martin Trust Center for MIT Entrepreneurship.

Ochedikwu's initial research focused on wastewater modeling of an electrocoagulation process for wastewater treatment. He developed a MATLAB-based model, which is a mathematical or graphical representation of a physical system for optimized pollutant removal.

Building on this, his next project will explore using amine-based polymers for petroleum industry applications.

The goal is to use modeling and experiments to better understand how gases like carbon dioxide interact with polymers, he said.

As an undergraduate, Ochedikwu decided to minor in economics to build a structured foundation for understanding micro and macro-economic interactions, such as how consumers and firms make decisions under different economic circumstances.

"I told myself that I wouldn't let an opportunity pass where I could find a way to incorporate chemical engineering and economics into my life or future," Ochedikwu said. "In my current work, there isn't necessarily a direct path to incorporate both, but there is a general theme in both my projects, which is sustainability. That goes in line with what I will be trying to achieve long term."

Combining chemical engineering and entrepreneurship gives Ochedikwu a foot in the door to begin sharing thoughts and ideas with like-minded people within the engineering industry.

"I am thrilled that Edwin has this unique experience to broaden his professional development," said Dr. Jodie Lutkenhaus, associate dean for research in the College of Engineering and chemical engineering professor. "The TEX-E Fellowship will give him direct insight into entrepreneurship and greater agility in his future career path. I am hopeful that his experiences in the program will bring this know-how into our research ecosystem, breaking down barriers to translation from lab to market."



DONORS SUPPORT AGGIE ENGINEERS IN LABS AND LECTURE HALLS

From a dryland wheat farm in West Texas to the classrooms at Texas A&M University, Doug White '78 has built a remarkable career in chemical engineering. Now he and his wife Donnice are giving back to ensure future Aggies have the same opportunities.

White first discovered his passion for engineering thanks to a high school mentor.

"A science teacher at Canyon High School noticed my aptitude for math and science and encouraged me to attend an engineering conference at Texas A&M during my junior year. That trip lit the spark," he said. "From that point on, my goal was clear: go to college and become a chemical engineer. Through a combination of good fortune and a successful wheat crop, I was able to attend as a first-generation college student."

While at Texas A&M, White joined the Aggie Band and maintained his focus on his studies — forging lasting relationships and meeting Donnice, who would later become his wife. Both pursued their chemical engineering degrees and launched rewarding careers in the industry before starting their family.

After a 34-year stint in the chemical industry, primarily with DuPont, White returned to Texas A&M

as a senior lecturer in the Artie McFerrin Department of Chemical Engineering.

"I enjoyed helping students and young engineers connect theory to real-world processes," he said. "Teaching in the Unit Operations Lab was a natural fit — it allowed me to focus on applied learning and help students develop the skills they would need in industry."

During his decade as an instructor, White taught more than 1,600 students and says it remains one of the most rewarding chapters of his career.

As committed Aggies, the Whites decided to support the department further through funding for upgraded lab equipment and by establishing a scholarship.

"Heat transfer is a fundamental unit operation in nearly every chemical engineering role, and the Unit Operations Lab needed improved equipment to better teach those concepts," he said. "When the department began fundraising for a new apparatus, Donnice and I felt it was important to participate."

The scholarship, targeting first-generation students, holds special meaning for the Whites.

"We chose to support first-generation chemical engineering students because we understand how unfamiliar and intimidating that path can be," he said. "We've been fortunate in our opportunities, and this felt like a meaningful way to help students with similar backgrounds reach their goals."

Thanks to the generosity of Doug and Donnice White, Texas A&M's College of Engineering continues to thrive, empowering new generations of Aggies both in the classroom and beyond.



A chemical engineer's road comes full circle back to Aggieland

From a junior college classroom in Corpus Christi to an industrial site in Al Jubail, Saudi Arabia, Robert "Jim" Fugitt '70 has lived a vibrant life full of adventure. His career as a chemical engineer has spanned decades and continents. Now, he's giving back to the Aggie engineering family by establishing the Maggie and Jim Fugitt '70 Chemical Engineering Endowed Scholarship.

Hindsight from the quieter life

The path of life is never straight, but looking back on his journey, every hurdle Fugitt faced posed a similar

choice: take on the challenge or remain comfortable. His accomplishments in his career and life are a testament to his decisions.

Since 2002, he and his wife Maggie have lived a slow life in Park City, Utah — a change of pace after moving 11 times in their first nine years of marriage. Despite the years and miles between them and Aggieland, the Fugitts hope they can send some needed support to a future chemical engineer's education.

"We're glad that there will be a student or two we can help," Fugitt said. "If they do it right, they'll have the career of a lifetime."

From student to soldier

Fugitt earned his first degree in business from Texas A&M University-Kingsville, formerly known as Texas Arts and Industries. There, he supported his education by joining the ROTC program.

"My mom pinned second lieutenant bars on me the night I graduated," Fugitt said.

He became a signal officer in the U.S. Army before moving to Fort Dix, N.J., to teach at the counterinsurgency school for the Six Special Forces. Then, Fugitt went to jump school in Fort Benning, Ga., with the 82nd Airborne. Afterwards, he was transferred to the 41st Combat Air Signal Battalion in Fort Lewis, Wash.

A fork in the road

When his contract in the Army came to an end, Fugitt faced a difficult decision.

"I had a good time with the Army, and they kept trying to get me to stay, but I just had a feeling that there was something that I needed to do," Fugitt said.

He left the Army and went to work in the business department at Celanese Chemical Company in Bay City, Texas, where his technical skills eventually led to a transfer to the engineering department. By the mid-1960s, as the Vietnam War escalated, Fugitt was contributing to engineering projects despite his lack of a degree. As a veteran, he wasn't in danger of being drafted. He was comfortable, but he came to another fork in the road.

"My boss told me that I was going to be limited in the things I could do, since I had a non-tech degree working in engineering," Fugitt said. "I probably would never do a major project, and I would be limited in size to the projects I could do. They were paying me well, but I wasn't satisfied, and that's when I made the decision to go back to school."

The Fugitts then moved to Aggieland, where he earned his second bachelor's degree, this time in chemical engineering. After three years of hard work, he was among the 13 graduates of the chemical engineering Class of 1970.

"It's a privilege, and you don't want to let your school down when you get out in the real world," Fugitt said. "That was something I was always conscious of; everyone knew I was an Aggie."

An Aggie in action

Fugitt took his skills around the world, continuing to embrace challenges and take on projects he felt passionate about. After a 36-year career, he retired in 1996. Throughout the next decade, he

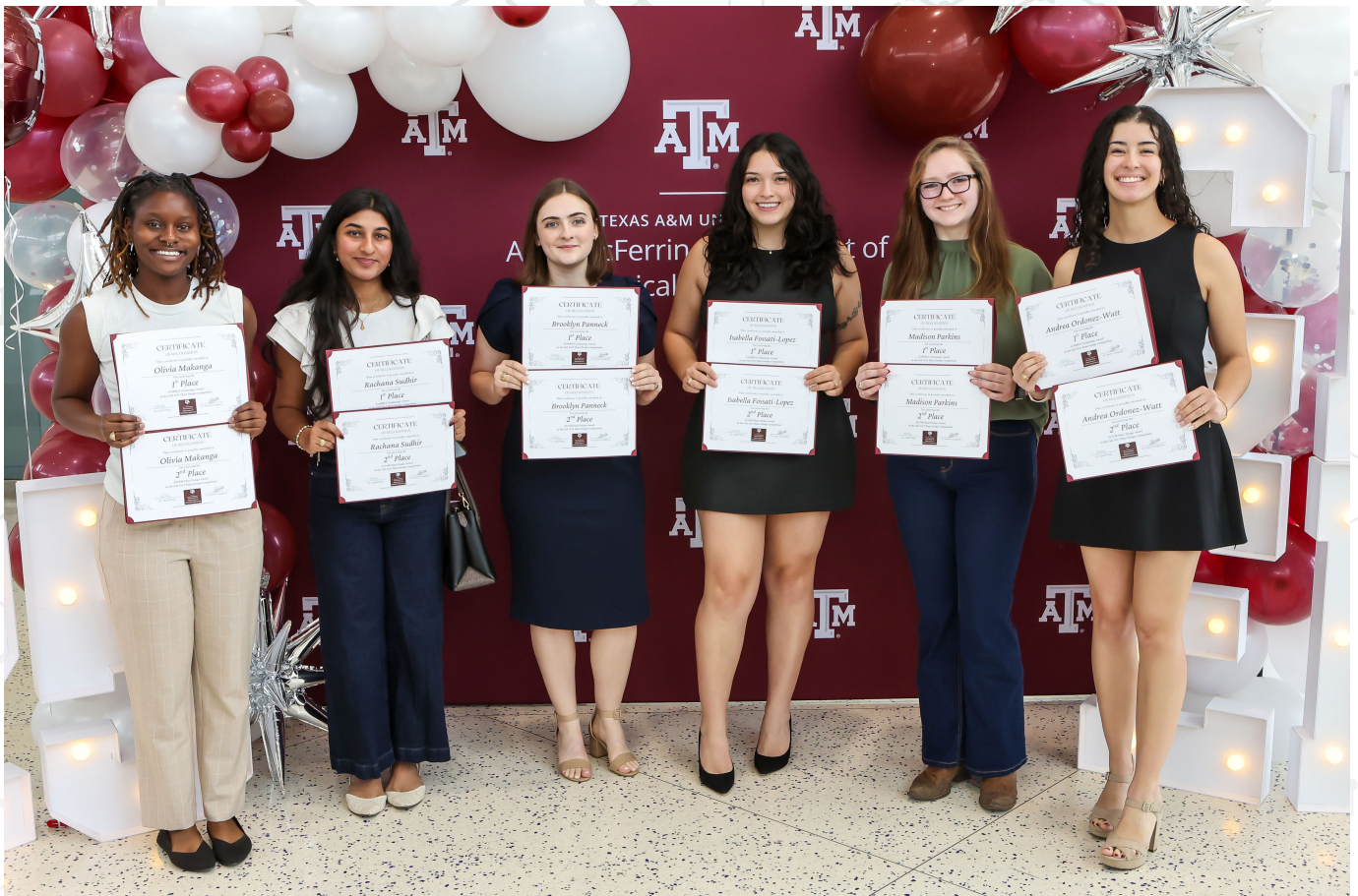
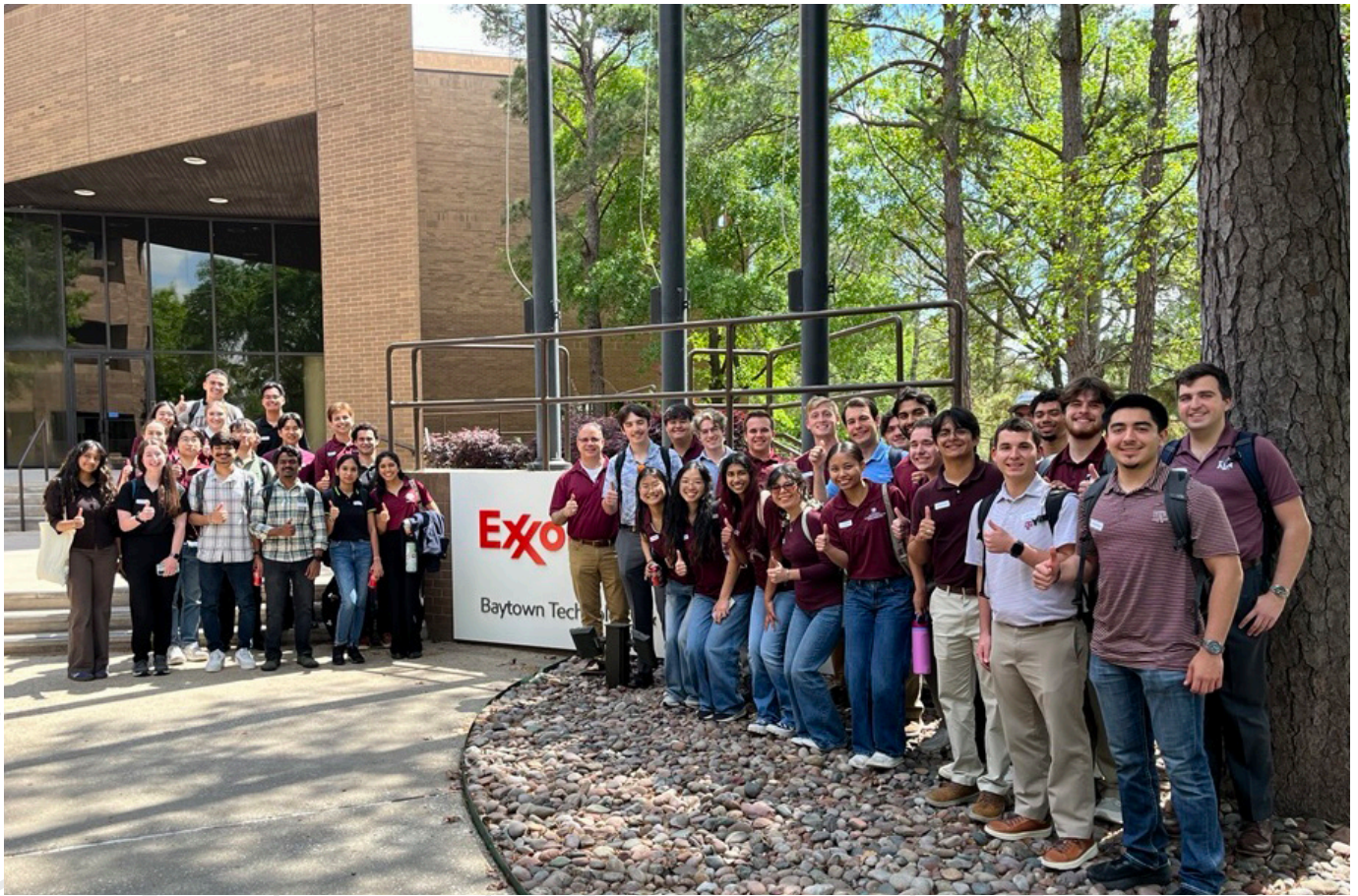


contributed to projects and worked as a consultant. Even 58 years later, Fugitt remembers the burden of supporting himself through an engineering degree.

"When you have to worry about money all the time, you can't concentrate," Fugitt said. "The schoolwork is very hard, and students need help. We're willing, and fortunate enough, to be able to do it."

The Fugitts have established the Maggie and Jim Fugitt '70 Chemical Engineering Endowed Scholarship to help Aggie engineering students in their own journey. With their help, a chemical engineering student can start their adventure for the rest of their life.







TEXAS A&M UNIVERSITY

Artie McFerrin Department of
Chemical Engineering

