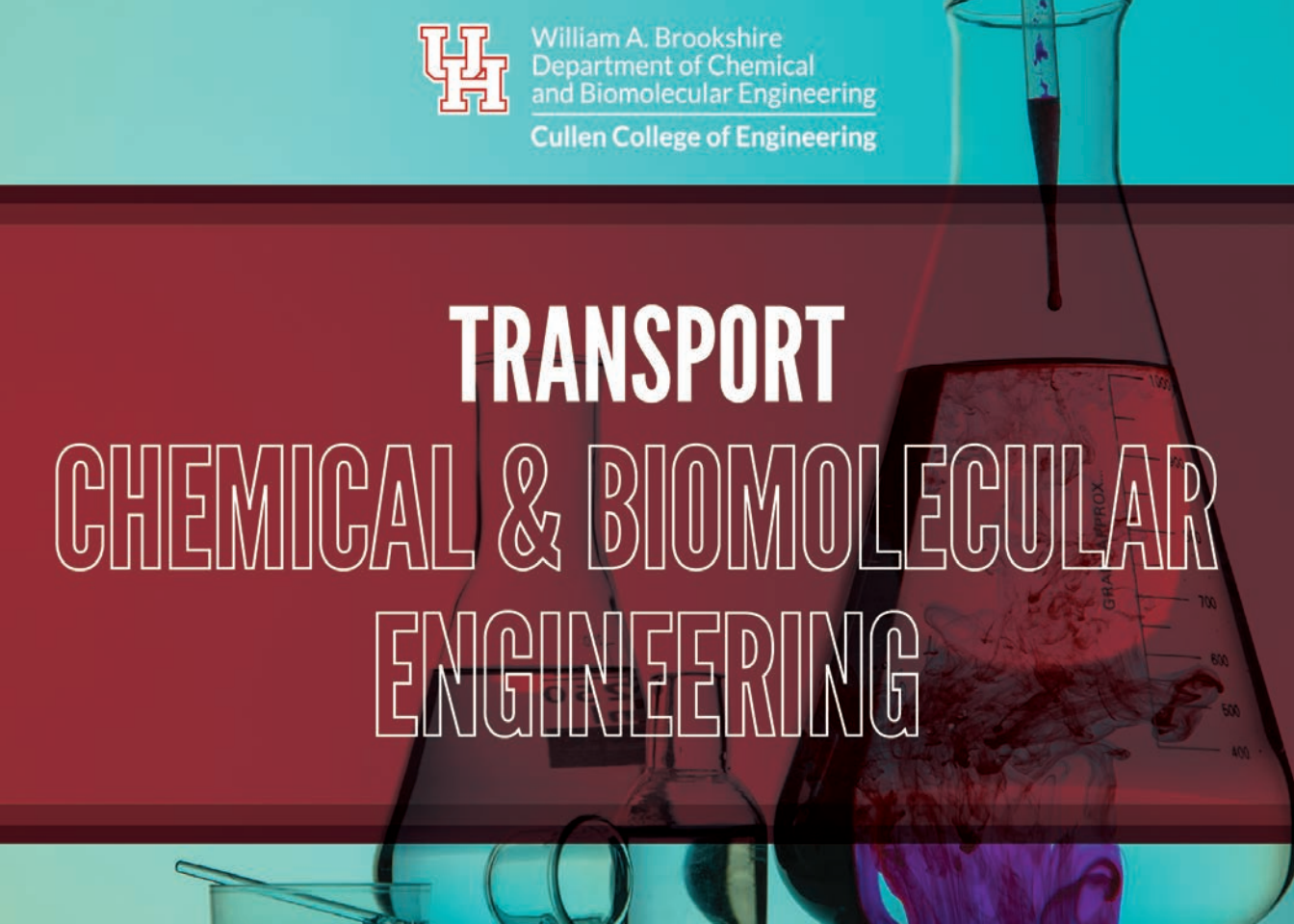
William A. Brookshire
Department of Chemical
and Biomolecular Engineering

Cullen College of Engineering

TRANSPORT

CHEMICAL & BIOMOLECULAR ENGINEERING



UH, CULLEN COLLABORATES WITH TEXAS MEDICAL CENTER INSTITUTIONS TO TRAIN NEXT GENERATION OF KIDNEY, BLOOD DISORDER RESEARCHERS

Leveraging the University of Houston's strengths in biomedical research and education, the Texas Medical Center, with its world-class hospitals, clinical and research programs, is partnering with UH to expand opportunities for training, discovery and innovations in health. The group, led by Baylor College of Medicine, is working to strengthen the pipeline for future kidney, urologic and hematologic research.

Researchers will receive $6.25 million over five years from the National Institutes of Health to launch the Houston Area Incubator for Kidney, Urologic and Hematologic Research Training.

At UH, the program director is **Jeffrey Rimer,** Abraham E. Dukler Endowed Professor of Chemical Engineering, who is known globally for his seminal breakthroughs using innovative methods to control crystals to help treat malaria and kidney stones.

"We currently have an NIH R01 grant with UT Southwestern Medical School where we are developing next-generation drugs to treat calcium-based kidney stones," Rimer said. "This new NIH-sponsored training program will enable us to recruit talented students and postdocs to work on these challenging areas of research."

Houston has a significant burden of kidney diseases, hypertension, sickle cell disease and other nonmalignant hematologic conditions. HAI-KUH's mission is to improve the health of these patients by building a strong scientific workforce to address their needs. HAI-KUH will leverage the team's biomedical research resources to develop research skills of students and trainees and prepare them for sustained and impactful careers in KUH research professions.

The program will fund six predoctoral students and six postdoctoral associates selected through a competitive application process. Trainees will receive support in scientific research, professional development and networking.

RESEARCH ADVANCEMENTS

CULLEN PROFESSORS FIRST TO TAKE **IMAGES OF HOW CHOLESTEROL FORMS CRYSTALS IN THE BODY**

A pair of University of Houston professors, known globally for their seminal contributions to crystal engineering with specific breakthroughs in the design of therapeutics to prevent crystallization in human diseases, are discovering how cholesterol crystals are formed in environments that mimic the human body.

Jeffrey Rimer, Abraham E. Dukler Endowed Professor of Chemical Engineering, and **Peter Vekilov**, Frank L. Worley Endowed Professor of Chemical Engineering, have published these findings and the corresponding videos of surface growth, which offer valuable insights into cholesterol's role in heart disease, in Proceedings of the National Academies of Science.

It's the first time anyone has been able to take images of the surface growth of cholesterol crystals in real time at near molecular resolution.

jeffrey Rimer
Professor

Peter Velikov
Professor

UH ENERGY RESEARCHERS DISCOVER THE PART OF AN ELECTRON THAT DRIVES CATALYSIS

Omar Abdelrahman and a team of researchers from the University of Houston's Cullen College of Engineering and the University of Minnesota Twin Cities College of Science and Engineering have discovered and measured the fraction of an electron that makes catalytic manufacturing possible.

This discovery, published in the open-access journal ACS Central Science, explains the utility of precious metals such as gold, silver and platinum for this manufacturing, and provides insight for designing new breakthrough catalytic materials.

Industrial catalysts – substances that reduce the amount of energy required for a given chemical reaction – allow producers to increase the yield, speed or efficiency of a specific reaction in pursuit of other materials. Such catalysts are used in processes related to pharmaceutical and battery production as well as petrochemical efforts such as the refining of crude oil, allowing supply to keep pace with demand in ways it otherwise could not.

Identifying faster and more controllable catalysts is a core goal of the multi-trillion-dollar fuels, chemicals and materials industries. In short, the world is currently in competition to produce faster, more efficient catalysts to enable lower-cost manufacturing processes across industries.

As molecules approach a catalyst surface, they share their electrons with the catalytic metal (in this case, gold, silver or platinum), thus stabilizing the molecules in such a way that the desired reactions occur. This concept has been theorized for over a century, but direct measurements of these tiny, highly consequential percentages of an electron have never been directly observed.

Researchers at the Center for Programmable Energy Catalysis, headquartered at the University of Minnesota, have now shown that electron sharing can be directly measured by a technique of their own invention called Isopotential Electron Titration (IET).

Omar Abdelrahman
Associate Professor

University of Houston | Cullen College of Engineering

SRIBALA GORUGANTU: ASSISTANT PROFESSORSHIP AND THE FUTURE OF CIRCULAR PLASTICS

Sribala Gorugantu, Presidential Frontier Faculty Fellow and Assistant Professor in the William A. Brookshire Department of Chemical and Biomolecular Engineering, is “very excited” to mark the start of the fall semester and is looking forward to commissioning new experimental setups in her lab at the Cullen College of Engineering.

Gorugantu completed her Ph.D. at Ghent University in Belgium where her doctoral research focused on experimentally investigating pyrolysis kinetics of biomass for the production of green chemicals. During this time, she also became acquainted with Professor Linda Broadbelt at Northwestern University, with whom she collaborated on the modeling of cellulose pyrolysis and eventually took a postdoctoral position focused on developing kinetic models for polymer deconstruction and recycling.

“The Department of Chemical and Biomolecular Engineering has a proud legacy of pioneers like Neal Amundson, and continues to lead in the areas of reaction engineering, catalysis and polymers, which align closely with my research. I was impressed by the collaborative and supportive environment in the department, which I see as essential for building my research program” says Gorugantu.

Gorugantu’s group, the Reaction Engineering and Analytics of Chemical Transformations (REACT) Lab, focuses on developing sustainable chemical processes by integrating experimental and computational approaches. The group investigates how molecular structure and catalytic chemistry influence the mechanisms and kinetics of complex multiphase reactions and develops predictive stochastic models to translate these insights into solutions for plastic recycling (including textiles and e-waste), renewable feedstock valorization, and environmental remediation.

Sribala Gorugantu
Presidential Frontier Faculty Fellow and Assistant Professor

DOOLING EXCITED TO SETTLE IN AT UH WITH IMMUNE CELL ENGINEERING GRANT

A deep passion for learning, and the strength of the William A. Brookshire Department of Chemical and Biomolecular Engineering Department, are some of the key reasons why **Lawrence "Larry" Dooling** made the trip across the country to join the faculty as an assistant professor at the Cullen College of Engineering.

"I was impressed by the breadth and depth of research and the collaborative environment," he said. "I sensed that I would have very supportive colleagues who were interested in what I could bring to the department and invested in helping me build a successful career."

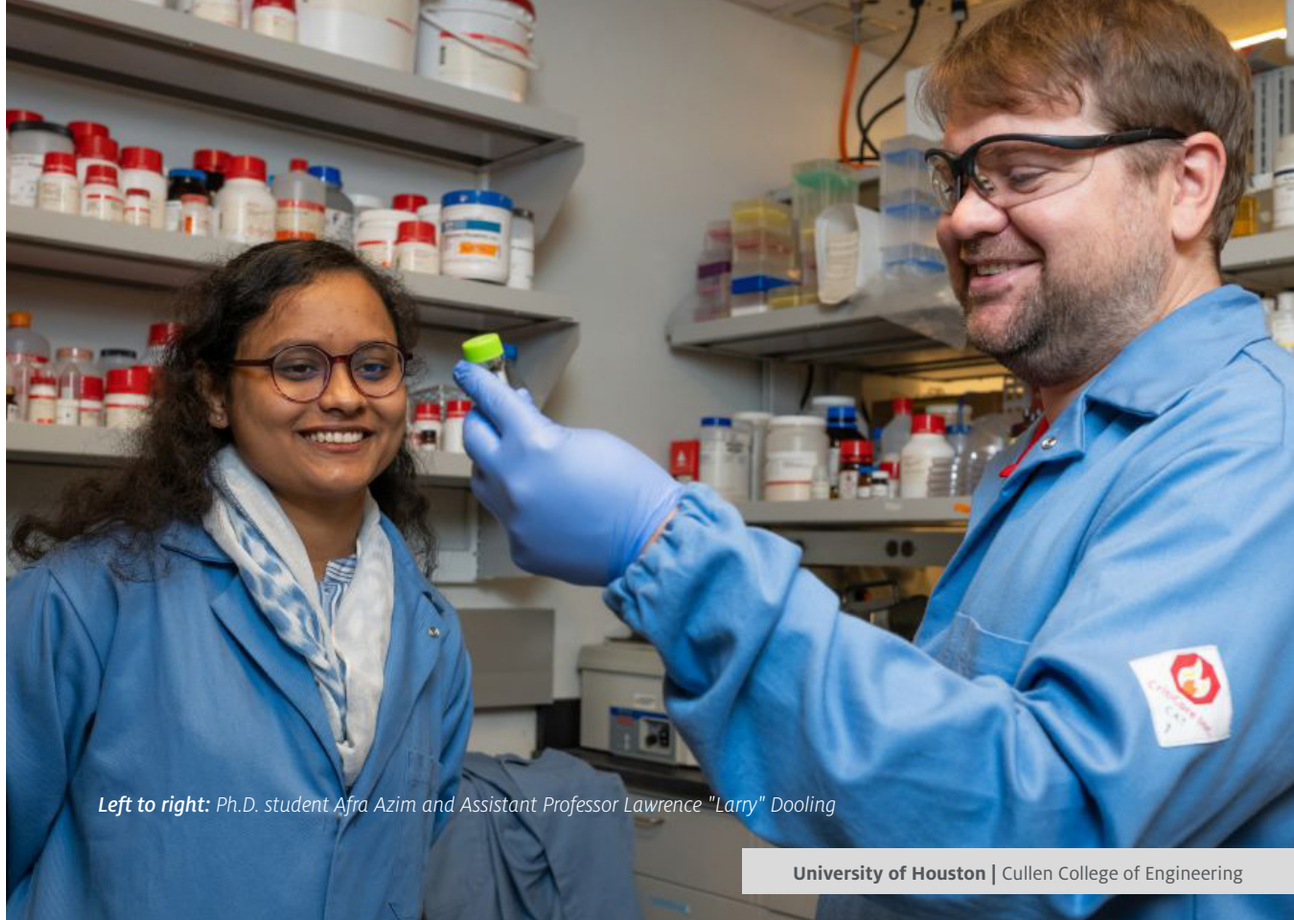
He added, "I was also drawn by the ambition and momentum to grow the College and UH as a top-tier public university in both research and education. I was excited for the chance to be part of this. Houston is a fantastic place for biomedical research. We have the Texas Medical Center and strong support for research, which will provide many opportunities for us."

Dooling noted it wasn't a linear path for him to get where he is now, but his desire for learning and knowledge is what has driven him in his career as a researcher and an engineer.

"I have the opportunity not only to keep acquiring new knowledge every day but also to create knowledge and use it in impactful ways," he said.

His lab works in two intersecting areas of study — cellular and molecular immunoengineering (especially with macrophages); and molecularly engineered materials.

"The questions and problems we are tackling are intellectually stimulating and unique enough that we'll be able to carve out our own space. For our immunoengineering research, the potential impacts are very broad because macrophages are found in every tissue and organ in the body, and they are key players in many disease states," he said. "In our biomaterials research, we are developing an experimental toolbox that will allow us to interrogate how cells sense and respond to certain mechanical properties of their surroundings, which is also broadly applicable."



Left to right: *Ph.D. student Afra Azim and Assistant Professor Lawrence "Larry" Dooling*

CHBE'S CONRAD ELECTED AS AAAS FELLOW

Jacinta Conrad, Frank M. Tiller Professor in the Willam A. Brookshire Department of Chemical and Biomolecular Engineering at the Cullen College of Engineering, has been named a 2024 Fellow of the American Association for the Advancement of Science (AAAS).

Conrad's election to the Section on Physics was announced by the AAAS on March 27. Election as a Fellow recognizes members that have advanced science or its applications in service to the society, and who have distinguished them among their peers and colleagues.

The AAAS is among the world's largest general-science societies. It is based in the U.S. and has an international membership of more than 120,000 people from more than 90 countries. One of the top voices in the scientific community, AAAS is perhaps best known as the publisher of Science and its affiliated journals.

"It's an honor to be elected as a Fellow of AAAS because of their sustained, effective advocacy for science and for scientists," Conrad said. "This is especially important right now because the federal government is dramatically reducing support for science, which will profoundly impact new discoveries as well as training opportunities at all levels. I look forward to strengthening my ties with AAAS to communicate the beauty of science and its value to my legislators and the public." As part of her past advocacy work, Conrad authored an opinion piece in the Houston Chronicle supporting expanded access to visas for international students.

Conrad joined the faculty of the Cullen College of Engineering in 2010. Her research goal is to understand how different types of small, micron-sized particles — including viruses and bacteria as well as nanoparticles — move in complex fluids, which are liquids that contain dissolved macromolecules, surfactants or other species. Conrad is fascinated by understanding how the chemical and mechanical properties of surfaces and fluids affect how these different types of particles stick to surfaces and move near them.

Jacinta Conrad
Professor

University of Houston | Cullen College of Engineering

THE AMERICAN INSTITUTE OF CHEMICAL ENGINEERS CHEM-E-CAR TEAM TAKES SECOND PLACE AT REGIONAL COMPETITION, SETS SIGHTS ON NATIONALS

AIChe Chem-E-Car Team Takes Second Place at Regional Competition, Sets Sights on Nationals

The American Institute of Chemical Engineers (AIChE) oversees a variety of project-based competition initiatives to engage student members in hands-on problem-solving activities and promote exploration, innovation and excellence in chemical engineering.

One such project is the Chem-E-Car Competition: one in which "team members design and construct a chemically powered vehicle within certain size constraints that must travel a specified distance." The vehicle must operate safely, using only chemical processes to run and stop, with "Prizes are awarded for traveling the correct distance, for creativity, and more."

After a multi-year hiatus, the AIChE UH Chem-E-Car team competed at this year's regional competition and took second place overall, earning them an invitation to compete at Nationals this coming fall.

Team captain **Evan Castillo**, an electrical engineering major, was surprised to learn that UH's last verified Chem-E-Car Competition year was 2014.

"Initially, I was contacted by the president and vice president of our organization, and I spoke to them with some interest in this project. It's pretty multidisciplinary, but as an electrical engineer, I didn't really know if I'd have a place in a chemical engineering club. After talking with them about my leadership experience and how it could be valuable here, they basically made me captain," he said. "You don't have to be a chemical engineer to do this. You can come as you are, and you can help.

"A big goal of mine coming into this, especially as an outsider, was that I made it my mission to do the absolute best I could to make this team at least compete at the regional competition. That was really important to me."

The team competed at this year's regional competition and took second place overall, earning them an invitation to compete at Nationals this coming fall

PHD CANDIDATE YERRAGUNTA RECOGNIZED **WITH 2025 OUTSTANDING LEADERSHIP AWARD**

Manasa Yerragunta, a Chemical Engineering doctoral candidate, was honored at last month's 2025 Student Employee of the Year Awards Luncheon as the recipient of this year's Outstanding Leadership Award.

Hosted by University Career Services (UCS), the luncheon wrapped up a two-week celebration including Student Employee Appreciation Week and Graduate Student Appreciation Week, bringing into focus the hard-working student employees and graduate assistants who help UH thrive.

Yerragunta's chemical engineering focus is in crystallization, which is relevant to pharmaceutical industry and specialty chemical operations. Though she knew she had been nominated for the Outstanding Leadership Award by her advisor, she wasn't sure she would actually win the title.

"There were a lot of people at the nominee lunch, so I was quite surprised when my name was announced as a winner," she said.

In fact, Yerragunta was only one of 151 total nominees across four Student Employee of the Year award categories. Her supportive, engaged leadership philosophy is part of what made her stand out amongst her peers.

"I think that interest developed naturally from a desire to contribute to the spaces I'm a part of and where I believe I can make a difference or a contribution. I also enjoy training and mentoring students; it feels very rewarding to share what I have learned throughout my journey to help them become more confident and more independent. I find that fulfilling," Yerragunta said.

"I enjoy being in leadership roles because I feel they challenge me and help me grow as a person," she added. "It teaches us a lot, especially about people, management, communications, and the responsibility that we take on when we organize or lead a group."

Peter Velikov and Manasa Yerragunta

PRINCETON'S SUNDAR REFLECTS ON CULLEN DEGREE EXPERIENCE

When **Sankaran Sundaresan** shifted to emeritus status at Princeton University in July, it marked a new phase in his professional life after 45 years — work that began after he earned his doctorate in chemical engineering at the University of Houston's Cullen College of Engineering.

Sundar, as he's more commonly known to friends, racked up an impressive list of external awards during his time at Princeton. He won the 1999 R.H. Wilhelm Award in Chemical Reaction Engineering, the 2005 Thomas Baron Award in Fluid-Particle Systems, and the 2022 Elsevier Particle Technology Forum Award for Lifetime Achievements from the AIChE. He also earned a Distinguished Alumnus Award from IIT Madras, and the Alexander von Humboldt Research Award.

For Sundar, it was his interest in learning that motivated him in the lab, and that it what he wanted to impart to his students. These were principals that were strengthened in his time at the University of Houston. We asked Sundar about his experiences at UH, and he was happy to share with us.

When it came to considering places to pursue a graduate degree, what made UH so appealing to you?

The Chemical Engineering Department at UH was rated as one of the top 10 chemical engineering departments in the United States at that time. The reputation of the UH Chemical Engineering Faculty and their research projects were important factors in my decision.

Also, the weather in Houston is not very different from that in India (except for a couple of months in the winter), which I found attractive.

Students from various Indian Institutes of Technology (IIT) campuses had gone to study in that department in earlier years and recommended the department enthusiastically. These students did very well in their studies, which helped establish a very favorable reputation for students from the IITs.

Sankaran Sundaresan
Chemical and Biomolecular Alumni

SHELL PROJECT ENGINEER AKUCHIE REFLECTS ON UNIVERSITY OF HOUSTON START

Justice Akuchie, who graduated from the William A. Brookshire Department of Chemical and Biomolecular Engineering with a bachelor's degree in chemical engineering in 2004, has worked at Shell for the last 13 years after starting out his career with Siemens Energy and Exterran. He currently serves in a "project engineering and management capacity leading a team delivering renewable power projects — things like solar battery storage, microgrids and the like."

"I've been able to work across just about every part of the energy value chain; I've worked in refining and midstream in biofuels, biogas and renewable power, so the last eight years have been very energy-transition-focused. I credit my strong engineering foundation and background that started at UH with the ability to move across those parts of the industry seamlessly. I may not be an SME in any particular area, but I know enough in every single area to be dangerous," he laughed.

Born in Houston to Nigerian parents and one of six children, Akuchie's family moved back to Nigeria when he was two years old. He spent his formative and schooling years, "but the plan was always to come back to Houston for college. In fact, the University of Houston was sort of always the plan," he said.

"The reason I picked chemical engineering is that the city I grew up in in Nigeria — Port Harcourt — is sort of the Houston of Nigeria. It's the oil and gas capital, so it was always sort of a dream of mine to become a petroleum engineer or petrochemical engineer," said Akuchie. "When I started looking at UH and the degrees offered, petroleum engineering wasn't being offered as a bachelor's degree at the time. That made chemical engineering a natural choice."

Akuchie graduated high school in Nigeria at age 15 and moved back to Houston one year later with his elder sister – another Coog.

Justice Akuchie
Chemical and Biomolecular Alumni

STANLEY THANKS MENTORS, STRESSES IMPORTANCE OF GIVING BACK

For **Steven F. Stanley**, the importance of the doctorate he earned at the University of Houston and its effect on his career goals can't be overstated. It's partly because of this transformative effect that he has given back to the Chemical and Biomolecular Engineering Department at the Cullen College of Engineering in the ensuing decades after earning his degree.

"The knowledge, mentorship, and opportunities I gained as a Ph.D. student allowed me to progress from research roles to leading companies across the global chemical industry," he said. "My success would not have been possible without the support of faculty, staff, and peers at UH, and I feel a responsibility to ensure future generations have access to the same transformative experience."

Stanley came to UH after earning his B.S. in Chemical Engineering from the University of Minnesota. Given Houston's reputation as the center of the U.S. petrochemical industry, it was on Stanley's radar when it came to earning his Ph.D.

"The University of Houston stood out not only for its national ranking in chemical engineering but also for its excellence in my areas of greatest interest — chemical reaction engineering and catalysis," he said. "During my due diligence, I discovered a remarkable connection between UH and UMN through several faculty members who had academic roots at Minnesota. Most notably, Professor Neal Amundson — the renowned member of the National Academy of Sciences and widely recognized for his groundbreaking contributions — founded the University of Minnesota's Chemical Engineering Department, where the building proudly bears his name."

"His example instilled in me both a respect for the discipline and an appreciation for the impact that engineers can have on society," Stanley said. "Throughout high school I excelled in STEM subjects, and when a career advisor suggested chemical engineering — describing it simply as a field that involved 'a lot of math and science' — I was intrigued and quickly became hooked."

Steve F. Stanley,
Chemical and Biomolecular Alumni

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