ANNUAL REPORT 2022-23

Northeastern University
Chemical Engineering

NORTHEASTERN

Northeastern University
College of Engineering

With over 230 tenured/tenure-track faculty and 18 multidisciplinary research centers and institutes with funding by eight federal agencies, the College of Engineering is a leader in experiential education and interdisciplinary research focused on discovering solutions to global challenges to benefit society. Northeastern's global university system—with engineering programs on campuses across the U.S. and in multiple countries—provides flexible academic offerings, innovative partnerships, and the ability to scale ideas, talent, and solutions.

About Northeastern

Founded in 1898, Northeastern is a global research university and the recognized leader in experiential lifelong learning. Our approach of integrating real-world experience with education, research, and innovation empowers our students, faculty, alumni, and partners to create worldwide impact.

Northeastern's personalized, experiential undergraduate and graduate programs lead to degrees through the doctorate in 10 colleges and schools across our 13 campuses worldwide. Learning emphasizes the intersection of data, technology, and human literacies, uniquely preparing graduates for careers of the future and lives of fulfillment and accomplishment.

Our research enterprise, with an R1 Carnegie classification, is solutions oriented and spans the world. Our faculty scholars and students work in teams that cross not just disciplines, but also sectors—aligned around solving today's highly interconnected global challenges and focused on transformative impact for humankind.

We are a leader in experiential education and interdisciplinary research, focused on Engineering for Society

DEAR COLLEAGUES, FRIENDS, AND STUDENTS,

At the Northeastern University Department of Chemical Engineering, our mission is simple: to educate and train students in chemical engineering practice. As we continue to grow and expand the department, our efforts to best prepare our students evolve. This year, we launched the Pharmaceutical Engineering MS program in collaboration with the Department of Pharmaceutical Sciences to directly apply engineering principles to biopharma. The implementation of inclusive teaching and mastery grading in our core undergraduate courses has shifted the classroom paradigm from lecture to learning. Our doctoral students are also getting hands-on experiences through cooperative education and internships that supplement their classes and research. At every level, our students learn that leaders in engineering will address global challenges that may not yet exist, so diversity of experience and thought is critical for their future.

With over 45 primary, joint, and affiliated faculty, we continue to grow, including welcoming two new faculty members this year with expertise in resource recovery and wastewater remediation, and making fertilizers and foods with gases and electricity. We had an NIH Trailblazer (young investigator) grant recipient this past year and an NSF CAREER award winner, along with other awards to our faculty for their scholarship and service. We are supported by multiple areas of research: biomolecular & biomedical systems, complex & computational systems, energy & sustainability, engineering education & pedagogy, and materials & nanotechnology, providing a wealth of opportunities for students to innovate in the food-water-energy nexus, healthcare systems, and computational and data engineering.

Northeastern's top-rated cooperative education (co-op) program plays an important role in our success. Chemical engineering co-op positions span the areas of consumer products, plastics, biotechnology & biopharmaceuticals, nanotechnology, alternative energy, and energy storage, with students placed in positions both domestically and internationally. Through a combination of rigorous academics, research excellence, and professional experience, recent graduate students have taken industry and research positions at leading organizations such as Moderna, Takeda, SpaceX, SES, Lockheed Martin, and Intel, to name just a few.

I invite you to explore the highlights of our Department of Chemical Engineering and the research of our faculty and students through this Annual Report.

Sincerely,

Rebecca Kuntz Willits, PhD
Professor and Department Chair
Chemical Engineering
r.willits@northeastern.edu

For more details, visit our website at CHE.NORTHEASTERN.EDU.

Photo by Bella Martinez

Quick Facts **CHEMICAL ENGINEERING**

42 **TENURED/ TENURE-TRACK** including Affiliated

26 **Young Investigator** Awards, including ▶ **11** **National Science Foundation** CAREER Awards

13 **Professional** Society Fellowships

522 Students, **47%** are Women (Fall 2022)

67% of Tenured/Tenure-Track Faculty are Fellows or Young Investigator Award Recipients

$15M **External Research Awards** (2021-2023)

Young Investigator Awards 2023

Sara Hashmi
Assistant Professor
National Science Foundation CAREER Award

Benjamin Woolston
Assistant Professor
NIH R21 Trailblazer Award

National Academy Member

Arthur Coury
University Distinguished Professor

Promotion

Ryan Koppes
Associate Professor

Degree Programs

UNDERGRADUATE:

BS Chemical Engineering
BS Chemical Engineering and Biochemistry
BS Chemical Engineering and Bioengineering
BS Chemical Engineering and Computer Science
BS Chemical Engineering and Data Science
BS Chemical Engineering and Environmental Engineering
BS Chemical Engineering and Physics

GRADUATE:

PhD Chemical Engineering
MS Chemical Engineering
MS Pharmaceutical Engineering

New MS in Pharmaceutical Engineering

The Master of Science in Pharmaceutical Engineering is an interdisciplinary program offered through the Department of Chemical Engineering and the Department of Pharmaceutical Sciences at Northeastern University. Through coursework and rich experiential learning, the program prepares engineers with a unique blend of advanced skills in state-of-the art pharmaceutical design, manufacturing process engineering, and regulatory and quality issues to meet the evolving and growing needs of the biotechnology industry.

Quick Facts **COLLEGE OF ENGINEERING**

With **238** tenured/tenure-track faculty and **18** multidisciplinary research centers and institutes with funding by eight federal agencies, the College is a leader in experiential education and interdisciplinary research focused on discovering solutions to global challenges to benefit society.

5 **Engineering Departments**

142 **YOUNG INVESTIGATOR** Awards

Including **72** NSF CAREER Awards, and **26** DOD Young Investigator Awards

102 **Professional Society Fellowships**

3,333 **Total Co-op Hires** (AY2023)

3,057 **Co-op Employer Partners** (AY2021-2023)

TOTAL ENROLLMENT (Fall 2022)

10,046 62% Graduate
38% Undergraduate

Graduate Enrollment Growth up **68**% vs. 2017

Our Newest Faculty

Magda Barecka *Assistant Professor*

Jointly Appointed: Chemistry and Chemical Biology

PhD: TU Dortmund University, Germany, 2017

Previously: Postdoc, University of Cambridge, Singapore 2019 – '22, Processium/Morgan Sindall 2018 - '19

Scholarship Focus: Transition to carbon-neutral chemicals production methods, electrochemical transformation of carbon dioxide, synthesis of advanced materials, process systems engineering and process intensification, sustainable methods for stable isotopes separation

Damilola Daramola *Assistant Professor*

Jointly Appointed: Chemistry and Chemical Biology

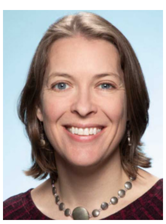
PhD: Ohio University, 2011

Previously: Assistant Professor, Ohio University

ChE Research: Energy & sustainability, complex & computational systems, and materials & nanotechnology

Scholarship Focus: Electrochemical engineering, food-energy-water nexus, resource recovery, wastewater remediation, atomic and process simulations, thermosetting composites, polymer upcycling

Award: 2022 Ralph E. Powe Junior Faculty Enhancement Award in Engineering and Applied Science



Allison Dennis *Associate Professor*

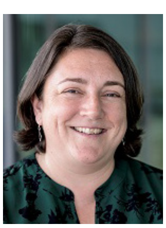
PhD: Georgia Institute of Technology, 2009

Previously: Assistant Professor, Boston University

Scholarship Focus: Semiconductor quantum dots, fluorescence biosensing, biomedical imaging, in vivo imaging

Awards:

- Scialog ABI (Advanced Biomedical Imaging) Fellow, 2021-23
- MAVEN Sr. Scientist, 2021-22
- Fulbright Scholar, 2002-2003



Marsha Rolle *Research Professor*

Associate Director of Life Sciences/BioPILOT Programs, The Roux Institute

PhD: University of Washington, 2003

Previously: Professor, Worcester Polytechnic Institute

Scholarship Focus: Engineered vascular tissue models, biopolymer materials, bio- and cell manufacturing, tissue engineering

Rebecca Sherbo *Assistant Professor*

Jointly Appointed: Chemistry and Chemical Biology

PhD: University of British Columbia, 2019

Previously: Postdoc, Harvard University and Harvard Medical School

Scholarship Focus: Electrochemical and biological ways to make important chemical products, like foods and fuels, from gases and renewable energy

Faculty by Research Area

Biomolecular and Biomedical Systems

Mansoor Amiji
Debra Auguste
Sidi A. Bencherif
Rebecca L. Carrier
Srirupa Chakraborty
Arthur Coury
Allison Dennis
Eno Ebong
Adam Ekenseair
Sara Hashmi
Francisco Hung
Abigail Koppes
Ryan Koppes
Carolyn Lee-Parsons
Steve Lustig
Marsha Rolle
Rebecca Sherbo
Ming Su
Rebecca Willits
Benjamin Woolston

Complex and Computational Systems

Magda Barecka
Rebecca L. Carrier
Srirupa Chakraborty
Damilola Daramola
Francisco Hung
Steve Lustig
Richard West
Qing Zhao

Energy and Sustainability

Magda Barecka
Damilola Daramola
Joshua Gallaway
Sara Hashmi
Francisco Hung
Carolyn Lee-Parsons
Laura Lewis
Steve Lustig
Courtney Pfluger
Hannah Sayre
Ming Su
Richard West
Benjamin Woolston
Qing Zhao

Engineering, Education, and Pedagogy

Adam Ekenseair
Luke Landherr
Courtney Pfluger
Behrooz Satvat
Rebecca Willits

Materials and Nanotechnology

Debra Auguste
Magda Barecka
Sidi A. Bencherif
Rebecca L. Carrier
Arthur Coury
Damilola Daramola
Allison Dennis
Eno Ebong
Adam Ekenseair
Joshua Gallaway
Sara Hashmi
Francisco Hung
Ryan Koppes
Laura Lewis
Steve Lustig
Rebecca Sherbo
Ming Su
Rebecca Willits
Qing Zhao

Photo by Bella Martinez

NIH Trailblazer Award for Engineering Smarter Gut Metabolites to Affect Human Health

With a $628,000 Trailblazer Award for New and Early Stage Investigators from the National Institutes of Health's National Institute of Biomedical Imaging and Bioengineering, **Benjamin Woolston**, assistant professor of chemical engineering, is leading interdisciplinary work to look for ways to use human gut microbes as potential therapies against disease.

"Scientists have had some initial successes utilizing microbes in our guts as potential therapies against diseases, but there are also some challenges," says Woolston. "First, the way in which microbes behave in a test tube is different than in the complex environment of the human gut. Second, the microbes developed so far tend to be pre-programmed for a specific behavior (e.g., reducing the concentration of a toxic metabolite, or producing a therapeutic one) regardless of what is actually going on in the gut."

The team's research aims to tackle both issues by figuring out what factors exist in the complex gut that engineers need to consider, as well as developing microbes that can proactively react to the environment in the gut microbiome in a more intelligent way.

"The engineered microbe would have a decision-making process through which they could turn on or turn off metabolic pathways to maintain the proper levels of a particular metabolite—much like a thermostat does for the temperature in your house," says Woolston.

For this project, Woolston and his team are concentrating on microbially produced hydrogen sulfide (H2S), which has been linked to health issues such as ulcerative colitis and Crohn's disease. Existing research suggests that low levels of H2S have anti-inflammatory properties and support a healthy epithelium (or gut lining), whereas high concentrations are genotoxic, inhibit mitochondrial function and butyrate oxidation, and potentially weaken the mucosal barrier.

Woolston's collaborators are also chemical engineering faculty; two of them—associate professors **Abigail Koppes** and **Ryan Koppes**—are developing gut-on-a-chip devices that allow the team to see what's happening at the interface between human and bacterial biologies. With this technology, they can introduce the microbes Woolston is building in his lab onto those chips to simulate the gut environment and compare the performance to that of microbes analyzed in test tubes.

Another collaborator, **Rebecca Carrier**, professor and associate chair of research for chemical engineering, is also working on a gut-on-a-chip system, but hers focuses more on the mucosal barrier that lines the organ. H2S might interfere with the structure of this layer, so the team is interested in what happens if it breaks down and whether this might change the ability for microbes to cross through the barrier to the tissue underneath.

Several PhD students who are co-advised by members of the research team are also involved in the project.

Woolston and his team hope that the lessons learned from this research developing the H2S-controlling microbes can be used in the future for different metabolites involved in other diseases, as well as provide some valuable basic science about the gut microbiome and how it behaves.

Photos by Bella Martinez

NSF CAREER Award for Examining Flow of Polymer Gels in Confined Spaces

Polymer gels are all around us in both natural and industrial settings, including gelatin, toothpaste, 3D printing materials—even human blood. Awarded a $550,000 CAREER Award from the National Science Foundation, **Sara Hashmi**, assistant professor of chemical engineering, is conducting research to better understand the fundamental science of how crosslinked polymers flow through small channels to prevent or reverse clogging in various applications, such as blood flow through a vessel.

"The idea of blood clotting within a blood vessel is the real-world problem that originally inspired me to think about this research," says Hashmi. "What happens in the blood is very complicated, but in the final stages when [fibrinogen] molecules become a polymer, they can stick together and to the walls of the blood vessel and cause problems. We want to better understand the fundamental science of how crosslinked polymers flow through small channels—as can happen in blood flow through a vessel—so we can potentially prevent or reverse clogging in many different applications."

For this research, Hashmi and Barrett Smith, a chemical engineering graduate student, have built a microscopic channel with two inlets on one end. They inject alginate, a naturally occurring polymer, through one opening and calcium chloride in the other; when the two combine, they crosslink, or begin to get stuck together and to the walls of the channel. Hashmi and Smith then record and observe this microscopic behavior within their model.

By manipulating variables, such as the amount of alginate versus calcium chloride or the speed at which they are injected, Hashmi and Smith are gaining insight into the behavior of these polymers. Of particular interest to the two is the intermittent behavior that occurs in a realm between steady flow and complete clogging.

"One of the interesting things we observe when clogs begin to form is that, as the channel becomes narrower and the fluid speeds up to go through that smaller space, the forces start to disrupt the gel, breaking off very small, very soft particles," says Hashmi. "Really tiny and soft gels are difficult to make in practice because they're very fragile, but this brings us into a thought-provoking future direction: How is this product that we're making useful, and can we make it consistently reproduceable?"

By creating mathematical models to better understand the physical processes of these flow patterns, Hashmi's research can extend into a range of applications, from pharmaceutical and biomedical to industrial. As part of her research, she intends to engage colleagues in additive manufacturing and other fields to help answer industry-specific questions that are yet unknown.

"People who study 3D printing generally publish about their successes, but we want to learn more about the failures," says Hashmi. "What have people tried to avoid or reverse clogging that hasn't worked? By developing a survey for academic and industry colleagues, we can learn more about real-world needs to help us determine what models and systems we should explore next."

Photo by Matthew Modoono

IEEE Fellow

Distinguished University and Cabot Professor **Laura Lewis**, chemical engineering, and mechanical and industrial engineering, was elevated to an IEEE Fellow for contributions to the design of magneto-functional materials. This distinction is reserved for select IEEE members whose extraordinary accomplishments in any of the IEEE fields of interest are deemed fitting of this prestigious grade elevation and is awarded to less than 0.1% of voting members annually.

ACS Rubber Division's Bioelastomer Award

University Distinguished Professor **Art Coury**, chemical engineering, is the recipient of the American Chemical Society's Rubber Division Bioelastomer Award, which honors significant contributions to the advancement of biomaterials in the field of rubber science and technology. Recipients are those who have made an outstanding contribution to the understanding or utilization of biomaterials, including naturally derived elastomeric polymers and protein-based bioelastomers.

Northeastern Global Educator Award

Associate Teaching Professor **Courtney Pfluger**, chemical engineering, received Northeastern University's inaugural 2023 Global Educator Award. The award recognizes the contributions of faculty to students' global learning and acknowledges and celebrates the value of these experiences to students and Northeastern's mission as a global university. Pfluger has developed meaningful cooperative partner projects, including nine Dialogue of Civilizations visits to Brazil since 2013.

Photo by Matthew Modoono

$3M NIH Award to Help Transform Treatment for Pancreatic Cancer

University Distinguished Professor **Mansoor Amiji**, pharmaceutical sciences and chemical engineering, in collaboration with University of California-Davis and drug developer TargaGenix, is working on the final stages of a new therapeutic model that could transform treatment for pancreatic cancer and potentially save thousands of lives every year. Amiji is leading a $3 million, five-year National Institutes of Health grant to work on mouse efficacy and safety trials at Northeastern for the next three years.

Developing a Computer Model for Carbon Dioxide Conversion

Associate Professor **Richard West**, chemical engineering, Assistant Professor **Magda Barecka**, chemical engineering and College of Science, and Assistant Professor **Qing Zhao**, chemical engineering, were awarded a $500,000 grant for "Accelerating Electrocatalyst Innovation: High-Throughput Automated Microkinetic, Multiscale, and Techno-economic Modeling" as part of the Creating Revolutionary Energy and Technology Endeavors (CREATE) Exploratory Topic managed by the Advanced Research Projects Agency-Energy (ARPA-E). The objective of the CREATE Exploratory Topic is to identify and support disruptive energy-related technologies that have the potential for large-scale impact. Northeastern will develop a computer model that could identify new avenues for producing essential chemical ingredients using carbon dioxide, a waste product of fossil fuels.

Seven Patents Issued for Technology Used in New DuPont Product

Associate Professor **Steve Lustig**, chemical engineering, was a major contributor to a new product by DuPont called Kevlar® EXO™, a novel, ultra-high-performance copolymer that offers added strength and resilience. Through this collaborative research, Lustig has been issued seven patents for his technology. DuPont created the original version of Kevlar®—a strong, heat-resistant, and lightweight synthetic fiber used in everything from bulletproof vests to boat sails—in 1965. With this new iteration, they sought to harness Lustig's expertise in the design and manipulation of molecular and materials chemistry and structure to create a fiber that was even stronger and lighter and with improved anti-ballistic capabilities.

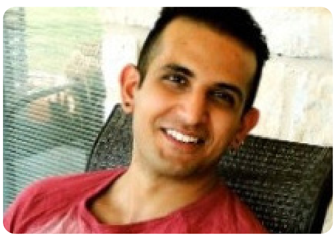
Learn more about our accomplished faculty

Student Successes

SELECTED HIGHLIGHTS

National Science Foundation Graduate Research Fellowship Program Award Recipients

The NSF GRFP recognizes and supports outstanding graduate students who have demonstrated the potential to be high-achieving scientists and engineers early in their careers. Six Northeastern University chemical engineering students received the award in 2023.

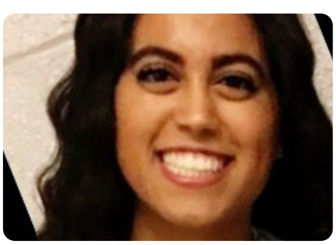


Adel Attari, E'19
chemical engineering

Gillian Audia, E'23
chemical engineering
and biochemistry

Rebecca Chinn, E'18
chemical engineering

Caroline Ghio, E'21
chemical engineering

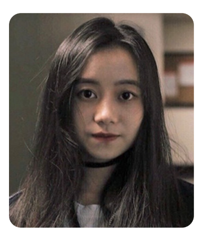


Nora Khalil, PhD'25
chemical engineering

David McMullin, E'20
chemical engineering

Donald F. & Mildred Topp Othmer Scholarship Award

Taryn Sparacino, E'22, chemical engineering, is the recipient of the 2021-2022 Donald F. & Mildred Topp Othmer Scholarship Award, which is awarded to 15 AIChE student members annually for their outstanding academic achievement and involvement in student chapter activities.



Future Leader in Chemical Engineering

Ke (Chloe) Wen, E'22, chemical engineering and biochemistry, was selected for the Future Leaders in Chemical Engineering Symposium 2022, organized by North Carolina State University. Wen was invited to present the research she conducted on engineering mechanically tunable gelatin-based hydrogels to study glycocalyx expression in human endothelial cells.

Outstanding Graduate Student Award in Teaching

Ronodeep Mitra, PhD'23, chemical engineering, is the recipient of Northeastern's 2023 Outstanding Graduate Student Award in Teaching, which recognizes those that have demonstrated an exceptional ability to communicate ideas and concepts in the classroom and a talent for inspiring students.

Student Spotlights

Research Co-ops Locally and Abroad

Originally from the Washington, D.C. area, **Gwyneth McNamara**, E'24, chemical engineering and biochemistry, aspired to travel far from home and gain as much career experience as possible during her college years. She has realized both of those goals at Northeastern by working on co-op at three companies—two locally in Cambridge, Massachusetts and one in Switzerland.

"It was the Northeastern co-op program that sold me," she says of her decision to attend the university. "I've aways been career-oriented, and I just realized, sitting at the info session and listening to students talking about their co-op experiences, that this wasn't something I was going to get anywhere else."

McNamara started to build laboratory skills in her first year by assisting a PhD candidate at the university's Center for Drug Discovery with her thesis research into cannabinoid modulation in mice. The experience was important proof for McNamara that she enjoyed and thrived on lab work, and it prepared her well for her co-op jobs to come.

The first of these was at pharmaceutical giant Moderna in Cambridge, where she joined its lipid nanoparticle process development team. Lipid nanoparticles form a crucial delivery component of many vaccines, including the mRNA vaccines then being finalized by Moderna and other companies to fight COVID-19. During her time there, McNamara leveraged her prior experience in the lab to help produce and characterize nanoparticles loaded with mRNA strands, and though she did not work on Moderna's COVID-19 vaccine, she presented some of her research to a COVID-19 task force there.

"It was quite a lot for my first co-op," she says, "but I was very eager."

McNamara found her second co-op job at a smaller pharmaceutical company nearby, Celsius Therapeutics, where she joined a protein sciences and biologics research group to work on drug pipelines for inflammatory bowel disease and cancer treatments. There, she learned fundamental aspects of early-stage research and development, expanding her view of the drug development process.

"I made the proteins and the antibodies that they used for every experiment in the lab," she says. "I communicated with people on every team. And I got to ask a lot of questions, even outside the scope of my job."

McNamara's work experiences in Cambridge prepared her well for her third co-op, this one farther afield in the city of Winterthur, Switzerland, northeast of Zurich. She joined the Institute of Computational Physics at Zurich University of Applied Sciences and was once again immersed in laboratory work, participating in three different projects with industry partners. One involved studying a cellular process called durotaxis using a bioprinter to create a multilayer polymer matrix and observing how cells interact with it. Two other projects involved creating synthetic skins—materials with the same moisture, thermal, and conductive characteristics as real skin—for use in laboratory experiments and testing of biomedical devices without the use of live subjects.

McNamara says she enjoyed using her fundamental engineering skills like design and prototyping on these projects, and values working with colleagues from across the globe.

"I was the only American there," she says. "I think me being there was helpful for them, giving them a new perspective—a woman's perspective, a young engineer's perspective, an American perspective."

The extensive practical experience McNamara got will prepare her well to pursue her career aspirations in pharmaceuticals and biotechnology. She plans to earn a master's degree, refining her field of study to a topic ripe for a PhD thesis, and to continue to see more of the world.

"I'd like to return to Europe," she says, noting that she is in the process of applying to graduate schools in both the United States and Switzerland. "It would be a dream to go back."

I was the only American there and I think me being there was helpful for them, giving them a new perspective—a woman's perspective, a young engineer's perspective, an American perspective."

Gwyneth McNamara, E'24
Chemical Engineering and Biochemistry

Caterina Bartomeu Garcia, PhD'22

CHEMICAL ENGINEERING

Advised by Rebecca Willits, Professor and Chair, Department of Chemical Engineering

Originally from Spain, **Caterina Bartomeu Garcia** earned her bachelor's degree in chemical engineering from the Universitat Autonoma de Barcelona, and master's degree in nanoscience materials and processes at Universitat Rovira i Virgili. In 2017, she began pursuing a PhD in chemical engineering at Northeastern.

Bartomeu Garcia's research focused on the development of novel drug delivery systems for the treatment of brain infections such as bacterial meningitis. A significant challenge for current brain disease treatments is the poor permeability of drugs through the blood-brain barrier (BBB). Her research aimed to develop and characterize a pH-sensitive liposomal drug delivery system with a cell-penetrating peptide to both increase the encapsulated drug's permeability and improve its stability in presence of a bacterial infection. In vitro studies showed great bactericidal properties against two of the main bacteria that cause meningitis, with no cytotoxic effect against two of the main cells that form the BBB. Promising permeability results were obtained with a 2D infection BBB model, suggesting that these liposomal systems represent a potential alternative to the use of antibiotics alone.

Bartomeu Garcia has one publication in the *International Journal of Nanomedicine.* She has collaborated on many other projects focused on material science, such as the surface modification of ceramics and stainless-steel surgical materials to improve their biocompatibility, reduce their degradation and prevent bacteria adhesion and proliferation. These collaborations during her PhD resulted in five peer-review publications. She has also presented her research in multiple conferences, including the Society for Biomaterials annual meeting in Seattle (2019), TechConnect World Innovation Conference in Boston (2019), and the American Institute for Chemical Engineering annual meeting in Boston (2020). She was an invited speaker in the Frontiers in Nanomedicine & Drug Delivery meeting in London (2019). In 2022, Northeastern University awarded her the Dissertation Completion Fellowship.

Bartomeu Garcia is currently working as a scientist at Repertoire Immune Medicines in Cambridge, Massachusetts. She continues to work with drug delivery systems, now focused on the delivery of novel mRNA technologies for the treatment of autoimmune diseases such as diabetes type 1 and multiple sclerosis.

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Chemical Engineering

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Letter from the Chair
1

Quick Facts
2

Faculty Honors & Research
5

Student Successes
9

COVER IMAGE

Assistant Professor **Sara Hashmi**, chemical engineering, was awarded a $550,000 National Science Foundation CAREER Award for “in situ Polymer Gelation in Confined Flows” to examine how polymer gels flow through tight spaces to better predict clogging behavior such as blood flow through a vessel. Read the full article on page 6.

Photo by Bella Martinez/Northeastern University