We are honored to have been chosen the new Department and Associate Department Heads of the UMass Amherst Chemical Engineering Department in January 2021 following nine months serving in an interim capacity. We look forward to working together to advance the education, research and service missions of the Department.

We are very pleased to send you our Fall 2021 UMass Amherst Chemical Engineering newsletter. We hope that you will enjoy reading about the accomplishments of our students, faculty and staff over the past year despite challenging circumstances. As the COVID-19 pandemic starts to dissipate, we are emerging with renewed enthusiasm and commitment for establishing UMass as one of the top chemical engineering departments in the country. A strong relationship with our alumni and supporters is critical to the short and long-term health of the Department. We wish to recognize the generous alumni contributions which allowed us to move forward on several key initiatives described below.

Following the departure of Lakis Mountziaris to become Department Chair at the University of Houston, our Department now has 19 full-time faculty members and two lecturers. We wish to thank Professor Mountziaris for his service as a faculty member and former Department Head. While Professor Mountziaris can never truly be replaced, we have received approval and resources to conduct an Assistant Professor search during the 2021-2022 academic year. Our faculty continued to receive accolades for their accomplishments in research, teaching and service. Friederike Jentoft received the College of Engineering Outstanding Senior Faculty Award, the highest award offered by the College. Shelly Peyton was the recipient of the College of Engineering Diversity, Equity and Inclusion (DEI) Award, a relatively new award that recognizes contributions to increasing DEI of the engineering profession both within and outside of the university. Omar Abdelrahman continued our impressive record of NSF Early Career Development Awards. Other notable accolades received by our faculty are covered later in this newsletter.

The Department is fortunate to have an outstanding group of staff members dedicated to our education and research mission. Over the past year, our staff has faced unprecedented challenges in their ability to provide outstanding support to our students and faculty. Despite working entirely remotely, our staff has provided exceptional service to the Department by adopting new strategies for remote interaction.

(Continued on page 2)
and support. Therefore, we wish to offer special thanks to each of our staff members: Margaret Malone (Administrative Head), Amity Lee (Office Manager), Anshalee Burgoyne (Bookkeeper), Gary Czupkiewicz (Technical Specialist II), Matthew Langer (Assistant Undergraduate Advisor), Tami Paluca (Undergraduate Advisor and Director of Alumni Affairs), Joseph Smith (Technical Specialist and Safety Officer), Marie Wallace (Graduate Program Secretary) and Jessica Washer (Bookkeeper).

We are very excited to announce that the Department received a generous gift from alumnus Gary R. Lapidus (B.S. Chemical Engineering, 1984) to support faculty within the Department. The Gary R. Lapidus Faculty Fund will be used for summer stipends, research support, professional travel, and other scholarship and teaching expenses. The Fund will support one faculty member for a five-year renewable term, starting in Fall 2022. The Department now has four endowed faculty: Armstrong-Siadat Endowed Professor (Nick Wu), Ed Price Endowed Professor (Wei Fan), Armstrong Professional Development Professorship (Shelly Peyton), and Gary R. Lapidus Faculty Fund (TBD). These endowments were made possible by generous contributions from our alumni and have allowed us to maintain a world-class faculty equally accomplished in research and teaching.

We continued to enhance our undergraduate program despite the COVID-19 pandemic. A positive outcome of this experience was the development of remote teaching materials and experience with virtual instruction. We are planning to leverage these advancements to offer improved course access to a more diverse cohort of undergraduate students on the Amherst campus and beyond. With faculty and staff returning to campus, we will continue our efforts to enhance the undergraduate experience through investment in improved facilities and expanded research opportunities. Approximately 60% of our undergraduate students take advantage of hands-on research opportunities within the laboratories of departmental faculty. We look forward to working with our alumni to develop internship and co-op opportunities. We find that these research and industrial experiences are a true differentiating factor providing enhanced professional opportunities for our students.

We have continued our efforts to hire world-class faculty and recruit the best graduate students worldwide. Efforts to expand our graduate programs suffered a temporary setback due to the COVID-19 pandemic, but we are ready to welcome a large cohort of M.S. and Ph.D. students this fall. We expect most, if not all, of these new students to be resident on campus by the time the fall semester starts in September. They will join graduate students already on campus and second-year students forced to work remotely during their first year of graduate studies. Combined with a substantial increase in sponsored research within the Department, this large influx of graduate students will enable a rapid ramping up of our research activities and social activities that we all missed last year.

Over the past year, our undergraduate and graduate students have faced unprecedented challenges ranging from the COVID-19 pandemic, a dramatic economic downturn and a period of widespread societal unrest. The Department, College and University will continue to support our students during this difficult period and beyond. In this newsletter, you will find that the Department is engaged in a variety of efforts to enhance Diversity, Equity, and Inclusion (DEI) across our chemical engineering community. We look forward to engaging our alumni in these efforts so that all departmental constituencies find our educational environment to be welcoming, positive and inclusive.

Thank you for all of your support over the past year and please do not hesitate to reach out to us.

All the best,

Michael A. Henson
Professor & Department Head

Jessica D. Schiffman
Associate Professor & Associate Department Head
A special congratulations to three of our faculty!

**Omar Abdelrahman**
Receives CAREER Award to Generate Pioneering Catalysts for Green Chemical Production

Assistant Professor Omar Abdelrahman of the Chemical Engineering (ChE) Department has received a five-year, $500,000 grant from the prestigious National Science Foundation (NSF) Early Career Development (CAREER) Program to develop dynamic catalysts that can utilize renewable electricity to generate more environmentally sound and inexpensive chemical production. Specifically, his NSF research will attempt to transform the electrochemical oxidation of hydrocarbons into oxygenates. *(COE April 2021)*

**Friederike Jentoft**
Chosen for the College of Engineering’s 2020-2021 Outstanding Senior Faculty Award

“Professor Friederike Jentoft, of the Department of Chemical Engineering (ChE), was selected for the 2021 Outstanding Senior Faculty Award. Jentoft is an internationally renowned researcher in the acceleration of chemical reactions. She has recently authored eight journal articles that were published in top journals. Her efforts to reorganize and revitalize the senior ChE laboratory are particularly noteworthy.” *(COE April 2021)*

**Shelly Peyton** — Receives College Diversity Award

The Department is very proud that Shelly Peyton was the recipient College of Engineering Diversity, Equity, and Inclusion (DEI) Award. Shelly is a highly talented scholar and educator who has shown exceptional commitment to and performance on DEI initiatives within the Department, College, University and broader community. The fact that she has accomplished so much in the DEI sphere while also leading a world-class research laboratory and developing innovative courses is a testament to her remarkable energy and enthusiasm for diversity, equity and inclusion at all levels.

Shelly has championed initiatives and tirelessly worked to increase female and underrepresented minority (URM) matriculation to graduate school, both in our Department and more broadly. She has actively recruited many outstanding female students and worked tirelessly to secure fellowships for many of them. Her laboratory offer a supportive community by promoting research opportunities fostered by strong female role models. While serving as our Graduate Program Director, her many efforts include traveling to the University of Puerto Rico Mayaguez to recruit senior undergraduates, which led to the first female URM student entering our graduate program, and organizing Department initiatives to improve recruitment and retention of URM students within our graduate and undergraduate programs. Her efforts have produced a significant increase in our graduate URM enrollment such that the Department has achieved and is poised to surpass the UMass COE average. Last summer, Shelly organized a series of meetings with other faculty members to develop a comprehensive plan for promoting and advancing DEI issues within the Department. This effort produced ten explicit action items that we prominently placed on our website (che.umass.edu/che-diversity-equity-inclusion) and submitted to the College as our first DEI action plan. Several other COE Department Heads expressed interest in this plan as a possible model for development of their own plans. This effort culminated in the formation of the Department’s first DEI Committee, for which Shelly serves as the Chair and the key contributor. In short, Shelly is the driving force behind our DEI efforts and certainly one of the key DEI contributors in the COE. *(COE April 2021)*
**Jungwoo Lee** was awarded tenure by the UMass Board of Trustees in June, 2021, and promoted to the rank of Associate Professor.

*Congratulations Jungwoo!!!*

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**Nianqiang (Nick) Wu**, the Armstrong/Siadat Endowed Professor in Chemical Engineering, has been named to the “2020 Highly Cited Researchers” list.

This coveted list, which serves as a “who’s who” of influential researchers, identifies scientists and social scientists who have demonstrated significant influence through publication of multiple papers, highly cited by their peers, during the last decade. *(COE December 2020)*

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**Wei Fan** was Selected for Inaugural Edward S. Price Faculty Fellowship.

The fellowship is based on a generous endowment established by UMass alumnus Ed Price, the president and CEO of PCI Synthesis, a pharmaceutical development contract manufacturing organization (CMO) based in Newburyport, Massachusetts. The Price fellowship is also supported by the university.
Lakis Mountziaris retired in January 2021

In 2020, he was elected Fellow of the American Association for the Advancement of Science (AAAS).

In retirement from UMass, Lakis gave up the snow of New England and moved to Texas to become the William A. Brookshire Professor and Chair of Chemical & Biomolecular Engineering at the University of Houston.

John Klier is now Dean at the University of Oklahoma in Norman

John is Dean and AT&T Chair of the Gallogly College of Engineering and professor in the School of Chemical, Biological and Materials Engineering at the University of Oklahoma in Norman.

Congratulations to Lauren Andrews and to Peter Beltrammo, each of whom celebrated the birth of their first child during 2020! The births of Lauren’s Mira and Peter’s John (JP or John Pierre) were happy events in the midst of a challenging pandemic year.
Friederike Jentoft Receives $550,000 Grant to Continue Pioneering Work on Acid Catalysis

Professor Friederike Jentoft, department of chemical engineering, has been awarded a $550,000 U.S. Department of Energy’s Office of Science Financial Assistance Program to continue her work on acid catalyst design.

Acid catalysis plays a key role in commercially established and emerging processes for the transformation of petroleum- or biomass-derived feedstocks to chemicals and fuels. Jentoft’s project focuses on acid-catalyzed processes that are characterized by long-lived surface species, which are often trapped in the pores of a solid catalyst.

“It is absolutely fascinating to me that the solid material that is placed into the reactor as the catalyst often has to undergo bulk and surface transformations to become catalytically active” Jentoft states. “It also makes our research very challenging because characterization of the starting material as such is insufficient.”

In some instances, these species appear to be necessary for the catalysis to proceed, whereas in other cases, they lead to deactivation of the catalyst. The objective of Jentoft’s project is to unravel the nature and reactivity of such species, and to use this knowledge to design better catalysts and more efficient chemical processes by promoting the target reaction while suppressing side product formation and deactivation. The catalytic transformation central to the project is the conversion of methanol to olefins, which is both of industrial relevance and a compelling example of an unresolved, complex mechanism. Methanol can be produced from diverse feedstocks, and olefins are both useful monomers and precursors for higher-value molecules.

The research conducted in this project establishes the reaction network of methanol-to-olefins conversion via a staged plan. In the first stage, a knowledge database is generated that enables identification of surface species by their vibrations and electronic transitions, which can be probed by spectroscopy.

In the second stage, correlations between spectroscopically measured concentrations of surface species and gas phase product formation rates pinpoint catalytically relevant intermediates among the variety of species typically present on a catalyst surface. In the third stage, these new insights are used to tailor the catalyst. Anticipated outcomes are fundamental insights into organic surface reactions on solid acids, new strategies to combat deactivation in acid-catalyzed processes and improved catalysts for methanol-to-olefins conversion.

Jentoft says “I am thrilled about the support for our group’s fundamental research.”

Forbes Will Use Manning Award to Target Deadly Hepatocellular Cancers

Professor Neil St. John Forbes of the Chemical Engineering Department will receive a Manning-Institute for Applied Life Sciences Award (IALS) from the UMass Applied Proof-of-Concept Seed Fund Program. The grant will help the Forbes start-up company, Ernest Pharmaceuticals, to develop a bacterial intracellular delivery platform (BacID) to target therapeutic drugs specifically and directly into Hepatocellular carcinoma (HCC) cells, which represent the third-leading cause of cancer-related deaths worldwide. One benefit of this pioneering therapy is treating advanced HCC tumors that are currently untreatable.

According to Forbes, “HCC incidence has tripled since 1975, and increased incidence in Western countries is expected due to its link with obesity and diabetes. Almost 75 percent of HCC patients get diagnosed at intermediate or late stage, for which no curative treatment exists.”

Forbes says that the current clinical therapies extend overall survival by several months before the onset of recurrence or multi-drug resistance. With a growing number of patients, very little progress has been made in increasing overall survival in HCC over the last decade.

Forbes says that his delivery platform offers the promise of a bacterial therapy to treat advanced HCC.
Preserving Vaccines Without Refrigeration

As the public has seen during the testing of lifesaving COVID-19 vaccines, refrigeration is one key to their distribution. According to an article from the UMass News Office, Associate Professor Sarah Perry of the Chemical Engineering Department at UMass Amherst has teamed up with Caryn Heldt, director of the Health Research Institute at Michigan Technological University and professor of chemical engineering, to develop a method using proteins to keep vaccines stable without the need to refrigerate them.

See Science Codex; ScienceDaily; and UMass News Office release

When asked if their new method could be applied to address some of the refrigeration challenges associated with the COVID-19 vaccines, Perry explained that “While it is possible that our method might work for COVID-19, vaccines can come in very different forms. Some are inactivated viruses, some are particular proteins from the virus surface, while others (as highlighted by the work of Pfizer and Moderna) are RNA-based vaccines. Our recent work focused on viruses, so further study would be needed to understand how our approach could be applied to RNA-based vaccines.”

Statistics from the World Health Organization suggest that half of vaccines are wasted annually because they aren’t kept cold. Typical vaccine solutions contain a lot of salt or sugar, which serve as natural preservatives to help stabilize the vaccine, in addition to refrigeration.

The viruses in vaccines, which train cells to identify and fight viral invaders, must be kept cold to keep them from bursting apart. The typical shipping temperature for vaccines ranges from 2 to 8 degrees Celsius (35 to 47 degrees Fahrenheit). However, many potential COVID-19 vaccines require even colder temperatures, as was recently revealed during the rollout of potential COVID-19 vaccines in the late stages of testing by Pfizer and Moderna.

Perry and Heldt have developed a way to mimic the body’s environment in vaccines using a process called complex coacervation. Rather than relying on refrigeration, Perry and Heldt tap another method to keep viruses stable; a pioneering technique which they refer to as “crowding.”

With this “crowding” technique, Perry and Heldt use polypeptides — synthetic proteins — that have positive or negative charges. According to the News Office story, when these charged peptides are put in solution, “they stick together and form a separate liquid phase, a process called complex coacervation. The liquid wraps around virus capsids, holding the virus material together like a burrito’s tortilla.”

Perry said that “These coacervate materials are something that we actually see all of the time in our daily lives. Many shampoos undergo coacervation. When you put the shampoo onto your wet hair, the water that is present dilutes the shampoo, causing it to phase separate and facilitating the removal of dirt and oil from your hair.”

Complex coacervation works for nonenveloped viruses, which have no lipid, or fatty layer, around them. Nonenveloped viruses include polio, rhinovirus (which causes the common cold), and hepatitis A. (COE December 2020)

AEE—Prism Link here

Oncology Nursing Society Praises UMass Researchers’ Water-purifying System

ONS Voice (website of the Oncology Nursing Society) offered high praise for the pioneering, portable, water-purification system developed by a multidisciplinary UMass research team. The team included: Associate Professor Sarah Perry of the Chemical Engineering Department; Human Testing Control Facilities Director Michael Busa in the Institute for Applied Life Sciences; Associate Professor Rachel Under; Julie Bliss Mullen, a doctoral alumna of the Civil and Environmental Engineering Department and a Forbes Magazine “30 Under 30” all-star in science; and Chemical Engineering alumnus Bryan Chua, who was celebrated as a “21st Century Leader” at his graduation ceremony for his wide-ranging involvement in sustainability issues.

The team’s water-purifying system would be a boon during disasters, such as the 2017 Hurricane Maria situation in Puerto Rico and elsewhere, when safe, clean, and easily accessible water is very difficult to find. The new portable system can filter water to medical-grade purity.

As ONS Voice explained, “telehealth” resources have been present in the United States for several decades. Traditionally, clinicians have used telehealth to help rural populations with limited access to care. However, telehealth innovations expand beyond home-care coordination and can now use technology to reach even the most remote and vulnerable patients.

As one prominent example, ONS Voice cited the UMass research group. “One of the inventions that the University of Massachusetts’ team developed addresses emergency nursing in remote areas. The engineers and scientists...built and tested components of a new portable, self-contained system that would filter water that was easier to access during disasters, like bottled or tap water, to medical-grade purity, then add it to sterile bags containing the proper salts, thereby creating new IV fluids right at the point of care.”

The UMass team that developed this water-purifying system represents a first-rate model for interdisciplinary cooperation and productivity in which the resulting research is invaluable for society’s most vital applications. (COE January 2023)
Chemical Engineering (ChE) Assistant Professor Jungwoo Lee, an adjunct of the Biomedical Engineering Department, leads a multidisciplinary team of researchers at the UMass Institute for Applied Life Sciences that has developed a technique to replicate bone tissue complexity and bone remodeling processes. This breakthrough could help researchers advance their study of bone biology and assist in further developing drugs for osteoporosis.

**See UMass News Office story »**

The team includes: Yongkuk Park, and Ryan Carpenter from the ChE department; Eugene Cheong, biochemistry and microbiology; Jun-Goo Kwak, molecular and cellular biology graduate program; and Jae-Hyuck Shim of the UMass Medical School in Worcester. The researchers recently published their findings in the peer-reviewed journal *Science Advances*.

According to the UMass News Office release, Lee’s team developed a trabecular bone organoid model that reproduces essential extracellular complexity and cellular processes of trabecular bone cavities. Trabecular bone, or spongy bone, is a light, porous bone enclosing numerous large spaces that give a honeycombed or spongy appearance. Trabecular bones are the “shock absorbers” of the body, transferring mechanical loads from the articular surface to the cortical bone. These bones have a lower calcium content and more marrow content compared to cortical bone, and their density decreases with aging.

“Bone is a multifunctional tissue not only maintaining mechanical stability, but also regulating blood-forming and blood mineral content,” explains Lee. “However, investigating bone remodeling biology is challenging because this process occurs inside the bone cavity.”

According to Park, the lead author in this interdisciplinary study, “Hard and opaque bone tissue is difficult to access, thus creating realistic bone tissue models outside of the body will advance our understanding of fundamental bone biology as well as provide new opportunities to model disease progression and screening drug responses.”

As the New Office story notes, humanized trabecular bone models could improve the predictive power of pre-clinical studies and shorten the screening period for osteoporosis drugs. It could also help researchers facilitate the future study of numerous aspects of bone biology.

As Lee says about the Lee Research Group, “The mission of our laboratory is to deliver enabling and translatable platform technologies that can advance basic biomedical research, solve various medical problems, and ultimately improve patient care. We design and manufacture a broad range of materials to construct standardized, functional human tissue models, and apply multi-dimensional imaging modalities to quantitatively capture complex, dynamic biological processes.”

Lee adds that “The highly cross-disciplinary and collaborative working environment provides unique opportunities to group members at every stage to foster skill-sets and intellectual proficiency at the intersection of engineering and medicine.”

**ADVANCE Research Will Develop Tool to Reverse Immunosuppression**

The University of Massachusetts Amherst ADVANCE Program has awarded a competitive collaborative research seed grant to Associate Professor Shelly Peyton of the Chemical Engineering Department and Assistant Professor Michelle Farkas of the Chemistry Department. Their ADVANCE research will develop a new tool for studying, stopping, and reversing the immunosuppression of the immune system in patients with cancer and other diseases.

**See UMass News Office release**

Competitive ADVANCE grants aim to foster the development of innovative and equitable collaborative research projects among faculty. The ADVANCE project being carried out by Peyton and Farkas is titled “Lighting Up Macrophages in Three-Dimensional Tissues.”

As Peyton and Farkas explain, macrophages are unique cells that can both activate and suppress the immune system by rapidly switching between states that either stimulate or suppress it. However, the balance between these states can be disrupted in cancer and other diseases, which can be disastrous for patients. But the study of this disruptive process also presents targets for treatment.

“There is a critical need for tools to study this interconversion, information vital to being able to stop or reverse immunosuppression,” as Peyton and Farkas say.

During their collaborative ADVANCE research, Farkas will develop real-time fluorescent reporters of macrophages to track their changes, while Peyton will then use these reporters in three-dimensional tissue culture models, which mimic the tumor microenvironment, to visualize and quantify macrophage-tumor interactions.

This work represents the first use of macrophage-based reporters and the first instance of real-time tracking of macrophage states in a multi-component system.

(COE December 2020)
Pioneering Method for Synthesizing Zeolites Used for CO2 Capture

Distinguished Professor H. Henning Winter and Associate Professor Wei Fan, both of the Chemical Engineering Department, have been issued U.S. Patent 10,793,442, which is called “Exfoliation of Zeolites in Functionalized Polymers.” Winter and Fan explain that their patented new method is a ground-breaking shortcut for synthesizing zeolites that are vital for capturing carbon-dioxide (CO2) pollutants using coal and natural gas, responsible for nearly one-third of total CO2 emissions in the United States. Zeolites also have widespread applications as a catalyst.

In their research, Winter and Fan have created a novel method for drastically cutting down the fabrication steps needed to form two-dimensional porous zeolites for gas separation and other advanced applications. As Winter and Fan explain the background of their patent, two-dimensional zeolites (2DZs) are a new class of porous materials with open pores of about 1 nanometer small and propagating only in two dimensions.

“In this recent invention,” say Winter and Fan, “we invented a facile, efficient, and reproducible exfoliation method to fabricate one unique 2DZ with MWW structure which has a pore size of around .3 nanometers using commercially available liquid hydroxyl-terminated polybutadiene (HTPB). The process only requires manually mixing the zeolite precursors in the liquid HTPB, avoiding other complicated exfoliation steps.”

Winter’s research group measures, analyzes, and models the rheology of soft matter. As Winter says, “This includes materials with dynamically evolving properties, such as physically and chemically crosslinking systems, crystallizing polymers, colloidal glasses, microphase-separating block copolymers, drying paints, aging bitumen, and structuring nanocomposites. It also includes complex materials, such as molten polymers, coacervates, adhesives, and hydrogels with molecular sensors. We place particular focus on the development of advanced experimental methods and models, as needed.”

Fan heads the Porous Materials Research Group. “The research of our group focuses on the rational synthesis of nanoporoporous materials for biorefinery and drug delivery,” says Fan. “The pore structure and size, surface properties, and active sites, are tailored based on the comprehensive understanding of their crystallization mechanism.”

“2DZs can be used to fabricate high-throughput nanometer-thick separation membranes with molecular recognition which can separate CO2 from nitrogen gas,” say Winter and Fan. “It is crucial for CO2 capture from the emission of electric power sector using coal and natural gas, which causes around 30 percent total CO2 emission in the U.S. In addition, 2DZs can be also used as catalysts, having potential to enhance the moving of molecules during their reactions and maximizing their catalytic performance.”

According to Winter and Fan, the problem is that, although 2DZs have shown very promising properties, the synthesis of 2DZs is still a challenge and requires multiple steps. Their new patented method is a possible answer to that challenge.

COE August 2020

Faculty Accomplishments at a Glance

Research Awards
- Sarah Perry, 3M Award
- Jungwoo Lee, Korean PYI
- Jessica Schiffman, ACS Young Investigator Award
- Shelly Peyton, AIMBE Fellow, Manning Prize
- Neil Forbes, Manning Prize
- Ashish Kulkarni, Bioengineering Young Innovator Award

Fellows
- Lakis Mountziaris, elected Fellow of the American Association for the Advancement of Science (AAAS)
- Christos Dimitrakopoulos, Academy of Inventors Fellow
- Lakis Mountziaris, AIChE Fellow
- Dimitrios Maroudas, AIChE Fellow

Professors
- Wei Fan, Ed Price Professorship
- Nick Wu, Armstrong/Siadat Professorship
- Shelly Peyton, Armstrong Professorship

NSF Early Career Awards
- Omar Abdelrahman
- Lauren Andrews
- Peter Beltramo
- Jungwoo Lee
- Sarah Perry

College of Engineering Awards
- Friederike Jentoft, Outstanding Senior Faculty Member
- Shelly Peyton, Diversity, Equity and Inclusion Award
- Jungwoo Lee, Outstanding Junior Faculty Member
- Jessica Schiffman, Outstanding Teacher Award

Cover Articles
- Nick Wu, Journal of Chemical Physics
- Jungwoo Lee, ACS Biomaterials Science and Engineering
- Wei Fan, J. American Chemical Society
Graduate Degrees Awarded

September 2020 to May 2021

September 2020

Yalin Liu, PhD (Chair: Sarah Perry)
Designing Material Properties in Polyelectrolyte Complexes

Whitney Cole Blocher, PhD (Chair: Sarah Perry)
Encapsulation and Stabilization of Biomacromolecules

Abhinav Sharma, PhD (Chairs: Neil Forbes and Jungwoo Lee)
Micro-Physiological Models to Mimic Mucosal Barrier Complexity of the Human Intestine In Vitro

Mengxi Chen, PhD (Chair: Dimitrios Maroudas)
Structure-Properties Relations in Graphene Nanomeshes and Interlayer-Bonded Twisted Bilayer Graphene Nanocomposite Superstructures Obtained by Atomic-Scale Modeling

Vishnu Raman PhD (Chair: Neil Forbes)
Creation of a Tumor Specific, Salmonella Based, Intracellular Cancer Therapy

Brandon Dunham, PhD (Chair: Christos Dimitrakopoulos)
Market-Conscious Strategies to Improve the Performance and Stability of Planar, p-i-n Hybrid Organic-Inorganic Metal Halide Perovskite Solar Cells

February 2021

Yen Tran, PhD (Chair: Shelly Peyton)
Force-responsive, Cryptic Materials and Their Applications

Xiangan Li, PhD (Chair: Michael Henson)
Metabolic Models of Gas Fermentation for Renewable Fuels and Chemicals Production

Xiangxi (Zoey) Meng, PhD (Chairs: Sarah Perry and Jessica Schiffman)
Electrospinning Fibers via Complex Coacervation

Sanket Ulhas Sabnis, PhD (Chair: Wei Fan)
Synthesis of inorganic porous materials with tunable morphology for molecular adsorption and separation applications

May 2021

Yimin Sun, MS (Chairs: Sarah Perry and John Klier)
Elucidating Mechanisms of Metastasis with Implantable Biomaterial Niches

Nicholas Bryant, MS (Chairs: Sarah Perry and John Klier)
Reverse Engineering and Replicating Fast-Setting Water-Based Coatings Using Complex Coacervates
Faculty Research Areas

**Bioengineering**: cellular engineering; metabolic engineering; targeted bacterioolytic cancer therapy; synthesis of small molecules; systems biology; biopolymers; nanostructured materials for clinical diagnostics, synthetic biology and cancer immunotherapy.

- Lauren Andrews
- Neil Forbes (Forbes Research Group)
- Michael Henson (Henson Research Group)
- Ashish Kulkarni (Kulkarni Research Group)
- Jungwoo Lee (Lee Research Group)
- Shelly Peyton (Peyton Research Group)
- Nianqiang Wu (Wu Research Group)

**Catalysis and Sustainable Energy**: conversion of biomass to fuels and chemicals, hydrocarbon chemistry, C1 chemistry, acid-base catalysis, electrocatalysis, microwave reaction engineering, computational catalysis, microkinetic modeling, catalysis thermodynamics, microporous materials synthesis, mass transport in porous materials, catalyst characterization methods, in situ spectroscopy.

- Omar Abdelrahman (Abdelrahman Research Group)
- Peng Bai (Bai Research Group)
- W. Curt Conner
- Wei Fan (Fan Research Group)
- Friederike Jentoft
- Rolf Jentoft
- Nianqiang Wu (Wu Research Group)

**Materials Science and Nanotechnology**: design and characterization of new catalytic materials; nanostructured materials for nanoelectronics, optoelectronics, and photovoltaics; graphene and carbon nanomaterials; synthesis and characterization of microporous and mesoporous materials; colloids and biomaterials; membranes; biopolymers; rheology and phase behavior of associative biomaterials; polymeric materials processing.

- Peng Bai (Bai Research Group)
- Peter Beltramo (Beltramo Research Group)
- Christos Dimitrakopoulos
- John Klier
- Dimitrios Maroudas
- Sarah Perry (Perry Research Group)
- Jessica Schiffman (Schiffman Research Group)
- H. Henning Winter
- Nianqiang Wu (Wu Research Group)

**Molecular, Multi-scale, and System-level Modeling**: Quantum chemistry and density functional theory; Computational statistical mechanics; Computational materials science; Computational fluid dynamics; Hierarchical and equation-free multi-scale modeling; Machine learning and high-throughput screening; Bioprocess systems engineering; Population-dynamics modeling.

- Peng Bai (Bai Research Group)
- Jeffrey Davis
- Michael Henson (Henson Research Group)
- Dimitrios Maroudas
Starting in the Spring of 2019, the Abdelrahman Lab is all set up in their new space in Goessmann Laboratory, working on designing new catalytic systems for renewable energy and chemical production. Founding graduate students Han and Ajibola are working on understanding metal oxide and phosphorous based catalysts for the renewable production of polymer building blocks from biomass, paving the way to the renewable production of resources like butadiene and isoprene. The lab is also excited to welcome post doc Joshua Gopeesingh to work on our first NSF funded project, which reimagines catalysts as dynamically evolving materials that can be controlled through targeted energetic oscillations. We are also excited to welcome our newest lab members, first year graduate students Shreya Thakkar and Sydney Foster. Shreya is off to a great start working on understanding the fundamentals of solvent environments on catalyst surfaces for selectivity control, while Syd is redesigning calorimetry studies for catalyst surfaces to deepen our understanding of active site control.

Abdelrahman Receives CAREER Award to Generate Pioneering Catalysts for Green Chemical Production

“As Abdelrahman explains his work, “Cost-effective and renewable energy is on the horizon, which is shifting the question from will we have renewable electricity to what should we do with it all? Dynamic catalysts hold the potential to one day revolutionize the way we produce the chemicals and fuels we consume as a society.”

(COE April 2021)
Andrews Research Group

In the Andrews Lab, we have been continuing our research to develop microbial communities that can be used to manufacture bioproducts efficiently and working to develop therapeutic gut microbes. We have developed new synthetic biology tools for non-model microbes and genome-wide engineering. In collaboration with Jessica Schiffman, we are also using these tools to understand and prevent bacterial infections on biomaterial surfaces. Over the past year, we have celebrated the many accomplishments of our team. Stephanie Call (ChE PhD) was awarded the prestigious NSF Graduate Research Fellowship and received the Google Cloud 2018 Academic All-District Women’s At-Large Division I Team award at her alma mater, the University of Tulsa, this spring. Matt Lebovich (ChE PhD) completed his NIH UMass Biotechnology Training Program Fellowship. Undergraduate researcher Kira Levenson (BMB UG) was awarded the Jessica Hayes Memorial Scholarship from the Biochemistry department. Maggie Dreishpoon successfully defended her Honors Senior Thesis Research and graduated with honors. Lauren Andrews received an NSF CAREER award, an ADVANCE Collaborative Research Seed Grant (with Jessica Schiffman), an NSF Biomaterials research grant (with Jessica Schiffman), and the Marion & Jasper Whiting Foundation Fellowship. Our group created a hands-on lab activity ("Bioengineering: How Engineering Cells Could Save a Million Kids per Year") for high school students to learn about our research, and we had so much fun presenting at various events, including the North Central Massachusetts Talent Search and the Women in Engineering & Computing Career Day.

Bai Research Group

The Bai group develops advanced multi-scale modeling and machine-learning methods, and apply them to study catalysis and separation in complex environments. Current research focus includes the investigation of catalytic systems containing high degrees of configurational diversity for parts not directly connected to the active sites: enzyme-like substrates that can adapt to the reacting species; 3-dimensional framework catalysts (zeolites and MOFs) that “recognize” molecules; and complex solvents with hydrophobic and hydrophilic domains. The beauty as well as the challenges of these systems arise from the fact that parts surrounding the active sites bestow much of the selectivity via non-covalent interactions. As a result, new tools and methods need to be developed to incorporate the sampling of phase space with the modeling of the reaction itself. Improved understanding in these areas may unlock the ability to select the optimal solvent system or 3-D framework structure based on the desired reaction, or to design enzyme-like, ultra-efficient catalysts using abundant elements, which will lead to significant gains in yields and selectivity for a wide range of reactions in the production of fuels and chemicals and the upcycling of plastic waste.
Beltramo Research Group

Group Contact Info:

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Recent Awards:

2020  NSF CAREER Award
      Lilly Teaching Fellowship

2019  American Chemical Society Doctoral
      New Investigator Award
      Student-Centered Teaching &
      Learning Fellowship

Research

Research in our group focuses on applying fundamental engineering principles and novel techniques to understand and engineer interfacial processes. Interfaces are everywhere, so our research has applications ranging from creating biomimetic materials for drug delivery to stabilizing emulsions in the food and petroleum industry. In the realm of biophysics, we’re interested in how information passes through the cell membrane and how particle/membrane interactions and material properties can be measured, controlled and exploited. This research is supported by an NSF CAREER Award. In colloid science, we’re imagining how particle size, shape and surface chemistry can be manipulated to create super-stable emulsions and develop novel photonic materials. This research is funded by an ACS-PRF Award and a large collaboration through ARL. The past year was certainly eventful in the Beltramo Lab, as we had three students (Paige Liu, Guinevere Tillinghast, Shreyas Joshi) successfully defend their Master’s thesis and two manuscripts published.

Outreach:

The Beltramo Group recently participated in the Discovery Museum (Acton, MA) Meet the Scientists night, where children learned about cell membranes by playing with soap bubbles!
Fan Porous Materials Research Group

Research Overview
The research of our group focuses on the rational synthesis of nanoporous materials for biorefinery and drug delivery. The pore structure and size, surface properties and active sites are tailored based on the comprehensive understanding of their crystallization mechanism.

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Group meeting with social distancing

Lab activities for Fan’s lab

Graduated undergraduate student, Jonathan Delaney, doing his final experiment in lab during the pandemic, with Jason Gulbinski. Jonathan Delaney will join University of Ulm in Germany as a master student in “Energy Science and Technology”
Forbes Research Group

Forbes Twitter Feed: [@forbeslabmass](https://twitter.com/forbeslabmass)
Neil Forbes Email: forbes@ecs.umass.edu

Research in the Forbes Lab is at the interface of engineering and medicine. We use fundamental principles to understand and control the mechanisms of human disease. The central theme of all projects is molecular transport in biological systems. The research is composed of experimental and computational techniques at the intersection of biomedical engineering, tumor biology, microbiology, and synthetic biology. Projects are focused on developing treatments for cancer, but this technology can be applied to many diseases and biomedical problems. Several specific research areas are:

- Engineer bacterial therapies that target tumors, penetrate tissue and deliver specifically designed anticancer molecules. We call this approach intratumoral therapeutic delivery. The ultimate goal is to create treatment modalities to treat patients with drug-resistant tumors and metastatic disease.
- Design of genetic circuits to control the motility and protein expression of bacterial vectors.
- Develop in vitro devices to quantify the transport of drugs and bacterial vectors in tumor tissue.
- Build computational tumor models to predict optimal drug designs and treatment strategies.

Henson Research Group

Group Contact Info: [http://www.ecs.umass.edu/che/henson_group/](http://www.ecs.umass.edu/che/henson_group/)
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The focus of the Henson Group is to develop system-level models and apply process engineering principles to problems in human health and renewable chemical production. Our research in human health is focused on computational modeling of bacterial communities that promote health, such as the human gut microbiota, or cause polymicrobial infections associated with cystic fibrosis and chronic diabetic wounds. Our models are calibrated with in vivo and/or in vitro data, in particular the relative abundances of different bacterial species, and generate predictions about intra-species interactions which are difficult to interrogate experimentally. Our long-term goal is develop model-based techniques to identify weak links in polymicrobial infections that can be targeted with novel antibiotic therapies. This research is supported by a recent NIH award on cystic fibrosis airway infections. Our research in renewable chemical production involves computational modeling of engineered microbial communities for conversion of relatively cheap carbon feedstocks to platform chemicals. We have particular interests in bioreactors for conversion of complex sugar mixtures and gas fermentation processes for upgrading of CO-containing waste gases. This research is supported by two recent NSF awards focused on synthetic yeast communities engineered to interrogate sucrose metabolism and bubble column reactors for CO conversion to butyrate and 2,3-butanediol. All these projects leverage the power of genome-scale metabolic reconstructions for describing metabolic interactions between diverse microbial species.
Graduations and Associated Research Highlights

In summer 2021, two students of the Jentoft group defended – Eric Hernandez a dissertation with the title “Spectroscopic Investigations of Zeolite-Catalyzed Carbenium Ion Chemistry” and Aditya Rane a M.S. thesis with the title “Effect of Phase Composition of Tungsten Carbide on its Catalytic Activity for Toluene Hydrogenation.”

The focus of Eric’s dissertation is methanol-to-olefins conversion, an advantageous pathway for the manufacture of small olefins, which are essential for producing important polymers. The process still faces challenges, namely catalyst deactivation and less-than-ideal selectivity. Eric advanced the interpretation of IR and UV-vis spectra of surface intermediates, which enables us to better understand (and hopefully ultimately control) the reaction chemistry in the pores of the zeolite catalysts used for methanol conversion.

Aditya synthesized tungsten carbides, which are potential replacements for precious metal catalysts, and analyzed their crystal structure, surface properties, and catalytic activity for toluene hydrogenation. Interconversion of toluene and methylcyclohexane is interesting for hydrogen storage, and toluene conversion is also a model reaction for heavy oil upgrading.

New Group Members

Dipti Bhave joined as a PhD student to take on the methanol-to-olefins conversion project (funded by the Department of Energy). Dipti holds a B.S. in Oils, Oleochemicals and Surfactants Technology from the Institute of Chemical Technology, Mumbai.

Alexander Marshall conducted an Honors Independent Study project in spring 2021 and explored new catalysts for the conversion of sugars and sugar alcohols into olefins by a transformation called deoxydehydration. Alex has submitted an Honors Thesis proposal to continue this research.

Collaborations

The Jentoft Group continued its collaboration with the Auerbach Group in the Department of Chemistry on carbocation chemistry in zeolites and submitted another joint paper. The carbide project benefitted from the collaboration with the Köhler Group at TU München in Germany (supported by DAAD - German Academic Exchange Service), and the Gazit Group at Technion, Haifa sent catalysts for the aldol project (collaboration funded by the National Science Foundation).

Service to the Scientific Community

Jentoft is presently an Elected Member at Large of the ACS Catalysis Division Executive Committee. As Chair of the Division’s Educational Committee, she launched the new ACS CATL Division Educational Seminar Series for graduate students and researchers. The first set of virtual lectures occurred in Fall 2020, and the Committee organized and chaired a second series in Summer 2021.
Kulkarni Research

Publications:


News Updates:

- Ashish Kulkarni was selected as the NSF ADVANCE Faculty Fellow at UMass
- AnnMarie won the Prestigious 21st Century Leaders Award
- Nanlan Yang is starting her graduate school at Johns Hopkins University
- Vaishali Malik completed her MS in Molecular and Cellular Biology Program
- Simran Singh was accepted to the Junior Fellows Program at UMass
- Anthony Brouillard won the Eldridge Award

https://youtu.be/C2A0x13jio0

Ashish Kulkarni, a biomedical engineer, is working with an interdisciplinary research group to develop new ways to treat cancer. Using a nanotherapeutic platform, these new methods are showing powerful results with less side effects for patients.
Ryan Carpenter completed his doctoral degree and got a job in Platelet Biogenesis in Boston. Patrick Ryan has joined the lab as a new member. Recently he has received UMass Biotechnology Training Program Fellowship. Yongkuk Park’s work entitled “Trabecular bone organoid model for studying the regulation of localized bone remodeling” paper is published in Science Advances, a high-profile open-access journal. This work is based on “Demineralized bone paper”, a newly developed biomaterial platform in the lab, representing many exciting opportunities to reproduce bone relevant tissue microenvironments and remodeling processes. Post-pandemic, the lab hosts Emma Villares (ChE, Junior) and Joseph Werenski (BME, Junior) for NSF REU students. The lab graduated five seniors in 2021. Three students went to graduate schools (Parker Bowden-Univ. of Colorado ChE, Katherine Daniel-Univ. of Rochester BME, Andrew Orenburg – Univ. of Pittsburg BME). Kyle Papulis, Duong Nguyen, and Andrew Hallinan got their jobs in biotech companies. Julia Tupper secured a lab assistant job in Beth Israel Deaconess Medical Center to prepare for her medical school. The lab alumni, Natasha Bitar, got admission to UMass Medical School. Finally, Dr. Lee has promoted to Associate Professor. Despite the COVID-19 pandemic, we are staying health and doing well in our careers. Congratulations all!!

UMass Amherst Researchers
Develop Technique to Replicate Bone Remodeling Processes

Jungwoo Lee, Yongkuk Park
Maroudas Research Group

The main theme of Prof. Maroudas’ research group is the multi-scale modeling and simulation of complex systems, with emphasis on establishing processing-structure-properties-function relations in bulk, thin-film, nanostructured, and low-dimensional materials that have applications in electronics, nanotechnology, and numerous energy technologies. The group’s research combines a broad range of computational tools, including first-principles density functional theory (DFT) calculations, Monte Carlo (MC) and molecular-dynamics (MD) simulations, coarse-grained stochastic dynamical simulators, and deterministic continuum-scale computational models employing finite-element, boundary-integral, or spectral methods, in conjunction with linear and nonlinear analyses of structural and morphological stability. The group’s current research efforts focus mainly on two topical areas: (1) plasma-surface interactions and their impact on the thermomechanical properties and surface structural and morphological response of plasma-facing components (PFCs) in nuclear fusion reactors; and (2) establishing structure-properties-function relations in graphene derivatives and graphene-based metamaterials and nanocomposites. The former effort is funded by a $20M multi-institutional SciDAC (Scientific Discovery through Advanced Computing) center through the U.S. DOE Offices of Fusion Energy Sciences and Advanced Scientific Computing Research, for which Maroudas serves as the UMass PI, while the latter effort is supported by the U.S. Army Research Laboratory.

Research by Maroudas’ group and collaborators unlocks the mystery of plasma-facing materials surface damage in nuclear fusion devices

The practical realization of nuclear fusion for electrical power production is widely recognized as a grand challenge for science and engineering for the 21st century. In the quest for fusion, a major obstacle is the design of materials for plasma-facing components (PFCs) which can tolerate the extreme heat and particle flux exposure conditions inside a fusion reactor core. Maroudas’ research in this field focuses on developing multi-scale models and simulation tools to predict the effects of plasma-surface interactions on PFC surface morphological evolution and near-surface structural evolution and to evaluate how such dynamical response affects the thermomechanical properties of PFC materials for the divertor, a key component of a nuclear fusion reactor that acts as an exhaust system to extract heat, helium, and other impurities from the plasma. Tungsten is the material of choice for the divertor in ITER (International Thermonuclear Experimental Reactor) because of its low sputtering yield and remarkable melting point, mechanical strength, and thermal conductivity. However, experiments have shown that, under fusion reactor operating conditions, implantation of helium ions produced in the fusion reaction is responsible for the formation of a fragile fiber-like crystalline nanostructure on the tungsten surface, known as “fuzz”, which has detrimental effects on the reactor performance. Numerous atomistic simulation studies have provided insights into this complex structure formation. Nevertheless, all these efforts have fallen short of simulating the spatiotemporal scales relevant to the fuzz formation process.
Together with his research collaborators, Prof. Brian Wirth and his postdoctoral research associate Dr. Dwaipayan Dasgupta, at the University of Tennessee, Knoxville, Maroudas has developed a hierarchical, three-dimensional continuum-scale model for the surface morphological response of PFC tungsten, capable of accessing the length and time scales (micrometers and hours) relevant to surface damage formation in PFC tungsten; the model accounts for various dynamical phenomena, including curvature-driven surface diffusion, stress-driven surface transport due to over-pressurized helium bubbles forming in the near-surface region of PFC tungsten during He irradiation, as well as defect fluxes toward the PFC surface. Recent upgrades include the incorporation into the model of atomistically-informed constitutive equations, including information (simulation data and scaling relations) on the dependence of the thermomechanical properties of PFC tungsten on the helium concentration in the near-surface region, enabled by systematic protocols of atomic-scale simulations conducted by Dr. Asanka Weerasinghe, a postdoctoral research associate in Maroudas’ group. An important example of such studies, is the establishment of the softening of the elastic moduli in the PFC near-surface region, including both thermal softening at high temperature and softening due to helium accumulation upon He implantation \[\text{A. Weerasinghe, B. D. Wirth, and D. Maroudas, ACS Applied Materials & Interfaces 12, 22287 (2020); \(\text{https://dx.doi.org/10.1021/acsami.0c01381}\).}

Simulations and analysis based on the above model, conducted by Chao-Shou (Josh) Chen, a Ph.D. student in Maroudas’ group, revealed that the elastic softening of the PFC near-surface region accelerates both nanotendril growth on the PFC surface and the onset of fuzz formation. The study also demonstrated that accelerating the rate of He accumulation accelerates the growth rate of nanotendrils emanating from the surface. Moreover, the study introduced the concept of an incubation time as a kinetic metric for nanotendril growth on the PFC surface, which predicts and explains the minimum exposure time required to observe fuzz formation on PFC tungsten surfaces. These findings were published in Nuclear Fusion \[\text{C.-S. Chen, D. Dasgupta, A. Weerasinghe, B. D. Wirth, and D. Maroudas, Nuclear Fusion 61, 016016 (2021); \(\text{https://doi.org/10.1088/1741-4326/abbf64}\).}

A more recent, upgraded version of the model also accounted for two types of bubble dynamical phenomena in the near-surface region of PFC tungsten during He plasma irradiation, involving bubble bursting and surface crater formation resulting in the appearance of surface holes of 10–20 nm in diameter, consistent with experimental observations. A simulation study and detailed surface characterization analysis conducted by Josh Chen demonstrated that this hole formation effect on the PFC tungsten surface accelerates the growth rate of nanotendrils and the onset of fuzz formation, leading to a further reduction of the incubation time for PFC surface growth, in good agreement with experimental measurements of incubation fluence. More importantly, the simulations have managed to capture the fine surface features in the PFC tungsten surface morphology (see figure) that are observed experimentally and predict that the average spacing between nanotendrils is on the order of 100 nm, consistent with the experimental findings. This is the first time that this level of surface morphological precision has been achieved by a coarse-grained modeling tool capable of accessing the relevant spatiotemporal scales of PFC surface damage. The findings of this study were published in the Journal of Applied Physics \[\text{C.-S. Chen, D. Dasgupta, B. D. Wirth, and D. Maroudas, Journal of Applied Physics 129, 193302 (2021); \(\text{https://doi.org/10.1063/5.0050195}\).}
Research Summary:
We are a diverse and creative team who work to use self-assembly, molecular design, and microfluidic technologies to address real-world problems. In particular, we are looking to use charge-driven polymer assembly to develop new classes of more sustainable and recyclable materials for applications ranging from adhesives to vaccine stabilization. We are also pushing the boundaries of microfluidic technology to enable cutting edge X-ray experiments.

Accomplishments:
• Graduated senior Joshua McGee was named a Rising Researcher, won an NSF Graduate Research Fellowship, and will be joining the PhD program in Biomedical Engineering at Boston University this fall.
• Graduated senior Hansen Tjo won Best Presentation - Biomolecular at the 2020 Gulf Coast Undergraduate Research Symposium, and will be joining the PhD program in Chemical and Biological Engineering at Princeton University this fall.
• Yimin Sun defended her MS thesis on “Cryptic Materials and Coacervates” and is now working as a researcher at WuXi STA.
• Nicholas Bryant defended his MS thesis on “Reverse Engineering and Replicating Fast-Setting Water-Based Coatings Using Complex Coacervates” and will be taking a position at MacDermid.
• Xiangxi “Zoey” Meng, a co-advised PhD student with Jessica Schiffman defended her PhD thesis on “Electrospinning Fibers via Complex Coacervation” and is now a postdoctoral researcher with Prof. Rachel Segalman at the University of California Santa Barbara.
• We welcome new PhD students Isaac Ramirez Marrero and Arvind Sathyavageeswaran to the group.

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Middle row: Xianci Zeng, Yimin Sun, Isaac Ramirez Marrero, Priyanka, Mingjun Zhou, Shannon McIntosh;  
Front row: LabLlama, Mr. Felix Cat, Darcy, Kitty, Sarah Perry
Of Note

The University of Massachusetts Board of Trustees named Shelly Peyton the newest Armstrong Professional Development Professor (more here)

Shelly Peyton was promoted to full professor, effective September 1, 2021.

In addition, she was chosen for the 2021 College of Engineering Diversity, Equity and Inclusion Award. Shelly has been instrumental in organizing the Department’s DEI activities (listed here).

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Research Update:
We are several women and men, engineers and biologists, and our mission is to learn how cells process information from their chemical and physical tissue environment. We design polymeric biomaterials to create models of human tissue, and use them to study how cells move, grow, and respond to drugs in different tissue environments. We use this approach to find new ways to stop cancer metastasis, discover more effective cancer drugs, prevent heart disease, and build scaffolds for regenerative medicine.

We are always looking for new members, contact us!
The Schiffman Research Group is an innovative and imaginative research team that has made seminal research contributions to tackle grand challenges in human health and the environment through the discovery of new principles at the interface of chemical engineering, polymer science, materials engineering, and microbiology.

Our core synergistic strengths are to use (1) structure-property-function relationships and (2) green chemistry and sustainable engineering to design next generation materials. These approaches enable us to unveil bioinspired and sustainable approaches to reduce our dependence on petroleum-derived polymers, eliminate organic solvents during manufacturing and provide alternative pathways to reduce infections without relying on commercial antibiotics.

Three areas that we are currently focusing on include the development of (1) Antibacterial and Antifouling Materials, (2) Bioinspired Membrane Technologies for Clean Water and Air, and the (3) Manufacturing of Materials for a Sustainable Future using Green Chemistry and Engineering.

Of Note
- Schiffman Awarded 2020 COE Teaching Award
- Schiffman named the 2020 ACS Young Investigator by ACS Applied Materials & Interfaces
- Schiffman named to the 2021 I&EC Research Class of Influential Researchers
- Schiffman received grant from the National Science Foundation (2029371), EAGER: Collaborative Research: Detection and analysis of airborne coronavirus with bioinspired membranes https://che.umass.edu/news/schiffman-developing-bio-inspired-membrane-capture-covid-19-airborne-droplets

Graduate students:
- Brandon Barajas receives NIH Chemistry-Biology Interface (CBI) Fellowship (2020-2022)
- Emily Diep receives David C. Tillwick Outstanding Teaching Assistant Award (2020)
- Mengfei Huang receives prestigious 3M Internship (summer 2021)

Undergraduate students:
- Schiffman mentors team of four undergraduate women to finals in entrepreneurship competition (Simran Jeet (junior, biology), Sarah Kaunfer (junior, microbiology), Phoebe Lasic-Ellis (sophomore, BDIC/emergency healthcare and trauma) and Hayley McIsaac (sophomore, biochemistry and molecular biology))
- ChE undergraduate Oshiokhai Oyageshio lands 2021 summer Core Summer Internship Program with the NMR polymer facility https://www.umass.edu/ials/csi
The focus of our research is on Electrochemical and Optoelectronic Materials/Devices. We work in four research thrusts of interplay: (i) photocatalysis and photoelectrochemical catalysis for energy and environment sustainability, (ii) electrochemical energy storage, (iii) biosensors, microfluidics, lab-on-chips and point-of-care testing devices for healthcare and environmental monitoring, and (iv) photodynamic therapy, drug delivery, theranostics and precision medicine. These thrusts are built on our core expertise in electrochemistry and plasmonics, and growing at the interdisciplinary interface of materials science, chemical engineering, photonics and biomedical engineering. These thrusts are tied with fundamental discovery of charge transfer and energy transfer processes, and driven by motivation to develop high-performance materials and devices with the ‘material-by-design’ or the ‘device-by-design’ strategy. Our research has been funded by Armstrong-Siadat Endowment, NIH, DOE, NSF, USDA, and other sources.

Dr. Nick Wu continued to be named in Highly Cited Researcher in 2020, which recognizes the Global Scientific Pioneers who has demonstrated significant influence in their fields. Dr. Wu joined this prestigious list with other eight scientists at UMass Amherst.

Dr. Hui Yang has accomplished her postdoctoral training at our research group, and started her new R&D position in a battery company in Silicon Valley, California. Dr. Botong Liu has returned to China and is working as materials scientist a large chemical company. Our research group welcomes four new members: Yingjie Hang, a graduate student, graduated from Soochow University in China; Qian Liu, a postdoctoral fellow, graduated from West Virginia; Weirui Tan, a postdoctoral fellow, graduated from Monash University in Australia; Anyang Wang, a postdoctoral fellow, graduated from The State University of New York at Buffalo.

Sample Research Projects:
Point-of-care testing of trauma brain injury (TBI) biomarkers
Rapid Detection of COVID-19 antigens
Nanoparticle-carried genetic transformation in live plants
Plasmonic nano-array patterns for immunotherapy
Polymer-ceramic electrolytes for Li-ion batteries
Metal-organic framework photoelectrocatalysts hydrogen generation
Photocatalyst for artificial nitrogen fixation

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Google Scholar Page: https://scholar.google.com/citations?user=JIYQ-BQAAAAJ&hl=en
Nick Wu’s email address: nianqiangwu@umass.edu

Jennifer Boryczka
Graduate Student

Yingjie Hang
Graduate Student

Qian Liu
Postdoctoral Fellow
Ph.D., West Virginia

Weirui Tan
Postdoctoral Fellow
Ph.D., Monash
University in Australia

Anyang Wang
Postdoctoral Fellow
Ph.D., The State
University of New
York at Buffalo
This year, persistent UMass Amherst undergraduates adapted to COVID-19 restrictions as they engaged in substantial research, exercised their creativity, and elevated campus and the community. They found ways to thrive—they worked on campus when permitted and capitalized on remote research, learning, and volunteer opportunities. Read about the remarkable accomplishments of the nine spring 2021 UMass Amherst Rising Researchers [here](#) and also [here](#), for Fall 2020.

**Goldwater Scholarship:** Nicholas Sbalbi ’22

Sbalbi, a chemical engineering major, is planning to pursue a Ph.D. in materials science or chemical engineering. His future pursuit is to conduct research involving the manipulation of microscale structure to tune macroscale material properties. His mentors at UMass are Laura Bradley, assistant professor, polymer science and engineering; Peter Beltramo, professor, chemical engineering; and Sarah Perry, associate professor, chemical engineering.

**NSF Graduate Research Fellowship:** Joshua McGee ’21

McGee is studying how microfluidics can be applied to improve the synthesis, purification, and characterization of protein nanoparticle systems, which have proven to be particularly ideal drug-delivery carriers, especially in cancer patients, due to their amphiphilic, biocompatible, and biodegradable nature.

**Scholar in the American Chemical Society’s Scholars Program:** Brandon Ugbesia ’22

**Conference Awards:**

2020 Future Leaders in Chemical Engineering Symposium in North Carolina chooses two of our students: Joshua McGee ’21 for “Microfluidic Synthesis and Purification of Protein Nanoparticles” and Hansen Tjo ’21 for “Charge Density Roles in Polyelectrolyte-Micelle Self-Assembly”

“Best Presentation” in the Biomolecular Engineering Session at the Gulf Coast Undergraduate Research Symposium (GCURS), hosted by Rice University: Hansen Tjo

**Student AIChE Awards**

**Student Poster Competition:** Hansen Tjo and Nicholas Sbalbi

**Materials Science and Engineering:** Nicholas Sbalbi ’21

**Donald F. Othmer Sophomore Academic Excellence Award:** Nicholas Sbalbi ’21

**Freshman Recognition Award:** Thomas Goodwin ’22
At the Materials Research Society (MRS) Meeting in early December, juniors Nicholas Sbalbi and Kyle Schoenberg with doctoral student Heather Hamilton of the Polymer Science and Engineering (PSE) Department to win a first-place prize in the annual Science as Art competition. Their winning entry was a scanning electron microscope (SEM) micrograph titled “Jellyfish Janus Particles.”

The purpose of the Science as Art competition is to show the aesthetic beauty of scientific images. “Nicholas Sbalbi works in Professor Laura Bradley’s lab in PSE, where he is leading a project to develop and understand these jellyfish Janus particles,” explained ChE Associate Professor Sarah Perry, who entered the artwork in the Science as Art competition on behalf of the three students. “The SEM micrograph was taken by Heather Hamilton, a Ph.D. student in Professor Bradley’s lab. The collaboration then extended to include Kyle Schoenberg, who did the false coloring on the image.”

The winning entry was an SEM image of a 1.5-micron-diameter polystyrene-poly (acrylic acid) Janus particle. The underwater effect was added in Photoshop, preserving the morphology and shape of the particle.

**AIChE Leadership for 2021/2022**

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<th>FACULTY ADVISOR</th>
<th><strong>Peter Beltramo</strong></th>
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<tr>
<td>Alice Duong</td>
<td>Vice-President</td>
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<td>Nicholas Sbalbi</td>
<td>Secretary</td>
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<td>Cailyn Gobeil</td>
<td>Treasurer</td>
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<td>Kyle Schoenberg</td>
<td>Academic Chair</td>
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<td>Thomas Goodwin</td>
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Two Chemical Engineering Undergrads Discuss Community Engaged Engineering on National Website

In the spring semester of 2020, undergraduates Katherine (Kat) Nilov and Sanjana Manghnani of the Chemical Engineering Department participated in Engineer Engagement Specialist Dr. Stephen Fernandez’s pilot course on “Learning through Community Engagement and Bridging Engineering Theory and Practice.” Recently, the Campus Compact Website posted an interview with Nilov and Manghnani, in which they very eloquently articulated the impact of the course on their worldview about engineering itself and using their future profession to engage with surrounding communities.

Campus Compact is a national coalition of colleges and universities committed to the public purposes of higher education. The interview with Nilov and Manghnani was the third in a series of posts leading up to a special session at the American Society for Engineering Education (ASEE) 2021 conference on July 27, 2021, entitled “At the Crossroads of Community Engagement, Ethics, Liberal Education, and Social Responsibility: Community engaged engineering education challenges and opportunities in light of COVID-19.”

The purpose of this post was to explore the value of community engaged learning from a student perspective.

As Nilov described their class with Fernandez, “Every week we had a student running a prompted discussion... A lot of the discussion topics were about things like racism in engineering or the environment and engineering... It was very ethics-based, which is very different from most of the classes that we take traditionally. We had readings beforehand and then students who led the discussion would summarize the readings and create discussion prompts.”

ChE Major Mahidhar Sai Lakkavaram Shines in Classroom, in Lab, and in Print

Mahidhar Sai Lakkavaram, a freshman Chemical Engineering (ChE) major and member of the Commonwealth Honors College, is already leaving a permanent mark on UMass Amherst and the College of Engineering as what the Italian Renaissance called the “Uomo Universale,” or “a man who can do all things if he will.” Besides earning the Chancellor’s Award and making the Dean’s List during the fall of 2020 in a very demanding engineering major, Lakkavaram has been working as a staff writer for the UMass Daily Colleague, writing regularly for Planet Home (a website for everyday solutions to help protect our planet), and is serving as a research intern in ChE Associate Professor Wei Fan’s lab.

In addition, in his spare time, Lakkavaram plays the Tabla, a traditional drum instrument in Hindustani classical music that he studied in his home country of India before attending UMass.

Lakkavaram explains that his career interests lie in STEM-related fields, but he has a passion for writing as well, so he tries to combine the best of both worlds in most of his work. Some of his favorite topics to write about include renewable energy (the industry in which he wants to work), plastic pollution, oil, and gas.

In pursuit of his future career in chemical engineering, Lakkavaram was selected by faculty to work in the Fan Porous Materials Research Group to assist with research into zeolites in the production of biofuel from biomass.

Meanwhile, Lakkavaram interned in 2019 for the Reseda Life Sciences company by conducting experiments independently and collecting data to determine the critical micellar concentration of natural substances for this company focused on the development of eco-friendly and non-toxic surfactants. He also used multiple analytical methods such as potential analysis, pH analysis, and electrochemical analysis for his experiments and completed all data collection in preparation for summarizing his results in a presentation.

(Continues on the COE website, February 2021)
ChE Students Win Accolades at AIChE Meeting and Other Conferences

Several undergraduates in the Chemical Engineering (ChE) Department won important awards in the recent student conference of the American Institute of Chemical Engineers (AIChE). Hansen Tjo and Nicholas Sbalbi both participated in the Student Poster Competition, and Sbalbi won the "Materials Science and Engineering" group. Sbalbi also won a smaller award, given out by the national AIChE organization, called the Donald F. Othmer Sophomore Academic Excellence Award. In addition, current ChE sophomore Thomas Goodwin won the Freshman Recognition Award for his accomplishments last year.

Sbalbi’s winning poster on work performed in Polymer Science and Engineering (PSE) Professor Laura Bradley’s research group was titled, “Nematic Colloids at Liquid Crystal-Air Interfaces via Photopolymerization” and demonstrated a pioneering, one-step fabrication process for developing two-dimensional, colloid assemblies that can be applied in systems ranging from photonics to microlithography. This work was a collaboration with PSE graduate student Xiaoshuang Wei and published in Soft Matter. (continued at COE January 2021)

MicrobeBlaster Team Competes in Entrepreneur Competition

The team of Simran Jeet (junior, biology), Sarah Kaunfer (junior, microbiology), Phoebe Lasic-Ellis (sophomore, BDIC/emergency healthcare and trauma) and Hayley McIsaac (sophomore, biochemistry and molecular biology) won big with their venture, MicrobeBlaster.

- Advanced through the Semi-Finals of the Innovation Challenge and awarded $1,000 in funding
- Grinspoon Concept Award Recipients ($500)
- Interviewed 15 medical professionals and industry experts to date to confirm the product-market fit of MicrobeBlaster catheters

Sbalbi Awarded Goldwater Scholarship

Nicholas Sbalbi, a junior chemical engineering major, has been awarded a prestigious Goldwater Scholarship from the Barry Goldwater Scholarship and Excellence in Education Foundation. His mentors include Peter Beltram and Sarah Perry. Hansen’s award-winning poster described his research with ChE doctoral student Whitney C. Blocher McTigue and ChE faculty advisor Professor Sarah Perry on “Predicting Polyelectrolyte-Micelle Phase Transitions: A Study in Charge Densities.”

The Barry Goldwater Scholarship and Excellence in Education Foundation was established by Congress in 1986 to serve as a living memorial to honor the lifetime work of Senator Barry Goldwater, who served his country for 56 years as a soldier and statesman, including 30 years in the U.S. Senate. By providing scholarships to college sophomores and juniors who intend to pursue careers in the natural sciences, mathematics and engineering, the Goldwater Foundation is helping ensure that the U.S. is producing the number of highly qualified professionals the nation needs in these critical fields. (COE April 2021)

Joshua McGee Receives Competitive NSF Graduate Research Fellowship

McGee is studying how microfluidics can be applied to improve the synthesis, purification, and characterization of protein nanoparticle systems, which have proven to be particularly ideal drug-delivery carriers, especially in cancer patients, due to their amphiphilic, biocompatible, and biodegradable nature.

As McGee says, “It is of paramount importance to research and develop new ways to enhance clinical efficacy and decrease toxicity of therapeutics against cancer.”

According to McGee, protein nanoparticles have enabled controlled delivery of therapeutics, imaging agents, nucleic acids, and proteins in a tissue-specific manner. And such particles can be engineered to bind specifically to cancerous tissue, thereby improving drug efficacy and safety.

“However,” says McGee, “traditional procedures for producing protein nanoparticles suffer from low throughput, low reproducibility of desired attributes (size, zeta potential, stability, polydispersity), and discontinuous processing.”

To improve this process for producing protein nanoparticles, McGee will be researching two hypotheses. “The superior control of solution conditions in a microfluidic device will enable the synthesis of protein nanoparticles with improved properties in a high-throughput manner,” says McGee. “And precise control over flow conditions and solution properties will enable more correlative protein nanoparticle characterization through replication of the tumor microenvironment.” (COE April 2021)
Graduate Student Awards

**Douglas Awards**
Ayushi Patel (Henson)
Min Zeng (Andrews)

**PPG Award**
Sarthak Saha (Perry)

**CBI Fellowship**
Carey Dougan – 2020-21 (Peyton)
Adrian Lorenzana – 2020-21 (Peyton/Klier)
Brandon Barajas – 2020-21 (Schiffman)
Sarthak Saha - 2020-21 (Perry)

**BTP**
Hyerim Ban (Andrews/Schiffman Lab)
Akaansha Rampal (MCB/Peyton Lab)
Patrick Ryan (MCB./Lee Lab)

**SMLS NRT**
Jun-Goo Kwak (MCB) – Fall 2020 to Summer 2021 (Lee)
Guinevere Tillinghast – Fall 2020 to Summer 2021 (Beltramo/Klier)
Emily Diep – Fall 2020 to Summer 2021 (Schiffman)

**NSF GRFP (Graduate Research Fellowship Program)**
Lars Howell (Forbes)

**Tilwick and Eldridge Awards**
For G.R.A.S.S. performance:
Anthony Brouillard (Kulkarni)
Honorable mentions:
Anh Nguyen, Weiuye Xin,
Sam Trevenen, Oscar Zabala

For Best T.A.:

**Fall:**
Chao-Shao Chen (Maroudas), Emily Diep (Schiffman)
Aditya Rane (Jentoft), Nicholas Bryant (Perry)
Juili Parab (Jentoft), Haley Keister (Mountziasris)

**Spring:**
Natthapong Sueviriyapan (Henson)
Anne Le (Bai), Stephanie Call (Andrews)
Chemical Engineering Graduate Society (ChEGs)

The Chemical Engineering graduate society board (ChEGs) is the student representative body of the graduate students. In the past, our student body organizes fun events like pumpkin carving, fall and spring barbeques, Halloween, outdoor events like bowling, hiking etc. With everyone vaccinated and students returning to normal life, we look forward to having future events.

Co-Presidents: Atharva Burte and Rushabh Shah
Treasurer: Adrian Lorenzana
Social Chair: Lars Howell
Professional Development: Anne Le
Recruitment Chair: Dipti Bhave
Senators: Emily Diep, Sam Hoover, and Arvind Sathyavageeswaran
Alternate Senator: Rushabh Shah

Find email addresses on Peoplefinder
Find CHEGS on Discord and Facebook
For more information about our Graduate Program, check out our web page for current students
Weiyue Xin Publishes Paper in Science Advances Describing Research Milestone

Weiyue Xin, a Ph.D. student in the Chemical Engineering Department, is the lead author of a paper recently published in *Science Advances* explaining how a UMass Amherst research team has discovered how to use elasticity to control the positions of solid micro-plates on curved 2D fluids. “Our research has applications in nanotechnology and other spheres where it’s desirable to have sophisticated, flexible devices that can respond to their environment,” said Xin. See *ScienceDaily*, *Science Codex*, and *News Office release*.

One real-world application of the team’s research includes flexible, ultrathin, and reconfigurable, wearable electronics.

This research is led by Xin’s advisor, Professor Maria Santore, with large contributions from other team members, including Professor Gregory Grason and Senior Research Fellow Hao Wu, all from polymer science and engineering.

As the UMass News Office release said, “A team of... researchers at the University of Massachusetts Amherst has demonstrated for the first time that the positions of tiny, flat, solid objects integrated in nanometrically thin membranes – resembling those of biological cells – can be controlled by mechanically varying the elastic forces in the membrane itself.”

According to the News Office release, “This research milestone is a significant step toward the goal of creating ultrathin flexible materials that self-organize and respond immediately to mechanical force.”

(LCOE May 2021)

Lars Howell awarded NSF Graduate Research Fellowship

Thirteen UMass Amherst students and alumni have received awards from the Graduate Research Fellowship Program. These include Selena Y. Cho, mechanical engineering; Joshua McGee, chemical engineering; and Lars Howell, a current graduate student in chemical engineering.

The program provides three years of support during a five-year fellowship period.

(COE March 2021)
The College of Engineering at the University of Massachusetts Amherst continues its climb in the annual U.S. News & World Report listing of “Best Graduate Engineering Schools” placing No. 54 nationally, a rise of two spots. The 2022 rankings were released on March 30, and show the college tied with Brown University, Colorado School of Mines, and Rutgers University. Among public engineering institutions, the college has entered the top 30, advancing three places to No. 28, and remains the top public engineering program in New England. In just four years, the College of Engineering has climbed eleven places in rank among the publics. “I congratulate our faculty, graduate students, and college-wide leadership for propelling us ever closer to our strategic goal of being among the top 25 public engineering colleges,” remarks Sanjay Raman, dean of the College of Engineering.

Four programs climbed in the national engineering specialty discipline rankings. Chemical engineering, ranked No. 33 in the country, rose three spots from last year’s report. Computer engineering, ranked No. 37, climbed seven places, and electrical engineering ranked No. 53, rose five slots. Environmental engineering, ranked No. 38, soared up ten places.

Dr. Whitney Blocher McTigue received her PhD from UMass in 2020 from Prof. Sarah Perry’s lab. She is currently a postdoctoral researcher under Prof. Charles E. Sing at the University of Illinois at Urbana-Champaign and is the recipient for the Department’s inaugural (for year 2020) Ph.D. Best Dissertation Award. Whitney’s thesis, titled “Encapsulation and Stabilization of Biomacromolecules,” focused on using oppositely charged polyelectrolytes as a means of sequestering and thermally stabilizing biomacromolecules such as proteins, viruses, and enzymes. She used complex coacervates, a liquid-liquid phase separation phenomenon that utilizes electrostatics via oppositely charged polymers, to encapsulate various biological cargo and tested the stability of these complexes at varying temperatures. Whitney generated ground rules to help determine parameters that would best encapsulate biomacromolecules and reduce the number of experiments required for optimal results. Her work is a steppingstone toward temperature stable vaccines and other therapeutics. The award consists of a commemorative plaque, an honorarium, and an invitation to give a Chemical Engineering Departmental Seminar within two years of the award announcement.
Christine (Chris) is presently a director in Regulatory Chemistry and Manufacturing Controls at Pfizer Inc., where she leads regulatory strategy and implementation for a portfolio of biological projects across all phases of drug development and commercialization. She has led the regulatory strategy for products such as Xalkori, Xanax, and Viagra. Previously, she led chemical process development research teams at Pharmacia Corporation and at G.D. Searle for products such as Celebrex and Inspra.

Chris previously served on the American Institute of Chemical Engineers (AIChE) Board of Directors and was the 2018 AIChE president. She serves on the Society of Biological Engineering Board of Directors and was the founding chair of the AIChE Pharmaceutical Discovery Development and Manufacturing Forum. She was elected as an AIChE Fellow in 2011 (the youngest member ever elected Fellow) and received the AIChE Epstein Award for Technical Programming in 2012. Recently, she received a 2020 Woman of Innovation award from the Connecticut Technology Council and Connecticut Center for Advanced Technology.

Chris has chemical engineering degrees from Lehigh University (BS) and from the University of Massachusetts at Amherst (PhD) as well as a MS in regulatory affairs from Temple University.

Chris lives in East Lyme, CT, with her husband, Regan (of 28 thousand years, as he says), who is also a chemical engineering UMass Amherst graduate (MS ’91). The Seymours keep busy with endless house projects, and for vacations they like to go on epic camping and hiking journeys in national parks. Chris is also a yoga instructor (200 RYT).

Kokui Francisca Adesokan ’09
Outstanding Junior Alumni Award Recipient

Kokui Adesokan is an associate director, an engineering manager providing strategic direction and technical leadership to a multi-disciplinary team of engineers on Geared Turbofan engine programs in the Externals engineering organization, at Pratt and Whitney in East Hartford, CT. Her team designs, analyzes and ensures industrialization of over a hundred Externals hardware to meet performance and safety requirements. She is also responsible for managing a multimillion-dollar yearly budget.

Kokui holds a Bachelor of Science in Chemical Engineering from the University of Massachusetts Amherst (UMass Amherst) and an MBA from Worcester Polytechnic Institute (WPI).

Kokui attends career fairs at local schools and delivers keynote speeches to inspire underrepresented students to pursue engineering careers. She delivered an inspiring keynote speech at the UMass Amherst Women in Engineering and Computing Day conference attended by over 200 high school girls.

Kokui was featured in the WPI Winter 2018 and the UMass Amherst October 2018 newsletters. She earned the Women of Color Professional Achievement in Industry award; the Black Engineer of the Year Trailblazer Spectrum Award; and the Science, Technology, Engineering and Production (STEP) award. Kokui also serves on the UMass Amherst College of Engineering Dean’s Advisory Council.

Kokui owns and operates an online boutique featuring bags and headwraps handmade by women in Africa. Her goal is to help provide better opportunities for African women by offering their products to a broader audience. You can learn more about Kokui’s mission at www.kokuisatelier.com

Kokui enjoys spending time with her husband and her 1.5-year old daughter, exploring various cuisines, and traveling internationally.

To see the latest Chemical Engineering News, check out che.umass.edu/news/
There’s a New Website for our Biochemical Engineering Concentration

**Student Spotlights** on recent graduates from the program

- **Helen Hua ’18**
  Associate Data Scientist, Bristol Myers Squibb (BMS)

- **Ishita Shah ’19**
  Operations Leadership Development Program, Thermo Fisher Scientific

- **Sarah Duquette ’18**
  Associate Scientist I in Manufacturing Sciences, AbbVie (PhD deferred) and then PhD Student, MIT Department of Biological Engineering

- **Kwan Yoon ’20**
  PhD Student, MIT Department of Biological Engineering

- **Elizabeth Voke ’20**
  PhD Student and NDSEG Fellow, UC Berkeley Department of Chemical and Biomolecular Engineering

- **Liz Tyburski ’21**
  Global Operations Development Program – Process Development Engineer, AbbVie

Two Alumni receive **NSF Graduate Research Fellowships**

- Nicholas O’Hare ’20 (Northeastern)
- Shuaib Adesina Balogun ’18 (GeorgiaTech)

Alumni—please stay in touch with us!

We have an online form to make this easier:

https://che.umass.edu/che-alumni-updates/form
What’s New on Campus

New Worcester Dining Commons
(see tour on youtube)

New Student Union Building
(see tour on youtube)

...and on our web site

Our reinvigorated twitter feed, courtesy of Anne Le (thank you for all your effort!)
@UMassChemEng

Our Biochemical Engineering Concentration web page

Our ISPE Student Chapter web page
The Chemical Engineering Department at UMass Amherst is strongly committed to diversity, equity, and inclusion. We recognize and value the wide range of voices and perspectives of our community, and we expect all members of our community to treat each other with mutual respect and civility. It is our privilege to provide access and opportunities for all people, while demonstrating our commitment to inclusion of students, staff, and faculty members from underrepresented groups. We are committed in policy, principle, and practice to creating and maintaining an inclusive environment that provides an opportunity for people from all groups to thrive.

A huge thank you to the 2020-21 Committee Members: Sarah Perry, Rolf Jentoft, Omar Abdelrahman, Ashish Kulkarni Shelly Peyton (Chair), Jessica Schiffman, Sydney Foster, Isaac Ramirez, and Mahidhar Lakkavaram

Members of the DEI Committee for 2021-22: Omar Abdelrahman, Ashish Kulkarni (Chair, Spring 2022), Amity Lee, Shelly Peyton (Chair, Fall 2021), Jessica Schiffman, Isaac Ramirez, and Mahidhar Lakkavaram

Upcoming DEI Events

**Fall 2021**
- Tuesday, October 19, 2021, 11:30 a.m. in LGRT 201.
- Tuesday, November 30, 2021, 11:30 a.m. in LGRT 201.

**Spring 2022**
- Tuesday, April 26, 2022, 11:30 a.m. in LGRT 201.
- Tuesday, March 22, 2022, 11:30 a.m. in LGRT 201.

Past DEI Events

- Tuesday, February 16th, 2021 11:30 am, Semra Colak Atan, 3M Diversity Series
- Tuesday, February 23rd, 2021 11:30 am-12:30/12:45 pm, - COE Sponsored Microaggression & Supportive Climate Workshop, Kirsten Helmer, Ed. D., from the Center for Teaching and Learning, will lead an interactive discussion about microaggressions. Recognizing and developing strategies for addressing microaggressions is a key part of building a respective, supportive community
- Tuesday, March 16th at 11:30-12:30 pm, Integrating Social Justice and Engineering Sciences: Transforming Engineering Education from Within with Dr. Juan Lucena, Colorado School of Mines
- Thursday, April 15th, 2021, 11:30 am-12:30 pm, Inclusive Teams and Collaborations, with Rolf Jentoft, UMass
- Thursday, August 5, 2021, 11:30 a.m. in LGRT 201. Steps toward building an antiracist lab, with Shelly Peyton, UMass

For a full listing of our department seminars, click [here](#)
ABET Update

The University of Massachusetts Amherst bachelor’s degree programs in Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Industrial Engineering, and Mechanical Engineering have been re-accredited by the Engineering Accreditation Commission (EAC) of ABET, the global accreditor of college and university programs in applied and natural science, computing, engineering, and engineering technology.

Chemical Engineering has the revised program educational objectives published on the department website. Please contact Dandan Xu if you have any questions about ABET or our accreditation.

For a look at the College of Engineering at a glance, Check out the COE Dean’s Report
Alumni—please stay in touch with us!

We have an online form to make this easier:
https://che.umass.edu/che-alumni-updates/form