Department of Chemical Engineering

Newsletter - Fall 2024

Welcome from the Chair

Dear Alumni, Colleagues and Friends,

Time flies! Summer has gone past us; while I hope that everyone had some time to relax or have been on some nice vacation, our faculty and students have stayed busy during the summer, either traveling to conferences or simply focusing on their research. This year is our ABET year and in early October we hosted the external

program evaluators, for both Chemical Engineering program and Chemical Engineering-Nuclear Engineering Option. After a beautiful foliage season, cold weather finally came, and we had the first snow just recently.

Here are some exciting news, helping keep us warm and fresh. Our faculty have recently received research grants from NSF, DOE, and NRC, with collaborators from other universities including MIT, Stony Brook, and Johns Hopkins, working on a range of topics, including molten salt chemistry for nuclear reactor fuel recycling (Dr. Stephen Lam), Distinguished Faculty Advancement Award from the NRC to support research and education on nuclear materials (Dr. Stephen Lam), and development of a sustainable method for creating organonitrogen compounds (Dr. Fanglin Che). Dr. Nese Orbey, working with SHAP3D Center at UMass Lowell, helped launch a workforce development program called START (Skills Training in Advanced Research & Technology), which will train undergraduate students from community colleges and universities in fundamental research in additive manufacturing. Dr. Wong's work on noncovalent interactions between lignin and cellulose during fast pyrolysis has been published in *ACS Sustainable Chemistry and Engineering* and was recognized as ACS Editors' Choice. Dr. Camci-Unal's research on tissue engineering used eggshells and 3D printing to grow bone tissues, which was recently published in *ACS Applied Materials & Interfaces*. Dr. Camci-Unal was also elected as the Chair of the AIChE 8B Biomaterials Division and appointed as an Associate Editor for the journal of *Science Advances*.

Our graduate students and undergraduate students are the main driving force for the research advancement. Doga Tekbas, a PhD student in the Wong's group, received the Women in Chemical Engineering (WIC) travel award to attend this year's AIChE Annual Meeting in San Diego. Richard Marx, a PhD student in the Yoon's group, was selected to receive a $12,000 Koerner Family Foundation (KFF) Fellowship. Flannery William, an undergraduate student in the Camci-Unal's group, received the 2024 C. William Hall Scholarship from the Society for Biomaterials (SFB), recognized at the World Biomaterials Congress on May 26-31, 2024, in

Daegu, Korea, during the SFB 2024 Annual Meeting. These are only a few examples of what our graduate and undergraduate students have been working on. In the next issue (spring 2025), we will feature some of our undergraduate students who have done a Co-OP or internship in local companies.

As we are approaching the end of the year, I wish you and your loved ones a wonderful holiday season, and a Happy New Year!

Yours sincerely,

Zhiyong Gu
Professor and Department Chair

Research and Faculty Accomplishments

Stephen Lam Receives DOE and NRC Awards

Dr. Stephen Lam, Assistant Professor of Chemical Engineering, is part of the team awarded a three-year $1M grant from the U.S. Department of Energy (DOE) to study molten salt chemistry for nuclear reactor fuel recycling. The team, also including researchers from MIT and Stony Brook University, will use a combination of particle accelerator, laser spectroscopy, and machine learning methods to gain new insights. Earlier this year, Dr. Lam also received a $600K Distinguished Faculty Advancement Award from the Nuclear Regulatory Commission (NRC) to support his research and education efforts in nuclear materials.

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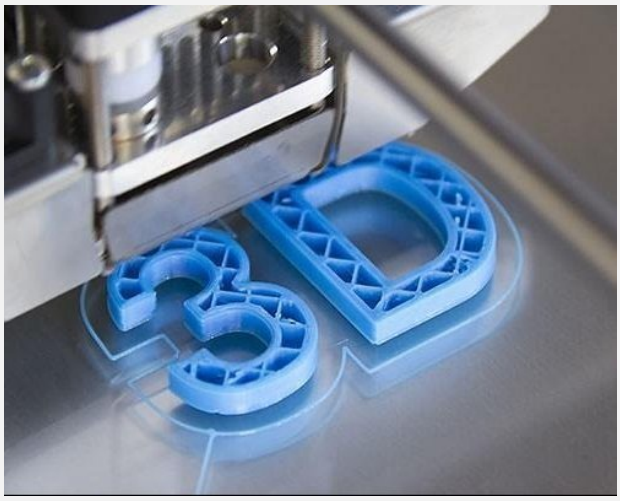
Workforce Development Program Advances Students' Skills in 3D Printing



The Science of Heterogeneous Additive Printing of 3D Materials (SHAP3D) Center at UMass Lowell has launched a workforce development program supported by the National Science Foundation (NSF) called START (Skills Training in Advanced Research & Technology). Dr. Nese Orbey, who serves as a co-director, will oversee the efforts to train undergraduate students from community colleges and universities in fundamental research in additive manufacturing. SHAP3D was recently awarded a $1.15M Phase II funding by the NSF, which brings the agency's total investment to the Center to $2.59M.

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Researchers Awarded NSF Grant to Develop Sustainable Method for Producing Essential Chemicals

Dr. Fanglin Che, Assistant Professor of Chemical Engineering, has been awarded a NSF grant develop a sustainable method for creating organonitrogen compounds. These chemicals are used in a wide range of industrial applications, from agriculture and pharmaceuticals to chemical raw materials and fuels. The project is in collaboration with Dr. Sara Thoi of Johns Hopkins University's Chemistry Department

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Research Uses Eggshells and 3D Printing to Grow Bone Tissue in the Lab

Dr. Gulden Camci-Unal, Robert and Gail Ward Endowed Professor in Biomedical Materials Development, has been conducting tissue engineering research in her lab using finely crushed eggshells to create microscopic 3D structures, or scaffolds, where bone cells can grow and proliferate. The findings from her team has been recently published in ACS Applied Materials & Interfaces.

In addition to her innovative work, Dr. Camci-Unal has has been elected as the Chair of American Institute of Chemical Engineers (AIChE) 8B Biomaterials division and accepted an Associate Editor position in Science Advances.

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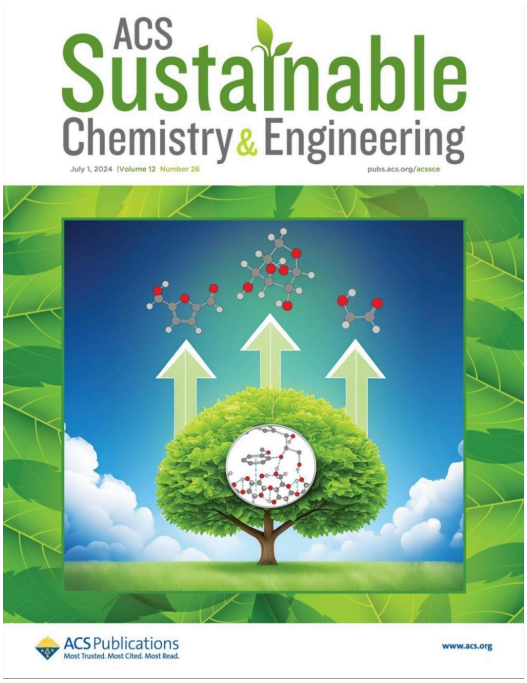
Research Recognized as ACS Editors' Choice

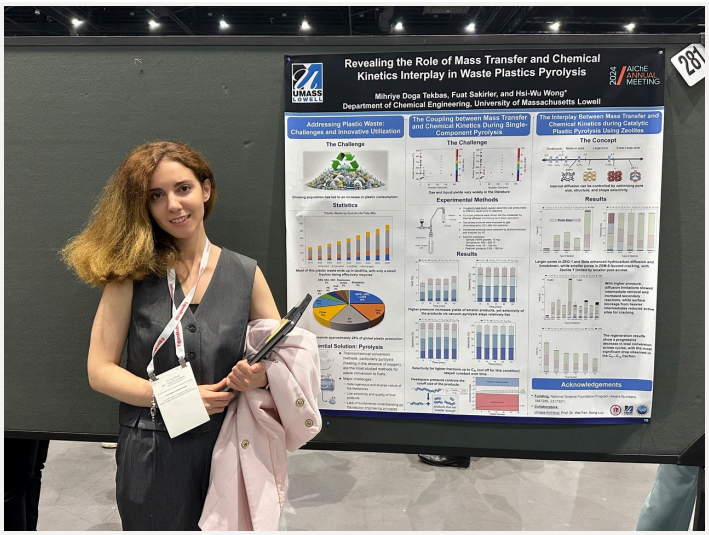


A recent paper from Dr. Hsi-Wu Wong's group has been recognized by the American Chemical Society (ACS) Editors' Choice. The paper reports noncovalent interactions between lignin and cellulose during fast pyrolysis via a combination of experiments and density functional theory calculations. The study paves the way for future genetic engineering or machine-learning design of energy crops for high yields of renewable chemicals or fuels.

Only one paper per day from the entire ACS journal portfolio is recognized as ACS Editors' Choice. The selected papers are free to read for a duration of six months and are promoted and featured on the ACS Publications homepage.

Student Success

Graduate Student Received AIChE's WIC Travel Award

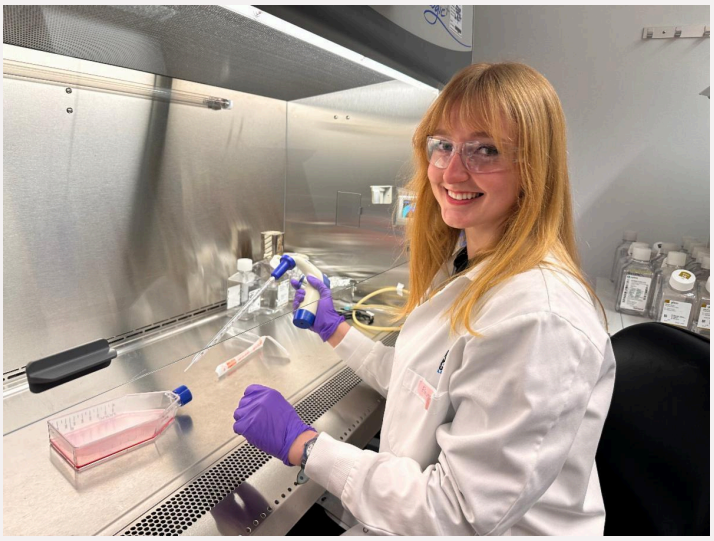


Doga Tekbas, a PhD student in Dr. Hsi-Wu Wong's research group, received the prestigious Women in Chemical Engineering (WIC) travel award to attend this year's AIChE Annual Meeting in San Diego. Each year, only approximately 25 female chemical engineering graduate students or postdocs are given with this honor. Doga's research deals with uncovering the interplay between species diffusion and chemical kinetics during catalytic pyrolysis of high density polyethylene.

PhD Student Selected for Fellowship

Richard Marx, a PhD student in Dr. Seongkyu Yoon's group, was selected out of a total of 71 candidates in the U.S. to receive a $12,000 Koerner Family Foundation (KFF) Fellowship. The KFF's goal is to inspire future generations of research-oriented engineers so they can find innovative solutions to future challenges, and to help the country train and retain engineers to remain globally competitive across all types of engineering fields.

Undergraduate Student Received SFB Scholarship



Flannery William, a undergraduate student in Dr. Gulden Camci-Unal's research group, received the 2024 C. William Hall Scholarship from the Society For Biomaterials (SFB). This award honors the memory of the Society's first president, Dr. C. William Hall. She received this award based on her outstanding scholastic achievement and objectives for her research project and career. Her achievement was recognized at the World Biomaterials Congress on May 26-31, 2024, in Daegu, Korea, during the SFB 2024 Annual Meeting.

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