NJIT New Jersey Institute of Technology

OTTO H. YORK DEPARTMENT OF CHEMICAL AND MATERIALS ENGINEERING

Spring 2022 CME Highlights

Message from the Chair

Dear Friends,

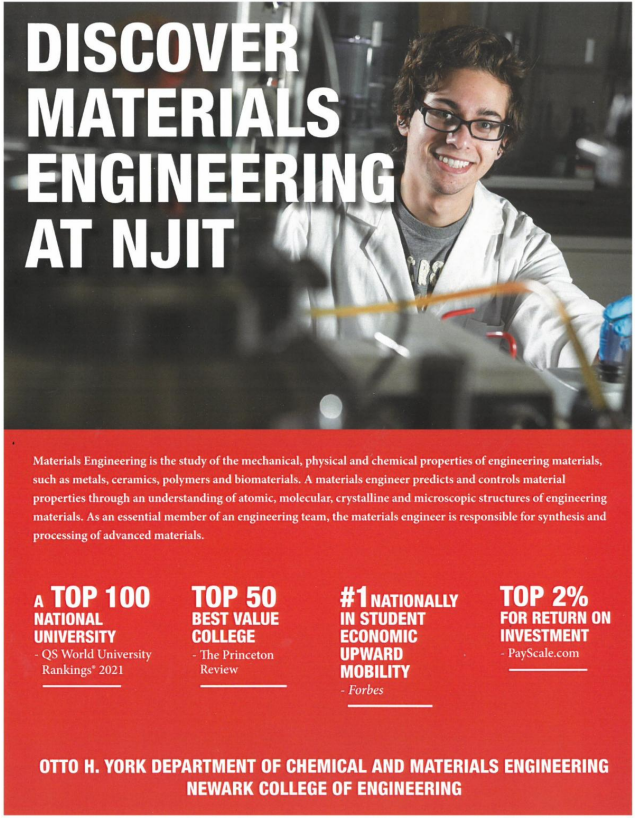
I hope this message finds you well and that your summer is off to an enjoyable start. I am pleased to report exciting news that includes welcoming our first undergraduate cohort of materials engineering students in the fall, beginning our new graduate certificate on Data Science for Chemical and Materials Engineers, and sharing faculty, staff, and student awards and achievements.

Wishing you a healthy and productive summer ahead!

Lisa Axe
Professor and Chair

VISIT CME WEBSITE

New BS in Materials Engineering Program Starting Fall 2022!



In Fall 2022, we are welcoming our first cohort in the BS Materials Engineering Program. Our curriculum is hands-on beginning the first year with a fundamentals of engineering design experience. We have hired seven new faculty in the last 5 years, three new senior university lecturers, and a new laboratory director for the materials engineering undergraduate labs. Professor David Venerus who joined the Department a little over 3 years ago serves as the Program Director.

More Information on the BS MTEN Program

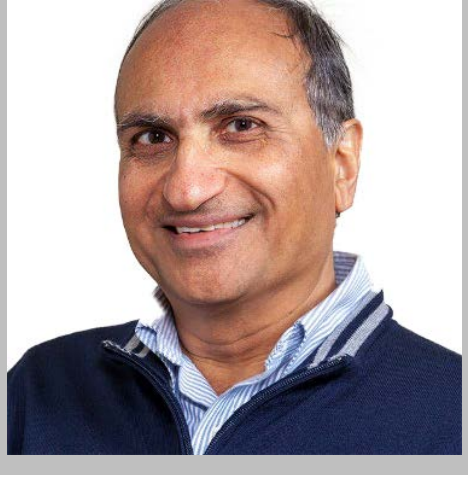
NEW DATA SCIENCE ONLINE CERTIFICATE PROGRAM

The 12-credit Graduate Certificate in **Data Science for Chemical and Materials Engineers** is comprised of four courses: two courses that provide a foundation in data science and data visualization, and two electives that provide the knowledge and tools needed to work in data science for industry, government, and academia. The Certificate will commence in January 2023. The online courses will be available to all graduate students in CME.

This Certificate focuses on integrating data science into chemical and materials engineering for preparing the future workforce. Students will have a foundation in data science tools and applications along with applying advanced data visualization tools in analyzing, interpreting, and representing data. Further knowledge will be gained through machine learning approaches, data mining, and advanced statistical and analytical tools. This foundational knowledge will be used on case studies and projects for predicting material properties, conducting high-throughput searches for materials, optimizing experimental design, and estimating properties to develop machine learning models that lead to virtual screening.

FACULTY HIGHLIGHTS

New NJIT-Led NSF IUCRC Center Wins Pharma Backing



Rajesh Dave, Distinguished Professor, leads a new industry-backed center that will improve pharmaceutical drug formulations, while developing efficient ways to design new drugs digitally and simpler, faster methods to manufacture them.

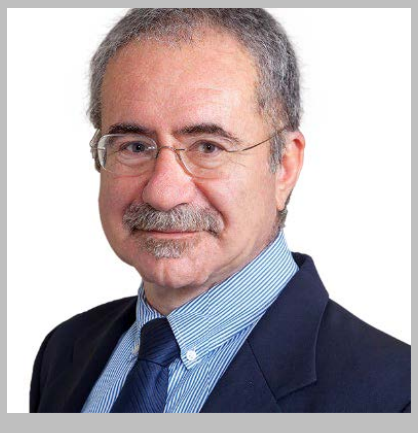
READ MORE

New Member of NJIT's Chapter of the National Academy of Inventors

Murat Guvendiren, Assistant Professor, was elected to the rank of National Academy of Inventors (NAI) Senior Member. He joins NJIT's Class of 2022 Chapter of the National Academy of Inventors (NAI).

READ MORE

PODCAST: Professor Armenante Talks About His Research Activities



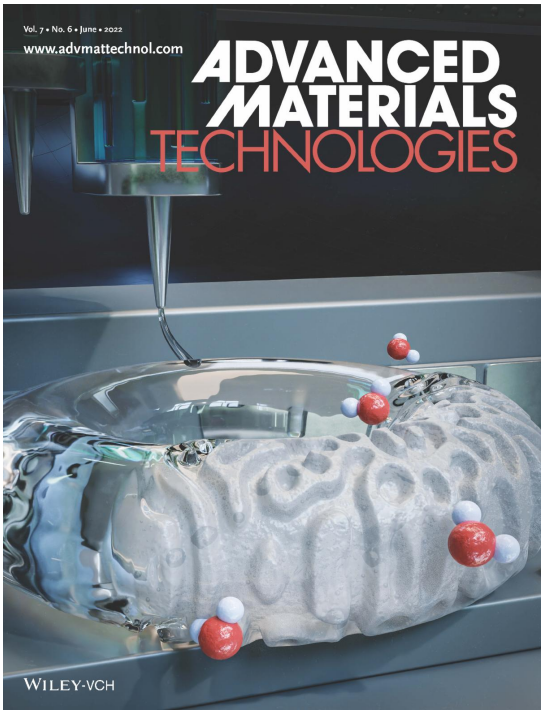
Piero Armenante, Distinguished Professor of Chemical Engineering, was recently interviewed by Dr. John Thomas of M-Star of M-Star CFD, about his current and past research activities focused on mixing in liquid and multiphase mixing systems and related phenomena.

LISTEN TO PODCAST

Surface Wrinkling Patterns

Murat Guvendiren and colleagues' paper titled "4D Printing of Surface Morphing Hydrogels" is selected as front cover on Advanced Materials Technologies (IF:8.848). Dr. Guvendiren's team develops smart inks for direct ink writing (DIW) printing that display preprogrammed surface wrinkling patterns on 2D and 3D surfaces post-printing which appear only when exposed to a

solvent. They demonstrate fabrication of optical devices, solvent sensors, anti-counterfeit devices and high throughput cell culture platforms.



FACULTY RESEARCH GRANTS

NSF and NASA Grants Supporting Advanced Materials for Photonic Devices

With funding from NSF and NASA, Professor Boris Khusid is working with researchers from NJIT, New York University (NYU), NASA Glenn Research Center, and Universities Space Research Association (USRA). The team is conducting microgravity experiments on colloids in the International Space Station (ISS). A colloid is a system of micron-sized particles suspended in a fluid. Milk, coffee and paint are everyday examples of colloids. Under the proper conditions, a colloid undergoes a phase transition from a disordered arrangement of particles (*liquid state*) to an ordered particle arrangement (*solid state*). The widespread use of colloidal processes in a variety of applications emphasizes a critical need for improving fundamental understanding of phase transitions in colloids at the particle level. Microgravity offers a unique opportunity to study these phenomena by removing masking gravity effects, such as particle sedimentation, convection and jamming.

One exciting aspect of the ISS experiments is the realization that in microgravity we can build large colloidal crystals with a three-dimensional ordered arrangement of particles that survive reentry to Earth. A colloidal photonic crystal is the optical analogy to an atomic lattice, in which the refractive index repeats periodically in three directions on the scale of the light wavelength. The particle sizes, shapes and properties can be varied based on the wavelength of light we wish to control with colloidal photonic crystals. Due to the unique properties, photonic crystals operating at infrared wavelengths are expected to be crucial for applications in remote sensing, fiber-optic communication, chemical analysis, biomedical diagnostics, optical computing, security and defense. Fabrication of large three-dimensional colloidal crystals on Earth remains a challenge as the particle assembly is strongly influenced by undesirable gravity effects. The following invention describes fabrication of large three-dimensional colloidal photonic crystals in a Low-Earth orbit and returning them to Earth:

Mary Murphy (Nanoracks, LLC), Qian Lei (NJIT), Boris Khusid (NJIT), Andrew D. Hollingsworth (NYU), Paul M. Chaikin (NYU), William V. Meyer (USRA). Method and apparatus for fabrication of large three-dimensional single colloidal crystals for Bragg diffraction of infrared light, Application # 63/365,667; Date 06/01/2022.

NSF Grant Awarded to CME Faculty

Professors Voronov and Guvendiren have been awarded the National Science Foundation (NSF)'s Partnerships for Innovation (PFI), Technology Translation (TT) track, grant titled: "PFI-TT: Development of an Automated Cell Culturing Platform for Highly Efficient and Reliable Drug Testing in Physiologically Representative Disease Models". The funding is for a two-year project whose aim is to build a first-of-its-kind automated cell culturing platform that will allow pharmaceutical companies to make faster, more efficient, and reliable predictions regarding whether costly (up to a $billion) animal and human drug trials are justified. Additionally, the team has partnered up with a local bioreactor company called Refine Technology, LLC that will help them to optimize their product for commercial use. NSF also awarded a Research Experience for Undergraduates (REU) supplement for the project, which the professors will use to hire and train undergraduate assistants in research and entrepreneurship. This grant will serve as a unique opportunity for the students to not only experience multidisciplinary academic research (and learn how to use cutting edge tools and equipment), but to also have an opportunity to interact with the industry representatives and to obtain valuable insights into the business side of translating technologies from a lab to the market.

- **Piero Armenante** has been awarded a grant from USP-United States Pharmacopeial Convention titled “Experimental Determination of the Velocity Distribution in the Chinese Pharmacopeia Small-Vessel Dissolution Testing System using Particle Image”
- **Ecevit Bilgili** (PI) and Murat Guvendiren (Co-PI) have been awarded a New Jersey Health Foundation grant titled “3D Printed Soft Nanodrug Tablets for Personalized Delivery to Pediatric Population”
- **Murat Guvendiren** has been awarded a New Jersey Health Foundation grant titled 3D Bioprinted Devices to Model Liver Fibrosis and Cirrhosis
- **Murat Guvendiren** (Co-PI) with Yuanwei Zhang (PI) have been awarded a grant from the New Jersey Health Foundation titled Novel Photoinitiators for Injectable and 3D Printable Hydrogels and Applications in Tissue Engineering
- **Kathleen McEnnis** has been awarded a New Jersey Health Foundation grant entitled “Targeted Delivery of Platinum Nanoparticles as a Low Toxicity Breast Cancer Treatment”

NATIONAL SCIENCE FOUNDATION RESEARCH EXPERIENCE FOR UNDERGRADUATES

In Summer 2022, the Chemical and Materials Engineering Department will host the inaugural National Science Foundation (NSF) funded Undergraduate Research and Innovation Experience in Cancer Diagnosis and Therapeutic Intervention. The REU is led by Drs. Nellone Reid and Sagnik Basuray and will include research, education, and training activities for nine talented students from across the United States! During the 10-week summer program, students will be carrying out individual research projects in areas such as photonics, biomedical engineering, and materials science.

RECENT CHEMICAL & MATERIALS ENGINEERING EVENTS

AIChE Regional Meeting at NJIT

In April, the Otto H. York Department of Chemical and Materials Engineering, for the first time, hosted the **2022 American Institute of Chemical Engineers (AIChE) Mid-Atlantic Student Conference**. The 2022 AIChE Regional Student Conference is 2 days of career information, social events, competitions, and fun. Student engineers from ~35 of **AIChE's Mid-Atlantic region** schools celebrated the Chemical Engineering profession, along with young professional members, AIChE leaders, and industry professionals from numerous engineering specialties. A highlight of the conference was the AIChE's **Chem-E-Car Competition®**, which engages college students in designing and constructing a car powered by a chemical energy source, that safely drives over a given

distance and stops within a specified time limit. The Competition was broadcasted for free in real time on YouTube (see links below), for interested individuals (e.g., high school students) who were unable to attend in person.

Furthermore, NJIT students gave a stellar performance:

- **1st Place** in the ChemE Car Poster contest. Team: Stephany Cabrejos (Captain), Allen Reed and Monica McEvoy (Co-Captains), Michael Maffucci, Mory Diane, Dennis Lema, Jennifer Quiros, Anh Tong (Coach), Irina Molodetsky (Safety Coordinator), Roman Voronov (Faculty Advisor)
- **2nd Place** in the ChemE Car Performance contest, which was **live-streamed on Youtube**. Here you can see our **1st and best attempt** that gave everyone quite a thrill and **2nd attempt**. Here is the best attempt from **the point of view of the audience**. Read more about the car **here**.
- Individual Research Poster competition: **2nd place Ashish Kokkula** (Advisor: Prof. Kathleen McEnnis)
- AICHE awarded Stoles to the **top three student organizers**: Raagavi Manivannan, Stephany Cabrejos and Madison Cosgrove

Event stats:

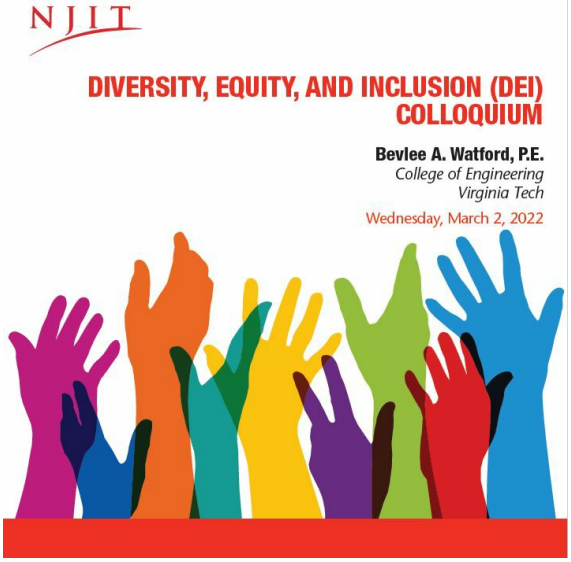
- Some ~225 Attendees from 22 Universities and 64 Volunteers (NJIT Faculty, Staff, graduate and undergraduate students, as well as Chapter Advisors from other universities and AICHE staff)
- **ChemE Jeopardy** with 18 teams
- ChemE Car contest: 12 competing vehicles, 14 posters and an incredibly well-run "**pit**" with live-streams and chemical disposal stations.
- Oral and Poster Presentations: 9 and 16, respectively.
- Nine industrial and academic **Sponsors**, five of which attended our **mini-Career Fair**
- **Social Mixer** where students were able to network over pizza and various games, such as pool and glow bowling.
- An awards **ceremony** with 19 trophies.
- Keynote Speeches by **Dean Moshe Kam**, Professor Kerri-lee Chintersingh and Professor Donald Sebastian
- Workshops by our CME alumni Ms. Sydney Sweet and Ms. Sara Abdelhamid, as well as by our by our Assistant Professors Joshua Young and Mengqiang (Mark) Zhao

A huge thank you to all of the sponsors and volunteers for making this event possible!

Diversity, Equity and Inclusion (DEI) Colloquium

In an effort to increase awareness about institutional and university wide issues surrounding Diversity, Equity and Inclusion (DEI), the Newark College of Engineering has begun an initiative to bring leading experts in these fields to NJIT on an annual basis for what we are calling the DEI Colloquium.

Our inaugural DEI Colloquium took place at NJIT on **Wednesday, March 2, 2022** at 2:30 PM in-person and live stream. The invited speaker this year was Dr. Bevlee Watford, the Associate Dean for Equity and Engagement and the Executive Director of the Center for the Enhancement of Engineering Diversity at Virginia Tech. Dr. Watford has been influential in engineering education for over 20 years.



Watch DEI Colloquium

NCE SALUTE TO ENGINEERING AWARD RECIPIENTS

Congratulations to the following Chemical and Materials Engineering students, faculty, and staff who were honored at the 24th Annual NCE Salute to Engineering Excellence on Tuesday, April 26, 2022. Alumni were honored on May 4, 2022 at 6:00 pm at the Liberty House in Jersey City.

NCE Rising Star in Research
Murat Guvendiren

Alumni and Special Recognition
John J. Shea '00
Director of Corporate Development
Merck

NCE Departmental Outstanding Seniors
Kristen Abraham

NCE Outstanding Support Staff
Roselyn Manning

STUDENT HIGHLIGHTS & AWARDS

2022 Kokes Award Recipient

Safa Alzaim, a PhD student in the Otto H. York Department of Chemical and Materials Engineering, received the 2022 Kokes Travel Award. This award supported Safa presenting a poster titled " A Practical Way to Enhance the Synthesis of N8- from an N3- Precursor" at the 27th North American Catalysis Society Meeting in New York, NY held May 22-27, 2022.

First Year NCE Design Showcase Award Recipients

The First-Year Newark College of Engineering Design Showcase was held on February 04, 2022. The first-year chemical engineering students John Mullen, Justin Nguyen, Matthew Stickles & Melisa Bilgili Team #14 won second place, while Madison Cosgrove, Antionio Antonucci, Colton Jones & John Szczepanski Team #15 won the Audience Choice Award. This important recognition would not be possible without the dedication, mentoring, and advisement from Professor Irina Molodetsky.

2022 Highlander Award & GSA Appreciation Day Recipients

During the 2022 Highlander Awards Ceremony, **Mehnaz Mursalat** received "Lisa A. Pierce Student Leader of the Year" award in recognition of her contributions in leading and representing the NJIT Student Community; and **Shomik Mukhopadhyay** received "Excellence in Advocacy" award for his continuous work for Graduate Student Association (GSA).

Also, at the 2022 GSA Appreciation Day **Mehnaz Mursalat** received the "Recognition Master" award; **Elif İrem Senyurt** received the "Multitasker" award; and **Shomik Mukhopadhyay** received the "Most Persistent" award.

Annual Scholarship, Service, and Research Awards

The Otto H. York Department of Chemical and Materials Engineering recognizes students for their academic excellence, leadership, and service each academic year. These awards are presented during the Annual Scholarship, Service, and Research Awards Ceremony. The Department is pleased to acknowledge these distinguished achievements of our student body. The award ceremony was held on April 29, 2022.

Chemical Engineering Annual Scholarship
Marcos Molina, Senior
Czerwienski ’72,’86, G J Scholarship
Patrick McAleer, Junior
Wilhelm '56 Chemical Engineering Annual Scholarship
Ameera Seetahal, Senior
Matthew M. '60 & Susan L. Nigro Family Scholarship
Roberto Martinez, Junior
Luis Morales, Junior
James F. Flynn Scholarship
Marina Ghobrial, Senior
Matthew Markulis, Sophomore
Benjamin Marsiglia, Junior
Patrick McAleer, Junior
Kristen Abraham, Senior
Myron D. '86 & Eileen Petruch Scholarship
Jeffrey Calixto, Senior
Holly F. Mccann, Senior
Ryan K. Nollstadt, Senior
Raymond McGowan Scholarship
Kristen A. Abraham, Senior
Matthew Berrios, Senior
Luis Morales, Junior
Sherif Elashri, Junior
Grecia Manrique, Senior
Misrad Mahaj, Junior
Jennifer Quiros, Sophomore
Jeffrey Calixto, Senior
Ryan K. Nollstadt, Senior
McGowan Family Endowed Scholarship
Matthew Markulis, Sophomore
Benjamin Marsiglia, Junior
Justin Pace, Senior
Grecia Manrique, Senior

Chemical Merit Scholarship
Marcos Molina, Senior
Schmidt, E. H, Scholarship
Sherif M. Elashri, Junior
BGK Endowed Scholarship
Olamide E. Omisakin, Senior
Thomas C. Pedersen '76 Scholarship
Benjamin Marsiglia, Junior
Marcos Molina, Senior
Ryan K. Nollstadt, Senior
Dana Knox Memorial Annual Scholarship
Marina Ghobrial, Senior
Agata Skura, Senior
Ayomide Kalejaiye, Freshman
Peter O. Shull '55-EAS
Marcos Molina, Senior
Ryan K. Nollstadt, Junior
Jacqueline Kane Endowed Scholarship
Lizete M. Afonso, Senior
Erica Maevsky, Senior
Narden E. Fahim, Senior
Marina Ghobrial, Senior
Holly Mccann, Senior
Iqra Alam, Junior
Katrin Girgis, Senior
Darshiben Shah, Sophomore
Sandrine Salloum, Senior
Fatima Hashimi, Senior
Khushi Patel, Sophomore
Sabrina Vasquez, Senior
Mirna Cheikhali, Senior
Barbara Schraier, Senior
Nadeza Ljesnjanin, Senior
Hadeel Darweesh, Senior
Chelsea Castillo, Junior
Madison Cosgrove, Sophomore
Melisa Bilgili, Freshman

Pictured L to R: Donald Sebastian and Patrick McAleer

Pictured L to R: Kerri-Lee Chintersingh, Erica Maevsky, Sabrina Vasquez, Melissa Bilgili and Madison Cosgrove

Pictured L to R: Nellone Reid and Olamide Omisakin

Pictured L to R: Ecevit Bilgili and Emma Hamza

Pictured L to R: Ella Ivanova, Irina Molodetsky, Sherif Elashri, Gennady Gor, Alina Emelianova

Pictured L to R: Sherif Elashri and Richard Cimino

Pictured L to R: Kristen Abraham and Irina Molodetsky

Pictured: Ecevit Bilgili

Pictured L to R: Piero Armenante and Justin Pace

CONGRATULATIONS NJIT CLASS OF 2022!