



## OTTO H. YORK DEPARTMENT OF CHEMICAL AND MATERIALS ENGINEERING

### Message from the Chair

Dear Friends,

I hope this message finds you well. As this very challenging year comes to a close, I am thankful for the immense dedication and hard work shown by our entire community. This fall we held courses in person and online working to provide our students the highest quality educational experience. With health and safety being of the utmost priority, our students were able to enjoy in person lab experiences. It is my great pleasure to share highlights of awards, grants, and other distinguished achievements from our faculty, students, staff, and alumni.

Best wishes for a healthy, safe, and happy holiday season!

Lisa Axe  
Chair and Professor

[Visit CME Website](#)

### Faculty Highlights

#### NJIT Engineer Elected 2020 Fellow of the National Academy of Inventors



Rajesh Davé, a distinguished professor of chemical and materials engineering, was recently elected fellow of National Academy of Inventors (NAI). Davé join 173 other academic innovators, representing 115 research universities and governmental and non-profit research institutes, in this year's class of fellows. Collectively, the group holds more than 4,700 issued U.S. patents. Davé has 15 U.S. patents.

Davé is a problem-driven inventor whose groundbreaking methods for re-engineering tiny particles have fueled advances in such diverse areas as weapons safety and drug delivery systems. Drawing on physics, chemistry and engineering, his research into the behavior of particles is fundamental and his

methods for adapting them, widely applicable. For example, by shaking granular or particulate materials along with nanomaterials, which form a thin coating around them, he is able to optimize their flow, among other processing improvements.

Most recently, Davé has been re-engineering drug particles to enhance the effectiveness of medications in a variety of ways: by increasing the absorption rates of drugs with poor water solubility, delaying the release of medications that degrade in the acidic environment of the stomach and masking the bitter tastes of drugs to make them more palatable for children as well as for adult patients who have difficulty swallowing.

Davé is the second person from the department to become a Fellow of NAI. Kamalesh K Sirkar became a fellow of NAI in 2016; he is a single or co-owner of 35 US patents.

[Read more](#)

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## Elected 2020 Fellow of the American Institute of Chemical Engineers



Kamalesh Sirkar, PhD, is a distinguished professor of chemical engineering and the Foundation Professor in Membrane Separations at New Jersey Institute of Technology, was elected fellow of the American Institute of Chemical Engineers (AIChE) in March 2020. Sirkar is an internationally renowned expert in membrane separation technologies. He is the inventor of the commercialized membrane-based solvent extraction technology for which Hoechst Celanese received Honorable Mention in the 1991 Kirkpatrick Award. He has pioneered among others the notion of microporous membranes as membrane contactors of two immiscible fluid phases as well as the contained liquid membrane. His research has provided a bridge between membrane technologies and conventional separation technologies resulting in developments of a number of novel separation and related technologies:

Sirkar is the Editor-in-Chief of the journal, *Current Opinion in Chemical Engineering* (Elsevier) since its inception in 2011. He was also the Editor of the Elsevier Series in Membrane Science and Technology during 2005-2011. He served as an Associate Editor of *Separation Science and Technology* during 2005-2011. He is serving/has served as a member of the Editorial Boards of *J. Membrane Science*, *I&EC Research, Separation Science and Technology* and *Indian Chemical Engineer* (International Advisory Board). Sirkar is a co-editor of the widely used *Membrane Handbook*. He has authored 207 refereed journal publications, 22 book chapters, 34 US patents, 3 Canada patents, 1 Indian patent and over 340 Conference presentations.

Sirkar was the Executive Director for the period 2010-2015 of the Membrane Science, Engineering and Technology Center (MAST), which is a NSF I/UCRC. He has delivered ten Plenary Lectures and fourteen Keynote Lectures in various International and National Conferences dealing primarily with membranes. In 2014, Cambridge University Press published his textbook entitled, "Separation of Molecules, Macromolecules and Particles: Principles, Phenomena and Processes," in their Cambridge Series in Chemical Engineering.

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**Dr. Ecevit Bilgili**  
*Master Teacher Award Recipient*



**Dr. Gennady Gor**  
*NSF Career Award Recipient*



**Dr. Irina Molodetsky**  
*Instructor of the Year Recipient*



**Dr. Xioyang Xu**  
*Excellence in Research Award Recipient*

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## Editorship

Sagnik Basuray, appointed Editorial Board Member, *Biosensors*

Ecevit Bilgili, appointed Associate US Executive Editor (AEE) of *Advanced Powder Technology* and Editorial Advisory Board Member of *Pharmaceutical Research*, Springer Journal

## Grants

Gennady Gor, recipient of a Colgate-Palmolive grant titled "Dynamics Simulations on Calcium Carbonate–Arginine–Dentin System."

Laurent Simon, recipient of a NIH(FDA) grant titled "A Multiscale Simulation Toolkit for Computational Pharmacology of Trans/Intradermally Administered Compounds in Health and Diseased Population."

Kamalesh K. Sirkar, Co-PI and Yifu Ding, PI, University of Colorado, through the NSF I/UCRC MAST Center "Fabrication, Characterization and Performance Studies of Novel Robust Microporous Membranes for Treatment of High Salinity Water."

Kamalesh K. Sirkar, PI, Sagnik Basuray, Co-PI, S.R. Wickramasinghe, Co-PI, U. of Arkansas through the NSF I/UCRC MAST Center "High Purification of a Protein/mAb by UF from Binary Mixtures having Close Molecular Weights."

Kamalesh K. Sirkar, PI, through the NSF I/UCRC MAST Center "Continuous Membrane-enhanced Nondispersive Solvent Extraction."

Xiaoyang Xu, recipient of a NIH R01 grant with Tufts University titled "Nanolipoids-Conjugated MicroRNA Enhance Oral and Cranial Bone Regeneration."

## Patents

"Compositions and Methods for Preparing Polymeric Films Loaded with Uniformly Distributed Drug

Particles." R. Davé , L. Zhang, E. Cetingad, and G. Guluzar. The patent should be issued sometime in Spring 2021.

"Separation of Organic Solvent Mixtures", K.K. Sirkar, J. Chau, P. Basak, US Patent No. 10, 843,133 B2, November 24, 2020.

## **Publications**

"Reactor Engineering Calculations with a Detailed Reaction Mechanism for the Oxidative Coupling of Methane", R. Barat, M. Landaverde, A. Molla, P. Pera, and S. Rivera, International Journal of Chemical Reactor Engineering

"Hollow Fiber Membrane Contactors: Module Fabrication, Design and Operation, and Potential Applications", A. K. Pabby, S. R. Wickramasinghe, K. K. Sirkar, and A-M. Sastre (Eds.), CRC Press, Boca Raton, FL, November 2020.

## **2020 Chemical and Materials Engineering Faculty Promotions**



**Promotion to Associate Professor with  
Tenure**  
Dr. Sagnik Basuray



**Promotion to Associate Professor with  
Tenure**  
Dr. Roman Voronov



**Promotion to Professor**  
Dr. Xianqin Wang



**Promotion to Associate Professor with  
Tenure**  
Dr. Xioyang Xu

## **Welcome New Faculty Member**

Meng-Qiang (Mark) Zhao joined the Chemical and Materials Engineering Department in Fall 2020. Dr. Zhao joins us from the University of Pennsylvania, where he is a Postdoctoral Researcher in the Department of Physics and Astronomy and advised by Professor A.T. Charlie



Johnson. He received his Ph.D. degree in Chemical Engineering from Tsinghua University, under the supervision of Professor Fei Wei. Subsequently, he joined the Department of Material Science and Engineering at Drexel University as a postdoc advised by Professor Yury Gogotsi. His research interest focuses on the synthesis, characterization, and processing of low-dimensional nanomaterials and their hybrids for a number of applications including energy storage and conversion, electronics, and biosensors. Dr. Zhao's research has been published in high-impact journals including Nature, Nature Energy, Nature Communications, Advanced Materials, PNAS, J. Am. Chem. Soc., Angew. Chem., ACS Nano, and others.



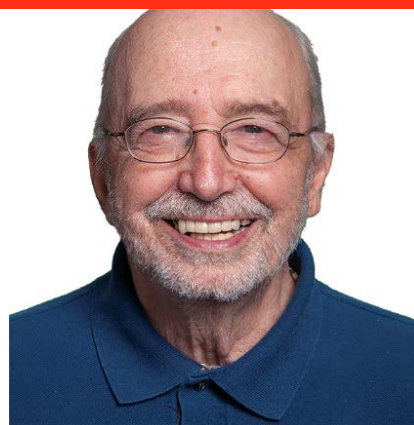
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## Welcome New Lab Director

Dr. Rees B Rankin is both pleased and excited to join the Otto H. York Department of Chemical and Materials Engineering at New Jersey Institute of Technology effective January 2021 as CME Lab Director. Dr. Rankin is passionate about advancing educational opportunities that bridge breakthroughs in materials research with existing chemical engineering practices and technologies. He is also passionate about leveraging computational methods, numerical techniques, and advanced data visualizations to identify surprising functional forms in data, particularly in the areas of catalysis. Dr. Rankin obtained his Ph.D. in Chemical Engineering from Carnegie Mellon University in 2006, and is joining NJIT after 7 years teaching the Unit Operations laboratory course (among others) at Villanova University. Dr. Rankin is looking forward to an exciting first semester in Spring 2021 in the Unit Operations!



## In Memoriam of Professor Angelo J. Perna



It is with great sadness that we inform you of the passing of our longtime colleague Professor Angelo Perna, who died on July 1, 2020 after a long illness.

Angelo Perna was a Professor of Chemical Engineering, serving as educator, researcher and mentor at NJIT for more than 50 years. Among his recent duties he was Director of the Ronald E. McNair Post-baccalaureate Achievement Program and advisor to the chemical engineering honor society, Omega Chi Epsilon. He served for many years as the advisor to the Student Chapter of the American Institute of Chemical Engineers (AIChE) and taught many courses to undergraduate and graduate students.

Professor Perna joined NJIT in 1967 after graduating with a doctorate from the University of Connecticut. He earned his Master of Science and Bachelor of Science degrees in Chemical Engineering from Clemson University. Among his many contributions to the education of Chemical Engineers at NJIT,

Professor Perna was the developer of the NJIT pilot-scale Unit Operations Laboratory, designed and implemented with his long-time collaborator and friend Professor Deran Hanesian. This remarkable facility continues to serve NJIT's chemical engineering students to this day, providing realistic hands-on experiences and preparing our students to tackle the complex challenges of the industry and the marketplace.

NJIT held a virtual Celebration of Life for Dr. Perna on December 2, 2020. We send our heartfelt condolences to Professor Perna's family and to his many friends and students at NJIT and the community.

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### ***Great News!***

NJIT AIChE will be hosting the Spring 2022 AIChE Regional Student Conference!

# **AICHE SPRING 2022 REGIONALS BID: New Jersey Institute of Technology**



By Prof. Roman Voronov  
Chapter Adviser  
Newark NJ, USA



**NJIT**  
New Jersey Institute of Technology

Newark College of Engineering

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## **Alumni Achievement**

### **AIChE Elected Fellow**

Robert A. Rossi, BSChE '67, has been elected a Fellow of the American Institute of Chemical Engineers by the Institute's Board of Directors in October 2020. Bob is a member of the Department's Industrial Advisory Board, the Board of the Alumni Association of NJIT, and is a recipient of the 2016 Distinguished Alumni Achievement Award as well as being Past Chair of the North Jersey AIChE. His 53 year career experience includes organic chemicals manufacturing, paper manufacturing, international marketing and sales of gas-solids processing technologies, process technology development and commercialization, and domestic and international electric utility project development. He has been a consultant to Carbon Engineering Ltd, Squamish, BC, Canada, for the past 12 years



developing Direct Air Capture technology to remove carbon dioxide from the atmosphere and convert it into useful products. He has five related patents in this area.

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## Marino Xanthos Memorial Lecture 2020



On October 12, 2020, the sixth Marino Xanthos Memorial Lecture chaired by Dr Piero Armenante took place virtually to honor the memory of Dr. Marino Xanthos. Marino Xanthos, Ph.D. was a professor of Chemical, Biological and Pharmaceutical Engineering, Associate Provost for Graduate Studies, and Senior Technical Advisor to the Polymer Processing Institute (PPI) at NJIT until his passing in the summer of 2013. Dr. Xanthos earned a bachelor's degree in chemistry from Aristotelian University of Thessaloniki and master's and Ph.D. degrees in chemical engineering from the University of Toronto, where he studied under Professor R.T. Woodhams.

This year's lecture entitled "*Plastics, What are they and could we live without them?*" was delivered by Frank S. Bates, Regents Professor and a member of the Chemical Engineering and Materials Science department at the University of Minnesota. He received a B.S. in Mathematics from SUNY Albany and M.S. and Sc.D. degrees in Chemical Engineering from MIT.

**[Read more about the Marino Xanthos Memorial Lecture Series](#)**

[View lecture](#)

## CME Student Recognition

***Congratulations to the Chem-E Car Team for placing 1st place at the National AIChE Chem-E Car Poster Competition!***





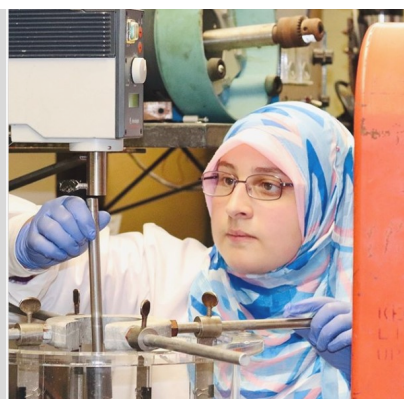
**NJIT Hy-lander : A Fuel Cell-Powered Rover**

[View Poster](#)



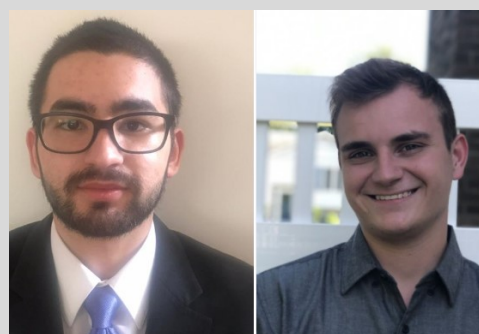
**2020 Presidential Award Recipient**

William Ho, PhD student, chemical engineering, recipient of the 2020 Presidential Leadership Award. William serves as a mentor for undergraduate and high school students working in the research lab under the direction of Professor Xiaoyang Xu. Will is the founder and president of the Science and Politics Society dedicated to involving stem students in politics.



**National Society of Collegiate Scholars**

Sara Abdelhamid, chemical engineering sophomore, earns acceptance into The National Society of Collegiate Scholars (NSCS). The National Society of Collegiate Scholars (NSCS) is an honors organization that recognizes and elevates high-achieving students. NSCS provides career and graduate school connections, leadership, and service opportunities, and gives out more than \$1 million annually in scholarships, awards, and chapter funds.





## 2020 NAMF Winner

Chadakarn Sirasitthichoke, PhD candidate, is the winner of this year's 2020 NAMF Student Award Competition for her paper entitled "Experimental and Computational Hydrodynamic Characterization of the USP Dissolution Testing Apparatus 1 with Baskets of Different Mesh Sizes," which she was requested by NAMF to present at the AIChE San Francisco Meeting. This is a prestigious award assigned every two years by the North American Mixing Forum (NAMF), a multidisciplinary, international group promoting scholarship, research and education in the field of mixing. NAMF is also a forum of the American Institute of Chemical Engineers (AIChE). Congratulations Chadakarn!

*Advisor:* Dr. Piero Armenante

## XSEDE Scholarship Recipients

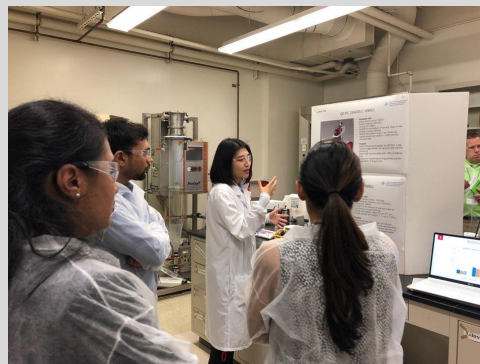
Diego Franco and Christian Kielbowicz, CME students and Professor Voronov's undergraduate research assistants, have both been awarded the Extreme Science and Engineering Discovery Environment (XSEDE) supercomputing scholarships.

Ultimately, Diego and Christian will help contribute to Prof. Voronov's project titled: "Growing Artificial Tissues using Machine Learning-based Controls". As a part of this work, the students will help to develop algorithms for directing cell behavior in lab-grown cultures, based on real time super-resolution microscopy observations. This work will help to develop future 3D cell culture biomanufacturing technologies, which will be ultimately used for: 1) testing and generation of virus vaccines, 2) drug screening (e.g., anti-cancer therapy) and 3) regenerative medicine (i.e., tissue engineering).



### IPEC Graduate Student Award Recipients

Guluzar Gorkem Buyukgoz and Eylul Cetindag, PhD candidates, were awarded this year's IPEC Foundation Graduate Student Award (Scholarships of \$1500 each) for their research accomplishments. This prestigious and highly competitive award by the International Pharmaceutical Excipients Council (IPEC) of the Americas Foundation is given in conjunction with the Annual Conference of the American Association of Pharmaceutical Scientists (AAPS). At the Award Ceremony, Guluzar presented her work, titled, "FDM 3D Printing Technology for Pharmaceutical Applications", and Eylul presented her work, titled, "Towards Quality by Design (QbD) of Pharmaceutical Oral Films Loaded with Poorly Water-Soluble Drugs". Details of their work may be found in the *International Journal of Pharmaceutics*, 591 (2020) 119987, and *Carbohydrate Polymers*, 250 (2020) 117012, respectively. They are both advised by Professor Rajesh N. Davé.



### Women In Chemical Engineering Award Recipient

Sangah Kim, a PhD candidate, was a recipient of this year's Women in Chemical Engineering (WIC) travel award to participate in the American Institute of Chemical Engineers (AIChE) annual meeting. In addition, she also received a highly competitive Computational Particle Fluid Dynamics (CPFD) Particle Technology Form (PTF) poster award for her research that she presented at the 2020 AIChE Annual Meeting. As a part of her eligibility for these awards, she made an oral presentation, titled, "Impact of dry coating on the agglomeration and dissolution of cohesive, poorly water-soluble drug powders" and presented a poster, titled, "Can you improve the dissolution rate of micronized poorly water-soluble drugs after dry coating with hydrophobic silica?". These prestigious awards are issued every year to recognize and support the student's research activities and their values. Sangah is advised by Professor Rajesh N. Davé.

