Prof. Marco J. Castaldi is the lead on a new $1 million project from the US Department of Energy Advanced Research Projects Agency – Energy (ARPA-E) program on “Gypsum & Clay-Based Additives to MSW for Pre-Combustion Enhancement of Syngas and Solid Residue Improvement.” The project will start in Spring 2021. Upon returning from an ARPA-E sponsored workshop on expanding the value proposition of Waste-to-Energy (WTE) facilities beyond electricity generation and landfill diversion, Prof. Castaldi presented the opportunity to the faculty, inviting all to participate in brainstorming sessions. Prof. Castaldi, Prof. Elizabeth Biddinger, and Interim Dean Alexander Couzis led the brainstorming efforts, producing a series of process diagrams and back-of-the-envelope calculations, proving the feasibility of the proposed processes. Ultimately, two proposals were submitted to ARPA-E – one on selectively co-feeding large-scale waste streams of gypsum & clay-based additives with municipal solid waste to alter the gases produced during gasification (the funded project), and one on extracting rare earth and precious metals from current WTE ash (which despite good reviews, was not funded). The funded ARPA-E project is part of the program “Topics Informing New Program Areas” where high-risk exploratory research is performed that has the potential to lead to transformative progress. Prof. Castaldi, an expert in the area of thermal conversion of wastes, connected with collaborators from industry and academia to strengthen the project. The funded team is comprised of PI Prof. Castaldi, co-PI Prof. Biddinger and senior personnel Profs. Robert Messinger and Xi Chen from Chemical Engineering at CCNY, along with Prof. Ashwani K. Gupta from the University of Maryland, Prof. Morton Barlaz from North Carolina State University, Dr. Alex Frank from Innoveering, Mr. Steve Goff from SpG Consulting and Mr. Michael Van Brunt from Covanta.

The Department of Chemical Engineering views the process of obtaining the grant as a template to increase collaborations within the department. Starting Spring 2021, “Research Brainstorming Fridays” have been a department-wide activity where faculty bring new research topics to share and brainstorm together to look for collaborative funding opportunities. The sessions allow faculty to apply their expertise outside of the applications they are traditionally engaged with while enhancing projects that they are currently working on.
Dear Alumni and Friends of the Department,

As always, I hope our Newsletter finds you in good health! The Fall 2020 semester was exhausting and I believe students and faculty alike were happy when we made it to the end. Things are looking up in New York City this Spring and we are in the middle of planning for all eventualities in the Fall 2021 semester and are getting ready for ABET. For the latter, we need your feedback via our alumni survey (click here). You will see that we made good use of the online world in creating collaborations between alumni and students, faculty within the department and beyond, and also with our postdocs and graduate students that have led to promising results ranging from research funding and internships to publications. Many of you know that Prof. Jeffrey Morris, Director of the Levich Institute, and Prof. Sanjoy Banerjee, Director of the CUNY Energy Institute, are members of the ChE Department, but do you know the staff members who make these institutes possible? Take a look and you’ll get a chance to meet them.

Did you know that March is Women’s History Month? In honor of this, we would like to celebrate the many ChE women ‘firsts’ at CCNY. With the help of Tom Castiglione, Registrar, and Prof. Sydney Van Nort from the CCNY Archives and their staff, we learned that the first female students to graduate with a Bachelor’s in ChE were Kay Elsas (1) and Roslyn Keller (2) in 1946. It looks like Kay finished her course work in 1945, but both students graduated in June 1946. Arlene Spadafino* (ChE BE ’63, ME ’66) was our first female Master’s program graduate, while Susan Brandes (ChE PhD ’86) was the first female PhD graduate. Our very own Prof. Carol Steiner (3) wins the prize for most ‘firsts’. She was the first female Assistant Professor (1985), the first one to get tenured, promoted to Associate and then Full Professor. You will see in the newsletter that Prof. Kathleen Stebe (4), our 2nd female PhD graduate, is our very first alumna to get inducted into the National Academy of Engineering (NAE). An impressive list of ‘firsts’ that I happily join as the first female Chair of the ChE Department at CCNY.

One last, but important note. Congratulations to Prof. Levi T. Thompson, Dean of the College of Engineering at the University of Delaware and our External Advisory Board Member, who was also inducted into the NAE.

Enjoy the Newsletter and I look forward to hearing from you!

- Ilona Kretzschmar

* Kohlheb was previously identified as first Master’s program graduate, when in fact it was Spadafino. see erratum.

Chair’s Alumni Highlight: After Lloyd Abrams (ChE BE ’61) graduated from The City College of New York in January of 1961 with a BE in Chemical Engineering, he started working for Pratt & Whitney (P&W) Aircraft on a nuclear engine aircraft. The project was terminated and he was transferred to the East Hartford research facility where he worked on deep space propulsion (ion engines). Then, P&W was awarded the fuel cell project for the Apollo mission and, since he was the only chemical engineer at P&W, he was put on the project. Interestingly (but not strange), folks did not really understand how the fuel cell worked. Lloyd was not satisfied at making things work without understanding why so he left P&W in September of 1963 and went to Rutgers to study surface chemistry and catalysis. He graduated with a PhD in physical chemistry in November of 1966. He then spent two years as a postdoctoral associate at Brookhaven National Laboratory (BNL). After completion of his work at BNL, he went to work at DuPont, from where he retired in 2012 after a wonderful career. Since October of 2012, Lloyd has been a volunteer assisting teacher at a local high school in math, physics, and chemistry. He states: “My experience at City and thereafter taught me how important a good education is and that is what I preach to my students.” If anyone is interested in Lloyd’s career highlights, please, check out his LinkedIn bio https://www.linkedin.com/in/lloyd-abrams-a1615396/ or e-mail him at LloydAbrams@MSN.com.
Prof. Kathleen (Kate) Stebe, an alumnus of our department (ChE PhD, ’89), was elected in February 2021 to the National Academy of Engineering (NAE). The NAE is a private, nonprofit institution whose purpose is to provide engineering leadership to the United States on a national level. Election to NAE is extremely selective and recognizes outstanding contributions to engineering research, practice and education.

Prof. Stebe is a faculty member in the Department of Chemical and Biomolecular Engineering at the University of Pennsylvania (U Penn) in Philadelphia, where she is the Richer & Elizabeth Goodwin Professor of Engineering and Applied Science; she has also served as Deputy Dean for Research. Prior to her appointments at U Penn, Prof. Stebe was in the Department of Chemical Engineering at Johns Hopkins University (JHU), where she served as the Chair. Prof. Stebe’s research focuses on soft matter physics, particularly at fluid interfaces. She has investigated the dynamics of adsorption of surface-active molecules at interfaces and its influence on interfacial flows. More recently, Prof. Stebe’s research has focused on the interaction and directed (robotic) assembly of colloids and bacteria at an interface, and the behavior of colloids in liquid crystalline phases. Prof. Stebe’s election to the NAE cites her “contributions to understanding of nonequilibrium processes at soft matter interfaces and its impact on new technologies.”

Kate and CCNY

Kate’s ties to City College run deep, which makes her election all the more special to our Department. Kate’s father (the late Peter F. Stebe) was a Professor of Mathematics at CCNY, and Kate herself, along, with her siblings, are all proud bachelor’s degree graduates of different departments at CCNY – in Kate’s case in Economics, which many have found surprising given her eventual career path in Chemical Engineering.

Kate’s doctoral thesis research, directed by ChE Prof. Charles Maldarelli, was among the first to be completed in the Levich Institute at CCNY. Kate began her graduate work resulting in her PhD thesis: *The Remobilization of the Interfaces of Moving Bubbles and Droplets Retarded by Surfactant Adsorption* during the period when the Institute, now directed by ChE Prof. Jeffrey Morris, was led by Prof. Benjamin Levich himself before his death in 1987. The leadership was then assumed by Prof. Andreas Acrivos, also an inductee of the National Academies of Science and Engineering.

Kate has been a big supporter of ChE at CCNY. Most recently, she has served as a member of our EAB from 2017 - 2020. Kate regularly approaches our faculty with invitations for proposal collaborations. She has recruited numerous students to doctoral programs at the respective institutions she has worked at and supported them on their future pathways into academia and industry. Thank you, Kate!

Our department has previously recognized Kate with the Stanley Katz Lectureship. Other significant achievements include the Frenkel Award from the Division of Fluid Dynamics of the American Physical Society for a paper published from her doctoral studies; a fellowship at the Radcliffe Institute for Advanced Studies at Harvard, the Robert S. Pond Excellence in Teaching Award at JHU, and most recently, the 2018 Langmuir Lectureship Award.

Kate joins eight graduates from our department elected to the NAE. The others are Martin Sherwin (elected in 1988, ChE BE ‘60, PhD ’67), Fred Krambeck (elected in 1999, ChE BE ‘63 PhD ’68), Amos Avidan (elected in 2009, ChE PhD ’80), Ghebre Tzeghai (elected in 2014, ChE PhD ’84), Andrew Grove (elected in 1979, ChE BE ’60), George Nemhauser (elected in 1986, ChE BE ’58), Stanley Sandler (elected in 1996, ChE BE ’62) and Arnold Stancell (elected in 1997, ChE BE ’58).
Dr. Jude Phillip (ChE BE ’10) has joined The Institute for NanoBioTechnology (INBT) at JHU as an Assistant Professor. Jude’s primary appointment is in the Department of Biomedical Engineering with secondary appointments in the Department of Chemical and Biomolecular Engineering and in Oncology. Jude’s lab, the Phillip (tiME)n Lab, focuses on cells through the passage of time.

We asked Jude how his time at CCNY prepared him for his new position. Here is what he told us: I think that my education at CCNY was foundational and critical to my career trajectory. I grew up in Grenada and I was drawn to Chemical Engineering at an early age, mainly due to an interest in manufacturing pharmaceuticals. However, before arriving at CCNY, I had never met another chemical engineer, and I think in addition to providing education regarding chemical engineering, my professors at CCNY inspired me to push beyond what I thought I could do and the impact I could have. CCNY chemical engineering professors are phenomenal!

To me, one of the defining experiences at CCNY was during the intro class, ChE 228. For that class we had Prof. Alexander Couzis and I remember becoming more thrilled with the notion of becoming a chemical engineer with every class. Just getting the idea of the breadth of the field and the impact that chemical engineers have on society, showing me that chemical engineering went far beyond what we classically think, i.e., pharmaceuticals and energy, but it encompassed so much more. After that class, I did undergraduate research in Prof. Couzis’ lab. I think that my conversations with Prof. Couzis over the years and working along with his graduate students and postdocs helped to solidify my choice to pursue graduate school.

During graduate school and beyond, my work has become a bit more biomedically-focused, however, the fundamentals in terms of how I think about the problems and the path to finding solutions is very much grounded in my chemical engineering education, which began at CCNY. I think the quality of education that students receive in the Chemical Engineering Department at CCNY is excellent, and it prepares you well for future career trajectories.

Zubair Bhuiyan (ChE BE ’15) is an Associate Scientist at AstraZeneca. After graduating from CCNY, Zubair pursued a MS in the Department of Chemical & Biomolecular Engineering at JHU. During his MS he participated in a Co-Op program with AstraZeneca (then MedImmune), where he developed a drug delivery platform for antibody-DNA conjugates with potential applications in multiple therapeutic areas. In 2017, Zubair joined AstraZeneca full-time as an R&D associate and was promoted to his current level in June 2020. Currently he is involved in the development of formulations and dose forms for clinical and commercial drug candidates including antibody drug-conjugates, nucleic acid therapies (i.e. mRNA/DNA vaccines) and other novel biologic therapies.

A year ago, few of us would have paid attention to AstraZeneca, a research-based biopharmaceutical company headquartered in England. Now, however, the COVID-19 vaccine co-developed by AstraZeneca and the University of Oxford has been granted Emergency Use Authorization by the World Health Organization for the prevention of COVID-19 across the globe. We checked in with Zubair to see how he is doing.

What is it like to work at AstraZeneca? How have things been during the pandemic?

Zubair: AstraZeneca is a highly science-driven organization and it’s always very enriching to be involved in delivering vital therapies to people. Despite the numerous challenges we faced this year, I’m proud to have had the opportunity to be a part of a team that has worked tirelessly toward developing a solution to the current global pandemic.

I am also very proud to say that many of the fundamental skills I use in my career were developed at CCNY whether in class or in Prof. Raymond Tu’s Lab as an undergraduate research assistant.
Rabbi says: ChAMP has been one of the greatest opportunities that the CCNY Chemical Engineering major has implemented for career development. I was matched with CCNY Chemical Engineering Alumna Marjorie Bosko (ChE BE ’15), who currently works at ConEdison. The mentorship program exposed me to several different interviewing styles that sharpened my interviewing skills as well as helped me create an outstanding resume. However, the best part about the ChAMP mentorship is the moral support that the mentors provide to the mentees. We all go through so much in our personal lives, and I was able to expand on my time management skills through sharing my struggles and weaknesses with Marjorie. I am learning that the essence of success is truly a positive mindset! I landed a summer internship with Estée Lauder, and I thank Marjorie for guiding me through the entire application process and my journey of self-exploration!

From ChAMP co-creators, Kelvin Leo and Long Ng: As ChAMP 2020-21 is ending, we are planning to continue the effort in building the community between alumni and current undergraduates of CCNY ChE. Therefore, we are actively recruiting ChE alumni who are interested. The next cycle will start August 2021. Want to get involved? Contact Long Ng at longngche[at]outlook.com.

Yaraslau reminices: I’ve secured a Chemistry & Kinetics Engineering Internship with Cummins for Summer 2021. I’m not exaggerating when I say that it would have been impossible without my mentor’s help from the ChAMP Program. His name is Edgar Juarez (ChE BE ’19), he is a CCNY ChE alumnus and he currently works for Chevron in Texas. During the past few months, Edgar helped me rewrite my resume (almost from scratch!), gave a lot of valuable tips about the internship/job interview process, and shared his experience of going through the curriculum here at CCNY. He also introduced me to some organizations and societies to develop a professional network. Funny fact: I secured the Internship after talking to the Cummins recruiter at the Black Engineer of the Year Awards (BEYA) Conference, but Edgar was the one who told me about this conference! Overall, I think the ChAMP program is a great opportunity for the students to network and gain valuable advice and experience from alumni. So big thumbs up and ‘thank you’ to the people who came up with the idea and organized the ChAMP program! And of course, thank you to all the graduates who volunteered to help us!

Two ChAMP Success Stories:

Yaraslau Yajak (Class of 2022)

Mohammad “Rabbi” Alam (Class of 2022)
Ilona Kretzschmar, professor & Chair of ChE at CCNY, and her co-authors from CCNY and Queens College Chemistry demonstrate a synthetic strategy to stabilize bio-inspired solar energy harvesting materials. Their findings, published in *Nature Chemistry*, could be a significant breakthrough in functionalizing molecular assemblies for solar energy conversion technologies.

The translation of Nature’s design principles to applications in optoelectronic devices has been limited by the fragility of the supramolecular structures used and the delicate nature of Frenkel excitons, particularly under mildly changing solvent conditions and elevated temperatures and upon deposition onto solid substrates. Researchers at CUNY overcame those functionalization barriers through composition of stable supramolecular light-harvesting nanotubes enabled by tunable, uniform cage-like scaffolds, and they showed that excitons within the cage-like scaffolds are robust, even under extreme heat stress, and control over nanocomposite dimensions is maintained on solid substrates. These bio-inspired nanocomposites provide a general framework for the development of next-generation organic devices made from stable supramolecular materials.

The Kretzschmar Lab is interested in nano and microparticles in general and more specifically in the modification and assembly of Janus and Patchy particles. Combining chemical engineering, chemistry, material and surface science, and molecular electronics we discover new materials and applications for novel colloidal systems.


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**Water-responsive crystals published in Nature Materials**

Xi Chen, an assistant professor in ChE at CCNY, and his co-authors at the CUNY Advanced Science Research Center (ASRC) created shape-changing crystals that enable energy transfer from evaporation to mechanical motion. Entitled: “Mechanistic insights of evaporation-induced actuation in supramolecular crystals,” the study appeared in *Nature Materials*.

Different from traditional crystals that are usually stiff and brittle, the new crystals have the ability to swell and contract in response to changes in humidity. These water-responsive crystals not only allow, for the first time, the direct observation of water-material interactions at the molecular level by using existing crystallographic, spectroscopic and computational methods, but also support the Chen Lab’s long-term goal of developing an evaporation energy harvesting technique that could open a path to directly harness the energy of natural evaporation.

The Chen Lab has a multi-disciplinary approach in the broader context of “hygroscience,” with research interests that are complementary to each other, including understanding the powerful and efficient chemical potential-induced interactions in biological systems, its nanoscale energy conversion mechanisms, and replicating these mechanisms outside their biological contexts for future engineering applications.


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**Bio-inspired solar energy harvesting materials published in Nature Chemistry**

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Mike Nyce is just more than nice, he brings in over 45 years of valuable battery chemistry and engineering knowledge and experience to the CUNY EI and ChE Department, which he joined in 2008. Mike has played an integral role in building the reputed Institute that it is today. He has nurtured, guided, and mentored countless PhD and undergraduate students through their arduous academic journey and passed on his highly valuable industrial experience rarely found in academia. His work on the Ni-Zn and MnO$_2$-Zn systems has led to many CUNY EI patents and a spin-off company, Urban Electric Power. Mike’s assistance to the Chem-E-Car team has been crucial for the team’s success. Mike’s role as the Senior Research Associate is to bring forth new battery technologies to commercialization such as the 2$^{nd}$ electron MnO$_2$ technology currently being developed in collaboration with Sandia National Laboratories.

Sumer Mishue, NASA & PIRE Project Coordinator
Sumer Mishue joined us in October of 2019. She is the project coordinator for the NASA-CCNY Center for Advanced Batteries for Space in the ChE Department and the Partnerships for International Research and Education (PIRE) Project in the Department of Mechanical Engineering. Her role spans everything from drafting reports for grantors and building and managing websites, to coordinating meetings and onboarding new team members for the Center.
To leave a gift in your will, simply share this sentence with your attorney or financial planner:

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Stelios is a member of our External Advisory Board (EAB) and has supported the ChE Department by giving advice and guidance during EAB visits. He has also provided our student body with internship opportunities at the Food & Drug Administration (FDA). After graduating from CCNY in 1986, Stelios joined the PhD program at Princeton University where he graduated with a PhD in Chemical Engineering in 1992. After short stints as senior engineer at Mobil and Schering Plough, Stelios worked at various pharmaceutical companies such as Merck, Cephalon, Teva, and Shire/Takeda in roles ranging from Senior Director to Head. Currently, Stelios is the Director of the Office of Pharmaceutical Manufacturing Assessment at the FDA, where he evaluates facilities, process design, and control strategies to assess capabilities of manufacturers to produce quality pharmaceutical and biotechnology products at commercial scale, and provides leadership and technical expertise to Agency components internal and external to the Office regarding manufacturing quality issues. If you are interested in contacting Stelios, he can be reached via Linkedin (https://www.linkedin.com/in/stelios-tsinontides/) or e-mailed at: Stelios.Tsinontides@fda.hhs.gov.

Dr. Stelios Tsinontides, ChE BE '86

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