

CHEMISTRY

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College of Natural Sciences  
Chemistry



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Dear Alumni and Friends of UMass Chemistry,

UMass Chemistry has had another productive and eventful year. In this issue of the Goessmann Gazette we hear from several of our alumni and highlight the achievements of members of the UMass Chemistry community. It's been wonderful to see our faculty and students be recognized for their teaching and research accomplishments!

Dr. Surampudi (PhD '13) won the University Distinguished Teaching Award, UMass's most prestigious teaching award, continuing Chemistry's tradition of excellence in teaching. With 12 awardees and 13 awards, Chemistry has won the second most DTAs of any department on campus.

Professor Min Chen won the CNS Outstanding Research Award for her work using and engineering novel biological nanopores and for a wide range of bioanalytical and biophysical applications. Several faculty won national awards, including Assistant Professor James Walsh whose NSF CAREER Award will support his work on high-pressure synthesis of new materials. Professor Richard Vachet received a prestigious NIH Maximizing Investigators' Research Award (MIRA) to use mass spectrometry to study amyloid protein formation and inhibition. Distinguished Professor Vincent Rotello received the ACS Arthur C. Cope Scholar Award for excellence in organic chemistry. Faculty recognized for their impact include Prof. Rotello, who was again named a Clarivate "Highly Cited" researcher and Associate Professor Mingxu You, who was recognized as among the Top 2% Scientists Worldwide by Stanford University.

Several graduate students won prestigious fellowships to support their research: Kimberly (Bolduc) Pereira (Donald Kuhn Graduate Fellowship and PPG Fellowship), Dheeraj Krishnan Agrohia (PPG Fellowship), Ashan Ausaf Ali (Paul Hatheway Terry Scholarship) and Rui Huang (Marvin D. Rausch Fellowship). Undergraduate Bao Le was named a UMass Rising Researcher for his work with Associate Professor Michelle Farkas to synthesize molecules to modify cell surfaces for cancer imaging and treatment. The highlight of the year was the Senior and Awards dinner, where we celebrated our students' outstanding academic achievements and exciting research.

In transitions, I'm excited that Dr. Jiahui (Chris) Wu will be joining our department and the Institute for Applied Life Sciences as an Assistant Professor this Fall. His research program will develop RNA therapeutics to regulate the degradation of disease-causing proteins and to rewire errant cellular metabolism. Marv Ellin, who, as Operations Manager, made sure that our research and teaching infrastructure worked, has retired after over 23 years in the department. In this issue we mourn the passing and celebrate the life and achievements of John Olver, faculty member, conservationist, and long-term public servant as State Representative, State Senator, and Congressman.

We continue to be deeply grateful to all of you who have contributed so generously to our department over the years. In addition to providing scholarships to students and improving our teaching and research facilities, your gifts help us to provide startup packages for new faculty. With your support, we will continue to train top-notch scientists and advance the frontiers of knowledge! Thanks to you, UMass has great chemistry!

Sincerely,

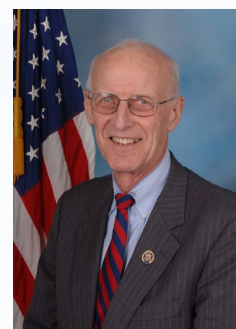


Ricardo Metz, Head of Chemistry



## Remembering John W. Olver

by Peter Lillya



Our former colleague, John Olver, passed away in February. Most will remember him as our former congressman from the 1st District, but before his political career, he was an assistant professor of chemistry at UMass, joining the Department in 1962. John was a talented chemist with a specialty in electrochemistry. However, John's life path soon took a departure from the rest of his colleagues. When he arrived at UMass, he was already very interested in public affairs and local politics. By the time he spent his sabbatical running for State Representative in 1968, he was deeply committed to public service; I believe he would have found a way forward in that direction regardless of the election outcome. His campaign resembled a children's crusade as his politically naive colleagues contributed in great numbers as his foot soldiers.

After his improbable win, he served for two terms as our state rep. He threw himself into promoting a ballot initiative to reduce the size of the Massachusetts house from 340 to 160 representatives. He was successful, but as you can imagine, it made him persona non grata in the house chamber. John saw the writing on the wall and decided to run for a seat in the Massachusetts Senate, winning by only around 300 votes. He served as our state senator from 1972 to 1991. In 1991, 1st District congressman Silvio Conte died in office. John eventually won a primary election that at one time had 11 candidates. He won the following general election by a thin 2% margin; in his long career, he never lost an election.

Due, in part, to his longevity and effectiveness in Congress, he rose to become chair (or ranking member) on the appropriations housing and transportation subcommittee. These were areas where John believed that government could improve the lives of his constituents. He forged a cordial relationship with his Republican counterpart and shepherded much beneficial legislation along. Olver's fingerprints are all over western Massachusetts, including his work in building community health centers, bringing intermodal public transportation centers to Greenfield and Westfield, and securing funds to support local economic development, notably along the Route 2 corridor connecting Greenfield, Orange, Gardner and Ashburnham. John, a lover of nature, also worked



The John W. Olver Transit Center in Greenfield. The first zero-net-energy transportation facility in the US.

on the designation of the Westfield River as a wild and scenic river and on knitting together our Metacomet-Monadnock trail with other trails to create a protected National Scenic Trail continuous from Long Island Sound to the New Hampshire state line. The John W. Olver Transit Center in Greenfield, MA, was the first zero-net-energy transportation facility in the US, harnessing geothermal and solar technologies for heat and power.

My wife Maija and I had the great pleasure to share a close friendship with John and his family. Together we hiked the New England Scenic Trail from the Connecticut border to the summit of Mt Monadnock. John and I have been best friends for many years, and I have described some of our adventures in the 2021 issue of the Goessman Gazette. I'll add a coda here. John and I enjoyed many rambles together on the Mt. Holyoke Range above our houses. John was good at identifying plants, and birds by their songs. The photos were taken on such a hike. We had to invite local naturalist and conservationist Peter Westover along to identify the showy orchis which we would visit every spring.



John getting up close to our quarry, the Showy Orchis

John was deeply passionate about many causes including the environment, social, and economic issues, and worked tirelessly for the betterment of western Massachusetts and the country as a whole. John's convictions went beyond legislating, and he went to great lengths to bring awareness and change for humanitarian causes.

### Cover: The John W. Olver Design Building



John Olver contributed to UMass in countless ways, but the John W. Olver Design Building is a moving reminder of his impact on our

community. It features a sustainable mass timber frame construction and unique design which have earned the building multiple awards. Forest health and sustainable construction were important to John, and he was instrumental in changing the building's structure to a timber frame design over traditional steel. The innovative, world-renowned building which integrates contemporary design with a lighter footprint, is home to four departments.



## CHANCELLOR SUBBASWAMY ON THE PASSING OF CONGRESSMAN OLVER

Western Massachusetts lost an extraordinary advocate and UMass Amherst a powerful champion. Former Congressman John Olver, a passionate public servant, UMass professor, activist and conservationist, died at the age of 86. Our community mourns his loss deeply.

Since the day he joined our campus in 1962 as a chemistry professor, to his days in the Statehouse and the US Congress, and even through his retirement, John worked behind the scenes to push the Amherst campus to not only be better, but to be the best. In recognition of his support, he was made an honorary alumnus in 1981 and received an honorary doctorate in public service in 2014.



Congressman Olver with Chancellor Subbaswamy

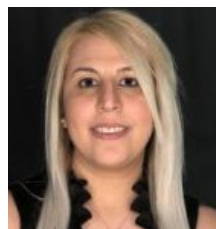
He was deeply committed to improving infrastructure as well as protecting the environment. Those two passions came together when he began working to persuade us to adopt new and innovative building technology for our proposed Design Building. Within the span of a week, he changed the trajectory from a traditionally constructed steel frame to a state-of-the-art building that emphasized the very latest in green building technology.

There is no other project that better personifies John's commitment to the environment, his love of science and planning, and his desire to bring people together for the greater good. So much so that worked with President Marty Meehan and our Trustees to name the Design Building, the largest academic contemporary wood structure in the entire country, as the John W. Olver Design Building in 2017.

His legacy also lives in our library, and students of true public service are well served to learn from it. In 2012, John gifted his papers to the Robert S. Cox Special Collections & University Archives Research Center. They contain thorough documentation of the congressman's career in Washington, including records of his policy positions, committee work, communications with the public, and the initiatives he supported in transportation, economic development, the environment, energy policy, and human rights.

Thank you, John, for your public service and your devotion to UMass Amherst.

## faculty Highlights



### Al-Hariri Receives UMass ADVANCE Faculty Peer Mentor Award

**Lara Al-Hariri**, Senior Lecturer II of chemistry, received the UMass ADVANCE Faculty Peer Mentor Award in the College of Natural Sciences in recognition of the critically important work faculty members perform in mentoring

and supporting their colleagues' professional development and success.

Provost Serio said, "Lara's unique experiences as a campus leader, STEM instructor, and supporter of other faculty have made her an incredible mentor in many areas. She is described by her colleagues as a great mentor for "navigating the College and University, and as very inclusive, extremely knowledgeable, patient, and willing to listen." While she is known to be an exemplary mentor within the department of Chemistry, in 2018 her mentoring role expanded to include colleagues in other CNS departments through a mutual mentoring grant."

Upon receiving the award, Dr. Al-Hariri said, "I am honored to receive this award for mentoring colleagues in the chemistry department and CNS. I am grateful for the opportunity to share my experiences teaching large enrollment classes and supporting colleagues in their professional development. I hope this inspires others to embrace mentorship and the mutual positive impact on the mentor and mentee."



### New Material Solves Wearable Sensor Problem

A team of researchers, led by chemistry Professor **Trisha Andrew**, synthesized a new material that solves one of the most difficult problems in the quest to create wearable, unobtrusive sensitive sensors: the problem of pressure.

"Imagine comfortable clothing that would monitor your body's movements and vital signs continuously, over long periods of time," says Andrew. "Such clothing would give clinicians fine-grained details for remote detection of disease or physiological issues." One way to get this information is with tiny electromechanical sensors that turn your body's movements—such as the faint pulse you can feel when you place a hand on your chest—into electrical signals. But what happens when you receive a hug or take a nap lying on your stomach? "That increased pressure overwhelms the sensor, interrupting the flow of data, and so the sensor becomes useless for monitoring natural phenomena," Andrew continues.

To solve this problem, the team developed a sensor that keeps working even when hugged, sat upon, leaned on or otherwise squished by everyday interactions. The secret, which was detailed in the journal *Advanced Materials Technologies*, lies in vapor-printing clothing fabrics with piezoionic materials. With this method, even the smallest body movement, such as a heartbeat, leads to the redistribution of ions throughout the sensor. In other words, the fabric turns the

mechanical motion of the body into an electrical signal, which can then be monitored.

Of particular advantage is that this all-fabric sensor can be worn in comfortable, loose-fitting clothing rather than embedded in tight-fitting fabrics or stuck directly onto the skin. This makes it far easier for the sensors to gather long-term data, such as heartbeats, respiration, joint movement, vocalization, step counts and grip strength—a crucial health indicator that can help clinicians track everything from bone density to depression.

### New Textile Unravels Warmth Secrets of Polar Bear Fur

Professor **Trisha Andrew** and other engineers at UMass Amherst have invented a synthetic textile modeled on polar bear fur. The results, published recently in the journal *ACS Applied Materials and Interfaces*, are already being developed into commercially available products.

As Andrew explains it, polar bear fur is essentially a natural fiberoptic, conducting sunlight down to the bears' black skin, which absorbs the light, heating the bear. The team have engineered a bilayer fabric whose top layer is composed of threads that, like polar bear fur, conduct visible light down to the lower layer, which is made of nylon and coated with a dark material called PEDOT.

A jacket made of such material is 30% lighter than cotton yet will keep you comfortable at temperatures 10 degrees Celsius colder, as long as the sun is shining or a room is well lit.

The research was supported by the National Science Foundation, and Soliyarn (Andrew's startup company) has begun production of the PEDOT-coated cloth.



### AI Ranks Promise for Carbon Capture

The journal *Digital Discovery* published a study from an international research team including UMass Amherst chemistry Professor **Scott Auerbach** that applied artificial intelligence (AI) to a long-standing problem in materials science – identifying structures within massive computer-generated databases

that are good candidates for actual fabrication. Auerbach and coworkers focused their study on hypothetical zeolites, which show promise for capturing carbon dioxide emissions.

Zeolites are nanoporous crystals that have been utilized for more than six decades in a number of industrial processes, particularly in refining petroleum and separating chemical mixtures. While much effort has been put into identifying and synthesizing new zeolites for modern needs such as producing clean biofuels and capturing carbon dioxide, success has been largely theoretical. While massive databases of hypothetical zeolites have been generated containing millions of new framework structures, none have been made in the lab.

"This problem, which is known as the 'zeolite conundrum,' has severely limited the pace of the clean energy transition,"

said Auerbach. "Finding the few hypothetical zeolites that can actually be synthesized in the lab is like finding a needle in a gigantic haystack."

Auerbach and coworkers developed an algorithm called the "sorting hat" that uses artificial intelligence and machine learning to distinguish between the 255 already-synthesized zeolites and more than 300,000 hypothetical framework structures. They created a short list of hypothetical zeolites that are so similar to real ones that they are "misclassified" by the sorting hat as real materials – making them good candidates for actual synthesis.

After filtering their results by additional criteria, including the potential for stabilizing them during synthesis, the researchers proposed three leading hypothetical candidates for synthesis. Their analysis also categorized real zeolites into four compositional classes or "houses." This partitioning into houses allowed the researchers to propose chemical compositions to pursue in the laboratory for making the hypothetical zeolites – like recipes for synthesis.



### Chen Receives CNS Outstanding Researcher Award

Professor **Min Chen** received the CNS Outstanding Research Award (early/mid-career) in recognition of her contributions to designing and developing novel biological nanopores and using them to answer a wide variety of bioanalytical and biophysical

questions. Her groundbreaking work has found applications in diverse areas such as protein sensing, disease diagnostics, drug candidate screening, and sequencing of nucleic acids and proteins.

In a nanopore sensor, there are two compartments containing electrolyte solutions ( $K^+$  and  $Cl^-$ ) that are separated by an impermeable membrane containing a tiny, nano-sized pore through which ions flow. By measuring the ion current over time, information can be obtained about what blocks the pore, when it is blocked, and for how long. Professor Min Chen's laboratory has developed nanopores that can sense the presence of disease biomarkers, detect subtle protein motions induced by ligand/drug molecule binding, and identify the building blocks of long DNA or protein polymers.



### Kittilstved Selected to Serve as ADVANCE Faculty Fellow

Professor **Kevin Kittilstved** is among 44 selected faculty members, each representing different units, who will partner with UMass ADVANCE to promote gender and racial equity for faculty. Through a combination of

research, programming, and practices, they seek to understand systemic and intersectional inequalities at UMass and to lay the groundwork for a fairer, more equitable, diverse and inclusive campus.





### Lin Receives DNI Award

**Zhou Lin**, an Assistant Professor in the department of chemistry, was granted a single-PI Doctoral New Investigator (DNI) award from the American Chemical Society Petroleum Research Fund to support her project, "Nuclear Quantum Effects in Photocatalytic Direct Methane Oxidation Driven by Proton-Coupled Electron Transfers," for two years.

Prof. Lin, a theoretical chemist, proposes to develop computationally aided design strategies to develop photocatalytic systems for the fixation and oxidation of methane, a significant greenhouse gas released by the petrochemical industry. She focuses on the direct oxidation of methane into value-added methanol with energetically accessible intermediates and minimal byproducts. The primary goal of her research is to determine the atomistic mechanism of the process, particularly the quantum effects of protons on the capacity and selectivity of proton-coupled electron transfers.

If successful, Prof. Lin's research will provide design principles for the catalysis community to create effective and selective photocatalytic direct methane oxidation systems and other interfacial reactions driven by proton-coupled electron transfers. This research could revolutionize how carbon emissions are transformed into valuable feedstocks, benefiting the environment and the economy.



### Rotello Receives International Cope Scholar Award

Distinguished Professor of chemistry, **Vincent Rotello**, has received the Cope Scholar Award from the American Chemical Society for his work using synthetic organic chemistry to engineer the interface between the synthetic and biological

worlds. Rotello's lab spans the areas of devices, polymers and nanotechnology/bionanotechnology to build lego-like molecules at the nano scale that have important applications in health care and environmental delivery, imaging, diagnostics and nanotoxicology.

Rotello's colleague, Jeffrey N. Johnston of Vanderbilt University, says: "In his 25 years of independent research, Rotello has produced an incredibly diverse, innovative and influential body of research that brilliantly blends the atom-by-atom control afforded by synthesis and the rigor of physical organic chemistry. He uses these tools to address important questions and needs in materials and biology. His extremely imaginative program has produced a lasting impact and continues to evolve in new and fascinating directions."

### Rotello Among World's Most Cited Researchers

Professor **Vincent Rotello** is one of a dozen UMass Amherst researchers representing a wide range of disciplines that have been recognized as among the world's most highly

cited researchers in 2022. The list is generated by the Web of Science database of analytics provider Clarivate. The highly cited papers rank in the top 1% by citations for their field and publication year, span 69 countries or regions and are spread across a diverse range of research fields in the sciences and social sciences.



### Skouta Researching Cancer Therapies

Prof. **Rachid Skouta**, Research Assistant Professor of chemistry, has received a scholar grant from the American Cancer Society (ACS) support his project "Identification of Ferroptosis Inducers Toward Better Anti-cancer Therapies."

Lung cancer is the leading cause of cancer death among both men and women in the US, with non-small-cell lung cancer (NSCLC) representing more than 85% of cases. Drug resistance in cancers including NSCLC is the second-leading cause of death in the US, and researchers are working to develop better NSCLC treatments.

Skouta's lab will focus on the ferroptosis cell death approach, which would be immune from the drug-resistance issues of apoptosis-based treatments and is also more precise, targeting only cancer cells. The researchers have identified a specific chemical that triggers ferroptosis cell death and will use the ACS grant to explore its efficacy as a targeted cancer treatment.



### Surampudi Receives UMass's Highest Teaching Award

The Distinguished Teaching Award (DTA) honors exemplary teaching at the highest institutional level, and Dr. **Sravan Surampudi** is the chemistry department's latest recipient. This highly competitive and prestigious campus-wide honor is the

only student-initiated award on campus.

During his seven years at UMass Amherst, Dr. Surampudi has emerged as one of the most outstanding teachers in our department, having demonstrated an excellent ability to engage his students, implement effective approaches in the classroom, and help his students appreciate both General Chemistry and Organic Chemistry. His student-centered model of teaching gets students to engage in class material and build critical thinking skills. One student shared: "Prof. Surampudi described organic chemistry with the use of visual models and analogies that made complicated conceptual names easy to remember."

His students have also benefitted from peer-led team learning (PLTL), which Dr. Surampudi and his colleague, Dr. Lara Al-Hariri are piloting for large-enrollment sections of Organic Chemistry. Their students work in small groups solving problems, building a cohort, and enjoying chemistry.

Dr. Surampudi said, "I am extremely grateful for winning this award and very thankful to my students and my colleagues for all the support I have received."

### Surampudi Named TIDE Ambassador

Dr. **Sravan Surampudi** was one of 10 faculty members named as a 2023-24 TIDE (Teaching for Inclusiveness, Diversity and Equity) Ambassadors Faculty Fellow. This highly competitive program provides members with the opportunity to explore how they can enhance students' learning and academic success across cultural, social and learning differences by adopting a strength-based, inclusive and equitable approach to teaching and learning grounded in the value of diversity.



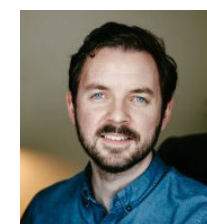
### Bridging the Clean Energy Gap

Professor **Dhandapani Venkataraman** (DV) is passionate about an interdisciplinary approach to solving problems. "I tend to explore issues at the edge of my field of expertise because it helps push the field forward into new directions," he says.

One of his new directions is at the intersection of energy and equity. Working with The Energy Transition Institute (ETI) at UMass Amherst, DV recently served as the principal investigator for a series of two National Science Foundation-funded workshops called NSF2026 that were focused on identifying energy technology research priorities as they relate to social justice. "By bringing together social scientists, equity scholars, and other stakeholders, we were able to ensure that clean energy research priorities include a just and equitable approach," DV said.

The dire state of global climate change necessitates a rapid and effective transition away from fossil fuel dependency. While clean energy solutions exist, if not implemented properly they have the potential to cause or exacerbate financial and access inequalities for marginalized groups.

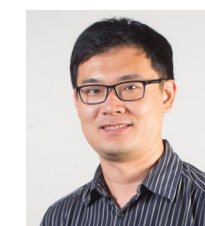
Several approaches to clean energy implementation solely focus on income-based inequity challenges. This single-lensed approach fails to consider the many other aspects tied to inequity like race, ethnicity, or gender. "Rather than trying to speak for communities, we need to seek input and involve impacted communities in early phases of the projects," he said. "We are very much looking forward to the next steps and eventually, to operationalizing an equity-based approach for energy research."



### Walsh Receives NSF CAREER Award

Assistant Professor **James Walsh** has received the National Science Foundation CAREER award for his project "Harnessing Microfabrication for Chemical Control During High Pressure Synthesis of Non-Equilibrium Carbides."

Through this award, funded by the Solid State and Materials Chemistry program in the Division of Materials Research at NSF, the Walsh Lab will develop a completely new approach to high-pressure synthesis that uses cutting-edge microfabrication methods to precisely tune elemental ratios to a much higher precision than is possible with standard methods. This will provide reliable synthetic access to non-equilibrium materials that are otherwise difficult to target experimentally.



### New RNA Fluorescence Imaging System

An interdisciplinary team at UMass Amherst, led by **Mingxu You**, Associate Professor of chemistry, has been awarded a grant by the Chan Zuckerberg Initiative to develop a novel multiplexed fluorescence imaging system for living cells.

The new imaging system will be used to study dynamic gene expression profiles and cellular heterogeneity, which will help researchers understand how diseased cells are different from healthy ones and how diseases emerge.

To advance general understanding of cells, the team will measure as many RNA signatures as possible in each individual cell and track how these different signatures can change over time and space.

Ultimately, researchers hope the project will result in an easily applicable, multiplexed, quantitative, and automated system that can be widely used in typical life science laboratories. It may also open the door for new applications in single-cell profiling for studying developmental biology, neuroscience, immunology and oncology.



### Weaver Appointed to NASEM Committee on Equitable and Effective Undergraduate STEM Education

**Gabriela Weaver**, Professor of chemistry and College of Natural Sciences assistant dean for student success analytics, has been appointed to serve as a member of the consensus study committee on Equitable and Effective

Undergraduate STEM Education of the National Academies of Science, Engineering and Medicine (NASEM).

The framework for institutions, educators, and disciplines is being convened by the NASEM Board on Science Education to develop an evidence-based guide for equitable and effective teaching in undergraduate STEM education and provide an analysis of policies and practices at the departmental, programmatic, and institutional levels that can facilitate implementation of its principles.

The 15-member committee will consider different teaching contexts, modalities and types of institutions, as well as strategies and resources needed for implementation.



## graduate student Accomplishments



### Agrohia Receives PPG Fellowship

**Dheeraj Krishan Agrohia** (Vachet group): Polymeric nanocarriers (PNCs) are versatile drug-delivery vehicles capable of delivering a variety of therapeutics. Quantitatively monitoring their *in vivo* biodistribution is essential for realizing their potential as next-generation delivery systems; however, existing quantification strategies are limited due to the challenges of detecting polymeric materials in complex biological samples. My research in the Vachet lab focuses on developing measurement tools to study how PNCs and their cargos are distributed *in vivo*. With the support of the PPG fellowship, I will be working to develop a new mass spectrometry imaging method that can quantitatively monitor how multiple distinct PNCs and their cargos are distributed in different organs in a single set of experiments. This multiplexing capability should improve the design and optimization of PNCs by minimizing biological variability and reducing analysis time, effort, and cost—minimizing the need for using multiple animals.



### Ali Receives Paul Hatheway Terry Scholarship

**Ashan Ausaf Ali** (You group): The cell membrane is a very important component of cells which plays a critical role in cell signaling and cell-cell communication. Since the cell membrane is fluidic in nature, molecules in it such as lipids and proteins are generally free to associate and dissociate resulting in short lived dynamic interactions. Such short-lived interactions are important because they allow the membrane to modulate the formation signaling platforms in response to specific stimuli. Unfortunately, visualizing these transient interactions has proved to be challenging due to their fast nature and the complex heterogeneous composition of membranes. In my research, we use short DNA tags to label certain lipids on the cell membrane which allows us to stabilize these short-lived interactions for long enough so that they may be imaged and quantified. This was achieved by developing a “DNA Zipper” probe where DNA hybridization between different lipid-DNA conjugates may “zip” two transiently interacting probes together to various degrees depending on the DNA sequence chosen. From our experiments we were able to visualize various lipid-lipid interactions and observe their relative strength. We further used our DNA Zipper probe to investigate and visualize the heterogeneity of the cell membrane and its role in several important biological processes including immune cell activation and the progression of cancer. Our current goal is to apply our DNA Zipper to membrane proteins as an approach to quantify transient protein interactions and screen various small molecules which may impact these interactions.



### Huang Receives Marvin D. Rausch Fellowship

**Rui Huang** (Rotello group): Bioorthogonal catalysis offers a unique strategy to modulate biological processes through the *in situ* generation of therapeutic agents. However, the direct application of bioorthogonal transition metal catalysts (TMCs) in complex media poses numerous challenges due to issues of limited biocompatibility, poor water solubility, and catalyst deactivation in biological environments. In the Rotello lab, these issues can be addressed by integrating TMCs into polymers to generate bioorthogonal “polyzymes.” Polyzymes are able to activate imaging and therapeutic agents from their inactive precursors, creating on-demand “drug factories.” Through the engineering of host polymer structures, I have synthesized a series of polyzymes that are biodegradable, biostable, and/or stimuli responsive. The therapeutic potential of polyzymes has been demonstrated *in vitro* for the treatment of both bacterial biofilms and cancers, with enhanced efficacy and reduced side effects.



### Pereira Receives PPG Fellowship and Donald Kuhn Graduate Fellowship Award

**Kimberly (Bolduc) Pereira** (Walsh group): The development of methods to enable the recovery of metastable high-pressure phases to ambient conditions remains an outstanding challenge in materials science. One route that remains unexplored is the use of shockwaves to rapidly decompress samples, analogous to the temperature quenching methods used to recover metastable high-temperature phases in steel processing. In our research, we use *in situ* X-ray diffraction to explore the impact that dynamic compression and decompression has on the location of phase boundaries in simple systems, with the goal of detecting and quantifying the kinetic effects that influence the phase transformations. We are specifically interested in transition metals, alloys, and binary oxide and carbide materials. These materials, while relatively straightforward stoichiometrically-speaking, are not well understood in terms of their phase transformations under extreme conditions. In addition, noticeable differences exist between the phases observed under static compression and the phases observed under dynamic compression. Quantifying the crystal structure in the dynamic compression regime could inform fundamental understanding of atomic bonding, and could also offer insight into planetary processes as well as the makeup of our earth's interior. To reach these conditions and perform our experiments, we travel to some of the brightest and most powerful light sources in the world including synchrotrons and XFELs, and collaborate with scientists at Lawrence Livermore National Laboratory.

## GCA Community by Nathanael Kuzio

The department's Graduate Chemists Association (GCA) has had a very exciting year thus far, hosting several events for our graduate student community. We kicked things off in November with the department Penny War and Food Drive to benefit our local Amherst Survival Center ([amherstsuvival.org](http://amherstsuvival.org)). After four weeks of competitive donating, the department was able to raise over \$1300 and nearly 2,000 food items, the large majority of which were items requested by The Survival Center. The labs on the first floor of the Physical Sciences Building (DV, Auerbach, Barnes, Kitilstved, Metz, Walsh, DuChene, and Lin labs) ended up on top, donating 774 food items and winning the pizza party! We were then able to co-host a cultural potluck with the Diversity, Equity, and Inclusion (DEI) committee at the end of January. This served as a great opportunity for many members of the department to get together and visit, play some board games, and enjoy some delicious food. One of our last big events in the past months has been the departmental ski trip to our local ski mountain, Berkshire East. After a few years of requests and not being able to make it happen, we finally got a group of almost 20 people together for some wonderful spring skiing under the lights. We had several experienced skiers and boarders, as well as a handful of first-timers making it an especially fun evening. In the coming months we look forward to hosting more events to bring the community together!



## Staff News

### Marvin Ellin Retires

After working for the department for 23+ years, our Operations Manager, **Marvin Ellin**, retired from UMass in March 2023. Marv says: "My departure is bittersweet.



The past 23 years have allowed me to work with some of the most amazing people. Chemistry faculty and staff have been wonderful colleagues, whom I will deeply miss. My interactions with our outstanding students have also been rewarding. And I sincerely appreciate all the support and camaraderie you have provided me over the years."

As a reminder, while there are numerous projects that were completed under Marv's tenure with our department, he was responsible for the building of ISB & PSB, the NIH renovations, and piloting the chemical inventory management system. He remained cool in a crisis and was always quick to support his colleagues. Marv received multiple accolades, including the Dean's Service Award and the Chancellor's Citation Award, and he was instrumental in promoting others to receive appropriate acknowledgments as well.

Marv's attention to detail and knowing whom to contact to resolve an issue, his unwavering support for the department and his colleagues, and his quirky sense of humor, will all be missed. We wish him the best with his new endeavors.

### New Staff

The department welcomed three new staff members:

**Lauren Rainaud** joined the Chemistry Department in early February after transferring from Auxilliary where she worked for nearly nine years in Food Service. An alumni of UMass, Lauren graduated in 2017 with a degree in Animal Science, but was unfortunately unable to pursue a career in research after discovering she was allergic to rodents. Undeterred, Lauren still follows her passion for helping animals through her extensive work with service dogs. For the last eight years, Lauren has worked with over fifty dogs and continues to do so in her spare time. In fact, Lauren was one of the first fosters for the service dog program here on campus and continues to help the program directors to this day.

The Chemistry Department welcomed **Aaron Snow** to the team in October of 2022 as our Personnel Coordinator/Office Manager. Aaron previously worked in the Du Bois Library here on campus for the last nine years as a Building Operations and Information Services Supervisor. He is a proud alumni of UMass Amherst Isenberg School of Management, and has always felt a deep connection with the university since his father, Mark Snow, was a long time employee in our department—which was a major factor in his decision to join the Chemistry Team.

When not at work, Aaron enjoys spending time with his family. A proud father of four, he and his wife often spend weekends at basketball, football, cheerleading or whatever sports games they are currently participating in, cheering on their kids and supporting them to achieve their goals. As an avid gardener, Aaron can also be found working in his vegetable garden teaching his children the art of growing your own food.

**Ryan Svoboda** joined the department as Computer Systems Administrator. Ryan was previously the IT Administrator for DFF, a CNC manufacturing company in Agawam, MA. He is excited to join his wife Tommy at UMass, who is currently a Postdoc in Peter Chien's lab in LSL. Ryan and Tommy live in Amherst with their dog Bean. Some of Ryan's hobbies include gaming, science fiction, and technology.



lab  
Notes

## Auerbach Group

The **Auerbach group** had a banner year during 2022 in research, teaching, and administration—branching into new fields of study. We published an article on education research about the interdisciplinary iCons Program entitled: "How STEM Undergraduates Choose, Navigate, and Integrate Interdisciplinarity in College and Beyond" in *The Journal of Higher Education*. We discovered three stages of student interdisciplinarity: (i) a choosing stage for beginning students, (ii) a navigating stage for more advanced students, and (iii) an integrating stage for program graduates. For more information, please read the article at [bit.ly/43396AZ](https://bit.ly/43396AZ).

We also branched out into artificial intelligence applied to zeolite science, publishing an article with an international research team from France and Switzerland entitled: "Ranking the Synthesizability of Hypothetical Zeolites via the Sorting Hat" in the journal *Digital Discovery*. Here we found the needles in a haystack. We used artificial intelligence to identify promising leads for new materials (the needles), from a computer-generated database of over 300,000 possible structures (the haystack). The leads show promise for making clean fuels and capturing carbon dioxide, which is why this work is important.

We congratulate **Dr. Babgen ("Bobby") Manookian** for publishing his final article from his PhD, entitled: "Shape-selectivity of Cyclopentenyl Cation Isomerization: Investigating Kinetic Control in Medium-Pore Zeolites" in the *Journal of Physical Chemistry*. This article is a tour de force in computational chemistry, from "soup to nuts" in computational methods. We also congratulate **Tongkun Wang** for being selected as a speaker in the 2022 ResearchFest, one of only four chemistry graduate students to attain this high honor.



Prof. Scott Auerbach with Prof. Cristian Blanco and Prof. M.Y. Combariza (Vachet lab) at their chocolate factory in Bucaramanga, Colombia

Past members of the Auerbach group are thriving. **Prof. Cristian Blanco** (PhD, 2004) at the Universidad Industrial de Santander (UIS) in Bucaramanga, Colombia is experiencing outstanding success in research, innovation, and entrepreneurship. The picture shows Prof. Auerbach during a recent visit to Colombia,

touring Prof. Blanco's new chocolate factory. Prof. Blanco's proprietary method of chocolate production uses 100% of the cacao fruit, as opposed to most processes that only use the bean – representing only 8% of the fruit's biomass. Prof. Blanco's method is more sustainable, more profitable, and anecdotally, much more delicious. :)

In addition, **Dr. Eugenio Jaramillo** (PhD, 1999) is also thriving, having returned to South America from his previous teaching position at Texas A&M International University at Laredo. Dr. Jaramillo is presently leading a large company in Colombia, with 400+ employees, that specializes in environmental compliance and clean-ups. The picture shows Prof. Auerbach with Dr. Jaramillo during Auerbach's recent tour of Colombia.



Prof. Scott Auerbach with Dr. Eugenio Jaramillo during Auerbach's recent tour of Colombia.

In closing, we wish all Auerbach group alums a wonderful year. We hope you stay in touch and have a good year and a very bright future.

## Barnes Group

This year, **Prof. Mike Barnes** continued research with a collaborative grant (with co-investigators Ashwin Ramasubramaniam and Todd Emrick) from the National Science Foundation. In addition, Barnes' experimental course "Computational Methods in Chemistry" – an upper division elective class aimed at the graduate and senior undergraduate level – was approved as a permanent course by the UMass Faculty Senate.

**Nick Hight-Huf** defended his PhD Thesis ("Electronic Properties of 2D Hybrid Materials") in December, and began a postdoctoral appointment at the National Renewable Energy Laboratory in Boulder Colorado, under the supervision of Gary Rumbles. **Nick Heller** (BS Chemistry, UMass Amherst 2021) is now finishing his second year of graduate studies at CalTech. **Sarah Marques** (PhD 2019 "Tuning H/J aggregation in organic semiconductor assemblies") finished a postdoctoral fellowship at Georgia Tech in 2021. **Peijian Wang** (PhD Physics, 2018) is currently a postdoctoral researcher in the Physics Dept. at University of Buffalo. **Joelle Labastide** (PhD 2015 "Photophysics of semiconductor aggregates") was awarded a AAAS Policy Fellowship in Washington, DC. 2019-2021. **Kevin Early** (PhD 2010 "Photophysics of hybrid quantum dot-conjugated organic nanostructures") is a Senior Project Manager at Illumina Corporation based in San Diego, CA. **Michael Odoi** (PhD 2010 "Time-resolved Single-Molecule Spectroscopy of Semiconductor Quantum

Dot-Conjugated Organic Hybrid Nanostructures") leads a product development team at Perkin-Elmer Corp. in Bridgeport, CT. **Austin Cyphersmith** (PhD 2012 "Probing effects of orientation on the chiroptical properties of single molecules") is now a Microscopy and Imaging Laboratory Manager at University of Illinois-Urbana Champaign. **Ruthanne Hassey Paradise** (PhD 2009, "Chiroptical Spectroscopy of Single Molecules"), is a Senior Lecturer at UMass Amherst, and supervises the Analytical and Physical Chemistry Laboratories for undergraduates.

## J. Chen Group

This past year has been a year of many changes. We are thrilled to welcome several new group members. **Dr. Shanlong Li** joined us as a postdoctoral research associate in December 2022 from Shandong China; he received his PhD in Polymer Chemistry and Physics from Shanghai Jiao Tong University in China. **Shrishti Barthiya** is a new Chemistry PhD student from Gwalior India; she has an integrated MS degree in Chemical Sciences from National Institute of Science Education and Research (INSER) Bhubaneswar. **Kairong Dong** is a new Molecular and Cellular Biology (MCB) PhD student from Xingtai China; she has a MS degree in Biophysics from Chinese Academy of Sciences. **David Decoeur** is a new MCB PhD student from Florida; he has a BS degree in Biochemistry from Florida State University. We also welcomed **Aron Korsunsky**, a talented ChemE junior, to our lab as an undergraduate researcher.



Chen lab Lunar New Year Party, March 2023

Senior graduate students **Erik Nordquist** and **Xiping Gong** have both done well and scheduled to defend in June 2023. Erik will move to the University of Maryland and join Alex MacKerell's group as an NIH T32 Fellow. Xiping will join his wife as a Research Scientist in the Food Science & Technology program at the University of Georgia. They both have been role models for younger graduate students in the lab and will be dearly missed. **Samantha Schultz** is expected to graduate with her fifth-year Master's degree by the end of summer 2023. Members of the lab have received several recognitions. For example, Erik was selected to give

a coveted talk at the department's annual ResearchFest and won the prestigious Dr. Paul Hatheway Terry Endowment Award. Jian received a competitive Chemistry Biology Interface (CBI) UMass Fellowship; he also passed his ORP exam and became an official PhD candidate.

The group continued to make exciting progress on several active projects in the general areas of computational biophysics and biomaterials this past year. The group has published several original research and review articles on a diverse set of topics including new molecular models, sampling methodology, intrinsically disordered proteins, protein aggregation, ion channels, protein-ligand interactions, and protein-based biomaterials and nano-devices. Several of these papers appear in prestigious journals including *Nature Communications* and have received substantial media attention. The full list of publications can be found on the lab webpage at: <http://people.chem.umass.edu/jchenlab>. The lab continues to be supported by two NIH grants and an NSF grant.

## M. Chen Group

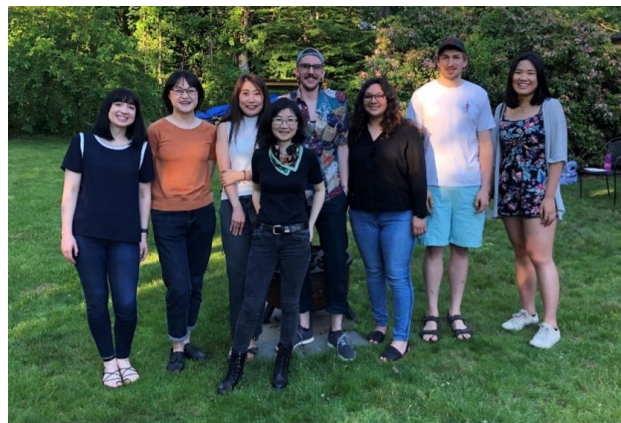
The Chen group has made significant progress in developing nanopore-based technologies for disease biomarker sensing, DNA and protein sequencing, and single-molecule enzymology and drug screening. In 2022, the group had a productive year, with a focus on the application of nanopore tweezers and sensors.

The group celebrated the successful defense of PhD candidate **Fanjun Li**, who has begun her postdoctoral research at EPFL in Switzerland. The Chen group wishes her success and happiness in her career and life. Current graduate students **Spencer Shorkey**, **Joshua Foster**, **Minji Kim**, **Kaitlyn Gilliam**, **Crystal Rodriguez**, **Jackie Sharp**, **Samantha Schultz**, **Lily Nguyen**, **Moly Rani**, and **David Decoeur** continue to work on various projects. Fanjun's work on applying nanopore tweezers to observe the kinase was published in *Nature Communications*, and Josh's design of OmpG multiplex sensor was published in *Angewandte Chemie* and highlighted as an editor's pick in *Nature Nanotechnology*. The group also co-authored a paper on single-molecule protein sequencing in *Nature Biotechnology* with Dr. Meni Wanunu at Northeastern University and another publication on bacterial conjugation in *Nature Microbiology* with Dr. Gad Frankel's group at Imperial College London. Additionally, we filed a patent application to cover Fanjun's invention, which has created an innovative, single-molecule, label-free approach for screening allosteric binders for kinases.

In the lab, Spencer and Jackie are completing several manuscripts on developing ClyA nanopore tweezers to follow the functions of Western Nile viral protease. Josh and Minji are working on designing new OmpG nanopore sensors for detecting viral biomarkers. Katie has established



a method to study protein-protein interactions among intrinsically disordered proteins, and Crystal is working on a project to improve the accuracy of current nanopore



DNA sequencing technology. Samantha is investigating the protein interactions of intrinsically disordered Taz2-P53. The Chen group welcomes three new members: Chemistry graduate students Lily Nguyen and Moly Rani and MCB graduate student David Decoeur.

Projects in the Chen lab are supported by multiple federal grants from NIAID (R01), NGHRI (R21), and industrial funding from Oxford Nanopore Technology. We are also expecting a new multi-PI NHGRI R01 grant in May to support our effort in protein sequencing. The Chen group is looking forward to an exciting year in 2024!

## DuChene Group

The DuChene Group continues to make great strides towards the development of new catalysts for the sustainable synthesis of fuels and chemicals. We also welcomed the arrival of two new graduate students, **Nicholas Baker** and **Neumiah Massenat**, to the DuChene Group this year. Nick has been developing new procedures for the photoelectrochemical synthesis of metal nanoparticles and has plans to use these materials as photocatalysts for the conversion of CO<sub>2</sub> into valuable chemicals. Neumiah has begun her work on developing new strategies for the electrochemical synthesis of well-defined catalytic nanomaterials. Her work will lay the foundation for the development of new catalysts with improved reaction selectivity for a variety of chemical reactions related to environmental sustainability. We are very happy to have them both join our group, and we are excited to see what new scientific contributions they make in the future.

The DuChene lab has also been joined by several new undergraduate researchers in the past year. We welcomed **Anastasia Antropova**, **Melissa Chook**, **Diana Duarte**, **Julia Ireland**, and **Remy Nelson** to the group. Our undergraduates have made important contributions towards the development of synthesis strategies for electrocatalytic nanomaterials and our understanding of electrochemical processes occurring on these catalysts. We would not have

made as much progress without their valuable contributions to our lab. We are also very proud to report that two of our group members received undergraduate research awards in recognition of their research efforts! **Anastasia** was the recipient of the Mahoney Undergraduate Research Award and the Oliver Zajicek Memorial Scholarship in Chemistry. **Owen Doyle** received the J.F.B. Fund for Undergraduate Research. These awards are well deserved for all their hard work and will provide vital financial support to allow these budding young scientists to continue their research in our lab during the summer. Finally, we would like to acknowledge the hard work of a few of our undergraduate researchers who have recently graduated with their BS degrees: **Sean Bhambhani**, **Erika Brown**, and **Gavin Maenzo**. Erika successfully defended her undergraduate honors thesis on the light-driven synthesis of shape-controlled copper nanoparticles. She has been instrumental in our lab's research as an undergraduate and we wish her well in graduate school where she will undoubtedly continue to do amazing work. The DuChene Group sincerely appreciates all their contributions to the group, and we wish them well in their future endeavors!

## Farkas Group

The last year was a very exciting one for the Farkas Lab. Prof. Farkas was officially awarded tenure and promoted to the rank of Associate Professor. **Javier Mas-Rosario** (MCB graduate student) defended his dissertation ("Chemical Biology Approaches for Tracking and Manipulation of Macrophage Phenotypes") and received his PhD in September. He is currently working as a Scientist in the Platform Biology group at Cellarity in Cambridge, MA. Recent Chemistry PhD grad **Sujeewa Sampath Lellupitiyage Don** (May 2022) is also working in Cambridge at Excision BioTherapeutics. He and his wife Nishadi welcomed baby Leo Gabriel in June—congratulations to them both!! The Farkas group had the opportunity to host **Jose Martinez-Montes** through NIH-PREP (Post Baccalaureate Research Education Program) in our lab. Jose applied and was accepted to the UMass Amherst MCB graduate program, where he is progressing through his first year and completing his laboratory rotations. Our big third-year graduate student cohort,



consisting of **Bhavna Kalyanaraman**, **Emmanuel Rivera Iglesias**, and **Clau-dia Yan**, passed their Original Research Proposal (ORP) examinations, making all three PhD candidates! We are also excited that we welcomed first-year chemistry graduate student **Yacun "Aimee" Shen**

to the lab! **Aimee** comes to us following her undergraduate career at Penn State, College Park; she is happy to be back in her home state of Massachusetts. In undergraduate news, we have three undergraduate students who are completing their degrees and leaving us in May – **Chris Dahlke** and **Minjae Song** (both Biochemistry & Molecular Biology) will be defending their honors theses soon, and **Bao Le** (Chemistry) will be attending graduate school in Chemistry at Emory. We recently found out that Bao was named a UMass Amherst "Rising Researcher," which is a competitive and prestigious award. Congratulations Bao! Lastly, we are excited for two rising seniors in the group who have secured outstanding summer research fellowships. **TJ Caira** (Chemistry) has been accepted to the Snyder Scholars Program in Organic Chemistry at the University of Illinois, Urbana-Champaign. He will spend the summer in Illinois working in the research group of Prof. Jefferson Chan. **Sophie Spielberger** (BMB) was accepted to the Clinical Research Internship program at the Center for Clinical and Translational Science (CCTS) at the UMass Chan Medical School. Until next time!

## Hardy Group

The Hardy Lab is breathing a sigh of relief as the lab is full of activity and we seem to have achieved a new post-COVID normalcy. Prof. Hardy continues to lead the Biotechnology Training Program, serve on the NIH Macromolecular Structure Function A study section, and as a member of the Executive Committee of the Protein Society. She also enjoyed teaching both Frontiers in Biotechnology (Fall) and Biochemistry for Chemists (Spring). Thanks to the funding of a new NIH MIRA (R35) grant, this year the Hardy Lab recruited one new Post-doctoral associate, **Thomas Bregnard**, who completed his PhD



Kristalle, Jeanne, Sparsh at the Protease Graduate Research Conf.

recently in the lab of Irina Bezsonova at the University of Connecticut. **Sparsh Makhaik** is moving towards protein backbone assignments for Chikungunya virus protease using NMR after successfully screening a fragment library to find out the interactions of hits obtained. **Irina (Niña)** **Sagarbarria** recently started working on determining the structure of caspase-6 and DJ-1, a substrate involved in Parkinson's Disease, while still working on our caspase-6 inhibitor, KT-60. **Andrew Smith** is investigating caspase-6 interactions with substrates tau and DJ-1 using mass spectrometry to ascertain exosite interactions that may be important for substrate recruitment and cleavage. **Nathanael Kuzio** has overcome a number of technical hurdles and is well on his way to becoming an NMR expert through his studies of caspase-6. He is headed to Biogen for an intern-

ship this summer. **Trisha Brady** is completing her 2nd year of her BTP traineeship and completed her prospectus exam this spring. **Rashad Baker** completed his Master's Degree and has taken a job at Pfizer. This year we added a number of talented undergraduate students to our research enterprise. Senior **Grace Baron** graduated in May 2023 and is headed to the Chemistry PhD program at California Institute of Technology. Grace serves as a research mentor for fellow undergraduate **Cece Polak**. We are also grateful for the research contributions of **Zsuzsa Kiss**, **Sai Reddy**, **Jamin Seo**, and **Hrachya Tonyan**.



Andrew and Rashad at Pacific Coast Protease

A number of Hardy Lab alumni shared notable events.

**Ishankumar Soni** started a new position at Leveragen.

**Derek MacPherson** welcomed a new daughter, Hayden, to his family. This was a great year for in-person conference travel for the Hardy Lab. Jeanne, Andrew, and Rashad presented at the Pacific Coast Protease Conference in Borrego Springs, CA, rode dune buggies, saw road runners in the wild and went scorpion hunting at night, aided by a



Nate, Irina, Jeanne, Ethan

UV light. Jeanne (GRC Vice Chair), Sparsh, and Kristalle attended the Proteolytic Enzymes and their Inhibitors Gordon Research Conference where two of them contracted COVID, but luckily after they spent the day following the conference at the beach! Jeanne, Nathanael, Irina and **Ethan Goulart** (former undergrad who has matriculated into graduate school in Chemistry at UC Berkeley) attended the Protein Society in San Francisco where an overly enthusiastic Lyft driver got all of them to scream and giggle as he careened cackling up the lumpy hills before his crooked descent down Lombard street. Overall, this has truly been a great year.

## Kaltashov Group

2022 was a very busy year in the Kaltashov laboratory. In addition to the ongoing NIH-funded project aimed at elucidating the structure/function relationship of heparin and related biopolymers, a new line of research had been initiated focusing on deciphering the molecular mechanism of the rare but extremely dangerous side effect of the adeno-viral-vectored COVID-19 vaccines (such as AstraZeneca's ChAdOx1), termed vaccine-induced immune thrombotic



thrombocytopenia (VITT). Working in close collaboration with a group of hematologists at McMaster University Health Center, our laboratory was able to identify a pathogenic antibody in a VITT patient's blood and determine its covalent structure (the amino acid sequence). This information was used to generate a three-dimensional model of the pathogenic antibody, which allowed the molecular basis of VITT to be determined; this information will be invaluable for medicinal chemists designing therapeutic and prophylactic strategies to make the adenoviral-vectored vaccines completely safe and free of dangerous side effects. The group has also received funding from the NIH to participate in a multi-institution project aiming at identifying early biomarkers of the lung cancer. This study is led by a group of radiologists and pathologists at the Massachusetts General Hospital, and also involves Prof. Vachet's group at UMass. Two other new collaborative efforts involve small/emerging biopharmaceutical companies: Fina Biosolutions (Rockville, MD) and NeuBase Therapeutics (Pittsburg, PA). The former aims at producing inexpensive recombinant carrier proteins for synthetic vaccines targeting diseases that plague third-world countries (such as malaria), while the latter is a leading innovator in developing potent drugs using the peptide-nucleic acid platform to treat a range of currently incurable hereditary diseases. Group members published a total of seven peer-review papers and one book chapter in 2022.

**Daniel Favre**, a fifth-year graduate student, returned to Amherst at the end of the year to finish his PhD work after spending over six months off campus as part of his co-op experience at Biogen in Cambridge, MA. In December the group also welcomed two new graduate students (**Ruolan Cheng** and **Chau Tran**) and bid farewell to two post-doctoral fellows (**Dr. Son N. Nguyen** and **Dr. Si-Hung Le**).

## Kittilstved Group

During the past year, the Multifunctional Inorganic Materials Lab welcomed new first year graduate student **Sheta Tori** to the group. Sheta comes from Bangladesh where she graduated from the University of Dhaka. Sheta has joined the clusters sub-group with **Hyunggu Kim** (4th yr) and **Mo Animashaun** (2nd yr) and will work on trying to unravel the chemistry of magic-size semiconductor nanoclusters. Undergraduate student **Sam Lawrence** also joined the group and is working with 4th year student



Hyunggu, Anthony, Sam, Kevin, Gaurav, Moshood, Enes, and Sheta

**Gaurav Mitra** on developing methods to control the oxidation state of manganese dopants in colloidal titanium oxide-based nanocrystals. Undergraduate student **Anthony Mastromatteo** continued his collaborative work with DV's ALIEN group studying charge transport in next-generation hybrid perovskite nanocrystal solar cells. **Enes Buz** continues to push the group into new areas and has done some very nice work developing a new ligand platform to easily control the surface chemistry of colloidal ZnO nanocrystals for a variety of technologies. The lab also celebrated PhD #8 when **Haneen Mansoor** defended her thesis, "The Dynamic Interplay of Defects and Transition Metal Dopants in Metal Oxide Semiconductors: A Balancing Act" in August.

## Lin Group

The Lin Group at UMass Chemistry has completed its third year with significant achievements. Within the past year, the group welcomed six new members and bid farewell to six others, bringing the total number of members to fifteen, including a postdoctoral scholar, four graduate students, six undergraduate students, and four visiting students.

The group focuses on developing quantum mechanical and machine learning models for applications in carbon neutrality, organic electronics, and materials discovery. In particular, the research projects can be classified into three areas: decoding reaction mechanisms in heterogeneous photocatalysis and electrocatalysis, predicting photochemical dynamics in unconventional organic materials, and integrating state-of-the-art machine learning algorithms into quantum mechanical models. The group also collaborate with computer scientists and experimental chemists within and outside UMass.

The group's third year was productive, with several notable achievements. Prof. Lin started affiliating with UMass Chemical Engineering and UMass Materials Science and Engineering. She received a \$110,000 Doctoral New Investigator (DNI) grant from the American Chemical Society Petroleum Research Fund (ACS PRF) to investigate the quantum effects of protons in photocatalytic methane oxidation. The group also published three research articles: "Improving Subgraph Representation Learning via Multi-View Augmentation" at the International Conference on Machine Learning (ICML) with Prof. Hui Guan from UMass CICS, "A Scalable Solid-State Nanoporous Network



with Atomic-Level Interaction Design for Carbon Dioxide Capture" at Science Advances with Prof. Yi Cui from Stanford and Prof. Jeffery Reimer from UC Berkeley, and "Inserting Single-Atom Zn by Tannic Acid Confinement To Regulate the Selectivity of Pd Nanocatalysts for Hydrogenation Reactions" at Small with Professor Jian Zhang from Wenzhou University.

Looking ahead, the Lin Group expects to be even more productive in the coming year, with a larger research group and more research funds. With continued dedication to computational chemistry research, the Lin Group is poised to make even greater strides in the field.

## Martin Group

Exploiting their long-standing expertise in RNA polymerase enzymology, the Martin Lab has been working hard on developing wholly new ways to make ("manufacture") RNA for the wide variety of therapeutics and technologies in our nation's pipeline. Along the way towards that, **Kithmie Malagoda Pathirana** defended a very nice PhD dissertation last summer and has stayed on for a bit as a postdoc. Her most recent paper came out in *Nucleic Acids Research* in February and she's wrapping up an invited Methods in Enzymology paper. Kithmie, **Ruptanu Banerjee**, and **Purnima Mala** have been making (and characterizing) lots of RNA to demonstrate and advance the foundational technology behind our efforts. **Amin Abek** is applying deep sequencing approaches towards a much deeper understanding of factors that impact fidelity (copying accuracy). In parallel, **Jamuna Vaishnav** is developing a different, novel assay for characterizing RNA in ways that are currently hard to do, while **Diwakaran Rathinam Palaniswamy** and **Berkant Yetiskin** are fully developing the flow reactor central to our novel process – guided adeptly by our collaborator, Professor Sarah Perry (Chemical Engineering).

In September, Craig was an invited speaker and panelist (with alum **Elvan Cavac**) at the mRNA Process Development & Manufacturing Summit, and in November, members of the group presented at the 10th International mRNA Health Conference. Craig will again serve as a speaker/panelist at the mRNA Quality Control & Comparability Summit in June and will again speak at the next iteration of the mRNA Process Development & Manufacturing Summit in September. And lastly, most of the group will represent us this June at RNA Therapeutics: From Concept to Clinic. We're getting a bit of exposure — stay tuned for more exciting developments!

Finally, we are excited to be comparing RNA produced by our novel approaches with RNA from other more traditional (academic and industrial) manufacturers in the Wellcome Leap R3 program. Buoyed by our successes and supported by our recently issued patent describing our initial technologies, we have spun out a company (RNA4Tx, Inc.) and are

talking with potential investors to develop our platform for manufacturing (synthesizing) RNA free of dsRNA impurities, at substantially reduced expense.

## Metz Group

Congratulations to **Dr. Schuyler Lockwood** (PhD 2023)! He defended his dissertation on using photofragment imaging to study the thermodynamics and photodissociation dynamics of NiO<sup>+</sup>, NiS<sup>+</sup> and MgI<sup>+</sup> and is now a postdoc at Pacific Northwest National Lab! We welcome new graduate students **Carmen Wiggin** and **Arnab Das**. Carmen is working with undergraduate **Olivia Hamel** (Chemistry) and graduate student **Gaurav Singh** to upgrade our photofragment imaging instrument, so we can use it to measure covalent bond strengths and photodissociation dynamics in metal carbenes. Arnab and undergraduate **Joe Gerrior** (Chemistry) are using vibrational spectroscopy in the C-H stretching region to characterize the products of C-H activation in sequential reactions of Nb<sup>+</sup> with methane. This extends work by graduate student **Justine Kozubal** on sequential reactions of Zr<sup>+</sup> with methane and on interactions of vanadium cluster ions V<sub>x</sub><sup>+</sup> with methane molecules. Working in the fingerprint region of the IR, graduate student **Apakorn Phasuk** and Joe studied how metal cations such as Al<sup>+</sup> and Cu<sup>+</sup> are solvated by acetone, and how the interaction with the metal affects the C=O and C-C bonds in acetone. They also observed that Al<sup>+</sup> catalyzes a pinacol coupling reaction between two of the acetone ligands. Undergraduate **Paul Albani** (Chemistry) is updating our data acquisition software and doing DFT calculations on reaction products. We are excited that we will soon be modifying this instrument to measure reaction kinetics, in addition to using vibrational spectroscopy to characterize the reaction products.

We love hearing from group alumni — please let us know what you're up to!

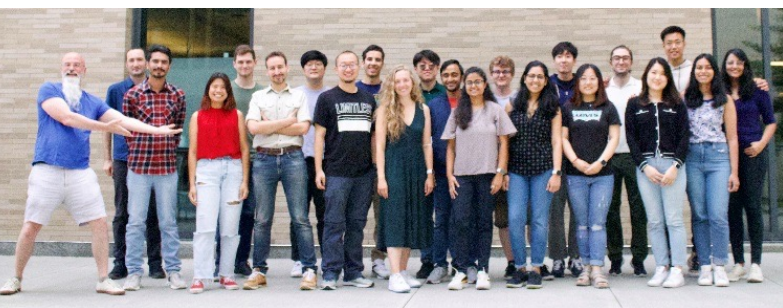
## Rotello Group

Things are going full speed ahead now in the Rotello Lab. Vince is the recipient of a 2023 Cope Scholar Award from the American Chemical Society. He'll be picking up his award at the Fall ACS meeting in San Francisco. Additionally, Vince has been named a Clarivate "Highly Cited" researcher again in 2022. The collaborative antimicrobial grant with Robin Patel was funded (\$1.9M). The publication total is ticking up, with the current count at 640.

The lab is doing a great job at winning awards this year. During last year's Department Research Fest, **Jessa Makabenta** excelled with an outstanding oral presentation which got her the Marvin D. Rausch Lectureship Award (First Place). **Ritabrita Goswami** taught us a thing or two about designing beautiful and compelling posters and won the



Marvin D. Rausch Lectureship Award (First Place) for an outstanding poster presentation. Additionally, **Rui Huang** was awarded the Marvin D. Rausch Fellowship Award. Congrats all!



We sent **Aarohi Gupta**, **Cristina-Maria Hirschbiegel**, **Dr. Stefano Fedeli**, and **Xianzhi Zhang** to the Gordon Research Conference – Metals in Medicine 2023 to spread the word about their exciting research in nanozymes and make great connections with other researchers in the field.

**Nourina Nassim** and **Soham Chakraborty** have officially joined our group as graduate students. We also welcomed **Dr. Will Ndugire** as a post-doctoral fellow and our two visiting scholars, **Nacho Garcia Peiro** and **Kevin Telliez**.

We bid farewell to our graduating students, **Dr. David Luther** (Regeneron), **Dr. Sanjana Gopalakrishnan** (Tufts University), and **Dr. Xianzhi Zhang** (Yale University), and wish them all the best on their way to new and exciting challenges! We also bid farewell to our visiting scholar **Prof. Gokhan Caglayan** (Ankara University) and our post-doctoral fellow **Dr. Stefano Fedeli** (off to Jena Germany). All the best!

For up-to-date news, please check out <http://www.umass.edu/rotellogroup/> or see what is up on our social media accounts: Facebook <https://www.facebook.com/rotellogroup> and Twitter <https://twitter.com/RotelloGroup>.

Above is an updated photo of our group with everyone in their best summer (2022) outfits.

## Thayumanavan Group

The Thayumanavan group enjoyed another productive year. We are listing here some of the highlights of the group. Please visit us also at <https://elements.chem.umass.edu/thaigroup/> for more on our news and achievements.

Graduate students update: **Minelise Rivera De Jesus** and **Anirudh Devarajan** joined the group in 2023. For our current graduate students, we congratulate **Jewel Medeiros** for welcoming a newborn. We congratulate **Stephanie Le** for becoming a finalist in the 3 Minute thesis competition 2023 in UMass.

**Dr. Peidong Wu** finished his PhD in October 2022 and has taken a job as a Postdoctoral Research Scientist, Eli Lilly and Company in Cambridge, MA. **Dr. Ruiling Wu** finished

her PhD in January 2023 and has taken a job as Scientist in Generate Biomedicines in Cambridge, MA. **Dr. Hongxu Liu** has been appointed as an Associate Professor in Sichuan University, China. **Dr. Ann Fernandez** finished her postdoctoral appointment at Northwestern University and started as Senior Research Specialist, Dow, Michigan. **Dr. Thameez Mohammed Koyasseril Yehiya**, is now a PTD Etch Module Engineer in Intel Corporation, Oregon, after finishing their stint as a postdoctoral Researcher in University of Massachusetts Amherst. Our alum **Dr. Bo Zhao** has been already promoted at Regeneron, NY.

Undergraduate students update: **Logan McCarthy** graduated. **Sriya Munugoti**, **Varun Gopal**, **Riva Deodhar** and **Amelia Talluri** joined our group for undergraduate research recently.



Also, follow our group on Facebook or Twitter (links provided in our website). If you are a group alum and we do not have your updated whereabouts, please let us know.

## Thompson Group

We are happy to welcome two undergraduates, **Natalie Zhu** and **Stanley Yuan** who joined the lab in Fall 2022. Congratulations to graduate student **Bella Jankowski** who was awarded a CBI Traineeship in September 2022, to undergraduate **Sarah Tobia** who received the Linda Slakey Award, and to lab alumnus **Brianna (Bri) Manning** (now at Harvard Medical School) who was awarded an NSF Graduate Fellowship.

The group has enjoyed many conferences this year, with **Katie Wahlbeck** and **Jessica Allen** presenting posters at the International Conference on Magnetic Resonance in Biological Systems (August 2022 in Boston), **Bella Jankowski** presenting a poster at the Bacterial Locomotion and Sensory Transduction meeting (January 2023 in Charleston, SC), and **Thomas Tran** presenting talks at Receptor Zoomfest (July



8th floor labs canoe/kayak July '22



Thompson group Mike's Maze F'22

Conference (Sept 2022 in Ventura, CA), and ACS National Meeting (March 2023 in Indianapolis, IN).

Finally, at the first-ever in-person CBI Alumni Networking Event in October 2022 we enjoyed a visit from lab alumnus **Xuni Li**, as well as reconnecting with a number of other graduates from the Chemistry Department. The event included an alumni panel featuring **Abigail Guce-Merriam** (PhD 2009), **Vanessa (Chaplin) Momany** (PhD 2018), and **Mahdieh Yazdani** (PhD 2020), as well as roundtable networking with additional attendees **Jake Pawlowski** (PhD 2018), **Xuni Li** (PhD 2018), **Luis Ramirez** (PhD 2013), **Derek MacPherson** (PhD 2018), and **Maureen Hill** (PhD 2018).

## Vachet Group

The group continues work developing methods to study protein amyloid formation, and this research is now funded for five more years as a result of Richard receiving a Maximizing Investigators' Research Award from the NIH. A new collaborative project with researchers from Massachusetts General Hospital is also about to begin as the group will use mass spectrometry imaging to characterize metabolite signatures associated with lung cancer.



There were some transitions in the group this year. We said farewell to **Stacey Nash**, who successfully defended her PhD in October. Stacey's research resulted in the development of some new ion mobility mass spectrometry methods and established surface-induced dissociation as a new technique in the group. She is now working at Ultragenyx Pharmaceutical, Inc. in Massachusetts. We also welcomed a new graduate student into the group: **Neslihan 'Ness' Tabaru**. Ness graduated from Pace University with a degree in Chemistry and

will be developing new ways to using mass spectrometry imaging to track the distributions of polymeric nanomaterials in biological systems.

In alumni news, **Kristen Sikora** (PhD 2020) started a new position as an Analytical Scientist at Coca-Cola in Florida. **Cara D'Amico** (BS 2015) had an eventful year as she finished her PhD at the University of Michigan, started a new position at Bristol Myers Squibb, and got married. **Matthew Miller** (PhD 2006) and his wife welcomed a new baby girl (Ivy) in April 2022. **Gokhan Elci** (PhD 2016) was promoted to Associate Professor of Biomedical Engineering at Pamukkale University in Turkey, and **Nadnudda 'Tan' Rodthongkum** (PhD 2011) was promoted to Full Research Professor at the Metallurgy and Materials Science Research Institute at Chulalongkorn University in Thailand.

## Venkataraman Group

The Advanced Laboratory for Iontronic, Electronic, and Nanomaterials (ALIEN) group, aka DV group, had a great 2022-2023 academic year. **Michael Lu-Díaz** was recognized as a 2022-2023 CNS Leadership Fellow. In this role, he has been working with Associate Dean Karen Helfer on programs to build a community of graduate students within CNS. **Emily Smith** successfully defended her doctoral dissertation and is now a postdoctoral associate at the Naval Research Laboratory in Washington D.C. **Hamza Javaid** came back to Amherst for the graduate commencement to get hooded and receive his doctoral degree.

Some of you may know that our device fabricating capabilities were hindered by the loss of the Electronic Materials Lab run by Dr. Vlad Duzhko. This was around the time that Hamza fabricated a perovskite cell with one of the highest power conversion efficiencies. Around the same time, we also lost our vacuum system of our evaporator in PSB. Emily put a valiant effort into getting this system back up and running. She spent an enormous amount of time communicating with Pfeiffer and Mbraun. The initial suspicion was that the turbo pump and the associated control box was the issue. To resolve this issue, we had to take the Turbopump to the Pfeiffer's facility at New Hampshire and bring it back. We took turns (Michael, Emily, Zhaojie and DV) to drive to New Hampshire. Bob Sabola was kind and patient. He disconnected the pump when we needed to take



Emily Smith after her successful defense

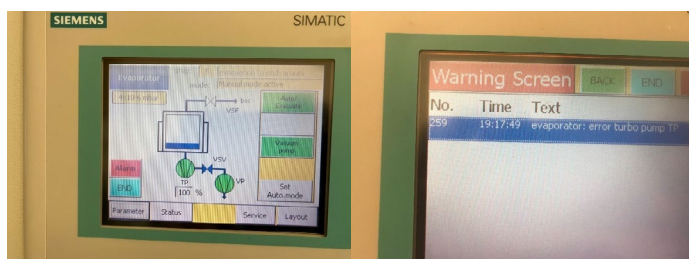


Dr. Hamza Javaid at the Graduate Commencement



it to Pfeiffer and put it back on when it came back. He also helped us run many of the tests that Pfeiffer and MBraun wanted us to run. After Emily graduated, Zhaojie took over the job of running the tests. The volume of emails between DV, Pfeiffer and Mbraun is sufficient to write a book on testing the vacuum system of an evaporator. After a year and a half of going offline, on March 2, 2023, we got the system back up and running! The problem was not the turbopump but the Triscoll roughing pump, which needed to be rebuilt. Somewhere between multiple visits to Pfeiffer, the wires on the turbo got switched and would not properly interface with the Mbraun controller. A big thanks to Richard Mannion from Mbraun and John Fortunato of Pfeiffer who worked through the possibilities. It was Richard who finally cracked the wiring problem and the Triscoll issue. Eastern Scientific was kind enough to do an emergency rebuild without an additional charge. Kevin Kittilstved lent us his equipment to check our vacuum pump and turbo pump settings. Yes, it took a village to get this system up and running after a year and a half.

During this tough time, members of the DV Group were patient, persistent and creative. We reworked many projects. We learned about all the ins and outs of the vacuum system and its controls. We learned to communicate diplomatically and with persistence.



(left) The dreaded error code that showed the turbopump error and (right) when we finally decoded the error code and identified the error. It was not the turbopump!

Research wise, the group's focus is still organic and hybrid semiconductors. We have started to unravel the role of dopants in organic semiconductors and the role interfaces on the stability of halide perovskites. With the evaporator fixed, we hope to accelerate our research in these areas in the coming year.

From the alumni side, **Tim Gehan** is now Head of Research and Development at Tandem PV. He has moved to the Bay area. DV met up with Group alums **Sam Knight**, who is now a graduate student at the University of Chicago and **Prof. G. Nagarjuna**, who is faculty at George Town University the Fall 2022 ACS meeting in Chicago. **Prof. Connor Boyle**, who is now faculty at UConn, Waterbury came back to campus for ResearchFest and participated in the career panel. DV is proud of your achievements and loves to hear from all of you. So, drop a line when you can to [dv@umass.edu](mailto:dv@umass.edu). For group updates and news, visit us on the web at [thedvgroup.com](http://thedvgroup.com) and follow us on twitter [@dvgrouppumass](https://twitter.com/dvgrouppumass) or Instagram at [dvgrouppumass](https://www.instagram.com/dvgrouppumass).

## Walsh Group

The Walsh Lab has continued to grow as it now enters its fourth year in the department. The past year has been a busy time for the lab with a lot of travel to beamlines across the country. The group visited the Advanced Photon Source in Chicago across four separate beamtimes, getting as much data as we can before the synchrotron shuts down for a year to allow for upgrades to the storage ring. We also visited the National Synchrotron Light Source II on Long Island across three separate beamtimes. We are now working through the trove of X-ray diffraction, Raman, IR, and Mössbauer data as we write up a number of manuscripts. In other news, two of our students earned highly competitive awards to support summer internships at Lawrence Livermore National Laboratory. **Zeynep Alptekin** ('23) was awarded a DOE Science Undergraduate Laboratory Internship (SULI) at Lawrence Livermore National Laboratory, where she will study and develop reliable, high temperature thermal barrier coatings. **Kim Pereira**, a fourth year graduate student, was chosen for a High Energy Density Science Center Graduate Student Internship at Lawrence Livermore National Laboratory. She will be working with a team running experiments across facilities in the US and Germany. In Fall 2022, the Walsh Lab received an NSF CAREER award to support our work on the high-pressure synthesis of new carbides. This is a great accomplishment for the lab and hopefully the first grant of many! At the beginning of the year, the lab officially welcomed **Liz Cote** as a new member. She has joined the carbides subgroup and is already learning all the tricks for successful high-pressure synthesis reactions. We have also been joined by **John Arigbede**, who is a graduate student in the Chemical Engineering program. John is spearheading our projects investigating the catalytic properties of novel recovered metastable carbides. The lab is looking forward to another productive year!

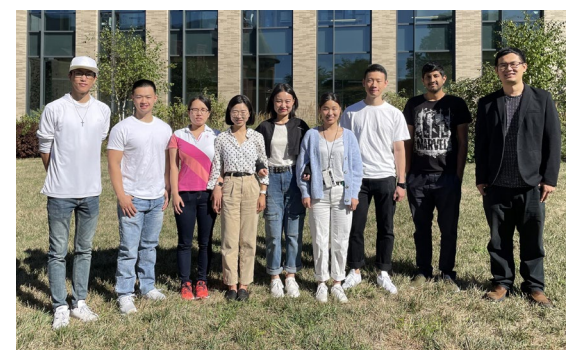
## You Group

This past year **Prof. Mingxu You** was promoted to Associate Professor with Tenure! Prof. You continues to serve as an associate editor of *Frontiers in Chemistry*, and on the editorial board of *Membranes*, *Biosensors*, and *PeerJ Analytical Chemistry*. Prof. You is now also an associate editor of *Frontiers in Chemistry*. In addition, he guest-edited a "Trends in Fluorescent and Bioluminescent Biosensors" special issue in *Biosensors* and an "Advanced Functional Materials-based Sensors" special issue in *Frontiers in Chemistry*. Meanwhile, for the third time in a row, Prof. You has been recognized as one of Stanford's List of World's Top 2% Scientists.

We have continued our research in developing next-generation RNA-based biosensors for cellular imaging and regulation, as well as cell membrane-anchored DNA probes to measure mechanical forces at cell-cell junctions and membrane dynamic interactions among lipids and pro-

teins. Some critical publications include **Ahsan Ausaf Ali** publishing in *Nano Letters* with a DNA hybridization-based approach for lipid domain imaging in live-cell membranes. **Lan Mi** published in *ACS Sensors* with the development of the first fluorescent RNA-based bioluminescence resonance energy transfer sensors for intracellular detection of various target analytes. These research efforts have been supported by an NIH Maximizing Investigators' Research Award, an NSF CAREER award, and a Camille Dreyfus Teacher-Scholar award. Meanwhile, this past year we received a new 2.5-year grant from Chan Zuckerberg Initiative to develop multiplexed RNA-based fluorescent sensors for cellular dynamic imaging.

Our lab members have also obtained several awards and achievements. **Ahsan Ausaf Ali** received a Paul Hatheway Terry Scholarship in recognition of his research and academic standing. This is the third You Lab winner in a row for one of the most prestigious departmental awards. **Zhaolin Xue** and **Lan Mi** have passed their original research proposal defense and become PhD candidates.



Two new chemistry major graduate students, **Sima Khajouei** and **Priyanka Bhattacharyya**, joined the lab this year. We also welcomed a visiting graduate student, Rania Joomun, from Université Paris Cité and a new undergraduate researcher, Justin Kieu. **Zhining Sun** will graduate this summer and then join Prof. Tom Soh's lab at Stanford University. We also have two undergraduate researchers, **Raymond Pho** and **Michelle Moskvitch**, graduating this year. We will miss all of you!

We are expecting another fruitful year for the You Lab! For more information, please visit our website <https://elements.chem.umass.edu/youlab/> or Twitter [https://twitter.com/UMass\\_YouLab](https://twitter.com/UMass_YouLab)

Stay in touch with you mentor  
or share your alumni updates at  
[ggazette@umass.edu](mailto:ggazette@umass.edu)



## Journal Artwork by Steve Acquah

Journal cover artwork is an important feature of the publication process, providing a visual representation of the content and helping to entice researchers to read the publication. I was asked to produce the artwork for the back cover of the *Journal of Materials Chemistry C* highlighting the work of Professor Xian Du's Laboratory (UMass Amherst — Mechanical and Industrial Engineering) and his collaborators. The image was selected for the back cover and will be promoted by the Royal Society of Chemistry and may be printed in other RSC publications. It will also receive additional promotion through their social media channels.

As I looked at a few recent examples of journal cover artwork, it was clear that the orange-teal color theme was still prevalent, so I included aspects of that in the design. The *Journal of Materials Chemistry C* is currently celebrating its 10th anniversary, and as part of the celebrations, authors were asked to consider including the number "10" in their cover designs if possible. I added it to the inkjet printer cartridge and as one of the conductive patterns.

I wanted to create a callback to the 1980s neon garage aesthetic and include some hidden features. For example, each droplet from the inkjet printer is chased by a smaller droplet (satellite), and when both drops hit the surface, they combine and spread out to form a dot.

While there wasn't much time for detailed concept sketches, I created the initial idea using Adobe Illustrator as it provided enhanced tools for the 3D extrusion of 2D shapes. However, as I created additional elements and shaders, the project file became too large for real-time rendering, so I migrated elements to Blender, a free 3D software package that allows users to create visual effects, animations, and 3D models. Blender features a variety of modeling tools, including mesh modeling and sculpting.

The manuscript had several key features I wanted to highlight, such as the inkjet printing, the flexibility of conductive patterns on a fluoroelastomer (FKM), the submersion of the device into a vat containing hydraulic oil, and the operation of various conductive pattern designs.

I look forward to supporting faculty with designs for journal cover artwork.



# Emeritus News

## Bret Jackson, Faculty 1985-2021

I continue to work on various molecule-surface scattering problems. While I still collaborate with several molecular beam groups examining the reactive scattering of methane on metal surfaces, my retirement has allowed me to focus on more fundamental, perhaps even esoteric problems. Over the past year and a half I have developed new ways to model the dynamics of molecules colliding with metal surfaces, accurately including, from first principles, coupling to the vibrational and electronic excitations of the substrate. In our most recent publication we explore the validity of the commonly invoked Markov approximation, using a reduced density matrix to examine correlations between the bath and particle dynamics. We show that these are minor, and derive a way to accurately model the scattering using a relatively small number of stochastic wave packets. This paper was selected to be an Editor's Pick in *J. Chem. Phys.* I have presented this work (remotely) at meetings in Toulouse, Kolkata, and Lieden.

## David L. Adams, Class of 1967 Faculty 1999-2009

Since retirement at the end of 2009, my wife Lynne and I have enjoyed both summers and winters in the Pioneer Valley. During the past 13 years, we have travelled extensively to destinations including Alaska, Hawaii, London, France (Normandy and Paris), Central America, Bermuda, several Mediterranean countries (including Italy, Greece, Spain and Turkey), and many Caribbean Islands. I have revived my interest in hobbies such as numismatics, philately, history, and reading. I have also spent time lumbering, hiking, and fixing things — anything! We visit our daughter and her two children (ages 22 and 17), as well as other family and friends. We researched UMass history in anticipation of a second volume of our book *Massachusetts Memories: UMass Amherst History*, but have not progressed on this since COVID shut it down. We don't spend much time on campus but do enjoy visiting the department at times, and eating at the world class UMass dining commons. I have maintained my involvement in the Metawampe Club and its annual hike and dinner, and have also written several articles for the *Goessmann Gazette*, the best chemistry department newsletter in the country. Lynne and I also attended our 50<sup>th</sup> reunion at UMass in 2017 — what a great time, with Elvis in attendance! One of my most rewarding experiences is when former students visit and we get a chance to talk about “old times” and I get a chance to hear about their wonderful and successful careers!



## Paul Lahti, Faculty 1985-2015

I have been interested in astronomy since my childhood, when my father pointed out how to find the North Star and some simpler constellations. Post retirement, I have had the opportunity to pursue this interest. I acquired two telescopes: a 90 mm aperture, 900 mm focal length refractor with a manual equatorial mount, as well as a 200 mm aperture, 1200 mm focal length Dobsonian reflector with a tilt-type altitude/azimuth mount. The latter has the strongest light gathering ability. With it, I have looked at numerous Messier object galaxies and star clusters, the seven other major planets, and a couple of bigger asteroids.

The smaller telescope is an adequate setup for EAA (electronically assisted astronomy). With a small mount-drive motor, the scope can follow Earth's rotation, locking onto an observed target. The scope eyepiece can be replaced with a small CMOS camera designed for photographing the moon, solar system objects of sufficient brightness, and brighter deep space objects. Using freeware written and generously made web-available by amazingly clever people, movies can be made of the scope view, or multiple photos acquired at a given exposure length. The exposures can be “stacked” exposures using other freeware to see faint features that are almost or completely invisible to the eye alone, even using the scope.

Chemistry-learned skills are valuable, such as spectroscopy (use of filters to limit light pollution, a problem even miles from university lights) and data analysis (choosing individual exposure frames using quantitative measures). I started EAA only recently, after much web-reading. It takes time to learn, but I have seen the progress from this “do it to learn it” activity – similarly to chemistry! I do this for fun, but it shows that, as we all know, chemistry provides broad experience to do many things not directly considered to be chemistry.

Top left: Half-Moon: Mare Serenitatis and Mare Crisium are upper grey plains (l to r), Mare Tranquillitatis the large plain in the middle, Mare Fecunditatis to the right of Tranquillitatis with the bright white Langrenus Crater further to the right, Mare Nectaris the “lowest” grey plain with three sizeable craters on its left border; note the heavy cratering of the lunar lower, south pole region, emphasized by lighting at this phase.

Messier 51, the Whirlpool Galaxy, night of 6 July 2022

# Seminar

by Joseph DuChene, Seminar Chair

The Chemistry Department was honored to host so many talented scientists and distinguished speakers for the 2022-2023 UMass Amherst Department of Chemistry seminar series.

In October of 2022, **Professor Laura Kiessling** from the Massachusetts Institute of Technology (MIT) presented the **Annual William E. Mahoney Lecture**. Professor Kiessling is the Novartis Professor of Chemistry at MIT, a member of the Broad Institute, a Fellow of the American Association for the Advancement of Science, a Member of the American Academy of Microbiology, and a member of the National Academy of Sciences. Her honors and awards include a MacArthur Foundation Fellowship, a Guggenheim Fellowship, the ACS Gibbs Medal, the Tetrahedron Prize, and the Centenary Prize from the Royal Society of Chemistry among others. Professor Kiessling gave an engaging lecture on protein-glycan interactions in immunity, in which she described her lab's work on understanding how cell surface glycans of foreign cells, such as pathogens, influence immune responses and how such information can be co-opted to combat cancers and other diseases.



Prof. Laura Kiessling

In November of 2022, **Professor Timothy Swager** from the Massachusetts Institute of Technology presented the **Stein-Covestro Honorary Seminar in Polymer Chemistry**. Professor Swager is the John D. MacArthur Professor of Chemistry at MIT and is an elected fellow of the National Academy of Sciences, the American Association for the Advancement of Science, and the National Academy of Inventors Fellow. Professor Swager has also been honored with many awards throughout his career, such as the Pauling Medal, the Carl S. Marvel Creative Polymer Chemistry Award, the Lamelson-MIT Award for Invention and Innovation, the American Chemical Society Award for Creative Invention, and he holds an Honorary Doctorate Degree from his alma mater, Montana State University. Professor Swager gave a very exciting presentation discussing his group's recent progress towards the development of polymeric systems wherein reconfiguration of complex liquid emulsions can be triggered chemically, biochemically, or with magnetic fields. The utility of such systems is to generate new transduction mechanisms by which chemical and biological sensors can be developed. We are eager to see how this work will lead to new technologies for a variety of applications.



Prof. Timothy Swager



Dr. Melissa Moore

In February of 2023, UMass Amherst hosted the Chief Scientific Officer of Moderna, **Dr. Melissa Moore**, to present the **Annual 5-College Lecture Series in Chemistry**. Dr. Moore's work at Moderna was vital in producing vaccines for fighting the COVID-19 pandemic, and she regaled us with a fascinating story of how these vaccines were developed in record time. Her talk concluded by sharing her perspective for the future of mRNA-based vaccines. It was a real pleasure to host the 5-College Lecture Series at UMass Amherst this past year and we thank the 5-College Consortium for their continued support of this unique seminar series.



Prof. Christine Thomas

In May of 2023, **Professor Christine Thomas** from The Ohio State University gave the annual **Marvin D. Rausch Lecture in Organometallic Chemistry**. Professor Thomas is the Fox Professor of Chemistry at The Ohio State, and is a Fellow of the Royal Society of Chemistry. She has won numerous awards for her work, including an NSF CAREER Award, the Department of Energy's Early Career Research Program, and is an Alfred P. Sloan Fellow. Professor Thomas' dedication to teaching was also recognized with a 2012 Michael L. Walzer '56 Award for Excellence in Teaching. Professor Thomas gave an interesting presentation on how her lab has been incorporating metal-ligand and metal-metal cooperativity into first-row transition metal catalysts. Her work has important implications for improving the efficiency of a variety of difficult to catalyze reactions involving two-electron redox processes, which are often challenging to perform with first-row transition metals.

We also hosted many great scientists in the field of chemistry, including **Prof. David Clemmer** (Indiana University, Bloomington), **Prof. Lan Cheng** (Johns Hopkins University), **Prof. Sarah Slavoff** (Yale University), **Prof. Celia Schiffer** (UMass Worcester), **Prof. Olivier Julien** (University of Alberta), **Prof. Hao Yan** (Arizona State University), **Prof. Andy Gewirth** (University of Illinois Urbana-Champaign), **Prof. Eric Gale** (Harvard MGH), **Prof. Ian Webb** (Indiana University-Purdue University, Indiana), **Prof. Chunyu Wang** (Rensselaer Polytechnic Institute), **Prof. Richard Robinson** (Cornell University), **Prof. Yuanyue Liu** (University of Texas – Austin), **Prof. Dan Fabris** (University of Connecticut), **Prof. Derek Stein** (Brown University), **Prof. Katie Hart** (Williams College), **Prof. Joseph Zaia** (Boston University), **Prof. Rob Coridan** (University of Arkansas), **Prof. Dorothee Kern** (Brandeis University), **Prof. Brandi Cossairt** (University of Washington), and **Prof. Stephen Maldonado** (University of Michigan). The variety of such great scientific speakers was truly inspiring, and we look forward to another exciting seminar series next year!

The Chemistry Department is very grateful for the generous contributions of our alumni and corporate sponsors, who make the success of the seminar program possible. More information about upcoming seminars and events can be found at [www.chem.umass.edu/events-seminars/](http://www.chem.umass.edu/events-seminars/).



## 32nd annual ResearchFest

The 32nd annual research symposium, ResearchFest, introduced incoming first year students to our program, faculty, staff, and fellow students. The keynote address was given by **Dr. Cornelius Taabazuig** (Knapp Group '15), a Presidential Assistant Professor in the Department of Biochemistry and Biophysics at the University of Pennsylvania Perelman School of Medicine.

The alumni Career Panelists were **Connor Boyle** PhD'18 (DV Group), **Riddha Das** PhD '19 (Rotello Group), **Mike Tarselli** BA'03 (PhD'08 North Carolina – Chapel Hill) and **Catherine Tremblay** PhD'21 (Vachet Group). Boyle is an Assistant Professor in Residence of General and Organic Chemistry at the University of Connecticut in Waterbury. Das is a Postdoctoral Researcher at Harvard Medical School focusing on imaging the pharmacology of lipid nanoparticles to apply in cancer immunotherapy. Tarselli is the Chief Scientific Officer for TetraScience, a Boston-based startup, building the life sciences R&D Data Cloud. Tremblay is a Mass Spectrometry Applications Specialist in the demo lab at Waters Corp. and works in the BioPharma group focusing on large molecule applications.

The **Marvin D. Rausch Scholarship Award** for Outstanding Oral Presentation was awarded to **Jessa Makabenta** (Rotello group) for their talk "Polymer Nanotherapeutics to Combat 'Superbug' Biofilm Infection." **Erik Nordquist** (J. Chen group) received the **Paul Hatheway Terry Endowment Award** as first-runner up for their talk titled "Predicting Protein Function by Integrating Physics-Based Modeling and Experiments with Statistical Learning." **Ruolan Fan** (Andrew group) and **Tongkun Wang** (Auerbach group) were each awarded the **William E. McEwen Scholarship Fund Award** as joint second-runner ups for their talks. Fan's talk was titled "On-site Identification of Ozone Damage in Fruiting Plants using Vapor-Deposited Conducting Polymer Tattoos" and Wang's talk was "The Charge Balancing and Structure Directing Roles Played by Fluoride in Zeolite Synthesis." The oral presenters were selected by a faculty committee through a nomination and evaluation process.

The **Marvin D. Rausch Lectureship Award** for Outstanding Poster Presentation was awarded to **Ritabrita Goswami** (Rotello group) for first place in the morning session. **Kimberly (Bolduc) Pereira** (Walsh group) and **Jeerapat Doungchawee** (Vachet group), the joint first place winners in the afternoon session, were awarded the **William E. McEwen Award** for Outstanding Poster Presentation.

Eight students received the **William E. McEwen Award** for Outstanding Posters. Securing joint second positions were **Katie Wahlbeck** (Thompson group) and **Bhavna Kalyanaraman** (Farkas group) for the morning session, and **Jithu Krishna** (Thayumanavan Group) and **David Bilger** (Andrew group) for the afternoon. **Ruptanu Banerjee** (Martin group) and **Theo Prachyathipsakul** (Thayumanavan Group) received joint third for morning session, and **Yanfeng Li** (Streiter group) and **Zhaolin Xue** (You group) for the afternoon. **Jessica Allen** (Thompson group) and **Gaurav Mitra** (Kittilstved group) were voted People's Choice for Outstanding Poster Presentation, and received **Paul Hatheway Terry Endowment Awards**.

We gratefully acknowledge the financial support we received for this event from the UMass Amherst Department of Chemistry, **Marvin D. Rausch Scholarship Fund**, **Dr. Paul Hatheway Terry Scholarship**, **William E. McEwen Endowment Fund**, and alumni. We also thank the following vendors who came to show us what their companies had to offer: Airgas, Azenta, Buchi, Bristol Myers Squibb, CellTreat, ChemGlass Life Sciences, Fisher Scientific, Opentrons, New England BioLabs, Thermo Fisher Scientific, and Thermo Fisher Scientific Biosciences. If you are interested in contributing to this event, please contact Vicki Hubby at [vicki@chem.umass.edu](mailto:vicki@chem.umass.edu).



Talk Winners (left to right): Prof. Rick Metz with Jessa Makabenta, Erik Nordquist, Ruolan Fan, and Tongkun Wang



Poster Winners: Jeerapat Doungchawee, Jithu Krishna, Ritabrita Goswami, Jessica Allen, Bhavna Kalyanaraman, Theo Prachyathipsakul, David Bilger, Kimberly (Bolduc) Pereira, Gaurav Mitra, Ruptanu Banerjee, and Katie Walbeck



Incoming Fall 2022 Graduate Students: Shrishti Barethiya, Anirudh Devarajan, Priyanka Bhattacharyya, Anthony Fosu, Chau Tran, Soham Chakraborty, Minelise Rivera De Jesus, Sheta Tori, Nicholas Baker, Carmen Wiggin, Arnab Das, Elizabeth Cole, Sophie Joseph, Brielle Maxwell, and Neumiah Massenet

## PhD defenses

August 2022 - June 2023

**Sandor Babik**, "Elucidating The Interactions Of K48-Linked Ubiquitin Chains With Uch37/Uchl5," Eric Strieter

**David Bilger**, "Expanding the Repertoire of Conjugated Monomers Amenable to Reactive Vapor Deposition," Trisha Andrew

**Nicholas T. Hight-Huf**, "Scanning Probe and Spectroscopic Investigations of Polarization-Driven Electronic Interactions at 2D-Polymer Interfaces," Michael Barnes

**S. Zohreh Homayounfar**, "Fabric-Integrated Sensors and Bioelectrodes for Wearable Health Monitoring: Design, Development, & Application," Trisha Andrew

**Myrat Kurbanov**, "Reactive chemistries for protein labeling, degradation, and stimuli responsive delivery," S. Thayumanavan

**Fanjun Li**, "Investigation of kinase conformational dynamics and analytes detection with protein nanopore," Min Chen

**Schuyler P. Lockwood**, "Determining Bond Strengths and Dissociation Dynamics of Diatomic Metal-Containing Ions by Photofragment Imaging," Ricardo Metz

**David Luther**, "Intracellular Delivery of Therapeutic Biomolecules through Versatile Polymer Nanotechnology," Vincent Rotello

**Jessa Marie V. Makabenta**, "Polymer-Based Nanotherapeutics to Combat Difficult-to-Treat Bacterial Infections," Vincent Rotello

**Haneen Mansoor**, "The Dynamic Interplay of Defects and Transition Metal Dopants in Metal Oxide Semiconductors : A Balancing Act," Kevin Kittilstved

**Erik B. Nordquist**, "Understanding protein structure-function relationships using simulations and machine learning," Jianhan Chen

**Zhining Sun**, "Development of Genetically Encodable Fluorogenic RNA Sensors for Small Molecules Detection in Live Cells," Mingxu You

**Tongkun Wang**, "Applying density functional theory simulations to study the charge balancing and structure directing role of fluoride in zeolite synthesis," Scott Auerbach

**Peidong Wu**, "Development of biomolecule nanoparticle conjugates for targeted delivery of therapeutics," S. Thayumanavan

**Ruiling Wu**, "Development of an anionic nanogel system for targeting delivery of thyromimetics to the liver in the treatment of Nonalcoholic Steatohepatitis (NASH) disease," S. Thayumanavan

**Xianzhi Zhang**, "Transition metal catalyst (TMC)-embedded bioorthogonal nanozymes for anticancer therapeutics," Vincent Rotello

MS Degrees: **Jeffery Cullen**, "Evaluations of Chemical Modifications on Primary and Immortalized Immune Cell Surfaces Toward Their Use as Cell-Based Vehicles," Michelle Farkas

## Chemistry Department Ambassador Program

The Chemistry Department Ambassador program provides support for graduate students to visit their alma mater institution to deliver special seminars. The ambassadors will present on not only their research accomplishments, but also on their experiences as a chemistry graduate student at UMass Amherst. The program aims to strengthen our ties with other departments by showcasing the excellence achieved by the students in our program, and will hopefully inspire the next generation to follow in their footsteps. This year's awardees are **Jessica Allen** (University of Massachusetts Lowell) and **Michael Lu Diaz** (University of Puerto Rico Mayaguez).



# Undergraduate Awards

The department hosted its 25th Annual Undergraduate Awards Ceremony on May 12th in the Student Union Ballroom. The recently renovated ballroom was the perfect venue with its campus views and additional seating to accommodate our growing guest list. Students and their families were joined by faculty, staff, and donors to recognize the hard work and dedication of our students and their exceptional achievements at our largest awards ceremony to date.

The awards are made possible because of the generous support the department receives from our alumni, industrial partners, and professional organizations. The committee wishes to thank our outstanding students for their contributions to the department and university and wishes to thank those who, in turn, support our students.

Research groups noted in parentheses.

## Academic Awards

### American Chemical Society (ACS) Hach Scholarships

Jenna Lutz and Kael Pelletier

### ACS Undergraduate Award in Analytical Chemistry

Ngoc Kim Vu (Vachet)

### Edward Shapiro Fund

Fiona McEvoy (Vachet), Anna Kosinski (Grossmann), Taras Nagornyy (Fan), Terry Nguyen (Rotello), and Megan Yee (Andrew)

### Jay A. Pirog Scholarship

Andrew Nichols

### John A. Chandler Memorial Scholarship

Thomas Caira (Farkas) and Wyatt Mitchell (Walsh)

### Michael Bruno Scholarship

Justin Kieu (You)

### Robert Maxwell Williams Memorial Scholarship

Harrison Hees and Emily Naughton

### Royal Society of Chemistry Certificate of Excellence

Bao Le (Farkas) and Liam Murphy (Skouta)

### Thomas R. "Casey" Stengle Scholarship

Joseph Gerrior (Metz) and Hayley Norton

## Research Awards

### ACS Undergraduate Award in Inorganic Chemistry

Zeynep Alptekin (Walsh)

### ACS Undergraduate Award in Organic Chemistry

Liam Murphy (Skouta)

### ACS Undergraduate Award in Physical Chemistry

Ethan French (Lin)

### Chemistry Undergraduate Research Fund

Pranav Viswanathan (Muthukumar)

### Dr. Uche Anyanwu Memorial Fund

Grace Baron (Hardy), Owen Doyle (DuChene), and Ngoc Kim Vu (Vachet)

### J.F.B. Fund for Undergraduate Research

Owen Doyle (DuChene)

### Mahoney Undergraduate Summer Research Award

Anastasia Antropova (DuChene)



### Mr. Tompkins Award

Erika Brown (DuChene) and Thomas Caira (Farkas)

### Oliver Zajicek Memorial Scholarship Award

Anastasia Antropova (DuChene) and Andrew Berlinsky (Mentzen)

### Professor Jack Ragle Endowed Fund in Chemistry

Gideon Tzafriri (Lin)

### Roger G. Bates Chemistry Fund

Kevin Alexander (Fejzo)

### Sir Harold W. Kroto and Steve F.A. Acquah GEOSSET Award

Maeve Tucker

### Tarselli Family Research Award

Kevin Alexander (Fejzo) and John Ferriera (Farkas)

## Departmental Awards

### Departmental Recognition Award

Grace Baron (Hardy) and Bao Le (Farkas)

### ACS-Connecticut Valley Section Student Award

Grace Baron (Hardy)

### American Chemical Society Membership Awards

Brooke Newby (He) and Shuyi Chen

### American Institute of Chemists Award

Bao Le (Farkas)

### Distinguished Undergraduate Instructor Award in Honor of Earl J. McWhorter and George R. Richason, Jr.

Nathan Schnarr

### Distinguished Graduate Teaching Assistant Award in Honor of George R. Richason, Jr.

Kyle Winters (Farkas)

### Distinguished Undergraduate Teaching Assistant Award in Honor of George R. Richason, Jr.

Ethan French (Lin)

### Positron Award

Erika Brown (DuChene)

### Richard W. Fessenden Award

Grace Baron (Hardy)

### Senior Class Award

Liam Murphy (Skouta)

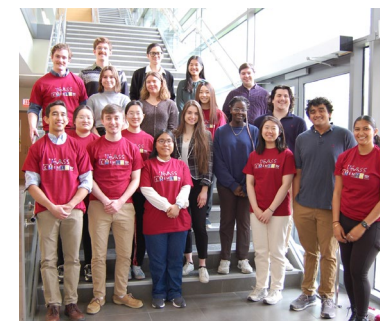
## undergraduate

# Poster Session

Chemistry's 2023 Undergraduate Research Poster Session was held on May 5th in the Intergrated Sciences Building (ISB) Atrium. Twenty-one students presented their posters to faculty and students.

The Dr. Uche Anyanwu Memorial Fund recognizes the top three research posters presented by students working in chemistry labs. The fund was established by Dr. Ucheoma O. Akobundu to honor her late husband, Dr. Anyanwu, who was the first member of the D. Venkataraman (DV) group, earning his PhD in 2005.

The awardees were senior Grace Baron, and rising seniors Owen Doyle and Ngoc Vu.

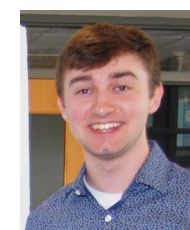


## Understanding the Implications of the Extended Prodomain of Caspase-7 Beta



**Grace Baron '23** (Hardy Group): My research aims to understand a rare form of Caspase-7, an enzyme involved in programmed cell death and a variety of diseases. This alternative form, Caspase-7  $\beta$ , has a 33 amino acid residue extension that we believe may alter the enzyme's function. To understand the biological implications of Caspase-7  $\beta$ , I have spent my time in the Hardy Lab optimizing the purification of this protein and assessing its activation and enzymatic activity through mass spectrometry and biochemical assays.

## Effect of Surface Grain Boundaries on Product Selectivity for the Nitrate Reduction Reaction



**Owen Doyle '24** (DuChene group): My research looks at how different methods of electrode cleaning affect product selectivity in the electrocatalytic reduction of nitrate to ammonia. Depending on how the electrode is electropolished, we can observe the formation of surface grain boundaries which were proposed to have different catalytic abilities than surfaces without them. In the future, this research could be deployed into wastewater treatment facilities as a new, net-zero-cost nitrate removal system.

## Decellularization as a Method to Enhance ECM Protein Detection by Mass Spectrometry Imaging



**Ngoc Vu '24** (Vachet group): My research focuses on developing a method to enhance the detection of ECM proteins using matrix-assisted laser desorption ionization mass spectrometry imaging (MALDI-MSI). We have investigated various conditions and concluded that a combination of decellularization and lipid removal improves the detection of ECM proteins while visually retaining their spatial distributions in tissues.

## Bao Le Named UMass Rising Researcher



Bao Quang Gia Le '23 is a chemistry major who works on the synthesis of molecules for cell surface modification: research with implications for a novel targeted approach to treat and image cancer. He is one of nine UMass Amherst undergraduates named Rising Researchers in recognition of their outstanding research, scholarship, and creative activity.

*Growing up in a family of scientists, I was introduced to the wonders of science at a very young age. Witnessing how my family members' research has improved lives and the world had a profound impact on me. I took my first chemistry class in middle school back in Vietnam, and I realized my passion for the subject. I knew then that I wanted to become a chemistry professor, and my love for the subject has only grown deeper over time.*

*For the past two years, I have been a member of Professor Michelle Farkas's lab and I have had the opportunity to work on two interrelated research projects that seek to improve targeted delivery of cancer drugs. In the first project, I focused on synthesizing a library of molecules for cell surface modification, which could react with and bind to macrophages and stem cells and act as active drug delivery vehicles to specific disease sites within the body. More recently, I have been working on attaching these molecules to macrophages and evaluating their effectiveness in vitro. By testing different combinations of molecules and cells, we aim to identify the most effective strategies for targeted imaging and drug delivery in cancer treatment.*

*Conventional cancer treatments such as chemotherapy are delivered passively, meaning that drugs are distributed throughout the body. This approach often leads to side effects, as healthy cells in internal organs and bone marrow are also affected by the treatment.*

*Our research aims to enable a new generation of active delivery agents that can precisely and selectively deliver imaging tools and drugs to disease sites while minimizing harm to healthy tissues. We hope to identify strategies for more effective, precise cancer treatments with fewer side effects.*

*This experience has been both intellectually stimulating and emotionally rewarding. I have been able to contribute as an author on seven peer-reviewed journal articles and present my work at three poster presentations.*

*Nothing excites me more than the thrill of discovery through research and knowing that my findings might one day benefit others. It is a feeling that keeps me motivated even during the most challenging moments. I also love the fact that there are always multiple ways to approach a problem in research, and enjoy the creative process of finding new solutions. I was personally exposed to different approaches to developing targeted delivery of cancer drugs through my work in the Farkas Lab, at the MD Anderson Cancer Center, and the Vietnam National University. Working in diverse research environments has expanded my understanding of scientific methodologies and techniques and has taught me the value of collaboration and interdisciplinary thinking.*

*My experience at UMass has inspired me to pursue research as a career and obtain a PhD in chemistry. — Bao Le*



## iCons by Wesley J. Dunham, iCons Strategic Communications and Program Manager

The UMass Amherst Integrated Concentration in STEM Program (iCons) is an academic certificate program for undergraduates whose mission is to inspire a diverse generation of innovators in science, technology, engineering, mathematics, and business with the attitudes and skills needed to solve problems facing our world. Building on the disciplinary strength of each student's major, iCons projects at all levels involve collaborative student teams working on cross-disciplinary communication and integrative problem-solving skills.



This past fall we launched the thirteenth cohort of the iCons Program after receiving a record number of applicants, an increase of over 27% from the previous year. The 72 new students represent 23 majors across six colleges at UMass Amherst, with 63% of students identifying as BIPOC and 69% identifying as non-male. This year's first case study will focus on *Water Scarcity*, a multifaceted problem that combines STEM and business in agriculture, climate, energy, and health. Water Scarcity is a particularly interesting topic for iCons students to tackle as the program will be launching a new track in Food-Water-Climate in 2024.

We are pleased to announce the selection of **Paul Wolff**, **Shira Epstein**, and **Nicholas Tooker** as the 2022-2023 iCons Teaching Fellows. The award provides funding for faculty to join the iCons teaching team while receiving professional development funds. Paul Wolff will be a member of the teaching team for first-year iCons students, ICONS 189H Global Challenges, Scientific Solutions. Wolff is a lecturer in the College of Natural Sciences in the Environmental Conservation department. Shira Epstein and Nicholas Tooker are joining iCons to teach ICONS 389H Team-Oriented Lab Discovery in Renewable Energy, the iCons 3 lab for the Renewable Energy track. Epstein serves as Director of Campus Makerspaces and Tooker is a professor in the Department of Civil and Environmental Engineering. Not only will the Fellows add unique and diverse perspectives to the iCons Program, but they will also benefit from professional development and training in student-driven instructional methods.

In April 2022, UMass Amherst announced its Carbon Zero Initiative — moving UMass Amherst to “netzero” carbon emissions by the year 2032. To support UMass Carbon Zero, iCons has partnered with the UMass Clean Energy Extension to create a senior capstone course called the **Clean Energy Living Lab**, a place where iCons seniors interface with towns and cities of the Commonwealth to guide their adoption of municipal solar energy. Moving forward, we will expand this Living Lab in both size and scope, making it an honors thesis course, and including both off-campus and on-campus carbon reduction opportunities.

iCons is spearheading inclusive and interdisciplinary education, and other academic institutions are taking notice. The College of Science and Engineering at Central Michigan University has launched the InSciTE Program (Integrated Science, Technology, and Engineering) in the image of iCons. Additionally, the College of Engineering and Mathematical Sciences at the University of Vermont has created the iCons Learning Communities for faculty who wish to bring real-world problems into their classes. Several other institutions across the western hemisphere are at earlier stages in the iCons adoption pipeline.

Two articles have been published in the last year on the power of the iCons educational approach. In the first article [link: [bit.ly/3ZG29CN](https://bit.ly/3ZG29CN)], the authors found that iCons faculty intentions and student outcomes are matching well, leading to excellent student learning. In the second article [link: [bit.ly/3ZIBeGy](https://bit.ly/3ZIBeGy)], the authors did a deep dive into the student experience of interdisciplinary learning, finding stages of “choosing,” “navigating,” and “integrating.” This work helps us understand better what's happening in the iCons courses and helps the world through iCons Thought Leadership.

We want to thank all our supporters and sponsors, including the Mahoney Family, the Chleck Family Foundation, Edward Marram '59 and Karen Carpenter, Impact Nano, Waters Corporation, Lumanity, the Western Mass Economic Development Council, iCAN (iCons Alumni Network), and all our benefactors and supporters.

We hope you will visit the iCons website, <https://icons.cns.umass.edu>, to keep up to date with our news and events and to check out student research projects on the Innovation Portal. We wish you all to stay safe, happy, and healthy.

## COMMENCEMENT 2023

The university re-envisioned this year's commencement to allow the entire Class of 2023 to celebrate during one ceremony on Friday, May 26th. Brianna Scurry, a UMass Amherst alumna and international soccer star, delivered the keynote 153rd Commencement address under sunny skies at McGuirk Alumni Stadium to an audience of approximately 20,000, celebrating the achievements of 7,500 undergraduates and 2,000 master's and doctoral students. Scurry encouraged students to draw strength and motivation from life's hardships. "Success is not a straight line...every single one of you is capable of changing your world" and Chancellor Subbaswamy told the graduates that young adults have always had the vision and the will to drive revolutionary change to improve the world.

The College of Natural Sciences Senior Celebration was held at McGuirk stadium Friday afternoon. Each senior had their name announced and was presented with a commemorative medal. Chemistry Senior Nicholas Dix was nominated by his peers to give a short speech at the ceremony. Chief Undergraduate Advisor, Dr. Ruthanne Paradise, and Graduate Program Director, Prof. Michael Barnes, led the chemistry procession, and Department Head, Prof. Ricardo Metz, and Undergraduate Program Director, Dr. Nathan Schnarr presented graduates with the medals and congratulated them on stage.



Brianna Scurry

Chancellor Subbaswamy



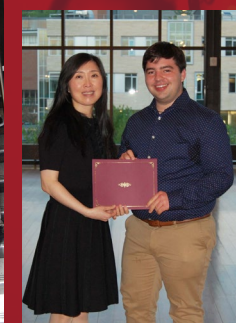
Graduation Ceremony at McGuirk Alumni Stadium



Chemistry seniors and their families were honored at our Senior and Awards Dinner on May 12th at the Student Union Ballroom



**2023 Chemistry Seniors:** Paul Albani, Grace Baron, Sean Bhambhani, Jared Bianchi, Erika Brown, Hanwen Chen, Shuyi Chen, Sheehan Choudhury, Leila Depina, Nicholas Dix, Liliana Florino, Ethan French, Adam Goulet, Simon Harrity, William Hill, Gabrielle Ho, Adam Hoolahan, Amelia Isabelle, Bao Le, Gavin Maenzo, Alanna Mahar, Anthony Mastromatteo, Brennan McAvoy, Liam Murphy, Brooke Newby, Isabella Nicastro, Josh Paine, Jillian Platt, Isabella Pomeroy, Eamon Porcello, Anita Ren, Grace Rogers, Marissa Romano, Adi Manish Soota, Rebecca Walsh, Samuel Watrous, Raymond Williams, Lu Yang, Timothy Yesepkin, Kristina Yoo







## Alumni Reflection: Kenrick M. Lewis PhD'77

### My Forty-six Year Career in Industrial Chemistry

Grenada to University of Alberta  
to UMass Amherst

So, how did I get to UMass Amherst? In the fall of 1970, while I was a student at the University of

Alberta (Edmonton), I received letters from many Chemistry Departments in the US congratulating me on my ACS Undergraduate Award in Analytical Chemistry and inviting me to apply for graduate study at their university. One of these letters came from **Prof. Sidney Siggia** at UMass Amherst. His letter was the most persuasive. My decision on UMass was bolstered by information in the ACS Directory of Chemistry Departments on the Analytical and Inorganic chemistry faculty and their publications. The relative closeness of Amherst to New York City, where I had friends and family, was also a contributing factor. However, before I could apply to UMass to pursue graduate studies, I had to fulfill a major obligation.



Prof. Sidney Siggia

I was in Canada on a British Commonwealth scholarship. Initially, I was at Brandon University in Manitoba. I transferred to Alberta in my junior year because of the rigor and prestige of the Chemistry Honors program there. On completion of my baccalaureate (BS, First Class Honors), I was obliged to return home to Grenada and work in the public service. I did so in June 1971 and taught chemistry, mathematics and biology at the St. John's Christian Secondary School. I had planned to stay the required two years, but the political instability in the island, especially following the general elections on February 28, 1972, influenced my decision to leave early. Applying to graduate school in March was indeed late. However, I wrote to Prof. Siggia and he responded quickly with application forms and lots of information about the department. My academic transcripts and letters of recommendation were sent from the University of Alberta. My letter of acceptance and appointment as a Teaching Assistant was at hand prior to the end of April.

I arrived in Amherst in the late afternoon of Sunday, August 27, 1972. I took up residence at Prince House and looked forward to graduate studies. The previous month was spent with my sister in New York studying for the placement exams and visiting friends and family. In those days, registration was

done with punch cards in the old gymnasium. Prof. Siggia was at the chemistry table and he greeted me warmly.

Since I passed the Analytical, Inorganic and Physical Chemistry placement exams, I was able to take graduate level courses in those disciplines straightaway. One afternoon in the Spring of 1973, I was supervising a General Chem lab in Goessmann when I was summoned to **Dr. George Richason's** office. On the way to his office on the ground floor of the Lederle Graduate Research Center, I searched my memory for whatever transgression I might have committed. As I entered, he told me to relax and that I hadn't done anything wrong. He then informed me that I had been awarded a University Fellowship for 1973 – 1976.

It was the first time that a graduate student in chemistry had received a University Fellowship. There were only a limited number awarded annually. My Teaching Assistantship would end when the semester ended, thus allowing me to focus on research. A few weeks later, Mr. Richason again called me to his office. This time he told me I had been awarded the Polaroid Fellowship for having the most outstanding performance among the first year graduate students. I had received all A's in my exams in December 1972. However, I was completely unaware that **Drs. (Ron) Archer**, Siggia, and **(Peter) Uden** had nominated me for both fellowships.

Prof. Siggia recommended me for summer employment in 1973 and 1974 at the R&D Center of Olin Corp. in New Haven, CT. He was the Director of Research there before joining the UMass faculty. At Olin, I used HPLC/GPC analysis to solve quality problems with extruded PVC pipe and flame-retardant polyurethane foams. That experience enabled me to learn that industrial research must produce financial benefit, not just knowledge advancement.

Between October and December 1972, I requested and obtained meetings with Analytical and Inorganic faculty members to learn about their research and the topics they wished to investigate. I was still undecided in January 1973, when Prof. Archer told me about a proposal that he and Prof. Gawienowski (Biochemistry)

had written to investigate the chemistry of the copper intra-uterine device (CuIUD) and its possible mechanisms of action. I accepted it straightaway because it involved the analytical, inorganic, and bio chemistry of copper. My passion for these aspects of copper chemistry originated from a lecture by Prof. R. B. Jordan during my senior year at the University of Alberta. The interdisciplinary nature of the research was also attractive. Professors Archer and Uden had recognized my interdisciplinary interests and agreed that my research would include both analytical and inorganic sections.



Prof. George R.  
Richason, Jr.



Prof. Peter Uden

My dissertation was entitled “**Chemistry of the Copper Intra-uterine Device: Copper Corrosion and Complexation and the Mechanisms of Action**”. The findings were published in *The Lancet* (August 27, 1977, 458), *Contraception* (1977, 15, 93 - 104) and *Steroids* (1979, 34, 485 - 499), not the usual journals for publications by an inorganic chemist.<sup>1</sup>

### Friends and Lab Mates

The Lederle Graduate Research Center was first occupied in January 1973. The Inorganic labs were on the fourth and fifth floors. Professors Archer and **(Oliver) Zajicek** were on the fourth floor and Holmes, George and Wood on the fifth. Grad students at that time included **Don Dollberg**, **Wan Su Kwak**, **Craig Donohue**, **Bill Rozelle**, **Marv Illingsworth**, **Christine Crumm**, **Bruce Waldman**, **Imogene Bigley**, **Paul Clark**, **Miguel Angel Desoto Pareira**, **Virginia Creedon**, **John Marhevka**, **Eugene Martin**, **Jeff Gere** and **Meredith Findlay**. There were, however, other students who were often on the fourth floor. **Barb Foster** was one. She was a high school chemistry teacher from Springfield who took a sabbatical to pursue a master's degree in Microscopy/Polymer Science with **Prof. Marion Rhodes**. She has since established a successful business providing training and instruction in microscopy and microscopy education (MME).

Barb's dad, Dr. Lawrence Litz, was a Corporate Research Fellow at Union Carbide in Tarrytown. In April 1976, following a visit to her parents in Pleasantville, NY, Barb told me that I should send my resume to her dad and provided his mailing address. Quite astonished, I asked what her dad knew about me. She responded that she told him everything he needed to know. I thanked her and promised to send the resume. A month passed. “Ken, my dad said he has not received your resume.” I acknowledged my procrastination and treated the matter with urgency thereafter. Dr. Litz circulated my resume to different groups within Union Carbide at Tarrytown. My invitation for an on-site interview arrived in late June and the interview occurred in mid-July. The job offer came a few weeks later. Barb's helpful initiative was directly responsible for that. I have thanked her on numerous occasions.

Meredith Findlay was a very dear friend. She had degrees in and passion for both chemistry and music. Her research, supervised by Prof. Chen, was on Synthesis and Characterization of Cytochrome C derivatives. We went to the orchestral and drama performances on campus as well as to operas in Boston and New York. After graduation, she worked at 3M, Engelhard and Ciba-Geigy before going to Law School to become a patent attorney. Quite coincidentally, she was hired in that capacity at Union Carbide at the Danbury, CT, headquarters. She had recently moved to M & T Chemicals in New Jersey when she was killed in a head-on automobile accident in February 1989. She lives on in the memories of her colleagues and classmates.

<sup>1</sup>Clinically removed Cu-7 IUDs were provided by Dr. Zwirek (of Amherst Medical Associates and Hampden County Gynecologists). Analysis of twenty-three of them revealed that copper (II) oxide was the major component of the corrosion layer. Extensive calcium carbonate formation was found on devices which had been removed because of pregnancy. Of all the possible mechanisms of action, inhibition of estrogen-receptor binding by copper seemed most likely to result in a reliable antifertility effect.

Jeff Gere and I became friends during the first week of graduate school. Later, we were roommates at the Puffton Apartments. His dad was a Political Science professor on campus. The entire Gere family was welcoming and very hospitable to me. Jeff's doctoral research in organic photochemistry was directed by Prof. Hixson. After graduation, he joined the US Army and had a very successful career in biomedical research.

**Art Strohl** was a chemistry graduate student and a member of the graduate senate. Through his advocacy, the Graduate Chemists' Association (of which I was President and he, vice President) obtained funds to support a seminar series separate from that organized by the department. The key distinction was that the invitee would give a seminar and converse afterwards with the students, not the faculty. Prof. Roald Hoffmann from Cornell was our most memorable invitee. Our after dinner conversations at the Top of The Campus lasted until closing time. He told us about his family's flight from Poland during WWII and that his birth surname was Safran, not Hoffmann.

Campus in the 70's

He asked us about our research and career interests and offered helpful comments. He was quite intrigued by the subject of my research.

In 1982, I attended my niece's graduation at Cornell and met Prof. Hoffmann. He actually remembered me. I introduced him to my family members and they were elated at meeting a Nobel Prize winner. In 2001, I chaired the Organizing Committee of the 34<sup>th</sup> North American Silicon Symposium in White Plains, NY. Prof. Hoffmann accepted my invitation to be the after dinner speaker. The Symposium featured a History and Retrospective Session, during which invited speakers from academic and industrial laboratories recounted the path to some significant 20th century discoveries in organosilicon chemistry. Their stories are archived here: “Some Notable Discoveries in Organosilicon Chemistry: Proceedings of the History and Retrospective Session of the 34th Organosilicon Symposium (2001)” by Adrian G. Brook, Robert West et al. (uwo.ca) bit.ly/3GoE9NX

I had been in Amherst about two weeks when I met Dr. Godwin Oyewole, manager of WFCR, the NPR-affiliated radio station on campus. It was adjacent to Herter Hall along that long walkway leading to the library. His greeting was, “you must be new here. I don't know you.” I confirmed that I was indeed new to the campus, a grad student in chemistry and that I was from Grenada. We exchanged phone numbers. He told me that there were two Grenadian graduate students (Eddie Commissiong and Reginald Buckmire) in Food Science and invited me to a picnic organized by some foreign students that weekend. I attended, met Eddie and Reggie and many other students with whom I continued to socialize during my stay in Amherst.



Prof. Godwin  
Oyewole



Godwin was Nigerian. He had a weekly program, Mbari Mbayo, on African and Caribbean News, Music and Information. In 1974, I accepted his invitation to co-produce the program. I continued to do so until 1981. I drove from New York to Amherst on weekends to do live shows at noon on Sundays and record programs for later airing. Our friendship continued even after Godwin moved to Washington D.C in 1978. He went to Law School and later, practiced law there. Simultaneously, he revived Mbari Mbayo on WDCU and I joined him a few times for broadcasts on Saturday afternoons.

### Career Highlights

When, on January 17, 1977, I began working in the Linde Division of Union Carbide Corp. in Tarrytown, NY, I had no idea that forty-six years later I would still be working in Tarrytown, albeit with a different corporate entity. In fact, I have worked for at least seven corporate entities without ever having been relocated—the company changed names many times over years<sup>2</sup>. Throughout these dizzying mergers and acquisitions, my colleagues and I maintained our focus on safety, innovation, high productivity and quality and excellence. C&EN May 7, 2007 reported that we “took all the changes in stride.”

In Linde, I researched novel industrial applications of chelation in hydrometallurgy and waste-treatment. A foam separation method employing chelating surfactants was successfully applied to the demetallation of electroplating wastes in the laboratory. In other work, an unusual ozone-induced migration of thallium from the cages to the exterior surface of zeolites was discovered during studies whose objective was to find new industrial chemical uses for oxygen and ozone. That work was published in *Inorganic Chemistry* in 1981.

Since 1979, my research has centered on catalytic reactions of silicon and silicon compounds. The results are disclosed in fifty-seven issued US Patents and sixty-seven publications and presentations. Some of the patents and publications arose from collaborations with academic colleagues in the US

<sup>2</sup>In January 1979, I transferred from Linde to the Silanes & Silicones Business Unit of Union Carbide. The Business was sold to DLJ Merchant Bankers in September 1993 and renamed OSi Specialties, Inc. Witco Corporation purchased OSi Specialties in September 1995. Witco Corporation merged with Crompton and Knowles in September 1999 and became CKWitco Corp. The company's name was changed to Crompton Corporation in March 2000. GE acquired OSi Specialties from Crompton in August 2003 and it became part of GE Advanced Materials. GE sold this business to Apollo Management in December 2006. For a brief period, it was merged with Hexion, another Apollo-owned company. It is now called Momenive Performance Materials and is owned by KCC, a Korean company.

and Europe. I am co-editor of the monograph, *Catalyzed Direct Reactions of Silicon*, Elsevier Science Publishers, Amsterdam, 1993. I have also written a recent article on the History of Hydrosilylation, “1946 and the Early History of Hydrosilylation” bit.ly/3ZM1e3Y.

There have been other UMass Amherst chemistry graduates here at Tarrytown. **Bruce Waldman** (PhD Uden) started in the Silanes & Silicones Business Unit about a year before me. He also experienced the many corporate changes mentioned above. **Jodi Veccharelli** (PhD Uden) was a chromatographer here briefly in the 1990's. We worked together on HPLC/GPC analysis of silicone surfactants. **Uche Anyanwu** (PhD DV) joined in 2006. His career was cut short by illness. He passed away in 2012. **Dr. Shreedhar Bhat** was a post doc in **Prof. Thayumanavan's** group. He was hired for a position in Bangalore when we were in GE. He and I collaborated closely on silicone materials for contact lens and are co-inventors on a number of patents. Dave Schlitzer, Jennifer David, Patricia Anderson, and Jeff Hallen are UMass (Amherst) graduates from Polymer Science and Chemical Engineering who are located at our Waterford, NY, site.

### Conclusion

Clearly, UMass prepared me for a career in industrial research finding impactful solutions to chemistry-based problems. My contributions have advanced fundamental knowledge about catalytic reactions of silicon and silicon compounds. They have also generated enduring financial value to the companies and I have benefitted reputationally.

I have been an invited and plenary speaker at many domestic and international silicon chemistry conferences and symposia. I have also participated in the organization of many of these meetings. The international locations have been as diverse as Tromsø (Norway), Shandong (China) and Zacatecas (Mexico). Travel to these, as well as to the global sites of the Momenive, have broadened my cross-cultural experiences and enabled enduring friendships with colleagues even after they retired or resigned. The same can be said for the friendships forged with colleagues and international students I met at UMass Amherst.

Many friends, family members, lab assistants, collaborators, teachers, mentors and advisers have contributed to my successes and my development. While I thank them all for their support and guidance, some deserve special mention due to the impact of their tutelage and mentoring. They are Prof. Dallas Rabenstein at the University of Alberta (now at UC Riverside), from UMass, Prof. Siggia, Prof. Uden and Prof. Archer, and from Union Carbide, Dr. Bernie Kanner, Dr. Lawrence Litz and Dr. Anthony Bolton.

## Alumni

### Checking In with PhD Alumni: Industry Focus

“What are you going to do when you graduate?” Every graduate student probably gets that question a hundred times, especially at the beginning and end of their studies. Eventually, what our students do is finish their PhD and get jobs. Most of them end up taking positions in industry, where they use the expertise and training they received at UMass to impact the world by crafting tastier foods and beverages, developing cutting-edge scientific instrumentation, or creating new medicines.

We tracked down recent Chemistry PhD grads and asked them why they went into industry and what about UMass prepared them for their current positions. Here's what they had to say.



**Libbie Haglin**, PhD 2017 (Thompson group), Company: Aptev Therapeutics

*I pursued a PhD to gain a deeper understanding of protein structure-function relationship, and how this relates to normal physiological processes. Along the way, and with the help of UMass resources like the Drug Design course and CBI-sponsored activities, I discovered that applying my research skills and scientific background to the development of biologic medicines that treat diseases was where I wanted to head after completing my degree. I have now happily found my niche leading the Protein Sciences team doing early product development at an immuno-oncology biotech company where we design, characterize, and manufacture bispecific antibody drugs to treat cancer.*



**Maureen Hill**, PhD 2018 (Hardy group), Company: MOMA Therapeutics

*I joined industry to bring my passion for research closer to patients. The Drug Design course at UMass Amherst taught me how the skills I was learning in graduate school directly applied to pharmaceutical research. When my thesis project received funding from the UMass-Chemical Screening Initiative to screen a 58,000 compound library, I knew I found my calling. The excitement I felt after validating a hit compound fueled my desire to bring that skill to a setting where I could drive that hit into a lead, and hopefully one day, a drug. Now, that's what I get to do every day.*



**Puspam Keshri**, PhD 2022 (You group), Company: Laronde Bio

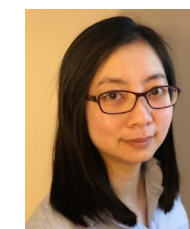
*UMass is a great place to do science and also learn from the mentors in the department. During my PhD, I thought of exploring internship opportunities in the*

*industry since I never had any exposure to that. After an internship I realized that I am more aligned to the industrial set-up. The environment in the department helped me to develop key skills such as a collaborative mindset and an open attitude towards learning, which are valuable in the industry. So, I transitioned to industrial set-up after my graduation.*



**Vikash Kumar**, PhD 2020 (Thayumanavan group), Company: Intel

*I decided to pursue a career in industry during the fourth year of my PhD. After a long day of experiments, and during one of my long training runs, I thought about the idea of “making progress” in tasks. The more work I put in, the better I got at running and the more progress I made. However, that was not always the case in my research projects. There were lots of learning, which is good, but the progress was sometimes very slow, and I was not able to foresee my work making a direct impact on society. After that, I started utilizing excellent resources at UMass, especially the office of professional development and chemistry department alumni for everything ranging from resume writing to making professional connections to preparing for industry job interviews. With all that help, and the problem-solving skills developed during my graduate studies, I was able to get an offer from Intel when they visited UMass during campus recruitments. Although I work on semiconductor research at Intel, the problem-solving skills developed at UMass prepared me to thrive in any kind of industry.”*



**Xuni Li**, PhD 2018 (Thompson group), Company: Sanofi

*After graduating from UMass Amherst, I joined UMass Medical Chan School as a staff scientist in the core facility. Later, I joined the R&D department at Sanofi as a scientist, where my main role has been to characterize proteins, which aligned well with my area of expertise in graduate school. The Chemistry Department at UMass Amherst provided opportunities and classes for students to explore both academic and industry environments, such as teaching assistant positions in chemistry laboratories and a drug design class that included a trip to a pharmaceutical company. The career services and networking events offered were extremely helpful in connecting students with industry and academic professionals. Additionally, the department provided financial support and encouraged graduate students to attend conferences in their areas of expertise to help develop their communication and critical thinking skills.*



**David Luther**, PhD 2022 (Rotello group), Company: Regeneron Pharmaceuticals, Inc.

*I decided to go into industry because I liked the idea of joining a large, experienced team advancing science in an established industrial setting. At UMass I loved being on the cutting edge of research and solving new problems every day, but the immediate financial stability and structure of working*



for a company felt like it fit my long-term goals. Classes from the Office of Professional Development with Shana Passonno at UMass made me feel confident there were non-academic routes for a Chemistry PhD, and I'd highly recommend these to any graduate student considering a career in industry!



**Mahalia Serrano**, PhD 2018 (Vachet group), Company: Bristol Myers Squibb

As a grad student in the Chemistry department, and especially as a CBI fellow, I was exposed to different research fields (both through research collaborations, seminars, and journal clubs), and we were encouraged to gain experience in a wide variety of analytical techniques and instruments. I really appreciate that this is something that they impress upon the students because having a diversified set of skills helps me a ton in my current career. Towards the last year of my PhD in UMass, I was chosen for an industry co-op internship at Sanofi, and this experience definitely helped cement my decision to pursue a career in the pharmaceutical industry afterwards. For me, choosing to be in industry came from the realization that this is where my skills belong. This is where I can use those skills to help bring translational science and medicine to patients who need it. It's a rewarding feeling to know that I contribute in that.



**Kristen Sikora**, PhD 2020 (Vachet group), Company: The Coca-Cola Company

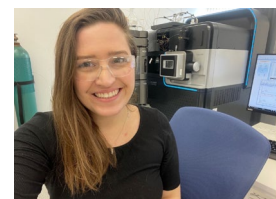
My decision to go into industry was based on my desire to use my scientific knowledge to improve services, methods, or products in concrete and visible ways, on a daily basis. While attending UMass, I was given many opportunities (thanks to my advisor, the CBI program, and OPD) to network and connect with industry experts via conferences, research collaborations, and various networking events that were held on campus (e.g. ResearchFest, the Drug Discovery course for CBI, non-academic panels held by OPD). Through many conversations, they helped me reexamine the impact I could have in industrial settings. Additionally, candidacy projects like the ORP encouraged me to explore my interests outside of the work I was pursuing in my research role, which ultimately sparked my interest in the food & beverage industry. The frequent exposure to industry contacts as well as the capacity to explore research interests beyond the scope of my dissertation were what led me to decide on this path.



**Ishan Soni**, PhD 2022 (Hardy group), Company: Leveragen, Inc.

As a PhD student in the Hardy lab, I had various opportunities, including two industrial collaborations, to enhance my scientific as well as teamwork skills. Moreover, as a CBI trainee at UMass, I got exposed to current cutting edge technologies and research being conducted

in pharma/biotech. Overall, my journey at UMass has helped me a lot to transit from academia into industry



**Catherine Tremblay**, PhD 2021 (Vachet group), Company: Waters Corporation

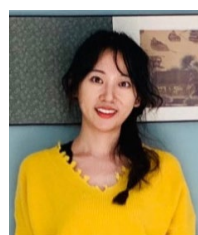
I may be a unique case, but I knew before I even started grad school that I wanted to work in industry once I graduated. I had the privilege of interning during my undergrad and learned that the types of jobs I wanted were ones that needed a PhD. UMass was hugely supportive in this goal, providing endless opportunities for networking with industry professionals, numerous professional development resources through OPD, and an abundance of incredible scientists to learn from, both faculty and students. Most valuable to my decision to go to industry was the number of instances I was given to talk to post graduates about what their jobs in industry were like. These conversations allowed me to be very picky about what job I was looking for that would play to my strengths best!



**Peidong Wu**, PhD 2022 (Thayumanavan group), Company: Eli Lilly and Company

There are a couple of reasons that made me decide to go to the industry: 1) I still enjoy exploring new science and doing research where joining the pharma industry could provide me with great resources (funding, facilities, etc.) to pursue innovative projects; 2) the projects in the pharmaceutical industry have great translational potential that excites me a lot. It is great to witness the progression of medicine from its infancy to the market and help patients; 3) I also enjoy working as a team. There is a lot of collaboration working in an industrial environment, which is also a great opportunity to learn from experts with different scientific backgrounds.

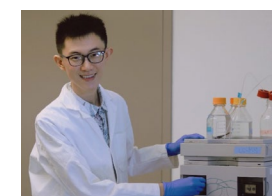
My experience at UMass helped me a lot in making this decision: 1) my research projects in Professor Thai's group was focused on the targeted delivery of therapeutics, which has great potential in translation; 2) the collaborative environment at UMass provided me with opportunities to work with people not only from my group and chemistry department but also people from other departments in UMass and other universities, which broadened my field of vision and made me a great team player; 3) the support from the department and my group for an industrial internship also give me the opportunity to really experience life as a scientist in industry.



**Ruiling Wu**, PhD 2023 (Thayumanavan group), Company: Generate Biomedicines

I went into industry because I really enjoy teamwork. In industry, there is much collaboration across multiple functional areas and disciplines. Also, industry career

opportunities are broader. Working in industry gives people the opportunity to see what other people are doing in the organization, and it allow them to move around so they can figure out what they want to do and achieve. UMass really helped me a lot in my career path. The Chemistry department regularly invites industry speakers to give seminars, which helps us have a better connection with people who work in industry and learn a lot from them. In addition, the Graduate School Office of Professional Development (OPD) offered an eight-week business foundations series every year. It improved my ability in leadership, team management, and communication. These skills are highly valued by employers in industry.



**Yang Yang**, PhD 2021 (Kaltashov group), Company: Biogen

I went into industry because I believe that we have the ability to positively impact people's lives through our research. If we can create something that can benefit the community or even the world, then that is something truly priceless. My time at UMass helped me achieve my goal. The university has a renowned Chemistry department that enjoys an international reputation, making it one of the most prestigious universities in the world. UMass offers various research opportunities, such as seminars and grants, which have allowed me to expand my knowledge and experience in the field. Furthermore, UMass provides comprehensive training on various instruments, which has helped me develop good habits, such as experiment design, instrument use, and software operation, which are invaluable in industry. With UMass's state-of-the-art equipment, I was able to adapt quickly to industry standards, making the transition from academia to industry a smooth one.



**Bo Zhao**, PhD 2019 (Thayumanavan and Vachet groups), Company: Regeneron Pharmaceuticals, Inc.

My passion for improving human health and treating diseases has always driven me to seek practical contributions to the field. Through my PhD training at UMass, I developed strong technical expertise in protein mass spectrometry and physical organic chemistry, making me well-suited for a scientist position in the pharmaceutical/biotechnology industry. Alongside these technical skills, I have also honed important soft skills such as critical thinking, problem-solving, and project management. I recognize that both technical and soft skills are highly valued in industry and can help me navigate complex challenges and contribute to the success of my career.



**Hanwei Zhao**, PhD 2020 (Kaltashov group), Company: Takeda

When I was young, I always dreamed about being a scientist operating instruments while wearing a white lab coat. My dream came true when I joined Prof. Kaltashov's group. To make it even better, Prof. Kaltashov's group has extensive collaboration with biopharmaceutical companies. I was fortunate to participate in one of these collaboration projects during my last years as a PhD student, and I got a chance to know how industry runs projects. With this collaboration experience, I had a smooth transition from an academic to an industrial setting. Thanks to Prof. Kaltashov, not only did my dream become true, but it also helped me to become what I am now.

**Please keep in touch!** Update your mentor and consider submitting an article for the alumni section. We'd love to hear from you! [ggazette@umass.edu](mailto:ggazette@umass.edu)

## In Memoriam



**Juanita "Nita" (Ford) Bradspies** '59 passed away last May. She graduated from UMass with a BS in chemistry in 1959. Juanita was a longtime, generous contributor to the department and in supporting undergraduate research in chemistry. For years, her funding of the JFB Fund for Undergraduate

Research enabled dozens of talented chemistry students to do summer research. She was an involved, caring steward who contributed to UMass and Chemistry for over 60 years. Juanita had a long career as a chemist for the Polaroid Company, and enjoyed cooking, music and gardening. She was generous to the department, even in her passing—requesting donations be made in her name to UMass Chemistry in lieu of flowers.

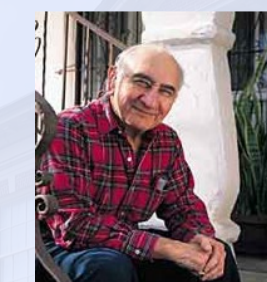


Photo: UMass Magazine

**George Epstein** '48, our featured alum in our summer 2022 newsletter, passed away last year at the age of 95. His article highlighted his remarkable life—he credited UMass Chemistry for the education and experience that led “to all the wonderful things along the way.” George served

in the navy during World War II and went on to have a long, productive, career in the aerospace and defense industry. He made poker “his second career” after his retirement. Aptly given the non de plume of the “The Engineer,” George published three books about poker, taught strategy to veterans and college students alike, organized tournaments, and is enshrined in the Senior Poker Hall of Fame. He remained involved with many community causes until his death.



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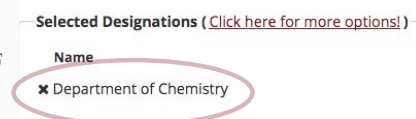
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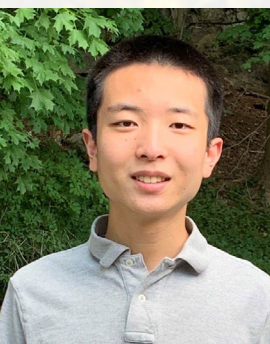
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"Being a recipient of the John A. Chandler Memorial Scholarship allowed me to further my research in environmental chemistry. Those experiences led to my role as an independent school chemistry teacher guiding high school students in their pursuits of science."

Hanwen Alex Chen BS '23



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