

Department of Chemistry

# Chemistry Newsletter

Winter 2023



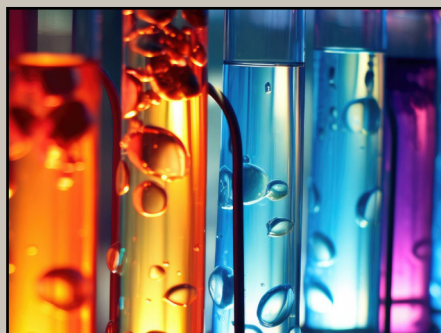
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**On the cover:** Backlit beakers



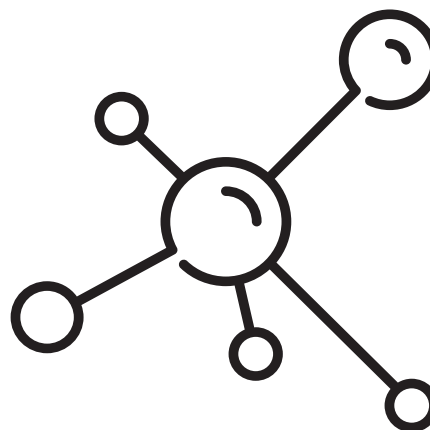
containing colorful chemical reactions.

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# A MESSAGE: From The Department Head



Welcome to our new tenure-track faculty members: Prof. **Alison Bain** and Prof. **Thomas Osborn Popp**, and our new fixed-term faculty members (instructors) Dr. **Jie Zhang**, Dr. **John Terhorst**, and Dr. **Shrikant Londhe**! Yes we have five new faculty members who joined the department in Fall 23! The excitement of fresh ideas and the new and renewed energies are palpable.

In Fall 2023, the second floor of the Linus Pauling Science Center will be busier than ever, with both Professor Bain and Professor Osborn Popp taking residence. Dr. Bain brings her specialty in aerosols related to atmospheric chemistry to OSU, and Prof. Osborn Popp brings solid state NMR for material researches. They each fill in a void in our current program, and together they make us stronger and better.

Gilbert Hall will also be bustling with new energies and aspirations. With the retirements of Dr. **Christine Pastorek** and Dr. **Neal Sleszynski**, we have recruited Dr. Jie Zhang to take charge of the upper level integrated labs, and Dr. Shrikant Londhe to renew the organic component of these labs. Dr. John Terhorst will be joining us from California, helping with the online teaching enterprise of the department. With these new additions, and with the return of Professor **Paul Blakemore** from the National Science

Foundation, our head count will rise to 18 for tenured and tenure-track faculty members, 13 for instructors in Corvallis, and 3 for Cascades, with a total head count of 34. Together we teach about 200 chemistry majors, several thousand undergraduate students, and about 100 graduate students, in almost all major subjects of chemistry: analytical, inorganic, organic, and physical.

The success of recruiting requires an extensive amount of work, particularly from members and chairs of the search committees: with the support of the whole department, including both undergraduate and graduate students, faculty members present and emeritus, and staff, and with the strong support from the dean's office, search advocates, the former acting dean **Vrushali Bokil**, and most recently, COS Dean **Eleanor Feingold**, we have defied the odds and demonstrated the power of unity.

The legacy of Dr. Christine Pastorek in our integrated lab classes is honored by the fundraising activity from the OSU Foundation led by emeritus Professors **Joe Nibler** and **Mike Lerner**. The baton is being passed on to Jie Zhang and Shrikant Londhe. Together the two new instructors will continue the tradition of excellence exemplified by Dr. Pastorek, and they will also be working with other faculty members to update and upgrade these labs. Thanks to the generous and continued donation of our esteemed alumnus Professor Emeritus Thomas Webb, we have finished the final upgrade of all computers and instruments in the integrated labs.

As the primary instructor for CH324, Dr. Neal Sleszynski has also taught and co-taught integrated labs, general chemistry, and graduate level classes. Neal brought his previous teaching and industrial experience to OSU, and will continue his presence in Gilbert Hall in the near future: he is hiring a few undergraduate students for research related to his consultation responsibility with PureLine (<https://www.pureline.com/>).

We have had a successful year with awards at different levels, in recognition of our research and teaching accomplishments. The department has nominated 15 colleagues for awards at the university level. At the college level, the department has received 6 of the 15 total awards, including:

- F.A. Gilfillan Award for Distinguished Scholarship in Science (**Wei Kong**)
- Milton Harris Award in Basic Research in Science (**David Ji**)
- Gender Equity in Leadership Fund (**Marilyn Mackiewicz** and **Paula Weiss**)
- Industry Partnership Award (**Kyriakos Stylianou**)
- Loyd F. Carter Award for Outstanding and Inspirational Teaching in Science (Marilyn Mackiewicz – graduate, **Paul Ha-Yeon Cheong** – undergraduate)

The college has also selected the three endowed professor scholar positions within the department:

- Patricia Valian Reser Faculty Scholar (**Chong Fang**)
- Bert and Emelyn Christensen Professor (David Ji)
- Terence Bradshaw Chemistry Professor (**May Nyman**)

Thanks to our generous donors, these positions serve as a great recognition to our outstanding faculty members.

In a report to the Dean's office, I stated that a major challenge facing the department is the facility situation. Gilbert Hall is past its useful lifetime as a laboratory facility with inadequate electrical supply and frequent power outages, and without adequate environmental control including temperature, air quality, and water supply. At the university level, a new building named the Jen-Hsun and Lori Huang Collaborative Innovation Complex (CIC) is due to open in 2025. The building will house a state-of-the-art cleanroom to advance discovery and learning to support the semiconductor industry, and it will house a series of characterization tools including the x-ray facility. A few faculty members currently housed in Gilbert Hall may acquire some spaces in the new building, which would be a welcoming change.

The College of Science has officially launched its strategic plan, involving 4 goals and 16 action items. These goals and actions align with the long range plan developed under the leadership of our previous head, Professor Michael Lerner – thank you Mike for another long lasting contribution to the department. In alignment with the college's strategic plan and the new CIC building, we anticipate more hires in the near future. An exciting time is indeed coming for the department!

# THE WEIRD AND WONDERFUL THINGS: that metals can make carbon do!

By: **Addison Desnoyer**

The central theme of the Desnoyer group, referred to as the AND Lab, is to develop renewable and efficient routes to industrially relevant transformations through the study of the fundamental reactivity of organometallic compounds. The Desnoyer groups' work sits on the traditional border between the fields of organic and inorganic chemistry. Addison has always been fascinated by the weird and wonderful things that metals can make carbon do!

The Desnoyer Group are trying to develop new reactions that make useful and/or interesting organic molecules using first-row transition metals as catalysts. Part of the reason they focus on first-row metals is because they are the most abundant (and thus inexpensive!) and non-toxic of the transition metals. They hope to develop new catalysts that will replace the noble metals that are currently used in industry. Of course, the reason they still use noble metals today is because they are very good at what they do! First-

row metals have historically been less studied than noble metals because they tend to react in less controlled ways. One of the big goals in the AND Lab is to really understand what factors dictate why these metals react the way they do. Like a lot of organometallic chemists, we also draw inspiration from Nature. While industry might not make much use of first-row metals, biology certainly does. There are many examples of natural catalysts, also called enzymes, that use iron or manganese in their active sites, and even a handful of less common first-row metals like zinc, nickel and vanadium. The AND Lab also tries to take structural or reaction motifs that we see in enzymes and apply them to our synthetic catalysts.

Students in the AND Lab make a lot of different molecules, some as ligands, substrates, catalyst precursors, or products of catalysis. Purification is a big part of everyday life in the group: students use techniques like recrystallization, distillation, and chromatography to

separate out our target(s) of interest from all the other things in their reaction mixtures. Characterization is also a fundamental skill students quickly acquire in Addison's group. They need to know what they've made once it's been separated from all the other things in the reaction mixture! We normally use Nuclear Magnetic Resonance (NMR) spectroscopy, X-ray diffraction (XRD), or mass spectrometry for structural elucidation. Fortunately for us, OSU has excellent facilities for all these methods in-house.

In particular, an ongoing project Addison is particularly excited about is that they are developing processes to prepare partially fluorinated small molecules via the defluorination of perfluorinated precursors. These partially fluorinated species are often highly attractive candidates in both the pharmaceutical and agrochemical industries. Thus, their new synthetic protocols will lead to significant impacts in the area of improving human health, enabling the preparation of new drugs and agricultural tools. Moreover, they expect this work to eventually extend to new methods for the complete defluorination of perfluoroalkyl substances (PFAS), a class of so-called "forever chemicals" that have been shown to be harmful due to their buildup in environmental reservoirs. This long-term application will be especially significant to OSU's research mission as it will help to mitigate an anthropogenic contamination of our environment. Importantly, the populations most directly affected by the buildup of PFAS in the environment tend to be disproportionately of low socioeconomic status.



# GILBERT HALL: Gets it's own ADA ramp!

By **Rusty Root**

The ADA ramp to the first floor of Gilbert Hall is open for use. There are a few minor issues the contractor is working on such as the handrail on the metal ramp, install missing screws, sealing some cut boards, and a metal transition plates at the top and bottom transitions.

Chemistry Facilities and Operations Manager, Rusty Root commented, "I think the ramp looks good and that the GBC Contractor crew did a great job of designing and building the access ramp."

The ramp which provides entrance to the 1st floor is located on the east side of Gilbert Hall, in the courtyard between Gilbert Addition and Rogers Hall.

To continue improving on the ADA access to Gilbert Hall, there are plans for power door openers on the exterior doors and hallway doors into the stairwell. Also, for the 2nd and 3rd floor skybridge doors, they will be installing magnetic latches to keep those doors open constantly. For safety, these will be tied into the fire alarm system, in which case the doors will automatically close.



## NEW FACES: Dr. Jie Zhang



Dr. **Jie Zhang** is a new instructor who will be teaching the CH 46X integrated lab series as well as the ECampus physical chemistry course. Dr. Zhang is very excited to be able to work with students one-on-one in the labs and to be challenged and amazed by students' creative ideas about their projects.

Dr. Zhang grew up in Beijing China; where her close family still resides. She moved to the United States to go to graduate school where she got a Ph.D. in chemistry. She said that throughout her graduate degree she truly enjoyed working and studying in the department, which made her want to stay. One of the best parts was as a new student she felt very welcomed, and it is a goal of hers to make the department as welcoming as it can be to all incoming students.

When not in the lab or busy with her family, which consists of her husband and two young boys; Dr. Zhang can be found growing peonies or reading a good science fiction or mystery novel. You may be surprised to know that Dr. Jie Zhang is an amateur balloon animal artist and is an exceptional whistler.

If Dr. Zhang could have any super power it would be to have the same abilities as Laplace's demon. Then they would know the precise location and momentum of every atom in the universe, and their past and future values for any given time are entailed; everything can be calculated from the laws of classical mechanics.

Want to keep up with everything happening in the department? Check out our **social media!**





# IUCCP: Industry-University Collaborative Conference Program

By **Brayden Tuers**

While the Oregon State Chemistry Department excels in much of what it does, like many other STEM departments here, networking and industry outreach have struggled to stand out. While this sector has certainly seen appreciable investments from faculty and staff, historically, the department has lacked any sort of large-scale coordinated event where these efforts can culminate to something momentous for the students. This year, however, the department smashed this unwelcomed continuity with an industry-integrated conference designed specifically to reinforce these career elements and embolden them with the light of unified action.

The Industry-University Collaborative Conference Program (IUCCP) kicked off the first week of spring term in the chemistry department, offering a novel experience for the students and faculty alike—with much anticipation. Since last year, undergrad **Citlali Nieves** and Prof. **Marilyn Mackiewicz** have been garnering support and excitement for the event, branding it as the department's first major industry outreach and networking event.

As the brainchild of these two spirited chemists and departmental Equity Justice & Inclusion (EJI) committee members, this event spent many painstaking months in the works. Mackiewicz explained that she was first inspired by the Portland ACS chapter's similar networking event, which reinvigorated her desire to promote career-focused programs in her home department. This sentiment was solidified when Mackiewicz attended a 3-day networking event

at her alma mater, Texas A&M, and was galvanized by the level of detail, coordination, and community spirit. After returning from this event, Mackiewicz conferred with her close friend and undergraduate associate Citlali Nieves, who immediately reciprocated these desires. In fact, Nieves had already been poised to host a research poster session for the department, and upon discussing this with Mackiewicz, the pair's dreams fused into one greater whole.

"I said, 'if we're gonna do something like this, let's make it bigger,'" Mackiewicz recounted. Likewise, Nieves shares a similar memory.

"When I pitched it to Dr. Mackiewicz, she told me to go bigger or dream bigger," Nieves said. "That is how this event turned into a whole day event..."

With this alignment of interests, Nieves and Mackiewicz got straight to work growing this seed of a dream into a headlining event for the department. The pair's first hurdle was drafting the plan and securing approval across the department. Fortunately, Nieves' dedication to this project spoke for itself.

"I thought this was an amazing idea and was so impressed with Citlali's organization and planning for the concept," Prof. **Rich Carter**, a department faculty member and key host of the event, said. "This event was designed from the beginning for the students and about the students."

It seems like, in large part, this event was also designed by the students, a fact which makes it all the more impressive. While she may only be an undergraduate student, Nieves clearly possesses a level of determination and self-efficacy


akin to that of seasoned leader in academia.

**Ben Clark**, the senior VP of Engineering at Inpria, clocked this upon his first encounter with Citlali—something which he said earned his immediate commitment to the effort.

"It was refreshing to see that level of clarity and conciseness, especially from someone so early in their career," Clark said. "The skills and attributes Citlali brought to this event, namely organizational, communication, and confidence, are exactly what we look for in our industry, so reinforcing and encouraging that where possible is a priority for me."

After securing Inpria as a major sponsor for the event and a future commitment from Intel, Nieves and Mackiewicz had now procured the industry support they needed to make this a thoroughly integrated event. With this sponsorship, the pair was able to include a networking lunch and résumé-building workshop where students of the department could mingle with and receive feedback from real representatives of industry. Being that career preparation was a major objective of this project, incorporating networking events was a first step in the duo's greater goal of permanently bridging the gap between academia and industry for OSU chemistry students.

Alongside this partnership with industry, the conference also capitalized on the importance of alumni associations. Coming from Texas A&M, Mackiewicz shared that her alma mater's colossal alumni network presented ample opportunities across the industry, and she wanted Oregon State students to share this same privilege. As such, the conference had



numerous chemistry department alumni in attendance, perhaps most notably, sponsor Inpria's Ben Clark. Midway through the day, the conference hosted an alumni panel where past OSU students shared their career stories and personal advice, something which graduate students like **Alyssa Johnson** found to be immensely helpful.

"The biggest impact for me was actually the alumni panel and hearing where these past students are at now and how different or similar their work is compared to what they were doing at OSU," Johnson said. Likewise, Johnson also appreciated the emphasis on networking.

"The networking component also was super beneficial; we had something in common [by both attending OSU] so it didn't feel as intimidating to talk," Johnson added.

Another career component which the organizers wanted to promote were so-called soft skills, i.e. social proficiency in professional contexts. Mackiewicz shared that she feels these skills are the most integral aspect of any student's transition into the workforce as they enable them to maximize the productivity of their social functions. Specifically, Mackiewicz wanted students to see what negotiation looks like in a technical workspace, and how it can be optimized with effective communication. During the conference, students participated in a "b "negotiation workshop" where they reviewed various social scenarios and simulated realistic experiences in the workplace.

"We want OSU Chemistry graduates to be able to excel at their chosen career and the real-world skills that this conference provided them - both in professional development and in knowledge of how the world works - will be essential to that," Carter said.

While industry and

professional skills were central themes of the conference, Nieves and Mackiewicz recognized that the event wouldn't be complete without also highlighting students' research in a meaningful way. After all, a STEM department is nothing without the academic and symbolic contributions of research.

To do this, Nieves and Mackiewicz included two research presentation activities: individual grad student slideshows and a two-hour departmental poster session which concluded with a 'mix-and-mingle'. Here, all the guests in attendance were free to chat, network, and reflect with each other about the event. By the end of the day, students hadn't only acquired memorable experience in the workings of academia and industry, but also in the social interplay of these two realms.

The conclusion of the event reflected unanimous excitement and social harmony across the department, and from speaking with numerous guests in attendance, the general sentiment seemed to align with these ideals.

"From my perspective, the event was a total success. The students were engaged, the workshops were well run, and participation was high throughout the day. I would definitely support this event in the future," Clark said.

For Nieves, the event's success meant finally satisfying an intrinsic drive to assist the community of her home department.

"I think for me, [my goal] was seeing at least one person leaving with something, whether that was a workshop, learning new skills, or a new contact for a future job, or simply feeling happy and proud that they presented their research to other people in the department," she said.

The future of this event is still in the shop, however, with continued

support from the individuals and sponsors who made it happen the first time around, the organizers are optimistic that it will burgeon into something much grander—perhaps becoming a vital tradition for the department. To guarantee this vision, Mackiewicz and Nieves have a plan.

"We've got a five year plan and we're going to make a new five year plan every year," Mackiewicz said. "[Every year] we're going to build a new element, and we're going to expand a program and we're going to report on it."

Whether or not this happens ultimately falls in the hands of Gilbert Hall, but with vigorous spirits like those of Mackiewicz and Nieves, the prospects are certainly looking up. In the meantime, Distinguished Professor and emeritus faculty member **Doug Keszler** shared some words of encouragement.

"Keep up the great work and continue to broaden engagement around intent to launch new opportunities among students, faculty, alumni, and companies," Keszler said.

Mackiewicz wanted to send a very special thank you to **Omar Farah, Marisol Trejo, Eliseo Quiroz, Dr. Rich Carter, Ryan Mackiewicz, Allyssa Schroder, Sophie Fischer, Sihang Huo, Emmanuel Musa, Andrew Clifford, Caren Tome, Anshika Nagar, and Gemma Kmetz-Gonzalez** for helping to coordinate all the activities at IUCCP. She also wanted to thank all the wonderful alumni's and emeritus faculty who served as career panelists and judges for the oral and poster presentations (**Juan Carlos Ramos, Johanna Schwartz, Matthew Cranswick, Scott Mokler, Pooya Tadayon, Doug Keszler and Caroll DeKock**). Most of all our wonderful sponsors, Intel, VallisCor, Inpria and the Corvallis Section of the American Chemical Society.

# MAY NYMAN

## Wins Prestigious ACS Award

By Brayden Tuers

For over 10 years, Dr. **May Nyman** has called the Oregon State Chemistry Department her home base, working as both an instructional faculty member and a fundamental chemistry researcher with a particular focus in materials chemistry. Over this tenure, Nyman has distinguished herself as a chemist of high caliber, securing momentous grants and leading cutting-edge research projects in her field. While her footprint in the department may point towards the grails of academia, Nyman's impression on the field extends long before her time at the University.

A practicing chemist since 1997, Nyman received her Master of Science from Virginia Polytechnic Institute and State University in 1992, and her Ph.D. from the University of New Mexico five years later. Nyman began her career working at Sandia National Laboratories, and while her primary role was developing ion exchangers and radionuclide waste form materials in the management of nuclear waste, she had always found herself particularly magnetized to the scientific footings of her work.

"At Sandia, I did as much fundamental science as I could get away with," Nyman said. "I was always, always interested in fundamental chemistry. And so in 2011, I just decided it was time to try academia."

Before leaving Sandia, Nyman received an Employee Recognition Award for Technical Excellence in 2010, and was promoted to Distinguished Member of the Technical Staff in 2012. While it may not have been her ultimate enterprise, clearly her work at Sandia was no mere trial. After a surprise discovery of an unknown metal-oxo cluster during her work with waste filtration, Nyman decided it was time to move towards a more

exploratory placement.

"Oregon State University was the best choice because they had, at the time, a center for sustainable materials chemistry, and it was exactly aligned with my interests [and] what I wanted to do with my career," Nyman said.

After moving to Oregon state, Nyman's fascination with metal-oxo clusters greatly expanded in scope and possibility, as she had finally parted ways with her previous job's industrial constraints.

"One of the challenges working in a national lab is being aligned with the mission...I always struggled to find that mission alignment. And the other challenge is overhead and huge operating costs. [At Sandia] I could support myself and, you know, maybe a postdoc, but not students. Now I work with a team of 10 students and postdocs, and so we can do a vast amount of chemistry," Nyman said.

Nyman also expressed that she has discovered immense personal fulfillment from teaching students and mentoring her post-grads, something which she never envisioned at her previous job.

"I had a great life at Sandia, and, and I'm very grateful for that, but just in terms of a scientist, and also an educator and mentor, I've had the opportunity to do far more [at Oregon State]—I mean, things I've never thought I would do," Nyman said.

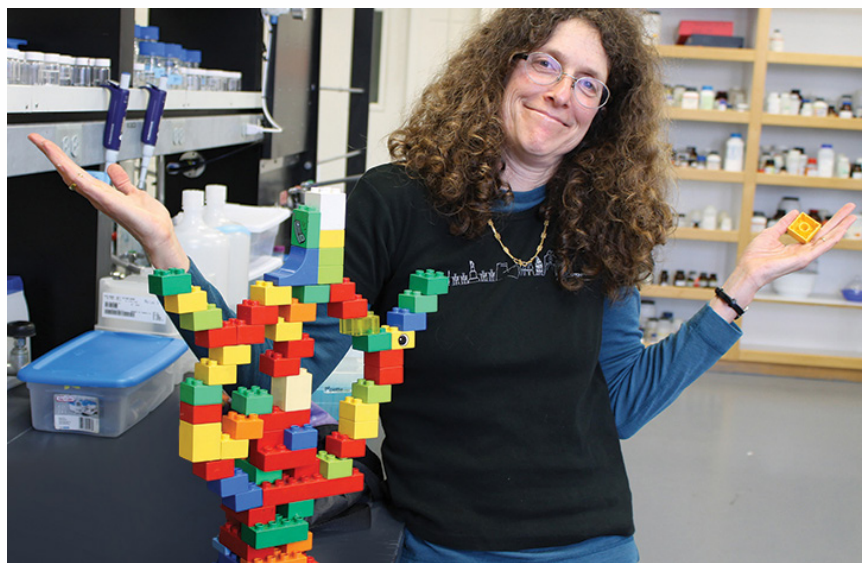
As an inborn introvert, Nyman explains that instructing wasn't always the most appealing undertaking. However, while it may challenge her on the daily, she has found that the benefits greatly outweigh the discomfort of interfacing.

"I still dread the personal interactions, but you know, when it goes well, it's a great feeling. The feeling of accomplishment—just connecting, connecting with the students. That's pretty awesome," said Nyman.

Now that she has the privilege of working with those in the adolescence of their research careers, Nyman feels that she has been able to satisfy a natural obligation to the field.

"As a person with experience, it's not only my job, it is kind of my role in life at this point to be a mentor, and share my experiences and give advice, and hopefully, inspire people in different ways," Nyman said.

As of right now, Nyman has four different funded projects going on in her lab, one of which is funded by the National Nuclear





Security Administration. Under this funding, Nyman's team studies fundamental actinide chemistry with the ultimate goal of training future scientists and workforce how to responsibly handle radioactive materials and mitigate contamination of the environment. Impressively, Nyman's undergraduate students from this program have both gone on to study actinide chemistry with prestigious universities, one at Berkeley and the other at Notre Dame. Another project in the lab which especially excites Nyman is the study of metal-oxo clusters in the process of metal recycling. Here, these clusters can function as a selective, self-sorting medium for the extraction of metals from waste solutions. In application, this research presents a potentially novel system of metal reprocessing with high precision and efficiency, ultimately suiting a broader goal of reducing the humanitarian impacts of metal mining. Nyman explains that most precious metals are mined in politically unstable regions with little regard for ecological consequences, so by reducing the need for additional resource extraction, these models could alleviate some of the global ramifications.

In recognition of this outstanding work, Nyman was awarded the F. Albert Cotton Award in Synthetic Inorganic Chemistry by the American Chemical Society

earlier this year. Most notably, this award is granted with an emphasis on creativity and imagination in research—something which Nyman certainly has no shortage of.

Reflecting on the personal effect of this award, Nyman shared that it has been a heartening addition to a rather difficult past few years managing the scourges of Covid. Furthermore, the news of this award came only a day after Nyman had received some harsh criticism on two papers she submitted for review.

"So yeah, it's been challenging. In dealing with these challenges and getting this award, you know, [it was] certainly a little bright spot," Nyman said.

Moving forward with this uplifting boon, Nyman still has plenty more work to do in the lab. With four ongoing projects, instructional courses, and a team of eager research students, respite is hard to come by for this workaholic. Despite receiving a career-defining honor, one thing is certain: this award is not the acme of Nyman's career.

"[My focus right now is] just getting my lab back on their proverbial feet, following the pandemic, and just trying to keep everybody going and working hard and motivated. Just a lot of day-to-day hard work right now," Nyman said.

## UNDERGRADUATES OF THE QUARTER

### Spring 2023



**Nicholas Pogue** grew up in Beaverton, OR, and attended Sunset High School. He has always liked science and knew he wanted to go into the field. Of all the different sciences, chemistry was Nicholas' favorite, and the most interesting to him because of all the real-world applications. Everything in life can be traced back to chemistry!

After living in Oregon his whole life and knowing family members who attended, Nicholas knew he wanted to go to OSU. He says that it's a great college, with amazing faculty, fantastic science programs, and a beautiful campus. After graduation, Nicholas plans to get his Master's in Education and jump right into student teaching to begin his career as a high school teacher.

Outside of school, Nicholas enjoys spending time with friends and family, playing video games, reading, tennis, and watching movies. Some of his favorite movies include the Cars trilogy, Star Wars, Comic book movies, and the Fast and Furious franchise. Nicholas' favorite book is Triple Zero by Karen Traviss (part of the Star Wars Republic Commando series), and his favorite food is cereal—namely Wheaties and Reese's Puffs. He is very grateful to have been nominated and selected for Undergraduate of the Quarter.

**Casey Rummelhart** grew up in Lake Stevens, Washington. He was drawn to chemistry after taking AP Chemistry at Lake Stevens High School, and initially wanted to become a high school chemistry teacher. Casey chose OSU because he wanted to go out of state but still remain close to home. He has enjoyed working as a general chemistry lab and lecture TA, and helping students in his job at the Mole Hole. Casey graduated in June 23, after only three years, and was accepted into our PhD program where he will begin in the fall. This summer, he joined the **Desnoyer** group conducting research in organic chemistry. Outside of school and work, Casey likes partying, playing Pokémon, and enjoying his favorite food, pho.



# UNDERGRADUATE STUDENT SPOTLIGHT:

## Mitchell Kenny



Mitchell Kenny said he felt this photo was an accurate representation of a 3rd year undergraduate with an Advanced Chemistry option. Keep up the hard work Mitchell!

By Brayden Tuers

For most undergraduate science students, research is the holy grail of experiential learning. These opportunities mark a student's first chance to practically apply their scientific literacy and sow the seeds of their curiosity—oftentimes vindicating all the sweat and tears of a STEM degree. Specifically for undergrad students yearning to attend graduate school, research experience is essential to an applicant's curriculum vitae. Fortunately for

sophomore **Mitchell Kenny**, checking all these boxes won't be an issue.

In March of 2023, Kenny was accepted into a prestigious research program in Germany through the Research Internships in Science and Engineering (RISE) program. In this program, students across the globe are matched with an international host university or research institute which corresponds with their interests. For Kenny, this meant inorganic chemistry—more specifically, 'MOFs'.

"[In Germany] We're going to be investigating MOFs, metal-organic frameworks, and we're going to use them for cooling applications," Kenny said. "The main point is to try and find an alternative to air conditioning, because air conditioning is very important nowadays, we're only getting warmer, and they use a lot of electricity...So that's kind of a problem."

Impressively, this opportunity won't be the first time that Kenny has worked with MOFs. During his Freshman year at Oregon State, Kenny studied MOFs in Prof. **Kyriakos Stylianou's** lab as a part of the Undergraduate Research in Science and Arts (URSA) program. Here, he discovered a fervor for the subject, especially with regards to its exciting prospects for the future of sustainable energy.

"[In Stylianou's Lab] I was making progress towards the knowledge of humanity, which is great," Kenny said.

As for the program's application process, Kenny expressed that it certainly wasn't a breezy task. After submitting all his credentials and writing a few essays, he needed a stellar letter of recommendation from a past mentor. Fortunately for him, Kenny had just the person to turn to: Prof. **Paul "Ha-Yeon" Cheong**.

"I have heard from a lot of different professors that one of the best things you can do for yourself is simply go abroad," Kenny said. "So, I talked to Paul and I just got really inspired, like, 'Wow, I could really do anything'"

After talking to Paul, Mitchell browsed his options

for studying abroad, and while he wasn't entirely resolved on going international, he did feel that it might be good preparation if he ever wanted to attend graduate school in another country. After preparing his application, Kenny asked Paul to write his letter of recommendation, to which Paul was much obliged.

Kenny's relationship with Paul first blossomed after he took Paul's classes his freshman year, and being the inviting and eager character that he is, began conferring with his instructor whenever he got the chance. After some time, Kenny expressed that he came to view Paul as a close friend and mentor.

"Whenever I'm like, 'Well, I don't know what I'm doing', I go talk to Paul," Kenny said. "Faculty like Paul, they're very, very good."

According to Kenny, the letter which Paul wrote must have been some work of art, because on a random early morning in March, Kenny received his acceptance letter from the German Academic Exchange Office (DAAD), in conjunction with a hearty scholarship. A few hours later, Kenny received another letter from the American Chemical Society (ACS) presenting him with an even grander scholarship and a trip to Washington, D.C. for the program's orientation. The ACS also invited Kenny to attend their symposium in New Orleans the following spring to present his research. Clearly, these organizations sensed something special in this OSU undergrad.

While Paul was the linchpin of this mission, another faculty mentor whom Kenny feels deserves his acknowledgement is **Marilyn Mackiewicz**, as he feels she imbued him with an assertive spirit during her Careers in Chemistry course.

"[During this class, Dr. Mackiewicz] was saying something along the lines of 'Even if you think there's like an improbable chance of getting something, you should just always ask for something, because maybe you'll get it,'" Kenny recounted. In response to this, Kenny promptly asked for Dr. Mackiewicz's fountain pen, which he successfully received. According to Kenny, this witty experience left him with a newfound reverence for the power of asking for things, regardless of how unlikely a favorable outcome is.

"Maybe you should ask for improbable German internships, and you might just get them," Kenny said. While Kenny expressed that he is ecstatic about many aspects of this prestigious opportunity, from culture shock to European transit systems to ornate fountain pen shops, he is most excited to do what he has always loved the most: learn.

"That feeling of having to just figure things out, go into the unknown, and dig through things that we've already done to try and figure out what to do next—that's what I like," Kenny said. "That's why I want to do this job."

# MAKING BETTER BATTERIES

## The second leading methodology of energy storage

By Brayden Tuers

For the average person, batteries don't mean much more than a phone charge-or on the off chance you encounter an electronic-those pesky metal cylinders which never seem to be the right size. For Prof. **Xiulei "David" Ji** of the chemistry Department, however, batteries mean much more than the power banks of consumer electronics-they behold the future of sustainable energy.

According to Ji, batteries are the second leading methodology of storing energy, while the first is pumped-storage hydroelectricity. While the preeminent form is the cheapest and most efficient, as far as sustainability goes, it presents meager prospects for the future of energy. Ji explains that the pumped-storage method is contingent on terrestrial features where an altitude gradient allows water to flow through turbines, thus it is entirely limited by geography. Furthermore, this method requires large portions of land, which requires the invasion of natural environments. Clearly, an alternative is needed.

"The Mure growth of energy depends pretty much on batteries," Ji said. "So potentially, we can challenge the current industry."

With this opening for creative destruction, Ji has settled into the field of sustainable battery research, using a mix of basic material chemistry in parallel with experimental design to advance the field from its roots. Specifically, Ji's central focus is elucidating the principles of electrochemistry enough to design new mechanisms and configurations which make better, more sustainable batteries.

"This [research] will probably be a pivotal moment," said Ji, commenting on the practical application of his research. "I think hopefully in the history of lithium ion batteries, or in the history of power batteries, that we probably will bend the trajectory upward."

Prof. Ji explains that the essence of a battery's "sustainability" boils down to two things: it has to be cheap, and it has to be made from 'clean' materials.

As it currently stands, most lithium ion batteries also contain cobalt and nickel, and according to Ji, the mining of these metals presents a range of humanitarian and environmental hazards. Additionally, these metals are approaching dire shortages.

"By 2035, we're going to have a shortage of cobalt, and by 2045, we will have a shortage of nickel," Ji said. "So we need to invent a new lithium ion battery that doesn't need cobalt or nickel."

Besides filling openings in the industry, Prof. Ji has personal draws to his research, too. I think my philosophy of doing battery research, and the battery research itself is very unique," Ji explains. "It's not completely curiosity driven, but if you don't do fundamental research, you won't have the understanding to eventually pivot the field. So far, my understanding is a must to advance knowledge and dispute."

Ji explains that his fixation with batteries traces all the way back to 2006 as a PhD student, when he worked to invent a lithium-sulfur battery in a lab funded by Toyota. Since then, Ji has settled deeper into academia, and while he still ventures into industry, the bulk of his work now is spent alongside students in his lab. For Ji, this experience is nostalgic of his years as a student and is something which he has found to be immensely rewarding.

"I think I want to use this opportunity to thank my group, my PhDs students whom I have worked with over the last 11 years. I have graduated 11 of them. This spring and summer, two more, we'll graduate, and hopefully, this year, I'm going to bring on another two students," Ji said.

While Ji is clearly a superb researcher, as illuminated by five consecutive years of being named a "highly-cited researcher" by the Web of Science Group, he doesn't spend all his time in the lab. As an instructional faculty member, Ji also dedicates his time to teaching the fundamentals of his field-something which he feels actually adds to his research, rather than detracting from it.

"It's a good thing to teach and research because these two things are synergistic, and it's a privilege for researchers to teach, and to teach can clarify your basic understandings," Ji said.

"That's the best part of being both a researcher and a mentor is that you get to learn from them." It seems that batteries and teaching are Ji's two favorite things, as he even designed his own Ecampus course which debuted this year. CH 482, Materials Chemistry in Rechargeable Batteries. Over these past five years, Ji has been diligently working to organize the curriculum of this course, pulling from his decades of experience and cutting-edge research to make it as novel and utilitarian as possible. Ji stresses that the major goal of this course is to provide students with a holistic understanding of rechargeable batteries in the contexts of industry, research, and theory.

"By learning this course, students will understand the big picture of energy sectors," Ji said. "I bring some vigorous considerations of chemistry to this very applied battery fuel, so this course is a vehicle of those pieces of understanding over my career."

Ji hopes that with enough demand in the coming years, he might be able to expand the course to its own multiple-level series. Whether or not this becomes the case, it's clear that Ji has plenty of work left on the research side, and the coming years will remain busy in the lab. While he admits that batteries aren't his only interest, this tenacious scientist is resolved to conquer them before he moves onto the next project. "I hope that we can provide a solution for both the storage and transportation [of batteries] as soon as possible, and if that is a done deal, if all challenges are addressed in the battlefield, I'll be happy to work on something else," Ji said.

# UNDERGRADUATES OF THE QUARTER

## Winter 2023



We're delighted to announce that **Stormy Macomb** has been named one of the Winter 2023 Undergraduates of the Quarter.

Stormy grew up on the Oregon Coast in the small town of Warrenton, right on the mouth of the Columbia River. Stormy chose to pursue chemistry because she fell in love with how chemistry surrounds everyday life- it made sense to her. After being homeschooled through high school, she received a GED to attend community college, where she attended college with her mom and brother. It was Stormy's mom who inspired her to pursue education in addition to chemistry, fostering her love for helping people learn. "I couldn't be where I am today without her," Stormy writes.

Now, Stormy attends Oregon State University, pursuing chemistry and education and working as a general chemistry TA. After OSU, she plans on getting a Master's in Education and interning at a local high school. Her long term goal is to be a high school or community college chemistry teacher in her hometown, working to encourage more interest in STEM.

Outside of school, Stormy likes to read fiction and paint scenery. She cooks and bakes regularly, and enjoys playing Dungeons & Dragons and Magic the Gathering with her husband and friends. Stormy's favorite book is *Till We Have Faces* by C.S. Lewis, and her favorite food is French fries (or any other form of potato). We're so proud of Stormy and everything she's accomplished while at OSU. We can't wait to see what she does in the future.

**Matthew Nguyen** has been named one of our Winter 2023 Undergraduates of the Quarter; and we're so proud. Matthew is from Beaverton, Oregon and is currently studying chemistry here at Oregon State University. Being close to home as well as the largest research university in Oregon are the main reasons that Matthew decided to attend Oregon State. Matthew was never interested in chemistry until he took AP chemistry in high school, where he had a chance to develop his interest. Despite being in this course at the height of the pandemic, and only watching experiments through the screen, Matthew knew that this was the right pathway for him.

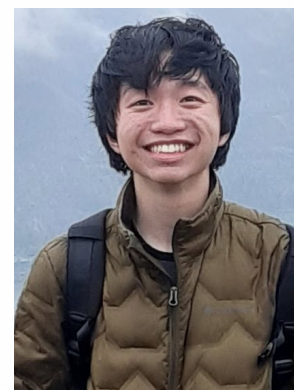
Beginning his freshman year, Matthew was quick to get into research. He was very eager to start experimenting and figuring out exactly what aspect of chemistry interests him the most. He asked his organic chemistry professor about labs to join, and one particular lab, Dr. **Kyriakos Stylianou's** lab came up as a recommendation. After talking to various professors, and reading some recent publications, Matthew decided that the chemistry of Kyriakos's lab was the most interesting and decided to make the commitment of attending the research meetings. Later on, he was able to officially join the lab and begin projects of his own.

Currently, Matthew is doing research on Metal Organic Frameworks, or MOFs. As of now, he is working on two different projects – one is studying a nickel-based MOF, and the other is studying a cerium-based MOF. The Nickel MOF project is focused on studying its water capture properties, in addition to experimenting with its synthetic pathways through the use of polymer beads. The cerium MOF project focuses on its properties in photocatalysis, in addition to finding new uses for this material. This Cerium project also extends into identifying new MOFs, where he is studying synthetic pathways for derivatives of the Cerium MOF.

After he completes his undergraduate degree Matthew will be moving on to complete his Masters in chemistry. Past this Matthew is deciding between pursuing a Ph.D. or going to medical school. Both of which have been dreams of his. Right now, Matthew is just focused on pushing out publications.

Outside of the chemistry lab, Matthew can be found rock climbing or preparing for meetings with the Vietnamese Student Association for which he is an officer. He can also be found playing the guitar or eating Pho.

We're so proud of everything Matthew has accomplished so far, and can't wait to see what he accomplishes in the future.



# 2022-2023 Honor Roll

## Fall 2022

Trinity Baumgartner  
Carley Beeman  
Audrey Biggerstaff  
Alejandro Bobenrieth  
Aidan Brankovic  
Katrina Brown  
Regan Campbell  
Madeline Coe  
Prongbarammee Colling  
Tyler Doyle  
Alden Dupras  
Seamus Fitzgerald  
Madison Glanders  
Emily Frechette  
Audrey Garrison  
May Gratton  
Matthew Gray  
Christina-Ann Groening  
Karina Hernandez  
Ivan Hickman  
Lucy Jaeger  
Mitchell Kenny  
Skylar Kim  
Seiji Koenigsberg  
Seohyun Lee  
James Lovdokken  
Eric Ly  
Stormy Macomb  
Milo Muniz  
Molly Murphy  
Isabella Nelson  
McKenna Neubert  
Matthew Nguyen  
Andres Nicacio  
Damara Ortiz Ojeda  
Jacob Pankratz  
Evan Park  
Jack Richardson  
Casey Rummelhart  
Adam Shoff  
Quinn Smith  
Kayla Stanley  
Jonathan Tence  
Rebeca Tran  
Jackson White  
Taryn Willman  
Nigel Yarnall-Benson

## Winter 2023

Carley Beeman  
Audrey Biggerstaff  
Alejandro Bobenrieth  
Katrina Brown  
Madeline Coe  
Prongbarammee Colling  
Tyler Doyle  
Alden Dupras  
Madison Flanders  
Emily Frechette  
Audrey Garrison  
Kelsey Gayler  
Jack Gordon  
Matthew Gray  
Christina-Ann Groening  
Katrina Hernandez  
Ivan Hickman  
Ava Hilden  
Devon Hoskins  
Ayden Hupp  
Lucy Jaeger  
Mitchell Kenny  
Skylar Kim  
Deborah Kim  
Seohyun Lee  
Phoebe Lee  
Taylor Lindsay  
James Lovdokken  
Sydney Lowe  
Eric Ly  
Hunter MacLennan  
Brooke Moser  
Milo Muniz  
Molly Murphy  
Isabella Nelson  
McKenna Neubert  
Citlali Nieves Lira  
Evan Park  
Cathering Qin  
Jianyao Qin  
Jack Richardson  
Gary Schmidt  
Adam Schoff  
Kayla Stanley  
Jonathan Tence  
Katrina Vaz  
Jackson White  
Makenzie Williamson  
Taryn Willman  
Samuel Wolfe  
Nigel Yarnall-Benson

## Spring 2023

Carley Beeman  
Audrey Biggerstaff  
Aidan Brankovic  
Katrina Brown  
Owen Caleen  
Noelle Chandler  
Madeline Coe  
Prongbarammee Colling  
Phoenix de la Fuente  
Tyler Doyle  
Travis Erb  
Emily Frechette  
Audrey Garrison  
Matthew Gray  
Christina-Ann Groening  
Savannah Harvey  
Ava Hilden  
Ayden Hupp  
Mitchell Kenney  
Skylar Kim  
Deborah Kim  
Seiji Koenigsberg  
Seohyun Lee  
Phoebe Lee  
Taylor Lindsay  
James Lovdokken  
Eric Ly  
Hunter MacLennan  
Chase McCurry  
Vishal Vinod Nonon  
Milo Muniz  
Molly Murphy  
Isabella Nelson  
McKenna Neubert  
Matthew Nguyen  
Citlali Nieves Lira  
Damara Ortiz Ojeda  
Evan Park  
Catherine Qin  
Jianyao Qin  
Jack Richardson  
Adam Shoff  
Quinn Smith  
Kayla Stanley  
MeKade Taylor  
Jonathan Tence  
Samantha Visaya  
Timothy Walz  
Jackson White  
Makenzie Williamson  
Taryn Willman  
Michael Wise  
Binyi Xiong  
Olivia Ziegler

# MAKING LEMONADE In the Kong Lab

This is the most recent tale (we have many more!) of the Kong group finding a solution to a frustrating situation in order to maintain research productivity.

On November 13, 2023, a roof-chiller of Gilbert Hall broke down, and Facilities are having problems locating the replacement parts. The impacted laboratories, including room 248 – teaching lab for CH464, and room 040 – research lab for the Kong group, have to be shut down. The instructor for CH464 reshuffled the schedule of the course to avoid the usage of the room for two weeks, and research activities from the Kong group have been significantly curtailed ever since.

The most sensitive device in the Kong lab is the camera for capturing images of diffracted electrons, and it requires room temperatures lower than 72°F to operate properly. Without the chilled water supply hence the air conditioner in the lab, the room temperature was 85°F, too hot for the camera to even turn on. Members of the Kong group, **Bill Freund** (Faculty Research Assistant) and **Andrew Clifford** (NSF GRFP recipient), decided to take charge of the situation: they exploited an outdated ventilation system in the room and found a way to cool the camera and the room.

On one of the walls in the lab is a hole of one foot in diameter directly connected to an antiquated ventilation box. The box opens to the exterior of the building, and to block the outside (dusty) air, a cardboard was placed on the hole. Over time, dark streaks have been created around the cardboard. Bill and Andrew installed a long duct with a fan and a filter from the hole to the camera. With outside temperatures hovering around 50°F, the room temperature is now 80°F, and the local area of the camera is cool enough to resume working.

Lemonade anyone?



## NEW AED'S For Gilbert Hall

As a part of its ongoing commitment to the safety of faculty, students, and staff, the Department of Chemistry is in the process of installing automated external defibrillators (AEDs) in Gilbert Hall and Gilbert Addition. Previously, no AEDs were located in either building. The installation of these potentially lifesaving devices was made possible by the efforts of the Departmental Safety Advisory Group along with financial support via Department Head, Wei Kong. Special thanks to Facilities and Operations Manager Rusty Root for device ordering and installation. Pictured (l-r) Michael Burand, Wei Kong, and Rusty Root.



# AWARDS

## Congratulations to all our winners!

**David Ji** is the lead on a multiple-PI \$3M DOE Grant

**Doug Keszler** received the Advantage Accelerator Lifetime Achievement Award

**Rich Carter** received the Advantage Accelerator Advancing the Mission Award

**Marilyn Mackiewicz** and **Paula Weiss** received a COS Gender Equity Award to start "The Catalyst" mentoring program for faculty

**Marilynn Mackiewicz** received the Lloyd F Carter Award for Outstanding and Inspirational Graduate Teaching in Science

**Marita Barth** won the 2022 OSU Faculty Excellence in Online Teaching award

**Amila Liyanage** received the Inclusive Excellence Award

**Paula Christie** was inducted into the 25 Year Club

Professor Emeritus, **Walt Loveland** was named an Associate Editor of *Frontiers in Physics*

**Kyriakos Stylianou** won the COS Industry Partnership Award

**Wei Kong** won the FA Gilfillan Memorial Award for Distinguished Scholarship in Science

NSF CAREER Awardee **Marilyn Mackiewicz** presented the College's inaugural Inclusive Excellence Award Lecture

**David Ji** received the Milton Harris Award in Basic Research

**Paul Cheong** received the Loyd F Carter Award for Outstanding and Inspirational Teaching in Undergraduate Science

**Chong Fang** received the Excellence in Postdoctoral Mentoring Award and the D Curtis Mumford Faculty Service Award

**Paula Christie** was awarded the University Mentoring and Professional Development Award

**Doug Keszler** gave the Fred Kavil Innovations in Chemistry Lecture at the Fall 23 ACS Annual Meeting

Undergraduate Recognition in chemistry Scholarship: **A Capodiecici, M Bekbossynova, A Kleinke, K Castle**

Careers in Chemistry Scholarship: **D Ortiz Ojeda**

Peter B Culter Memorial Scholarship: **A Anderson, K Evanchak, K Jacobs, M Taylor**

Carroll W & Gerry A DeKock Scholarship: **E McDonald, J White, J Lovdokken, K Stanley**

Linda Mae Oleson Scholarship for Excellence in Chemistry: **J Gordon, C Beeman**

Colleen Spurgeon Scholarship: **M Neubert, S Lowe**

ACS-Hach Land Grant Undergraduate Scholarship: **N VanDerZwan, M Bouchard, S Macomb, N Pogue**

Keith McKennon Undergraduate Research Scholarship: **A Biggerstaff, J Tence, T Baumgartner, S Visaya, A Dupras**

James D Ingle Scholarship: **C McMurry**

JJ Stephenson Scholarship: **CA Groening**

Jeff Fahey & Margaret Peterson Chemistry Scholarship: **A Persson, M Ellarma, S Scherzinger**

Freshman Chemistry Achievement Award: **C Xu, D De Young**

PLU Award: **A Schroeder**

ACS Physical Chemistry Award: **K Brown**

ACS Analytical Chemistry Award: **D Hoskins**

ACS Inorganic Chemistry Award: **R Jensen**

ACS Organic Chemistry Award: **I Nelson**

AiChE: **C Rummelhart**

WIC Culture of Writing Award in Chemistry: **T Lindsay**

OSU Chemistry Integrated Lab Series Writing Award: **T Lindsay** (CH 462), **M Frank** (CH 463), **M Williamson** (CH 464)

TA Lab Awards:

F22 - **R Loughran** (CH 261), **NC Chiu** (CH 261), **E Kalbaugh** (CH 324), **E Hernandez** (CH 361)

W23 - **C Kuan** (CH 262), **S Opfer** (CH 262), **K Kiaei** (CH 122), **S George** (CH 122)

S23 - **C Tome** (CH 263), **S Macomb** (CH 263), **Z Solabella** (CH 205), **R Chilcott** (CH 463), **L Allan** (CH 205)

F 23 - **L Lancaster** (CH 464), **B Zhou** (CH 324), **M Nure Alam** (CH 261), **M Nikpayam** (CH 261)

Chemistry Graduate Fellowship: **E Musa, D Bashirova, C Tome, R Chilcott, S Huo**

NL Tartar Research Project: **E Starchman, P Sengupta, C Kuan**

Milton Harris Graduate Fellowship: **Z Mao, S Sandstrom, Y Sui, A Yadav, A Verma**

Bruce Graham Memorial Scholarship: **B Hopewell**

Dr. Sheng Chung Fang Fellowship: **L Lancaster**

Benedict Graduate Fellowship: **H Wise**

Ken & Lise Hedberg Fellowship: **L Allan**

United Fellowship of Graduate Students: **J Laddusaw**

Nibler Integrated Lab Development Fellowship: **B Samel-Garloff**

Women in Chemistry Fellowship: **M Nord**

David P & Clara B Shoemaker Memorial Fellowship: **J Schuder**

Whiteley Graduate Fellowship: **M Trejo**

Milton Harris Graduate Teaching Award: **T Gallagher, A Johnson, E Quiroz, C Boelke, S Tran, C Wheeler**

Ingram Award: **K Wiese**

Benedict Award: **M Kim-Fu**

David T Wong Chemistry Research Internship: **AT Nguyen, A Clifford**

Daniel & Janis Kerrigan Internship Fund: **M Khorani, B Zhou, NC Chiu, A Clifford**



# Oregon State University

Department of Chemistry  
153 Gilbert Hall  
Corvallis, OR 97331

Help us celebrate Chris Pastorek's and Emile Firpo's many years of service with a gift to the **Chris Pastorek and Emile Firpo Integrated Lab Fund**, ensuring that future students will have the same high-quality educational experience.



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