

Department of Chemistry

# Chemistry Newsletter

Winter 2024



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**On the cover:** Metal-oxo cluster, i.e.,

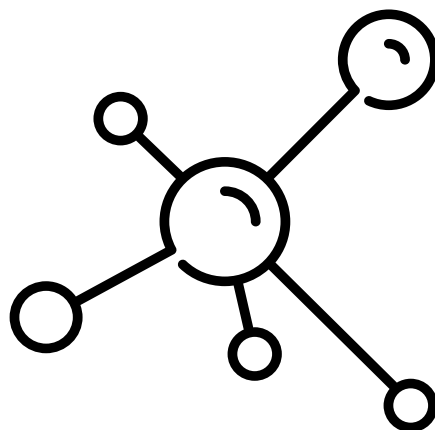


a polyatomic ion with more than one metal-oxygen bond  
Photo credit: Makenzie Nord (Nyman Lab)

**Expanded stories available online:**  
[blogs.oregonstate.edu/erlenmeyer](https://blogs.oregonstate.edu/erlenmeyer)

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# A MESSAGE: From The Department Head



On campus, fall always brings excitement and anxiety, and this year is no exception. Oregon State University (OSU), particularly the Corvallis campus, saw another record year of enrollment, with over 1300 students in CH231 alone – General Chemistry for science majors! As we contemplate the necessary measures to handle the ever-increasing teaching load, we are also grateful for this “good” problem unique to OSU: in comparison, some of our peers are experiencing decreased enrollment and some are even cutting programs altogether. Perhaps years of emphasis on student success has finally paid off, or perhaps the tireless efforts of our instructional faculty, the graduate teaching assistants, the support staff, and the innovative teaching methods are reaching the homes, the neighbors, and the towns across the country.

For years the Center for Teaching and Learning has been sending out tips for “effective and efficient” teaching. The increasing enrollment has made the “efficiency” issue even more prominent: without compromising the quality of education, how can we teach efficiently, so we do not over-burden the instructional staff? Over the years, I have also witnessed many teaching innovations in General and Organic Chemistry to handle the ever-increasing class sizes or section numbers. A big kudo to our instructional team: although our nomination for the Student Learning and Success Teamwork Award did not bear fruits this year, we will reorganize the nomination and try again.

Speaking of awards, congratulations to Professor **David Ji** for the OSU Impact Award, Drs. **Taylor Krueger** and **Andrzej Gladysiak** for the Postdoctoral Excellence Award, and **Steven Tran** for the Herbert F. Frolander Graduate Teaching Assistant Award. We are lucky to have such outstanding colleagues and students.

With the arrival of Professor **Artiom Skripka** and Dr. **Jun Li** to our faculty, we now have 18 research-active tenured and tenure track (TT) faculty members, 14 instructors at the Corvallis site, and 3 instructors at Cascades. We are currently recruiting one more TT faculty member specializing in organic chemistry -- broadly defined. Once we are successful, we will have four or more faculty members in each division, with more capacity for research and teaching innovation. Now is the time to debate the vision and the actions for the department and for each faculty member: how we define success as a department, what actions we need to take to achieve this common goal, and how we can help each other achieving both personal and professional fulfillment. We discussed this topic at our Fall Retreat, and we will continue to debate throughout the year. As I explained more than once during faculty meetings, I do not believe in a “visionary” leader, but rather I believe in member-led communities. When we all buy into the same vision, we take actions on our own volition and we do not need a leader.

Our graduate recruiting committee has had a successful year, with a record number of international students joining us from all over the world. A big “thank you” to the committee members: Professors **Chong Fang**, **Addison Desnoyer**, **Alison Bain**, and **Marilyn Mackiewicz**!

We want to express our sincere appreciation to Dr. Prabu Nambiar and family for establishing the Nambiar Family Faculty Scholar Funds. For years Dr. Nambiar’s donation has supported travels of graduate students to conferences and other expenses related to internships. This endowed faculty scholar fund will help us recruit an outstanding faculty member specializing in any one of the four focus areas of the provost: climate science and related solutions, clean energy technology and related solutions, robotics, and/or integrated health and biotechnology.

The new Core Education Curriculum, to be implemented in Fall, 2025, has posed a significant challenge and opened up possibilities for the department. Thankfully several of our instructors took charge and are intimately involved in the committees from the university and the College of Science: **Margie Haak**, **Cassi Siler**, and **Paula Weiss**. They brought back the newest information to help us plan and capture the opportunity. So far the first courses of all three General Chemistry sequences have been identified as Core classes in the category of Scientific Inquiries, the courses on careers in chemistry are being redeveloped to fit into the category of “Beyond OSU I” and “Beyond OSU II”, and **Alison Bain**, one of our newest assistant professors in the department, is developing a class titled “Environmental Chemistry and Society”, fulfilling the mandated category of classes “Difference, Power and Oppression”. In the meantime, instructors of these courses, **Lou Wojcinski**, **Marita Barth**, **Rick Nafshun**, **Silas Towne**, **Paula Weiss**, **Marilyn Mackiewicz**, and others, are working to rewrite the learning outcomes and adjust the course contents to satisfy the new requirements. This is a monumental task, and I am sure glad that I have my colleagues to lean on!

In the meantime, we are going through a major update of integrated labs, with the enthusiastic involvement of TT faculty members: Professors **Addison Desnoyer**, **Paul Blakemore**, **Dipankar Koley**, **Kyriakos Stylianou**, **Marilyn Mackiewicz**, and **Tom Osborn Popp**, and with the leadership of Drs. **Jie Zhang** and **Shrikant Londhe**. These labs have only gone through minor updates over the past several decades, and we hope the new labs will train our students with the most up-to-date techniques and technologies, and prepare them for the future workforce. The generous support of our colleagues and alumni has fully endowed the **Chris Pastorek** and **Emile Firpo** Integrated Lab Support Fund, and we are excited to put the funds into action!

Stay strong and remain optimistic!

# RESEARCH in the Osborn Popp Lab

By: Tom Osborn Popp

The Osborn Popp Lab at Oregon State University is dedicated to advancing solid-state nuclear magnetic resonance (NMR) spectroscopy, a powerful method for exploring the molecular structure and properties of complex materials and biological systems. Our research leverages solid state NMR to tackle scientific questions that remain difficult to answer by other techniques, while also pushing the boundaries of what solid state NMR can investigate by expanding its utility in chemical systems that are challenging to study. The theory and practice of solid state NMR can be rather complex, so we also work to make it more accessible by designing new and robust instrumentation that can be manufactured by modern fabrication methods such as 3D-printing. While we are chemists at our core, our lab is highly interdisciplinary, combining elements of physical chemistry, engineering, materials science, and biophysics to address fundamental scientific questions and real-world challenges alike.

One of the central techniques in solid state NMR is magic angle spinning (MAS), a method that makes it possible to measure NMR spectra of solids with very high resolution. MAS works by rapidly spinning a sample at the magic angle, or  $54.7356^\circ$ , with respect to the magnetic field, using small air bearings with pneumatically-driven turbines. The spinning rates used in MAS can be as high as 100,000 Hz or more (6 million RPM—much faster than any typical mechanical device!), but most solid state NMR is performed at MAS rates ranging from around 1,000-40,000 Hz. Without MAS, spectra

of solids have very broad peaks, obscuring details about the chemical environments we are interested in studying. However, commercially available instrumentation is typically quite expensive, requires specialized expertise, and there is a risk that the spinning sample may crash if the system is set up incorrectly, which ultimately makes solid state NMR a rather inaccessible technique for most chemists.

In our lab, we design and fabricate devices and components required to perform MAS, developing new methods of spinning samples that improve the stability, spinning speed, and substrate scope of MAS NMR. Students in the lab use 3D printing and computer-aided design (CAD) to prototype and test unique experimental setups that go beyond what commercial hardware has to offer. Both graduate and undergraduate students participate in the hardware design and testing process as an introduction to performing more complex solid state NMR experiments. The very devices they make as a means towards understanding solid state NMR at a deeper level also serve to improve the accessibility of the technique, as the development of 3D-printable hardware should lead to reduced costs and downtime required to repair solid state NMR instrumentation when it breaks. We have designed devices for spinning cylinders, spheres, and other novel sample geometries. This versatility in equipment design also means that MAS NMR, once mostly confined to specific samples, allows us to now apply it to a wider array of systems, including thin films, porous solids, and phospholipid membranes—each presenting distinct challenges that

MAS NMR can now help to address. Students also gain experience in developing software tools for data analysis and in the preparation of biological and material samples. Our focus on hands-on, interdisciplinary training prepares students to tackle diverse scientific and engineering challenges, both in academia and industry.

The Osborn Popp Lab applies solid state NMR to two key application areas: materials and biological solids. In materials, we focus on gaining insight into systems governed by disorder and complex chemical composition, particularly with an eye towards how the processes by which these materials are synthesized impact their chemistry and structure, and how these chemical properties relate to their functional performance. For example, in collaboration with Prof David Ji's group, we are currently investigating the chemistry of a solid electrolyte interphase (SEI) formed on the surface of a Zn electrode in an aqueous Zn-metal battery- a novel battery paradigm that promises safe and cost-effective energy storage. The formation of an SEI helps to improve the performance and stability of a battery, but the composition and formation mechanism of the SEI in this system is largely unknown. We have performed solid state NMR on deconstructed battery cell components to reveal details on how the breakdown of certain electrolyte species and subsequent electrochemical cycling results in the formation of an organic, carbon rich layer on top of the Zn electrode. These results required us to scrape material off the electrodes, but in future work, we hope to be able to study intact electrode surfaces

using custom-built MAS devices for spinning disk-shaped samples.

On the biological side, we have been exploring the chemistry of cellular membranes, which are dynamic, multi-component structures crucial for cellular function. We use a specialized solid state NMR technique to measure the lateral mobility of phospholipids in mixed-phospholipid membrane vesicles. Our aim is to shed light on the functional roles of the many different lipid species that comprise both mammalian and bacterial membranes, and observe how they interact with each other and with molecules that bind to the membrane surface. Currently, our work is focused on improving the precision of our phospholipid lateral diffusion measurements by coupling it with a relatively new analytical technique known as tunable resistive pulse sensing (TRPS), which can provide highly accurate size distributions of our membrane vesicle samples. We aim to use this methodology to observe coexistence of liquid-ordered and liquid-disordered lipid phases, as well as to measure the effects of environmental contaminants such as polyfluorinated alkyl substances (PFAS) on membrane properties.

For more insights into our research or to learn about current projects, check out our lab website, [osbornpopplab.com](http://osbornpopplab.com).



## NEW FACES

### Ryan Lubinski



By: Ryan Lubinski

**Ryan Lubinski** grew up in Ellensburg, Washington, a college town of 30,000 people in central Washington State. He chose to work in the OSU Department of Chemistry because his interests lie in chemistry, and he appreciates the university environment; furthermore, he believes OSU is a good school with a lot of interesting research, and he quite likes Corvallis.

Ryan's job largely involves preparing for and cleaning up after the learning labs that chemistry students take; and being present in the issue room during labs to help with labware or other related issues that may arise during lab times. One of the things that Ryan loves about his new position is the opportunity to work around students. Even though he doesn't play any role in instructing students, he has long maintained an interest in teaching.

A more unconventional interest of his is in carnivorous plants. He has been growing multiple different genera, in terraria and on windowsills, since he was a teenager. As for hobbies, He enjoys hiking and camping. He has yet to explore that much around the Willamette Valley area, but hopes to hike around the Cascade peaks in the spring and summer. He also practices calligraphy, model making and painting. As for a superpower, he would choose the power of shapeshifting. He said "it might be inconvenient if people were unable to recognize me, but the ability to look or be however, whoever, or whatever I want (with minimal effort) is hard to resist!"

## NEW FACES: Artiom Skripka



By: Prof Artiom Skripka

We are proud to welcome our newest colleague, Professor **Artiom Skripka**, to the Chemistry Department. Artiom is from Lithuania, a small country in northeastern Europe. He was born and grew up in Vilnius, the capital of Lithuania. If anyone is looking for a European destination, he highly recommends visiting Lithuania in the summer. His fiancée Diana and their lovely cat Hertz moved

from San Francisco to Corvallis. It might be surprising to hear that he is not a cat person, although he does have a cat. There is no particular reason why he got his cat, but once he did, he couldn't see himself not having Hertz around. He enjoys hiking, rock climbing, and binge watching shows with Diana. It was quite an adjustment after leaving the big city, but they love the peace and quiet of Corvallis and the gorgeous nature surrounding it.

When he was looking for a place to start his independent research, the Department of Chemistry at OSU had an open position that closely aligned with his research interests. Upon visiting the Department for his interviews and meeting the people who worked there, he felt a sense of belonging— a certain good vibe. So when the time came to decide whether

to take the job, he was encouraged to say “yes.” The research opportunities and freedom for exploration were reasons to apply for a job at the Department of Chemistry, but it's the people and the support they provide that led him to join the team. He is now, an assistant professor in the Department of Chemistry.

By and large, his position involves teaching and research. He teaches undergraduate and graduate courses in general or physical chemistry. When he isn't teaching, he leads a materials science research group that studies tiny crystals – nanoparticles – that are amazing at converting light from one color to another. In his group, they are developing new recipes for making various nanoparticles, which doesn't look too different from making a soup. Once these nanoparticles are ready, they move them to their optics lab and shoot lasers at them to study their color conversion and light emission properties. They are especially interested in how nanoparticles' structure dictates their optical properties and how they can use them for imaging, sensing, and data-handling applications.

There are many things that he likes in his new position, but the one that stands out right now is teaching. He genuinely enjoys teaching, interacting with students, and helping them learn. It is a new and humbling experience for him, and one that has pleasantly surprised him.

We're so proud to have Artiom as part of our department, and we can't wait to see what he does in the future.

# Welcome

## NEW FACES: Jun Li

By: Dr. Jun Li

Welcome Dr. **Jun Li** to the Oregon State Chemistry Department. Jun joins the department as a new instructor for General Chemistry CH 23x and an e-campus instructor for Inorganic Chemistry CH 411 and CH110 Chemistry

of Colors. Li has been a local resident of Corvallis for many years and she is a proud alumna of the Oregon State University.

Born in Changsha, the capital city of Hunan Province and one of the largest cities in China, Jun earned her Bachelor's

of Science in Chemistry from Central South University, also in Changsha. After graduation, Jun moved to the U.S. where



she pursued a master's program at the University of Minnesota. Following her masters she acquired her PhD in Inorganic/Materials Chemistry at Oregon State University in 2005. After finishing her postdoctoral research in the Materials Research Laboratory at the University of California, Santa Barbara, Jun worked as a senior scientist in one of the top chemical companies on the east coast before coming back to Corvallis around 2010. Although it was supposed to be a temporary stay, she has been living and working in Corvallis ever since. Aside from some personal reasons, she says what made her settle down in Corvallis is the research, the teaching, the people and the working environment in the Department of Chemistry at OSU, as well as the peacefulness of this small college town which she considers her second hometown.

Jun was born into a university family with both parents working as professors in the Mineral Engineering Department of the Central South University in Changsha. With both parents working full time, Jun learned how to take care of herself and her younger sister from a very young age. She can still recall picking up her sister from kindergarten, getting food from the university dining hall and walking to the building where her parents worked on campus. She showed a strong interest in teaching during elementary school when her parents found her writing on a door with chalk at home and forcing her baby sister to be her only student. Having been exposed to too many mineral engineering discussions while growing up, Jun decided not to follow in her parents' footsteps and chose chemistry instead. Her curiosity in chemistry was developed in high school thanks to many fun course class demonstrations. Her decision to pursue a graduate degree in the U.S. was influenced by her father who received his advanced degree at Colorado School of Mines and spent a sabbatical year as a visiting professor at University of Alaska Fairbanks.

Studying abroad is a valuable educational and cultural experience, and the support and kindness of faculties and staffs in the U.S. made a huge difference in the lives of international students like her. Even though she has always been

interested in teaching, the only real teaching experience she had before coming to the U.S. was being a substitute teacher for a month at the request of her college English professor. Teaching general chemistry recitations and labs as a GTA was a new and exciting experience for her. The course instructors and the students helped her a lot in improving her teaching and communication skills. While working as a teaching assistant Jun also worked as a research assistant during her graduate studies. Compared with synthesizing organic ligands and organometallic compounds for her Masters research, she found it more appealing making polycrystalline samples via solid state reactions, characterizing materials properties and studying the structure-property relationships for her Ph.D. research. Under the guidance of Professor **Arthur Sleight** she completed a number of research projects on functional metal oxides such as p-type transparent conducting oxides, negative thermal expansion materials, ferromagnetic and dielectric materials. She also learned how to refine crystal structures using the Rietveld method with the help of Prof. Sleight who was one of the pioneers in this field. Among her publications throughout her PhD the most cited papers all involving collaborations with Professor **Mas Subramanian** who at the time was still working at DuPont. After coming back to Corvallis many years later she joined Prof. Subramanian's research group at OSU and continued working with him conducting cutting-edge research on multifunctional materials including cool pigments. With his unwavering support, Jun had the opportunity to mentor numerous undergraduate and graduate students and high school summer interns in the lab and to teach several courses independently or with others as a temporary instructor in the Department of Chemistry to gain valuable teaching and mentoring experience.

Before interviewing for an instructor position at OSU, Jun has already taught many chemistry courses ranging from undergraduate to graduate levels: CH202, CH231, CH232, CH616 and Ecampus CH122, CH123, CH202, CH411. She enjoyed the teaching and interacting with students and was super

excited to finally become an official chemistry instructor at OSU. She is very grateful for the help and support of all the senior instructors and professors and that is one of the many reasons why she chose OSU to continue her teaching career. Jun says she wanted to be a teacher in high school because she found some of her teachers although they taught well they never treated students equally. Their negative and discouraging attitude towards certain group of students significantly demotivated those students and hindered their academic progress. She learned from her own experience how crucial an inclusive and welcoming classroom environment is for student success. Learning is a lifetime process. Jun says she believes every student can be successful; and academic success alone is not everything in life. She wants to help all the students to value and nurture their intellectual curiosity, live ethical lives, and have productive careers. It is the responsibility of educators to provide students with knowledge and tools they need to promote a just society and to make the world a better place.

Outside of work, Jun can be found listening to music, reading, cooking, gardening and riding her new electric scooter. She used to love playing piano and guitar (although not very well) and singing karaoke, which according to her relatives and friends she was, "totally better than average." She has a garden with assorted species of roses and lilies, and two blueberry trees that growing at a turtle's speed yet are still producing tiny berries. Going blueberry picking in nearby U-Pick farms is her favorite summer activity in Corvallis. In her childhood she had pets like bunnies, chickens, and ducks, but never had a cat. So, she enjoyed feeding and playing with her former neighbor's black and white striped cat who used to wait for her outside her door every day. She still misses that sweet cat and feels they may have some sort of past life connections. If Jun could have any superpower, it would be the ability to see where atoms locate and how they vibrate in the crystals without any structure determination and refinement - things she's done thousands of times in her professional journey as a researcher.

# FACULTY & STAFF: recognized for another year of great service

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By: Luanne Johnson

Friday, October 4, 2024 marked the date of the Chemistry Department's Fall Gathering. A time where we gather as colleagues to recognize and award the hard work and dedication of our faculty and staff over the last academic year. This year's winners were:

## Milton Harris Faculty Teaching Award

This award is to recognize outstanding teaching as indicated by teaching evaluations and strong, positive comments from students.

–**Dipankar Koley**



"I am deeply honored to receive the Milton Harris Faculty Teaching Award from the Department of Chemistry. With heartfelt gratitude, I look forward to continuing this journey of teaching and scientific exploration in chemistry with the next generation of chemists." –Dipankar Koley



## James H Krueger Faculty Teaching Award

This award is given in recognition of an instructor's ability to provide an effective environment for learning as well as a sustained dedication to our teaching program.

–**Amila Liyanage**



"I am deeply honored to receive the James H. Krueger Faculty Teaching Award and grateful for the recognition of my commitment to providing an effective environment for learning. This motivates me to continue delivering impactful educational experiences for all my students. Teaching is always a collaborative effort – I sincerely appreciate the incredible support of my colleagues on the teaching teams, my dedicated teaching assistants, and the hardworking lab staff members. Kudos to them as well!!" –Amila Liyanage



## Staff Service Award

The Staff Service Award is presented to a staff member who continually goes above and beyond the call of duty in performing their job. Their hard work and dedication to the department are part of what makes the chemistry department such a unique place to work.

–**Loren Johnson**



"I felt flattered. Receiving it among friends in an informal setting toned down my shy introvert self and made the experience enjoyable." –Loren Johnson



## Outstanding Faculty Service Award

Beginning in the Fall of 2022, this award is presented to an outstanding faculty member in recognition of their hard work for the department above and beyond that of the job description.

–**David "Xiulei" Ji**



"It is my great honor to receive this award. Our department is home to excellent work that is changing the world. We are on our way to earning a reputation on par with our fantastic work." –David "Xiulei" Ji



## Length of Service Award

The Length of Service Award was started in Fall of 2022 to honor our staff who have stayed with our department for multiple years.

–**Paul Blakemore** (20 years)

–**Paula Christie** (15 years)



# INTERNSHIP SPOTLIGHT

## Doctor Stephen



My name is **Doctor Stephen**, and I am a fourth-year PhD student. I was born and raised in Kaduna State, Nigeria, where I earned my Bachelor of Science degree in Chemistry from Kaduna State University. My passion for research and graduate studies was ignited during my undergraduate thesis, where I investigated the ‘Photocatalytic degradation of

polyaromatic compounds using modified titanium dioxide’ under the mentorship of Dr. Moses Titus Yilleng. During my graduate school application process, I had the privilege of being selected by EducationUSA Abuja, U.S. Embassy in Nigeria, for the prestigious “Opportunity Grant Scholarship Award” program, which covered my pre-departure expenses to the U.S. for my PhD program.

At OSU, under Prof. **May Nyman**, I focus on the separation of Platinum Group elements (PGE) and gold using metal-oxo cluster chemistry, a project funded by the U.S. Department of Energy. PGE materials are extensively used in advanced technologies such as energy and electronics. Our studies aim to improve the inefficient industrial separation process of these materials into their elemental, pure form via more environmentally friendly means. This study’s foundational knowledge will translate to other metal separations, extractions, and recycling of critical materials for advanced technology.

I was selected for the Graduate Research at ORNL Program (GRO Internship) at Oak Ridge National Laboratory, Tennessee, which helped to broaden my skills in critical element separation further. I also received the David T. Wong Research Internship Award from the OSU Chemistry Department, which covered my tuition and fees during the summer. The GRO program offers internships ranging from 3 to 12 months; my internship ran from June 24, 2024, to September 20, 2024 (approx. 3 months). While there, I joined the Chemical Separation Group within the Chemical Science Division, working under Dr. Nikki Thiele. Our project was centered on expanding the coordination and

separation chemistry of heavy alkaline earth metals and f-block elements by exploring their fundamental coordination and radiochemistry. I had the chance to dive into the fundamentals of radioactive nuclei, and my responsibilities included crystallizing supramolecular complexes of f-block elements by exploring the synergy between macrocycles (organic ligands) and polyoxometalates (inorganic ligands). This experience enabled me to make meaningful contributions to the team, including synthesizing a few alkaline earth element (AEE) coordination polymers and f-block supramolecular complexes that will serve as a foundation for studying the radiochemistry and separation of heavier AEE and f-elements. These f-block elements also have significant applications in growing number of technologies, including catalysis, magnetics, electronics and biomedicine.

My scientific goal is to develop sustainable, eco-friendly methods for isolating and recycling critical materials—such as gold, platinum, palladium, and certain rare earth elements—to meet essential needs in materials and clean energy sectors. I hope my work contributes meaningfully to reducing the excessive disposal of these valuable materials in landfills and to minimizing the need for extensive mining.

My growth as a person and a chemist has been shaped by my mentors and loved ones. I extend my deepest gratitude to Prof. May Nyman, who has skillfully balanced her roles as my advisor, mentor. She guided me by offering advice that goes beyond scientific research but also about personal and professional development; it is a privilege to learn and work under her guidance. I am also immensely thankful for the support from past and present Nyman group members, and other graduate students and mentors at OSU.

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Dr. Nikki Thiele, Doctor’s mentor while at ORNL had this to say, “Upon first meeting Doctor, I could sense immediately that he is an extremely hardworking, motivated, and respectful student. He is genuinely interested in his research, and his enthusiasm was refreshing. Being such an exceptional student, Doctor tackled three subprojects over the course of his three-month tenure at ORNL. These subprojects involved learning something he had never done before—radiological work. Although this was a new area of research for Doctor, he took on the challenge of learning the principles of radiochemistry and how to safely handle radioactive material. As frequently happens in research, some of his experiments were not immediately successful. However, Doctor was not at all deterred. Rather, he would come in early the next morning with alternative experiments already planned out and in hand to share with me, excited to try to overcome the challenges he encountered. This perseverance is rare. I’m confident that Doctor will excel in his research at OSU, and I’m excited to see all the great science he does in the coming years. I welcome him back at ORNL any time!”

# UNDERGRADUATES OF THE QUARTER

## Fall 2024



We're proud to introduce, **Trevor Storm**, one of the Fall 2024 Undergraduates of the Quarter. Trevor grew up in Enumclaw Washington, a very small town just outside of Mount Rainer in the western side of the state. There, he attended Enumclaw High School. The reason he chose chemistry was because of his enjoyable experiences in Professor **May Nyman's** lab which prompted him to add the Major.

He chose OSU because he knew that it was a great research school, and he would have lots of opportunities to join a lab here. Also, because he loves the Oregon climate and nature. He is currently doing research in May Nyman's research group working on niobium and tantalum peroxide materials for use as carbon dioxide capture materials. He knew he wanted to get into research from the very beginning, so when the URSA-Engage program gave him the opportunity to apply to work in the Nyman lab, he jumped on it. He's very thankful that Professor Nyman selected him to work with her and her graduate students.

His post-graduation plans are to continue his education in graduate school although he has not decided exactly where yet. After that, he would like to work in a national laboratory. Outside of school he loves to bike, hike, and be outdoors. He plays piano and juggles to de-stress during finals season and he enjoys fixing things and working on his house. His Favorite book is *Breakfast of Champions* by Kurt Vonnegut, and his favorite Movies are *Pulp Fiction* and *The Silence of the Lambs*. His favorite food is mashed potatoes so he is excited for Thanksgiving. Something else that is interesting about him is that he lives in a tiny house outside of campus.

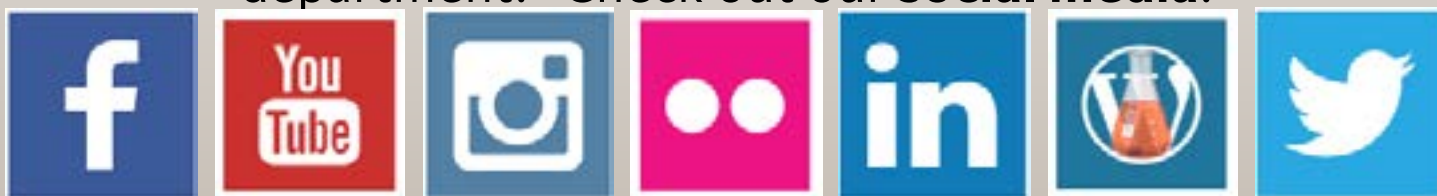
We are proud to introduce, one of our Fall 2024 Undergraduates of the Quarter, **Mitchell Kenny**. Mitchell grew up in Portland, Oregon, where he attended Benson Polytechnic High School. He explored several career options while growing up. He went to an arts middle school, then swapped directions and attended a technical high school. At Benson, he explored and then rejected careers in architecture, computer science, and engineering. Then, in the early stages of the pandemic when he had run out of career ideas, he stumbled upon and promptly tore through what became his favorite sci-fi book series: *The Expanse*. He applied to college as a chemistry major to pursue the awe-inspiring future he read about, and four years later his goals have not changed. He was accepted at many schools across the country. However, upon receiving the tuition costs, OSU was the involuntary choice, with the added benefits of more easily visiting family and pleasant weather.



Mitchell is currently working with Dr. **Kyriakos Stylianou** on MOFs. He is involved in several projects, the largest is investigating the structural differences between many new MOFs he has made in the same family. In his quest to explain the vast and inexplicable structural diversity, he continues to encounter new materials and phenomena. He has begun to realize he is suffering from success, wading through the sprawling richness of this MOF family and hoping to understand but a small fraction of its complexity. He started his research with the URSA Engage program, (also with Dr. Stylianou) and became even more involved with a scholarship to travel to Germany and study MOFs all summer. He will be continuing his MOF research with a PhD somewhere after graduation.

When not in school, or the lab, he enjoys lifting heavy objects, playing Doppelkopf, mining Morkite, trance music, and consuming more sci-fi media when he is not doing any of the previous things. Picking a single book out of *The Expanse* saga is difficult—but he will grudgingly settle for the final one as his favorite. His favorite food is the Noodles & Company Wisconsin Mac and Cheese, best served across the street from Powell's Books. That location has unfortunately been closed. One thing he'd like readers to know is that the show "Dark" on Netflix is perhaps the most beautiful and perplexing piece of science fiction television that exists. Watch with subtitles and without spoilers and be amazed, although it is a slow burn.

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



# GRAD STUDENT OF THE QUARTER

## Fall 2024



**Arpa Ebrahimi** is our inaugural graduate student of the quarter. She was born in Tehran, Iran, and immigrated to the U.S. when she was a teenager.

In her junior year of College at California State University, Los Angeles (CSULA), she met Dr. Xin Wen, a dedicated teacher who sparked her research interest and guided her exploration. Initially, Arpa was her biochemistry student and had her first research experience under her guidance. What captured her heart about Oregon State University (OSU) is the wonderful mix of qualities that make it a fantastic place for her academic and research journey. The friendly atmosphere, both in the stunning natural surroundings and the supportive community, truly drew her in.

Professor **Claudia Maier** has been an exceptional mentor during her time at OSU. She's consistently guided Arpa in her research direction and helped her develop an analytical mindset to approach biological questions with precision. Under Dr. Maier's mentorship, she has honed her ability to think like a scientist, effectively utilizing advanced analytical tools to uncover meaningful insights. Dr. Maier has also emphasized the importance of precise scientific communication, encouraging her to become a better presenter and to pursue grants and opportunities to advance her career actively.

At the start of her graduate journey, the pandemic brought some tough challenges. She couldn't access the lab or work hands-on, and she missed the chance to connect with her lab mates in person. On top of that, being away from her partner for a year was hard, but it taught her a lot about resilience and finding ways to stay motivated during tough times. She attributes her academic success to perseverance, mentorship, and curiosity for science. Perseverance helps her navigate challenges, from setbacks to balancing responsibilities. As a science student she's been fortunate to receive many fantastic opportunities that have shaped her career. She had an internship opportunity at the University of British Columbia, which led to an exciting collaboration with Dr. Leonard Foster's lab. She also worked with HP Life Sciences, contributing to the development of single-cell dispensers that are now widely used in the single-cell omics community. Collaborations with the BENFRA project, which is the botanical dietary supplements research center that investigates botanicals enhancing neurological and functional resilience in aging, as well as with Dr. Siva Kolluri's biochemistry lab on cancer therapeutics, have expanded her experience in cutting-edge research. Additionally, she's presented at numerous international conferences and received several prestigious fellowships, including the NL Tartar Summer Research Fellowship, the David T. Wong Chemistry Research Internship, and the Harvey H. & Donna Morre Basic Cancer Research Fellowship. Each of these experiences has deepened her passion for science and enhanced her skills as a researcher. Before joining the PhD program, she worked at Amgen, where she had the opportunity to contribute to the characterization of evolocumab, a blockbuster drug for the treatment of diabetes. Sometimes, she sees the drug featured in commercials on TV, and it feels rewarding to know she played a part in its development.

In her free time, she enjoys staying active with barre classes and Pilates, gardening, and spending quality time with her friends.

Chemistry Instructor, **Richard Nafshun** and Undergraduate/ Ecampus Coordinator, **Mak Ashton** staffed a table at the Oregon Science Teacher's Association Conference (OSTA) on November 2, 2024.

*"It was great to meet all the science teachers from all the different schools, and discuss potential OSU visits for their budding scientists. Their passion for learning was commendable." -Mak Ashton*



# PROFESSOR MARILYN MACKIEWICZ

## named Scialog: ACL Fellow

By: Professor Marilyn Rampersad Mackiewicz & Luanne Johnson

Automating Chemical Laboratories... what does that mean? According to the Research Corporation for Science Advancement (RCSA) it means, a Scialog. The overarching purpose of a Scialog is to advance cutting-edge science by capitalizing on innovative ways of performing basic research. Going back to the beginning, but doing it better, faster, and with less cost. This particular Scialog focuses on transforming the way chemical laboratories operate. By integrating automation and AI into laboratories performing basic research, PI's, like our very own, Professor **Marilyn Rampersad Mackiewicz** would have the opportunity to enhance science in ways we've only begun to explore.

The 2024 Scialog: Automating Chemical Laboratories is a three-year program, co-sponsored by the Research Corporation for Science Advancement, The Beckman Foundation, and the Frederick Gardner Cottrell Foundation. Scialog's are a highly competitive program, and only 50 fellows were selected to enter this year's cohort. Professor Mackiewicz says, "it's a little like Survivor. Inside a day, you form a team with a bunch of strangers, based solely on your research interest, then spend the evening and late into the early morning hours creating a whole new research project." Proposals are written, and the next day, the projects are pitched to Scialog facilitators and the rest of the fellows. Of all the pitches by 50 fellows, only seven (7) teams' proposals are funded. Scialog funding is only meant to be seed money to help PI's collect preliminary data on their perspective research projects that allow them to seek multi-year larger scale funding as collaborative teams such a center proposals.

The proposal presented by Professor Mackiewicz's team was to use AI to perform predictive modeling to innovate materials design and discovery; in lay terms, they're endeavoring to, use AI and machine learning to identify the best nanomaterial for use as X-ray imaging agents for early detection and diagnosis of triple-negative breast cancer, the leading cancer death in women. Their overall goal is to use scalable experimental data to predict how the physicochemical identities of nanomaterials drive their uptake and nanoparticle-biological interactions in cancerous cells and biomimetic 3D organoids. This will be accomplished by harnessing the power of Continuous Flow (CF)-chemistry to design and characterize a library of robust pristine nanomaterials. This library of nanomaterials will enable the team to identify the critical physicochemical properties that drive the formation of unique protein coronas on the surface of the nanomaterials. Using non-cancerous and cancerous cell lines and 3D biomimetic cancerous organoids, the team would identify which combination of physicochemical

identities and unique protein corona fingerprints are most important for uptake in cells and tissues. The team would then use AI and machines to do predictive modeling and provide informative feedback that guides the second-generation nanomaterials. Their ultimate goal is to provide clinicians and materials scientists with fundamental design paradigms for stable nanomaterials with high uptake for diagnostic imaging, therapy, and drug delivery.

Whether funded or no, all these proposals represent some of the latest in innovative laboratory research using AI. "I think that as chemists, we have to innovate the way we do chemistry. And in order for us to innovate and change chemistry, we need to adapt to new technologies and methods of characterization." When asked if she was worried that AI would someday replace the human researcher, Professor Mackiewicz replied with an emphatic, no. "Humans will always be the creative genius behind these laboratory experiments."



# HARNESSING THE POWER OF WATER

## OSU chemist joins DOE-funded battery consortium

Originally published in COS's IMPACT magazine by: **Hannah Ashton** | <https://science.oregonstate.edu/impact/2024/09/harnessing-the-power-of-water-oregon-state-chemist-joins-doe-funded-battery>

In the pursuit of large-scale, reliable, safe, environmentally sustainable and affordable electricity storage, chemist **Xiulei "David" Ji** is part of a collaborative, interdisciplinary team funded by the U.S. Department of Energy.

Battery Consortium (ABC) which comprises energy storage experts from 15 research institutions across the United States and Canada. Oregon State will receive \$1.35 million in funding.

The researchers are excited about the possibility of a new kind of aqueous battery, a type of battery that will use water-based solutions as the electrolyte, the medium through which electric charge moves inside the battery. This type of battery has numerous

the U.S. economy and leadership in transforming electricity storage and usage, and noted that recent awards equip teams to tackle key challenges in decarbonizing transportation and integrating clean energy into the grid.

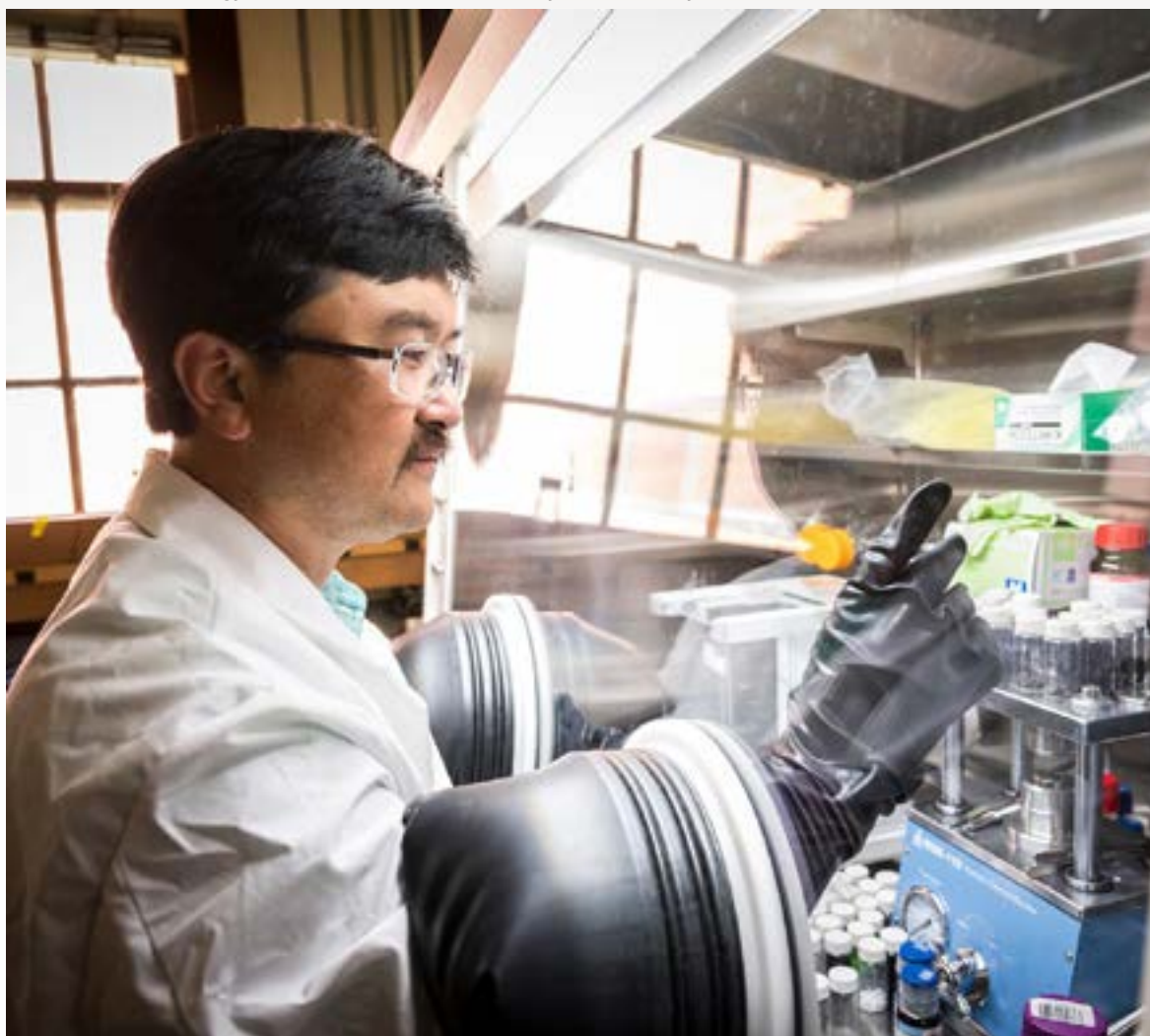
"To get the whole energy storage crisis fixed, we need chemists, engineers, and entrepreneurs. So, it's going to be a collective effort for everyone," Ji said.

Ji is responsible for groundbreaking work in battery science, particularly in sustainable battery and energy storage techniques. His work has not only advanced scientific understanding but has also had a profound impact on the broader scientific community, both within and outside the academic sphere.

He has consistently introduced innovative approaches, particularly in battery chemistry. His recent studies on zinc and iron metal batteries have fundamentally shifted how scientists approach energy storage, offering the potential to transform the industry by utilizing more abundant and cost-effective materials. These advancements, published in high-impact journals like

Science Advances, have positioned Ji at the forefront of global battery research.

To learn more about the Aqueous Battery Consortium or the Energy Innovation Hub team, click: <https://abc-hub.stanford.edu/>



The DOE announced \$125 million in funding will be awarded to two energy hub teams to provide the scientific foundation needed to accelerate the next generation of energy storage technologies. Ji is part of the Aqueous

benefits including being safer, more environmentally friendly and possibly cheaper than traditional batteries like lead-acid or lithium-ion batteries.

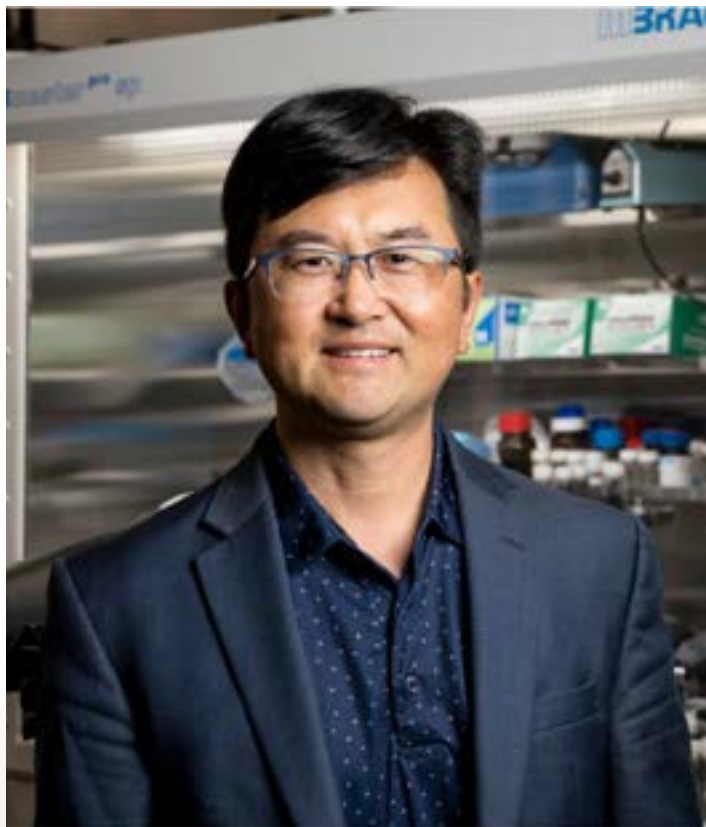
The Department of Energy emphasized that advancing research is critical to

# CHEMISTRY AWARDED

## Four of nine COS awards from University Day

Originally published in COS's IMPACT magazine by: **Hannah Ashton** | <https://science.oregonstate.edu/impact/2024/09/college-of-science-shines-with-nine-awards-at-university-day>

### OSU Impact Award for Outstanding Scholarship



Bert and Emelyn Christensen Professor **Xiulei "David" Ji** received the OSU Impact Award for Outstanding Scholarship. This award recognizes faculty who have demonstrated outstanding scholarship in a specific project or activity resulting in substantial impact beyond the university setting.

Part of the Department of Chemistry, Ji is responsible for groundbreaking work in battery science, particularly in sustainable battery and energy storage techniques. His work has not only advanced scientific understanding but has also had a profound impact on the broader scientific community, both within and outside the academic sphere.

Nominators noted he has consistently introduced innovative approaches, particularly in battery chemistry. His recent studies on zinc and iron metal batteries have fundamentally shifted how scientists approach energy storage, offering the potential to transform the industry by utilizing more abundant and cost-effective materials. These advancements, published in high-impact journals like *Science Advances*, have positioned Ji at the forefront of global battery research. His work is widely

recognized, as evidenced by his impressive citation record of over 39K citations and an H-index of 87. This metric is exceptional and exceeds typical values, indicating his position as a leading expert in his field.

"Dr. Ji's scholarly achievements represent the highest level in terms of creativity and productivity in the energy storage field around the globe," one nominator wrote.

In addition to his research, Dr. Ji is deeply committed to public engagement and the dissemination of knowledge. His ability to communicate complex scientific concepts in accessible terms has earned him significant media attention, with features in outlets such as the Associated Press, Oregon Public Broadcasting and Science Daily. His leadership also extends to shaping the future of energy research. He serves as an Associate Editor for *Carbon Energy* and is a fellow of several esteemed scientific organizations.

### Postdoctoral Excellence Award



Department of Chemistry Postdoctoral Scholar **Taylor Krueger** earned the Postdoctoral Excellence Award for his exceptional contributions to research, mentorship and outreach.

Krueger has demonstrated remarkable scholarly achievements. His research, particularly in ultrafast laser spectroscopy for bioimaging, has resulted in 17 journal publications, showcasing his innovation and productivity. One nominator emphasized Krueger's status as "a highly innovative and prolific postdoc in the field," underscoring the significant impact of his work on the scientific community. This impact has been recognized by him winning the 2023 CGS/ProQuest Distinguished Dissertation award, the sole recipient in Biological/Life Science at Oregon State.

His leadership and mentorship further distinguish him as a standout postdoc. He was one of the two recipients of the 2023 Oregon State University Excellence in Undergraduate Research Mentoring by Postdoctoral Researcher award. He has excelled in mentoring lab members and organizing educational workshops, setting “exemplary routes for others” and enhancing student learning outcomes.

Since 2017, Krueger has played a pivotal role in the OSU Juntos Chemistry Camp and its evolution into Academia Juntos, a program aimed at inspiring underrepresented youth in STEM. One nominator praised his ability to engage students “in a fun, encouraging, and educational manner,” highlighting how he helps them envision a future in higher education and STEM fields.



Department of Chemistry Postdoctoral Scholar **Andrzej Gladysiak** earned the Postdoctoral Excellence Award, for his outstanding contributions to the field of chemistry and his exemplary leadership and collaborative skills.

Gladysiak completed his Ph.D. at the Ecole Polytechnique Fédérale de Lausanne in Switzerland. His research focused on

the design and characterization of metal-organic frameworks for gas separation and sensing, where he demonstrated exceptional proficiency in crystallography.

As a postdoctoral scholar at Columbia University and later at Oregon State, Gladysiak has continued to excel, integrating his crystallography expertise with chemical engineering to address global challenges like carbon capture. He has co-authored more than 10 scientific articles at Oregon State and has taken on a mentorship role, guiding undergraduate and graduate students with his research acumen and critical thinking.

Gladysiak’s communication skills are also noteworthy; he has significantly contributed to grant applications, scientific presentations, and outreach activities, including plans to become an ambassador for the Oregon Museum of Science and Industry. His dedication to fostering an inclusive environment and supporting marginalized students at OSU further highlights his commitment to excellence in both science and mentorship.

“His exceptional intellect, strong interpersonal abilities, and unwavering enthusiasm position him as a standout scientist

capable of effectively leading multiple projects or a research group in the near future,” the nominator wrote.

#### Herbert F. Frolander Graduate Teaching Assistant Award



**Steven Tran** received the Herbert F. Frolander Award for Outstanding Graduate Teaching Assistants. Since joining the Department of Chemistry graduate program in Fall 2019, Tran has demonstrated remarkable abilities as both a teacher and researcher. He has maintained a near 4.0 GPA and shown research abilities close to the level of a postdoctoral fellow.

Tran’s teaching style is highly valued by both students and colleagues. He is known for his conscientiousness, fairness and inclusivity in the classroom, and his students appreciate his organization, promptness in grading and constructive feedback. Despite being a physical chemistry graduate student, he has also taught a broad range of chemistry courses, demonstrating his versatility and exceptional command of chemistry content. His willingness to help, even at a moment’s notice, has been crucial to avoiding lab cancellations. One faculty member said he embodies the ideals that the Oregon State community aspires to, “a strong desire to help others learn, a fantastic contagious positive attitude, a welcoming demeanor that immediately makes all students feel comfortable and respected, and a desire to make things better for students, the Department, OSU and beyond.”

As a first-generation student from a single-parent household, Tran planned to enter the workforce directly after high school to support his family. However, his passion for learning and curiosity about the world led him to pursue higher education. As Tran himself reflects, “I realized that school was not just a free daycare center or a place where I was sent to learn English; it was a place where I could be curious about how the world worked.” His experience as a first-generation college student allows him to connect deeply with students, inspiring them to overcome their challenges and succeed.



# Oregon State University

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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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