



Michigan
Technological
University

DEPARTMENT OF CHEMISTRY

CHEMNOTES

2021

▶ Table of Contents

- 2** Letter from the Chair
- 3-5** Departmental News
- 6-7** Echo of Fall 2020
- 8-11** Pandemic Chemistry
- 12-15** Awards & Recognition
- 16** Alumni News
- 17** In Memoriam
- 18-19** Notable Profiles

mtu.edu/chemistry



FROM THE CHAIR

Sarah Green Interim Chair and Professor

The Department of Chemistry and Michigan Tech successfully weathered pandemic disruptions in 2020-21, demonstrating an agility that will continue to serve us well. Heroic efforts by instructors and staff kept courses running. Remarkably, we kept all teaching labs functioning by shifting many pre- and post-lab activities online to allow smaller, shorter classes with the necessary distancing. Teaching assistants, faculty, and staff did a masterful job of coordinating all this, including recording dozens of technique demonstrations. Meanwhile, faculty invented new methods to connect with students, develop their skills, and evaluate progress in Zoom classrooms. We are grateful for our amazing students, who persevered through it all with remarkable patience, goodwill, and tenacity.

Department research continued during 2020-21. Once safety protocols were established, masked and distanced graduate students haunted the labs, frequently consulting with their advisors via Zoom. Others focused on computational research or writing projects from home. We had a chance to see each other during our dynamic Zoomified seminar series, which allowed distant speakers to visit with our researchers. As I write in August 2021, we are back to 3D human interactions, though wary of the COVID-19 delta variant's recent arrival in Houghton.

This summer the long-awaited second-round renovations of the first-year chemistry labs are underway. Our sights are set on eventually updating the organic and analytical teaching labs, and

ultimately our research facilities, since our building passed its half-century mark last year.

Likewise, our chemistry curriculum and degree offerings need to evolve with the times. In 2021 we are launching a BA in Chemistry, which allows students to combine a strong grounding in chemistry with courses tailored to career paths in health, entrepreneurship, communication, and other fields. We continue to recommend the ACS-certified BS degree for anyone on a research trajectory. The BS in Cheminformatics has been renamed to Computational Chemistry and Chemical Informatics.

Department research continues strongly, with over \$1 million in funding in FY20 and over \$900,000 in FY21, despite the disruptions. The National Science Foundation (NSF) and National Institutes of Health (NIH) are increasingly supporting department research, with recent grants to Drs. Tanasova, Christov, Fang, Liu, Green, Karabancheva-Christova, and Perrine, as well as several ongoing projects. The awardees include two students of Dr. Valenzano: Colette Sarver and Amanda Studinger are both funded by NASA to compute the properties and behavior of polyaromatic hydrocarbons in space (Sarver has gone on to pursue graduate work in astrochemistry). And, we'll soon have a new 500-megahertz nuclear magnetic resonance (NMR) spectrometer on campus, funded by the NSF thanks to the efforts of Drs. Tanasova, Fang, and Liu.

In addition to keeping courses and research going, faculty continued to publish papers in highly regarded journals. Some recent research projects are highlighted elsewhere in the newsletter. I'd like to especially point out the successes of Dr. Marina Tanasova (tenured in 2020) and Dr. Christo Christov (tenured in 2021), who have established dynamic research groups. Dr. Tanasova's lab is focused on developing, synthesizing, and testing

probes to understand how fructose interacts with cancer cells. Dr. Christov's group investigates mechanisms of enzyme catalysis via computational methods. Pre-tenure faculty in chemistry are also moving forward: Dr. Perrine was recently awarded NSF funding for her project on the surface chemistry of water disinfectants, and Dr. Karabancheva-Christova is funded by NIH for her computational studies of metalloproteins.

Last year we launched a new Graduate Student Safety Committee—on-the-ground eyes and ears—to make recommendations for improving our safety culture. I've been really pleased with their initiative and engagement. I am further dedicating some department resources to improving sustainability practices such as solvent recycling and energy/water conservation. The new Green Chemistry Journal Club is helping identify places for improvement.

Spring graduation took place in a novel format with graduates strolling through campus and stopping for photos with faculty and friends in lovely spring weather. Some people liked it so much that they suggested making the campus walk a permanent feature of commencement. (Though, that could mean adding winter boots and parkas to graduation gowns in some years!)

Our recent graduates have gone in many directions, including a research lab at Ford, an astrophysics PhD program, the local Carnegie Museum, and a sales position in California. We are incredibly proud to send them off into the world!

Thank you for your investments in the future of our Michigan Tech chemistry students!

– Sarah Green
Interim Chair and Professor
sgreen@mtu.edu

▶ DEPARTMENTAL NEWS



Work on H-STEM Complex Begins Next Spring

Construction on the H-STEM Complex is slated to begin in May 2022. The project comprises newly constructed shared and flexible lab spaces, co-located with renovated classrooms and learning spaces in the Chemical Sciences and Engineering Building. When complete, the H-STEM Complex will permit multidisciplinary teams working together in a shared, flexible, and collaborative lab space to advance learning and develop new technologies. Construction should conclude by January 2024.

Notable News

- Students can now enroll in a pathway leading to a Bachelor of Arts in Chemistry, which provides students with a firm, broadly based foundation in chemistry and allows flexibility to pursue other educational or professional objectives.
- The BS in Cheminformatics is now called Computational Chemistry and Chemical Informatics.
- Dr. Sarah Green is a co-author on the article "Quantifying the Consensus on Anthropogenic Global Warming in the Scientific Literature," which has been downloaded over 1 million times.
- An endowed scholarship (Linda G. Schmitt '74) for chemistry majors focused on organic chemistry is being established.
- Artwork by student Alex Pohl was installed on the fifth and sixth floors of the Chemical Sciences and Engineering Building. The site was thoughtfully selected to display Pohl's work, which uses pigments found locally in nature—blackberries, acorns, and iron acetate. The installation continued through the 2020-21 academic year.
- Welcome, Megan Jarvi and Hans Lechner, to the Department of Chemistry!
- We now have a social media presence! Find the Department of Chemistry on:

 @chemistry.michigan.tech

 @MTU_chemistry  Michigan Tech Chemistry

Graduate Student Safety Committee



The Department of Chemistry Graduate Student Safety Committee launched in 2020. This graduate researcher-led laboratory safety team focuses on the safety of chemical laboratories within the department. It seeks to provide a platform where graduate researchers can teach and learn about safe laboratory practices while building their safety leadership skills. The idea was conceived after a few of the members attended an American Chemical Society Division of Chemical Health and Safety workshop in fall 2020.



▶ FACULTY AWARDS

Shiyue Fang

\$250,000 NSF Grant, July 2019

"PFI-TT: Affordable and High-Quality Polyethylene Glycols for Nanomedicine and Other Applications"

\$490,000 NSF Grant, July 2020

"CAS: Long Oligodeoxynucleotides Directly from Automated De Novo Synthesis"

Kathryn Perrine

Michigan Space Grant Consortium Award, February 2020

"Influence of Water Vapor and Cationic Species in Corrosion Reactions on Iron Interfaces"

Research Seed Grant, November 2019

"REF/RS: Measuring in situ Surface Corrosion and Dechlorination Reactions on Iron Interfaces to Address Water Quality Challenges"

Andrew Galerneau

Dean's Teaching Showcase 2021

CTL Large Class Teaching Award, 2021

Marina Tanasova

Research Excellence Fund Awards, November 2019

Portage Health Foundation Infrastructure Enhancement Grant, November 2019

ADVANCE Grant (Proof of Concept Funds, MSU), March 2020

\$446,849 NIH Award, July 2019

"Exploiting Cellular Discrimination through GLUTs with Small-Molecule GLUT-Targeting Probes"

Paul Charlesworth

CTL Instructional Award, November 2019

Rudy Luck

VIPEr Fellow, September 2020

Ashutosh Tiwari

\$459,000 award, NIH, June 2019

"Ratiometric Near-infrared Fluorescent Probes for sensitive Detection of Lysosomal and Mitochondrial pH changes in live cells"

Christo Christov

\$179,040 NSF grant, July 2019

"Collaborative Research-Ethylene Forming Enzyme"

\$382,448 R&D grants, US Department of Health and Human Services and NIH, June 2021

Earned tenure, spring 2021

Tatyana Karabancheva-Christova

\$439,609 NIH grant, March 2020

"Insights in structure function relationships of Matrix metalloproteinase-1 from computational experimental studies"

Hired as associate professor, January 2020

Momoko Tajiri

\$33,597 grant, Michigan Department of Agriculture and Rural Development-Michigan Craft Beer Council, April 2020

"Berries & Brews: Understanding the Market and Technological Processing Opportunities of Michigan Grown Fruit in the Craft Beverage Industry"

Xiaochu Ding

Research Seed Grant, Portage Health Foundation
Research Excellence Fund Awards, May 2021

▶ THE RETIREMENT OF PUSHPA MURTHY



Pushpa Murthy retired July 1, 2020. Before retiring, Murthy had served as associate provost and dean of the Graduate School since 2016, when she returned from a three-year appointment as program director in the Division of Graduate Education at the National Science Foundation.

Murthy joined Michigan Tech as a faculty member in the Department of Chemistry in 1985. She served as its department chair from 2000 to 2004 and directed Michigan Tech's Women in Science and Engineering (WISE) program between 2007 and 2012.

The provost and academic deans wished Murthy well:

"Dr. Murthy has been a strong and unwavering advocate for graduate students. Under her leadership, graduate student support and experiences improved and educational quality increased. A heartfelt thanks for all of your contributions and positive impacts."

—Adrienne Minerick, former dean of the College of Computing

"I have appreciated the opportunity to work with and learn from Pushpa when I was chair of the Graduate Faculty Council and as a dean—she will be missed as we wish her a wonderful time in retirement."

—Andrew Storer, dean of the College of Forest Resources and Environmental Science

"From the moment I arrived, two years ago, I felt a part of the MTU family. That may be because the house I bought had been the chemistry review Q&A homestead for years, and also a direct result of Dr. Pushpa Murthy's strong influence in the area and at the University for decades."

—Janet Callahan, dean of the College of Engineering

“ Pushpa has contributed to Michigan Tech and the Graduate School in so many ways. I’m going to miss having easy access to her wisdom. ”

— Jacqueline Huntoon, Provost and Senior Vice President for Academic Affairs

Murthy summed up her 35 years at Michigan Tech in one word: fun. “When we first arrived at Michigan Tech, we were sure we would be here for only a few years—too far, too cold, and too isolated, we said. We stayed because we found outstanding students, exceptional colleagues—faculty and staff, and a wonderful community,” said Murthy. “I would like to thank all the students I have worked with, including the thousands in my organic chemistry and first-year chemistry courses, and a very special shoutout to the 75-plus graduate and undergraduate research students who worked in my lab. I wish to thank my colleagues in chemistry and chemical engineering, and across the University for rich spirited discussions on teaching, learning, research, and University governance as well as other arcane topics of interest to few outside the University. And finally, to my colleagues in the Graduate School—thank you for your support, hard work, and sense of family. I have always been passionate about graduate education, and you are the reason we were able to accomplish what we did. I have truly enjoyed it all!”



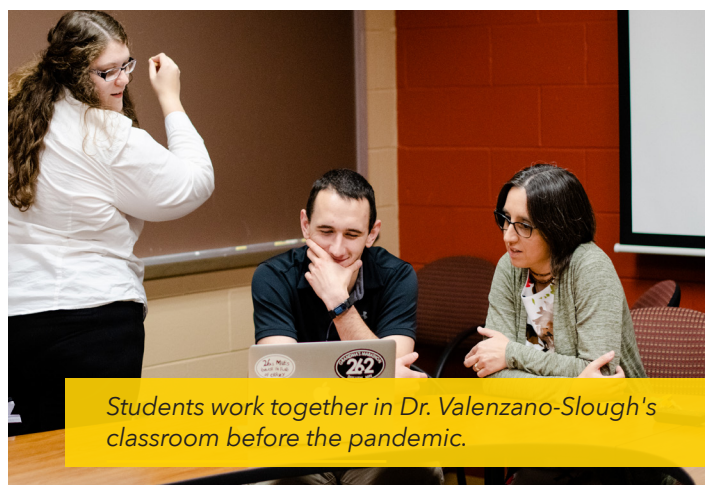
▶ A NEW SEMESTER AND THE ECHO OF FALL 2020

Everybody is back! Michigan Tech's campus is swarming with students. Mostly walking in groups, they smile and laugh at the narration of each other's summer adventures. The air and incident angle of the sun are hinting at the fact that, in the UP, fall is knocking at the door. Soon enough, the unequivocal signs of the change of seasons will appear: early morning mist rising from the canal, tree leaves smoothly changing color, the first morning frosts. Nobody would be surprised to soon spot a few timid snowflakes.

The first day of class is always positively charged with excitement and promises. It's a day that returns every year, and yet always feels like a debut. It's the day where the light veil of ambitions and good propositions wins over the heavy burden of uncertainties and doubts. As the first day of the fall semester begins, I always stop for a few minutes to absorb the energy that the students are spreading and that I will do my best to return to them when, later during the semester, they will most need it. And, at last, the moment I have eagerly waited for has come—it's time for me to go to class, meet them, work with them, and see them grow!

But fall 2020 was very much different. Campus was much quieter, and everybody's smiles were covered by face coverings. With the high degree of uncertainty related to the ongoing pandemic, I set two priorities:

the well-being of the students and giving them the flexibility to more freely organize their days and weeks should medical emergencies manifest in their families. I won't describe the logistical and technical teaching approaches I adopted in fall 2020 and spring 2021; instead, I will concentrate on their most notable outcomes.



Students work together in Dr. Valenzano-Slough's classroom before the pandemic.

Trust, honesty, and mutual respect are the core principles of my teaching style—they make the class and lab environment a pleasant place to be, where good things can be done and results can be achieved together. In the usual class environment (what we now commonly call face-to-face or in-person instruction),



it takes a few meetings for the students and me to reach the right balance between doubts and expectations. Going into fall 2020, I thought: How was remote instruction going to work for a whole 14-week regular semester? How was I going to engage the students and get to know them? Were they going to trust me? Were they going to be successful while jumping from one Canvas link to the other, dodging the virus, and worrying about their own and their family's health?

“ They wanted to give all they had—they wanted to learn and succeed. And they did! We all did! We all worked hard, diligently, constantly. ”

Concerned about not being able to establish a direct connection with the students, through video and Canvas announcements, emails, and at the end of almost every lecture video, I encouraged them to meet with me in Zoom to discuss any issues they might have. Soon, requests arrived; they had questions, they needed to be reassured, they wanted to know if their reasoning in solving problems was correct or whether their exam study approach was going to be successful. They wanted to give all they had—they wanted to learn and succeed. And they did! We all did! We all worked hard, diligently, constantly. We trusted each other, we were honest with each other, and we respected each other. We worked together for months, despite having never met in person and never been in the same classroom or lab. We helped each other in doing and being the best we could, given the circumstances.

Will fall 2021 be back to normal? At the time of this writing in July 2021, I know only one thing for certain—either in person or through a computer screen, nothing can beat, professionally, the joy of hearing: “Hey, Dr. V, I just wanted to thank you for your class this semester!” I am indebted to all the students I had the fortune to have in my classes throughout the years, because they are the reason I love my job: the trustworthy, honest, respectful Michigan Tech students who allow me to do what I love doing and be what I am.

– Dr. Loredana Valenzano-Slough

THE INSTRUCTIONAL BONDS OF PANDEMIC CHEMISTRY CLASSES

Through remote instruction, hybrid classes, and adaptive lesson plans, instructors in the Department of Chemistry helped their students through the pandemic.

Some profs learned they liked online lectures and want to keep them. Some dreaded hybrid class prep and the hundreds of separate containers needed to run a single lab experiment. They made technique videos, solo lab stations, and home studios. They're grateful for teaching assistants (TAs). Most are still weary. One plans to burn the face shield they wore during in person lectures Viking funeral pyre style.

“ The level of interest, enthusiasm, and focus of the students in a Zoom class surprised me. Most of the time I felt that Zoom could not foil the main objectives of my teaching. If both sides—the students and the instructor—are sincere and interested, and if the instructor is passionate, the quality of learning remains high, even in a remote setting.

— Tarun Dam, glycobiologist and associate professor

For all of them, distance based methods of teaching chemistry a subject that is traditionally lab based and hands on, but also abstract and akin to learning a new language were a shared hardship.

Read more about what many instructors faced and overcame during the first year of the pandemic at mtu.edu/news/chem





Before the pandemic, regular lab setup included a bench for students to stop in and pick up materials. Physical distancing required single serving containers for individual workbenches, which meant some labs required up to 750 extra containers to run a single class experiment.

The Kinetics of Instruction

Much like lab gloves, teaching rarely succeeds with a one-size-fits-all approach, and the COVID-19 pandemic is no exception. Even as classrooms, offices, cafeterias, and local businesses continue to reopen, the pandemic and its impact on education is far from over. That makes class format an important part of the conversation in reflecting on and recovering from the initial changes wrought by COVID-19 safety protocols.

Classes that were fully remote—taught via live virtual lectures or recorded lectures and premade demo videos—became the norm almost overnight in March 2020. But courses like Organic Chemistry and Introductory Chemistry require lab time. It's tough to learn titration from talking and YouTube videos alone. So, in summer 2020, the Department of Chemistry was one of two departments asked to experiment with and design hybrid lecture and lab courses that the rest of campus could mimic during the fall 2020 semester. It worked. Michigan Tech went to remote lectures, hybrid classes and (mostly) in-person lab sections in fall 2020, supported by a robust COVID-19 testing program and wastewater monitoring.

Now scale up. University Chemistry is Michigan Tech's general chemistry course, and usually enrolls 1,200 students each year. With up to 66 lab sections, it uses all six of the intro chem labs, running in time slots just 10 minutes shy of three hours. In-person physical distancing meant long labs got sliced into 80-minute speed rounds—and working with a partner was not an option. All the equipment and reagents were diced into single servings at individual workstations. Students entered through one set of doors and left through another, and their TAs poured, labeled, and



Dr. Paul Charlesworth's studio setup for recitation courses.

handed out 90 to 750 containers in a single lab section. The prep benches went from six to 60.

Despite the department's ingenuity, many students opted to go fully remote or switch between remote and in-person learning in fall 2020. So, every single experiment needed a step-by-step procedure video and many shorter technique videos to help students learn chemistry outside the lab space. The technique videos, which other classes used as well, were an especially helpful technology.

Graduate students mostly made those videos. But they had their own classes and research to adjust, which was particularly challenging when their graduate research involved experimental work and lab equipment. Students and faculty prioritized written work for publications or reports and expanded computational elements to their dissertation projects so progress could occur outside of the laboratory. When labs could be opened, they scheduled staggered lab time.

Supplemental Instruction Improves Grades

However, it's not always an instructor or TA helping a student. Michigan Tech's education is built around teamwork and peer-to-peer learning, which became a significant challenge during the pandemic. That's why the Chemistry Learning Center, among others, stepped up to make sure MTU's Supplemental Instruction (SI) programs did not succumb to the pandemic's pressures.

SI is a peer-facilitated group learning program: Student leaders adapted online tools such as Pollev, Zoom polls, and EasyPoll to digitally read the room, and whiteboard apps like Google JamBoard to draw compounds and balance equations, along with online review games like Kahoot and JeopardyLabs. The Chemistry Learning Center reports that regular attendees earned a whole letter grade higher on average than their non-attending counterparts during the 2020-21 year.

The 2021-22 year may bring its own challenges—but the resilience and creativity of MTU's chemistry instructors have better positioned the entire University to handle them. Their efforts are a reminder to stop, breathe, catalyze a little calm, and offer some gratitude for all our teachers.

CHEMISTRY LABS: BY THE NUMBERS

STATS ON AN AVERAGE YEAR

1,200

MTU's University Chemistry enrollment per year

~66

lab sections

6

number of labs used

PRE-PANDEMIC

170

vs.

PANDEMIC

80

minutes per lab section

6

vs.

60

prep benches per lab section

24-180

vs.

120-900

containers labeled and distributed per experiment



► AWARDS AND RECOGNITION

Graduate Departmental Awards

Award	Presented To	Year
Outstanding Lower-Division Chemistry Teaching Assistant (TA)	Priyanka Kadav, Jessica Krycia, and Nazanin Nahrjou	2020
Outstanding Lower-Division Chemistry TA	Connor Hensley and Amanda Studinger	2021
Outstanding Lower-Division Chemistry TA-Honorable Mention	Ethan Burghardt and Alexander Apostle	2021
Outstanding Upper-Division Chemistry TA	Mikhail Trought	2020
Outstanding Upper-Division Chemistry TA	Nick Newberry and Parya Siahcheshm	2021
Graduate Student Leadership Award	Mikhail Trought	2020
Outstanding Graduate Student Summer Fellowship	Shobhit Chaturvedi	2020
Outstanding Graduate Student Summer Fellowship	Sodiq Waheed	2021
Outstanding Graduate Student Summer Fellowship-Honorable Mention	Chathura de Alwis	2020
Ray E. and Eleanor K. Cross Endowed Graduate Fellowship in Chemistry	Priyanka Kadav	2021
Robert and Kathleen Lane Outstanding Graduate Research Award	Dhananjani Eriyagama and Chathura Adambarage	2021
Undergraduate Award in Analytical Chemistry	Andrew Zampaloni	2021
Department of Chemistry Ambassador Award	Komal Chillar	2021

Undergraduate Departmental Awards

Award	Presented To	Year
Outstanding Student in First Year Chemistry	Vincent Pellizzon	2020
Outstanding Student in First Year Chemistry	Justin Andersen	2021
Doc Berry Award	Abby Schwartz	2020
Doc Berry Award	Steve Beuther	2021
Leslie Leifer Award in Physical Chemistry	Colette Sarver	2020
Leslie Leifer Award in Physical Chemistry	Henry Roell	2021
Undergraduate Award in Organic Chemistry	Henry Roell	2020
Undergraduate Award in Organic Chemistry	Ellianna Sempek	2021
Undergraduate Award in Inorganic Chemistry	Logan Mikesell	2020
Undergraduate Award in Inorganic Chemistry	Collette Sarver	2021
Undergraduate Award in Analytical Chemistry	Peyton Bainbridge	2020
Undergraduate Award in Analytical Chemistry	Andrew Zampaloni	2021
Undergraduate Award in Analytical Chemistry-Honorable Mention	Collette Sarver and Abby Schwartz	2020
Undergraduate Award in Biochemistry	Jessica Krycia	2020
Undergraduate Award in Biochemistry	Henry Roell	2021
Outstanding Senior Award	Peyton Bainbridge and Jessica Krycia	2020
Outstanding Senior Award	Collette Sarver	2021
Outstanding Senior Award-Honorable Mention	Logan Mikesell and Sarah Montgomery	2020
Outstanding Senior Research Award	Michael Hromada and Sarah Montgomery	2020
Outstanding Senior Research Award	Ethan Burghardt	2021
Departmental Scholar	Collette Sarver	2020
Departmental Scholar	Ethan Burghardt	2021
Departmental Scholar-Honorable Mention	Steve Beuther, Henry Roell, and Garven Huntley	2021
Rebecca Sandretto and Susan Stackhouse Undergraduate Summer Fellowship	Steve Beuther	2020
Rebecca Sandretto and Susan Stackhouse Undergraduate Summer Fellowship	Connor Hall	2021
Department of Chemistry Ambassador Award	Erin Berglund, Gretchen Heins, and Abby Schwartz	2021

Graduate Awards

Award/Recognition	Presented To
Best Poster, Biophysical Society Poster Competition	Sodiq Waheed
College of Sciences and Arts Songer Award 2021	Jared Edwards
Graduate School Finishing Fellow-Winter 2020	Vaho Begoyan
Graduate School Finishing Fellow-Winter 2020	Christina Welch
Graduate School Finishing Fellow-Winter 2020	Shuai Xia
Graduate School Finishing Fellow-Spring 2021	Mikhail Trough
Graduate Student Government Colloquium Winner	Amanda Studinger (with Dr. Valenzano-Slough)
Health Research Institute Fall Fellowship	Adelina Oronova
Michigan Space Grant	Amanda Studinger (with Dr. Valenzano-Slough)
Portage Health Foundation Graduate Assistantship-Winter 2020	Avik Ghosh
Outstanding Graduate Student Teaching Award-October 2019	Parya Siahcheshm
Outstanding Graduate Student Teaching Award-February 2020	Mikhail Trought
Outstanding Graduate Student Teaching Award-February 2021	Nick Newberry

Undergraduate Awards

Award/Recognition	Presented To
Michigan Space Grant	Collette Sarver (with Dr. Valenzano-Slough)
Pruett Undergraduate Fellowship-Summer 2019	Peyton Bainbridge
Sandreto/Stackhouse Undergraduate Fellowship	Steve Beuther
Songer Award for Human Health Research-Fall 2019	Andrew Cooper
Summer Undergraduate Research Fund Award	Kayleigh Wahr
Undergraduate Research Symposium First Place-2021	Ethan Burghardt
URIP Pavlis Honors College Young Investigator-Fall 2019	Jason Barr
URIP Pavlis Honors College Young Investigator-Spring 2020	Peyton Bainbridge

▶ RECENT GRADS



The spring 2020 and fall 2020 commencement ceremonies were canceled, and while nothing can fully replace an in-person ceremony, Michigan Tech tried to make the most of the situation with a new celebration in spring 2021.

At the end of the spring 2021 semester, graduates celebrated with an outdoor walk along the campus mall on the sunny afternoon of Friday, April 30. Faculty, staff, departments, friends, and family took part in the celebration by cheering on their students as they participated in this send-off.

The celebration was held in honor of the accomplishments of nearly 700 undergraduate and graduate students who completed their degrees by the end of the fall 2020 semester. Despite the lack of a formal commencement ceremony due to COVID-19 restrictions, more than 350 undergraduates and nearly 330 graduate students were recognized.

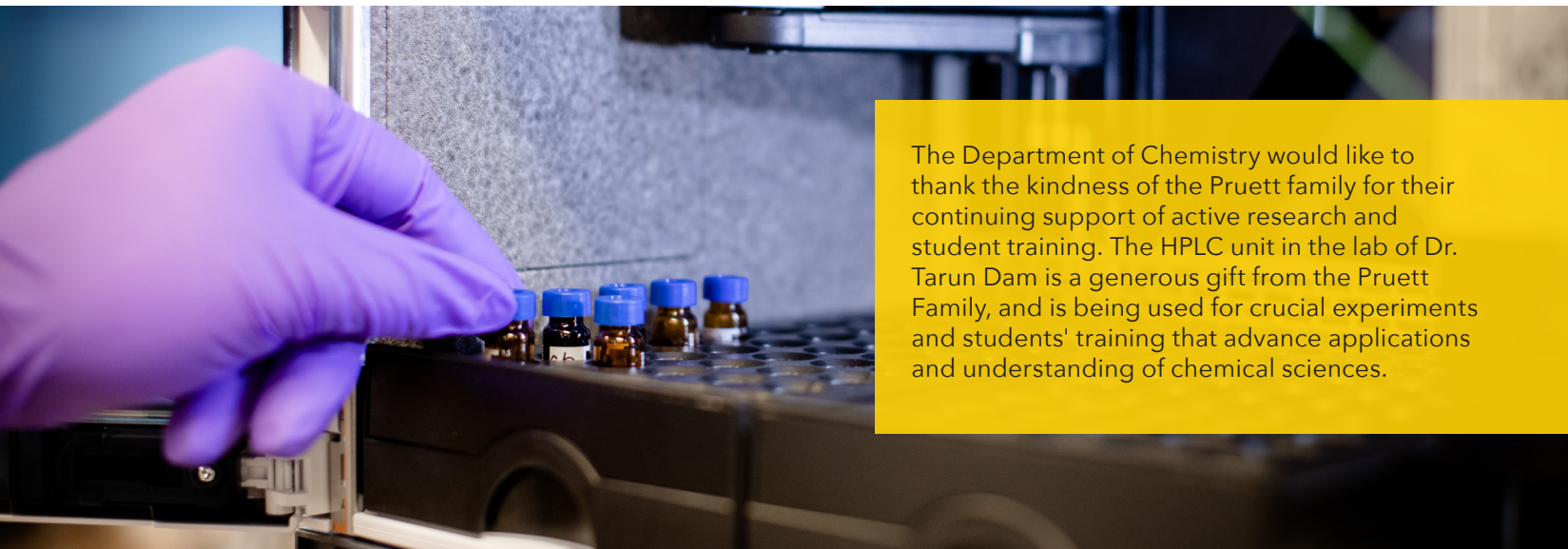
PhDs Awarded	Advisor	Year
Rashmi Adhikari	Ashutosh Tiwari	2019-20
Vagarshak Begoyan	Marina Tanasova	2019-20
Matthew Alfred Brege	Lynn Mazzoleni	2019-20
Bhaskar Halami	Shiyue Fang	2019-20
Wafa Mazi	Haiying Liu	2019-20
Shahien Shahsavari	Shiyue Fang	2019-20
Mikhail Trought	Kathryn Perrine	2020-21
Christina Welch	Tarun Dam	2019-20
Shuai Xia	Haiying Liu	2019-20
Xin Yan	Lanrong Bi	2019-20

Master's Degrees Awarded	Advisor	Year
Chathura De Alwis Adambarage	Kathryn Perrine	2020-21
Nazanin Nahrjou	Marina Tanasova	2019-20
Parya Siahcheshm	Patricia Heiden	2019-20
Fei Xie	Haiying Liu	2019-20

Undergraduate Degrees Awarded	Year
Patrick Acton	2020-21
Zach Angst*	2020-21
Peyton Bainbridge	2020-21
Erin Berglund	2020-21
Grace Billman-Beneviste	2019-20
Sami Bolles	2020-21
William Carstens	2019-20
Nathan R. Conner*	2019-20
Liz Hedgecock	2020-21
Michael Hromada	2020-21
Sarah Jones	2019-20
Sarah Kizselik	2020-21
Jessica Krycia	2019-20
Logan McDonald	2020-21
Jerry Medford	2020-21
Logan Mikesell	2019-20
Brett Otto*	2020-21
Collete Sarver	2020-21
Mackenzie Scholz	2020-21

*Midyear graduation

▶ ALUMNI NEWS



The Department of Chemistry would like to thank the kindness of the Pruett family for their continuing support of active research and student training. The HPLC unit in the lab of Dr. Tarun Dam is a generous gift from the Pruett Family, and is being used for crucial experiments and students' training that advance applications and understanding of chemical sciences.

- Special thanks for the generous donations received from: James and Elaine Bolthouse (\$25,000), Elton and Miriam Cairns, Mark and Ginger Chateaufeuf, James G. Matujec, and Dean and Julie Seppala.
- Element of Success = Number 102, nobelium. Jane Raymond-Wood, a faithful donor, has claimed a second Element of Success with a generous gift made in November 2020. The previous element, radium, was in honor of both Jane and her husband Tom. This newest element is just in her name.
- Eric Schelter, a professor at the University of Pennsylvania and a Michigan Tech alum, won the Inorganic Chemistry Lectureship Award.
- Linda G. Schmitt is helping create an endowed scholarship for chemistry majors focused on organic chemistry.
- A new gift from David and Valeria Pruett will be used to fund a postdoc researcher in Tatyana Karabancheva-Christova's group.
- Ben Larson, J. Craig, and Gretchen Speck contributed to the Excellence in Graduate Education Fund for summer support.



Alumnus Joins Research Staff at Carnegie Museum of Natural History

Michigan Tech alumnus Travis Olds (Chemistry '12) is the new assistant curator of minerals at the Carnegie Museum of Natural History in Pittsburgh. Olds was selected following what the museum deemed "an international search." He took up the position on December 30, 2019.

"We're thrilled to welcome Travis to our distinguished team of researchers," said Steve Tonsor, the museum's Daniel G. and Carole L. Kamin Interim Director. "Our mineral collection is among the world's best, and our institution's scientific work in this field enjoys a celebrated legacy. Travis, whose work zeroes in on the intersections of humans and minerals, positions us to build on this legacy and achieve new relevance."

► IN MEMORIAM

Professor Emeritus Larry Julien

Michigan Tech Chemistry Professor Emeritus Larry Julien passed away August 27, 2020, at his Houghton home following a four-year battle with brain cancer and Parkinson's disease.

A native of Nora Springs, Iowa, Larry taught at Michigan Tech from 1966 until his retirement in 2000. The classes he taught included physical chemistry, quantum chem, statistics, advanced graduate P chem, and freshman chem classes where he used a lot of chemical demonstrations in his lectures. He developed and taught summers "Computers for the Classroom" to high school science teachers from across the nation, and volunteered to do after-school science programs at local schools. He served two years as president of the University Senate, and was also the University's ombudsman and its marshal for commencement ceremonies.

Larry enjoyed fishing, sports, canoeing, and country living on Lake Superior in the house he built with his wife Connie. Dr. Julien was a friend to all and was always willing to listen and help in any way he could.



Pref Class	Full Name	Degree(s)
1954	Lucille W. Bicknell	BS Chemistry
1957	Ora L. Flaningam	BS Chemistry, 1954
1957	Ronald G. Sonderhouse	BS Chemistry
1961	Carl E. Lugviel	BS Chemistry
1964	Cecilia J. Faw	BS Chemistry
1971	Jeffrey C. Strieter	BS Chemistry

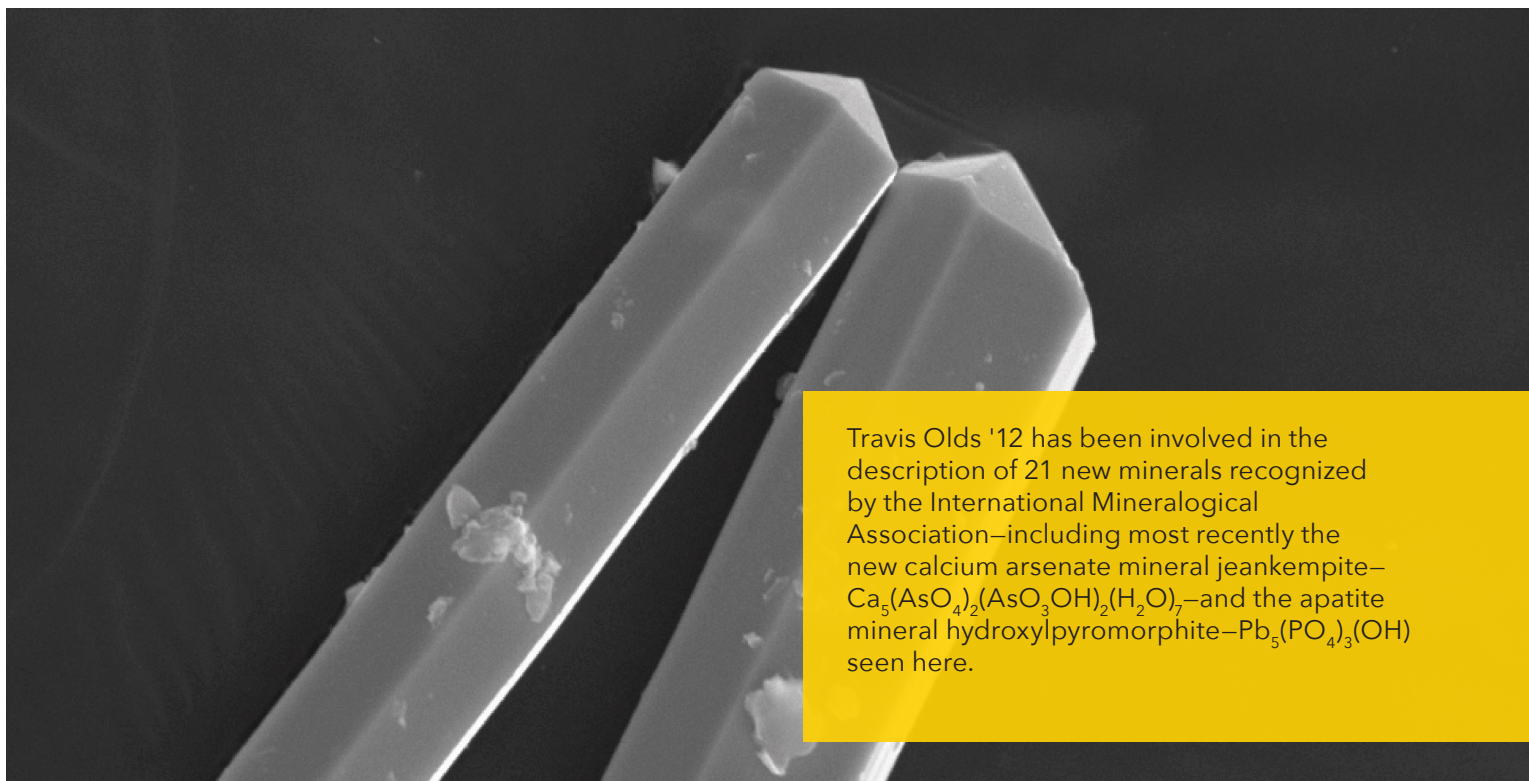
► LIST OF DONORS June 2019 to June 2021

Emily V. Baker
Martha A. Banks Harding
Benevity Community Impact Fund
Robert and Roxann Berner
Lucille W. Bicknell
James and Elaine Bolthouse
Carole L. Bolthouse
Ricki and Jeanette Burger
Elton and Miriam Cairns
James and Carol Cetnar
Paul and Debra Charlesworth
Mark and Ginger Chateauneuf
Leslie Cook and Stefany Valentine-Cook
Arthur P. Craig
Lawrence and Laura Creemer
Alan and Debra Crowther
Xiaochu Ding
Richard and Anne Fornicola
Yunpeng Geng and Xiaoqing Zeng
Walt and Raeanna Gislason
Sarah Green and Floyd Henderson

Thomas and Adele Greenlee
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Patricia A. Heiden
Lou Ellyn and Ronald Helman
Jacquelyn A. Hillman
David and Geraldine Horsma
Donald D. Horton III, P.E.
John and Sherry Jaszczak
Rudolph and Julie Johnson
Connie D. Julien
Steven and Carol Keinath
Lynnette and Jeffrey Klucinec
Robert P. Laney
Larry and Rachel Lankton
Jodi and John Lehman
Ralph and Patricia Lund
Russell and Lorraine Mattson
James G. Matujec

Pushpalatha Murthy and Madhukar Vable
Mark and Suzanne Nachbor
Thomas Neils and Stephanie Schaertel
Edwin and Patricia Perry
Jan Pierce
Adrian L. Pishko
David and Valeria Pruett
Vesa Pylkkanen and Laura Barrientos
Jane Raymond-Wood and Thomas Wood
Scott C. Roth
Stanley and Pauline Schroeder
Oliver R. Simi
Patricia Smiley and William Miles
J. Craig and Gretchen Speck
Thomas Verme and Nancy Ciavarri
Jeremy T. Wilmot
Randall Winans
James and Kathie Woelfel
Mingming and Lihua Zhou
Kenneth and Eilene Znidarsic

► NOTABLE PROFILES



Travis Olds '12 has been involved in the description of 21 new minerals recognized by the International Mineralogical Association—including most recently the new calcium arsenate mineral jeankempite— $\text{Ca}_5(\text{AsO}_4)_2(\text{AsO}_3\text{OH})_2(\text{H}_2\text{O})_7$ —and the apatite mineral hydroxylpyromorphite— $\text{Pb}_5(\text{PO}_4)_3(\text{OH})$ seen here.



Dr. Travis Olds '12, a native of Ishpeming, Michigan, has spent significant time searching for and studying the UP's rarest minerals. His passion is based in a fascination with chemistry—motivated by his father and uncle, who worked in the iron mines around Marquette County, and by influential MTU faculty:

"I was lucky to learn from many great mentors at MTU, including George Robinson, John Jaszczak, Rudy Luck, and others. Each passed on their unique scientific perspectives and skills that I use every day as a mineralogist."

Olds went on to study uranium mineralogy and crystallography at the University of Notre Dame, receiving his PhD in 2017. His postdoctoral research focused on the materials science of simulated nuclear fuel at Washington State University. In late 2019, Travis became assistant curator of minerals at the Carnegie Museum of Natural History in Pittsburgh, Pennsylvania, where he continues to specialize in crystallography, using diffraction and spectroscopic techniques to understand how atomic arrangement affects material properties.

Dr. Christina Welch '20 is a separation scientist in analytical development at Absci in Vancouver, Washington. Her work is centered on separating



target molecules from other impurities. She learned many of her skills at Michigan Tech as a research assistant in Tarun Dam's lab—including pipetting, doing SDS-PAGE, and running the HPLC. She credits those lab experiences as "the whole reason" she has her current job. She wants to go beyond basic separation techniques, expanding

her knowledge of various molecules and interactions to develop new methods of separation. Her PhD studies on glycan interactions with various molecules are already translating into possible separations methods in her current work.

Welch is proud to have built such a strong research foundation, which includes the publication of a paper on a new lectin and glycoprotein purification method. The paper, published by Dam's research team during her final year of PhD studies, led to the publication of a subsequent protocol paper. She called the initial paper a great accomplishment that took a lot of work from everyone in the lab.

Amanda Studinger is completing her PhD in Chemistry with a focus on theoretical physical chemistry. Working with Loredana Valenzano-Slough, she studies intermolecular energetic properties of active pharmaceutical ingredient (API) cocrystal conformers and interstellar polycyclic hydrocarbons, and also maps terahertz spectroscopy of energetic materials and cosmetic nitro musks. From proof of concept to improved product development, the applications include better understanding of abiogenesis and detection methods for homeland security.

Studinger is from Manistique, Michigan, and earned her AS from Bay de Noc Community College and her BS in Chemistry from Northern Michigan University. She came to Michigan Tech with industry experience in research and development, chemical manufacturing, quality assurance, and environmental consulting. Her industry research projects include degradable plastics, chemical engineering of material production and disinfection systems, intake water entrapment and effluent thermal impact studies, and process water chemistry treatments for mitigating flow-accelerated corrosion. She plans to leverage her work and education experience to teach chemistry at the university level to help the next generation of working professionals.

Sodiq Waheed is completing his PhD in Chemistry under Christo Christov and Tatyana Karabencheva-Christova. He is researching computational approaches to understanding the structure-function relationships, conformational flexibility, collective motions, catalytic mechanisms, and electronic structures of non-heme Fe(II) and 2-oxoglutarate dependent enzymes, which are involved in DNA repair,

epigenetic regulation, and histone N-methyl arginine demethylation.

Waheed grew up in Oyo, a town in southwestern Nigeria. He holds a BS in Industrial Chemistry and an MS in Physical Chemistry from the University of Ibadan. He also completed a master-level integrated study program in theoretical chemistry and computational modeling at the University of Porto in Portugal and the University of Valencia in Spain. The program's second year was dedicated to research—specifically, unraveling the full mechanism of the reduction of glutathione disulfide by glutaredoxin using a hybrid method of quantum and molecular mechanics. He plans to continue conducting research as a university professor, instructing students in physical chemistry, theoretical and computational chemistry, and other related subjects.



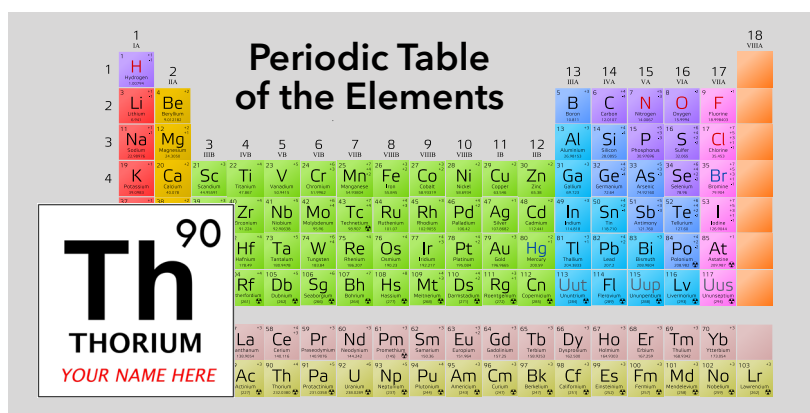
Jared Edwards and Priyanka Kadav in the Laboratory of Mechanistic Glycobiology.

Jared Edwards and Priyanka Kadav are both pursuing their PhD in Chemistry in the Laboratory of Mechanistic Glycobiology alongside Tarun Dam. The pair is researching the purification and characterization of a complex plant-based hemolytic molecule, Hemolysin X; the binding capabilities of human protein Galectin-3; and a fundamental, widely applicable purification process involving the capture and release (CaRe) of proteins using the sugars many have attached.

Edwards is from Manistique, Michigan, and holds a BS in Biochemistry from Northern Michigan University. He has taken a great interest in plants and the biochemically relevant compounds they produce and is also interested in studying the geometric orientation of multivalent ligand-substrate lattices. He plans to find a career in research—and hopes to find a way to link his future work to space and its exploration.

Kadav is from Mumbai in the state of Maharashtra, India. She earned bachelor's and master's degrees in microbiology from the University of Mumbai, and another master's in forest molecular genetics and biotechnology from Michigan Tech. She plans to join the research and development team of a biotechnological or pharmaceutical company, and intends to research proteins with biomedical significance.

▶ GIVING OPPORTUNITIES



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