

THE MIDLAND CHEMIST

A publication of the Midland Section of the American Chemical Society

July 2022, Vol. 59, No. 7

Contents

| | |
|--|----|
| Call for Nominations for 2023 Officer and Director Candidates..... | 1 |
| Midland Section ACS Receives 13 ChemLuminary Award Nominations for 2021 Programs | 2 |
| David Allan Wins ACS Division of Chemical Education Central Region Award for Excellence in High School Teaching..... | 3 |
| Announcing a Couple of Cool Summer Camps!..... | 5 |
| 2022 Project SEED Program Update | 8 |
| 18th Annual MSU ChEMS Department Research Forum, August 23..... | 10 |
| Water Quality Testing – Volunteer Adventure Opportunity, July 29–31 | 13 |
| Exhibit Progress: We're Almost There! | 14 |
| SVSU Adjunct Chemistry Instructor Opportunities | 15 |
| Testing the Limits of Recycling..... | 15 |
| Please Consider the Midland ACS Scholarship Fund in Your 2022 Giving! | 17 |
| In Memoriam – Douglas Leng..... | 18 |
| In Memoriam – Jacob Eichhorn..... | 19 |
| Upcoming Dates, Events, and Other Updates | 20 |

Call for Nominations for 2023 Officer and Director Candidates

Shuting Feng, Chair, Nominations and Elections Committee, Midland Section ACS

Here is your opportunity to become more involved in your local ACS section! We need candidates to run for the following positions for 2023:

- Chair-elect (1-year term)*
- Secretary (1-year term)
- Treasurer (1-year term)
- Chair, Nominations and Elections Committee (1-year term)
- Directors (3 open positions for 3-year terms)

*Note: The election of a Midland Section ACS member to the Chair-elect position triggers a rolling three-year commitment, the first year as Chair-elect, the second year as Chair, and the third year as Past Chair. The Chair and Past Chair positions are not subject to the annual elections process unless a vacancy arises.

If you are interested in running for any of these positions, or if you know of someone who might be interested, please contact Shuting Feng at fengs1391@gmail.com. If you have any questions regarding the responsibilities

of any of the positions, please contact the current officers or Shuting Feng. You are also encouraged to visit our website at www.midlandacs.org.

Midland Section ACS Receives 13 ChemLuminary Award Nominations for 2021 Programs

Robbyn Prange, Past Chair, Midland Section ACS



The Midland Section of the American Chemical Society is honored to be nominated for thirteen 2021 ChemLuminary awards, once again including the competitive award for Outstanding Performance by a Local Section in the Medium Size Category.

It is truly impressive how much of a powerhouse the team of dedicated, hard-working Midland Section ACS volunteers is. The commitment, inventiveness, and creativity of our volunteers are being recognized as some of the best in the nation, once again. The Midland local section has been selected as a finalist for the following ChemLuminary Awards:

- **Best Continuing Senior Chemists Activity within a Local Section:** Planning for Centennial Exhibit Reset at Central Michigan University (CMU)
- **Best Event or Activity Organized by, or Benefiting, the Applied Chemical Technology Professional Community:** MMTG Anniversary Dinner
- **Best New Public Relations or Communications Program of a Local Section:** 365 Days of Chemistry
- **Best Overall Local Section Minority Affairs:** Summary of Minority Affairs
- **Local Section Partnership Award / Marinda Li Wu Award:** STEAM Stew
- **MAC Industry Engagement & Outreach:** MMTG 30th Anniversary
- **Most Creative & Innovative Use of the CCEW Theme:** CCEW Exposure / Seminar
- **Most Creative NCW Celebration Using the Yearly Theme:** Halloween Bash
- **Outstanding Continuing Public Relations or Communications Program of a Local Section:** Newsletter
- **Outstanding Engagement with K-8 Students:** 2021 Summary of Engagement
- **Outstanding High School Student Program Award:** Summer of High School Programs in 2021
- **Outstanding Local Section Industry Event:** MMTG Anniversary Dinner
- **Outstanding Performance by a Local Section – Medium Size Category**

Winners will be announced, and the awards presentation will occur at the ACS 2022 Fall National Meeting in Chicago, IL, on Tuesday, August 23, at the Hyatt Regency Chicago, located at 151 East Wacker Drive, Chicago, IL 60601.

Congratulations, Midland Section ACS team! Well done!

David Allan Wins ACS Division of Chemical Education Central Region Award for Excellence in High School Teaching

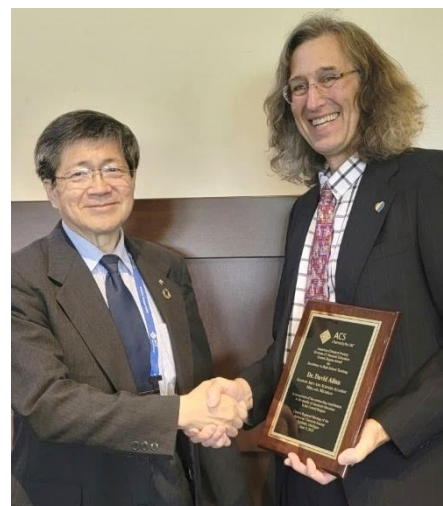
Diana Deese, Chair, Awards Committee, Midland Section ACS

Dr. David Allan is, simply put, one of the most fascinating people I have had the honor of knowing. During the evening of Thursday, June 9, at the 2022 CERM Awards Banquet in Ypsilanti, MI, he was recognized with the Division of Chemical Education (ChEd) Region Award for Excellence in High School Teaching as presented by H.N. Cheng (National ACS Immediate Past President).

In the photo at right, **H.N. Cheng** (left) presents **David Allan** (right) with his award (*Photo credit, Diana Deese*).

David began his career at Case Western Reserve University where he received his B.S. in Chemistry and his M.S. in Macromolecular Science and Engineering. He then went on to receive his Ph.D. in Polymer Science and Engineering from the University of Michigan.

Securing employment with Dow, he thrived as a specialist in emulsion polymers research, a project leader in superabsorbent products R&D, made many advancements in the science for Dow products, and authored 44 reports and 21 publications.



But there was something more that he wanted to achieve, ... a means through which he could pass along his passion for the sciences. So, back to school he went, receiving his teaching certification in Chemistry, Physics, and Math from Central Michigan University. David then left Dow to secure a teaching position in the Great Lakes Bay Region.

Dr. Allan is currently one of the most popular teachers at the Saginaw Arts and Sciences Academy (SASA) where he teaches all levels of chemistry, physics, and astronomy. It is there where he founded the school's ChemClub and Environmental Club, coached a National Champion Science Bowl Team, and has been the coach of the FIRST Robotics Team.

Rachel Reid, Principal at SASA, describes Dr. Allan as an educator who "finds innovative ways to encourage student engagement, and he continues to seek professional development to ensure he has the best possible strategies, materials, and equipment to teach his students, and instill in them the ability to "think like a scientist." His versatility allows him to interact and motivate students with unique personalities and learning styles as he demonstrates fun laboratory experiments, organizes field trips, invites guest speakers, and mentors many extra-curricular activities, which include countless independent study projects for his students.

"Selfless dedication," an "inspiration to students and educators," and a "mentor of the highest caliber" are all appropriate descriptions for this superhero of science education.

It is not all serious in the way he hooks you into a science-based conversation. It may be appropriate to note here that he wore socks with the image of "Einstein sticking his tongue out" (*Photo credit, Diana Deese*) for the CERM Awards Banquet occasion. David has many humorous stories, anecdotal quips, and thought-provoking quotes from his personal journey as well as recalling those of Einstein, Richard Feynman, and many others



that have paved the way in our field. He is a skillful listener and adept problem-solver as he considers the lesson and ruminates on ways to turn the concept into an engaging demo. Only from such an in-depth knowledge across several fields, a rich personal journey, a continual quest to be on the cutting edge of new concepts, and a sincere desire for personal interactions, can such influential and motivating conversations be realized.

In his own words, his teaching style comes from his passion for sharing his “curiosity and love of science with bright young people.” The connection with his students begins with establishing a personal rapport. Dr. Allan believes that nurturing a love of science takes time and care and should connect concepts they learn in the classroom to their world and their experiences. Often, lesson plans are abandoned to pursue contemplative discussion on student inquiries around the topic, further nurturing their curiosity. Dr. Allan doesn’t stop at connecting with students. He also fosters communication and collaboration between science educators, and it is why he established a Facebook page for them to network.

From his students’ point of view, he is a mentor and a confidant. They report that some of their favorite activities include the annual Mole Day (10/23) T-shirt logo contest followed by tie-dying shirts and wearing them for this “chemist’s holiday.” Another instance – miracle berries (*Synsepalum dulcificum*) – where the glycoprotein binds to the tongue’s taste buds and acts as a sweet flavor when in contact with acidic foods such as pickles. I have asked him to share with me the silvering of glass ornaments, exploding pumpkins, and a few other demos that we discussed at the banquet dinner, ... so I can “up my demo game” with the second-grade classes that I coach.



Affiliations, associations, and achievements that Dr. Allan has on his curriculum vitae include, but are not limited to: National Science Fellowship, FRSEF Teacher of the Year in 2017, AACT Dow Fellow, Carl F. Prutton Prize in Chemistry, W.R. Veazey Prize in Physical Chemistry, and American Association of Chemistry Teachers, National Science Teachers Association, Tau Beta Pi Engineering Honor Society, American Association for Physics Teachers, ChemClub National Advisory Board, ACS Exam Institute (High School exam contributor), CHEMED Conference, several STEM Summits, Visiting Lecturer/Professor, numerous science fairs, and of course, the American Chemical Society. Personally, I had the distinct pleasure of presenting David with the 2011 Midland Section ACS Award for Outstanding Achievement in High School Chemistry Teaching.

Our sincerest “Congratulations,” **Dr. David Allan** (Photo credit, Diana Deese). Well done!

Added notes: The ACS Central Region is comprised of 25 local sections from areas across Indiana, Kentucky, Michigan, Ohio, Pennsylvania, and West Virginia. The 2022 Central Regional Meeting (CERM) was held June 7-10, 2022, at Eastern Michigan University, in Ypsilanti, hosted by the Huron Valley Section of the American Chemical Society.

In 2006, the ACS Division of Chemical Education established an endowment to underwrite an Awards Program designed to recognize, encourage, and stimulate outstanding teachers of high school chemistry in the ten Regions of the American Chemical Society. Nominees must be actively engaged in the teaching of chemistry or a chemical science in a high school (grades 9-12) on at least a half-time basis. The Region Award consists of a \$1,000 cash award and an engraved plaque, along with reimbursed travel expenses to the meeting at which the award will be presented.

Announcing a Couple of Cool Summer Camps!

Gina Malczewski, Director and Outreach Committee, Midland Section ACS



The Midland Section ACS Outreach Committee is partnering with MSU St. Andrews (for the fifth year running) on a couple of summer STEAM camp experiences for middle schoolers. All the camps have had/will have different content, and a number of experts are involved in the presentations on the chosen topics. This year there are two camps, one scheduled for July 11-15, 9:00 AM to Noon, and the other one scheduled for August 1-5, 9:00 AM to Noon most days. Both have specific themes and are offered FREE for students entering grades 6 through 8 this coming fall.

The July 11-15 virtual summer camp (“Crystal Crazy”) covers piezoelectric crystals, gemology, liquid crystals, and will even involve a psychological study on healing crystals. The faculty for this camp includes Drs. Richard Staples and James Geiger (MSU) who are X-ray crystallographers, and MSU’s Jason Moser (Psychology). Dr. Zhihua An of New York University will speak on crystals in the human body. David Nelsen, a local jeweler, will also be presenting.

We obtained a MiSTEM grant to cover the cost of sensors and a Bay Sail trip for students who will participate in “H2-WHOA!,” the in-person August 1-5 summer camp. The sensors will be coded in a workshop with Dr. Tracy Zhang (MSU St. Andrews), and we plan to use those in a hydroponics study of the impact of different lighting and nutrient levels on lettuce plants. Drs. Rod Lammers and Dale Lecaptain of CMU will cover hydrology (flood predictions!) and water analysis, respectively. A session on boatbuilding (followed by a competition) will be offered by Gougeon Brothers of Bay City. We are also hosting Wayne State University professors Rodrigo Fernandez-Valdivia and Mala Hettiarachchi, who will speak on microplastic water pollution.

Please spread the word – especially to those who may encounter cost barriers in attending other summer camp programs. More information and registration forms can be found at the two following links:

<https://standrews.msu.edu/2022/06/24/free-virtual-steam-stew-v-summer-camp-crystal-crazy/>

<https://standrews.msu.edu/2022/06/24/free-in-person-steam-stew-v-summer-camp-h2-whoa/>



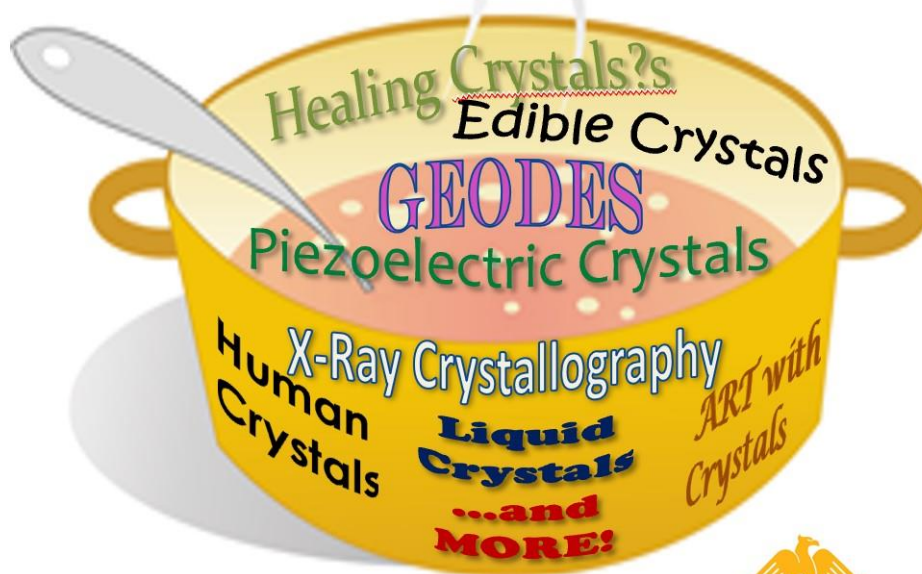
FREE Virtual STEAM Stew V Summer Camp: "Crystal Crazy" via Zoom

Monday to Friday, July 11-15, 2022, 9:00 AM to Noon

Please register by Tuesday, July 5. For more information or any questions, please contact Gina Malczewski at reginamalczewski@gmail.com, or Claire Light at lightcla@msu.edu.

STEAM Stew V: Crystal CRAZY

VIRTUAL Summer Camp
For Rising 6-8th Graders in Fall, 2022
July 11-15, 2022
9 am-Noon FREE



MICHIGAN STATE
UNIVERSITY

MSU St. Andrews

American Chemical Society

FREE In-Person STEAM Stew V Summer Camp: "H2-Whoa!" at MSU St. Andrews

Monday to Friday, August 1-5, 2022, 9:00 AM to Noon (most days)

Please register by Tuesday, July 19. For more information or any questions, please contact Gina Malczewski at reginamalczewski@gmail.com, or Claire Light at lightcla@msu.edu.

STEAM Stew V:

H₂-WHOA!

IN PERSON Summer Camp
For Rising 6-8th Graders in Fall, 2022
Aug 1-5, 2022
9 am-Noon* FREE

*On Wed and Fri
activities / field trip
require extension to
1 pm



MICHIGAN STATE
UNIVERSITY

MSU St. Andrews American Chemical Society

2022 Project SEED Program Update

Michelle Rivard, Chair, Project SEED, and Diana Deese, Chair, Awards Committee, Midland Section ACS

The Midland Local Section of the American Chemical Society (ACS) administers a [Project SEED](#) (Summer Experiences for the Economically Disadvantaged) program to provide sustained STEM research, learning, and growth opportunities for high school students with diverse identities and socioeconomic backgrounds so they can be empowered to advance and enrich the chemical science enterprise. Established nationally in 1968, this program partners with qualified mentors from local colleges, universities, and industry to provide paid internships to students through the local area sections of the ACS. These intern research experiences can be hands-on or virtual, and provide useful insight to college readiness, professional development, and lab preparedness through exposure to chemistry-related career paths. For more information about this program, please visit [Project SEED](#).

Due to COVID restrictions, the last two years have offered virtual experiences for students. The Midland Section ACS is excited to announce that we are hosting five students for three different projects that will be carried out in-person over an eight-week period during the summer of 2022. Furthermore, two additional students will be hosted virtually.

The Midland Section ACS would like to recognize and congratulate its 2022 Project SEED students:

- Madison Ludwig (Midland, MI, attends Midland High School)
- Anissa Overly (Rhodes, MI, attends Pinconning High School)
- Graci Hernandez (Saginaw, MI, attends Midland High School)
- Tristan Mosher (Bay City, MI, attends Bay City Central High School)
- Derek Schoch (Merrill, MI, attends Merrill High School)
- Nasma Ibrahim (Dearborn Heights, MI, attends Dearborn High School)
- Alejandra Ruiz (Mayagüez, Puerto Rico, attends W.A.L.K.S./W.E.B.S. High School)

Madison Ludwig and Anissa Overly, under the guidance of Professor John Hull of Michigan State University – St. Andrews in Midland, will focus on an organic chemistry project.

Graci Hernandez and Tristan Mosher, under the guidance of Dr. Tami Sivy of Saginaw Valley State University, will support the research study of the Saginaw Bay watershed.

Derek Schoch, under the guidance of Dr. Anna Mueller of Central Michigan University, will support the research study of removal of zinc from water with pressure stable resins and membranes.

Nasma Ibrahim and Alejandra Ruiz, under the guidance of Professor Leela Rakesh of Central Michigan University, will conduct research virtually using computer modeling and random simulation applied to biochemical understanding.

In addition to the eight weeks of research, the Project SEED students will participate in a variety of on-line enrichment seminars, be invited to tour local chemical companies in Midland, volunteer for local outreach programs, and present their research at the 2022 Fall National ACS Meeting in Chicago (August 21-25).

Photos and short bio profiles of all seven 2022 Midland Section ACS Project SEED students appear on pages 9 and 10.

Madison Ludwig
MSU-St Andrews- Professor John Hull



High School: Midland High School
Graduation Year: 2024
Extracurricular Activities: I am part of the school newspaper.
Future Plans: I plan to go to college to become a pharmacist.
Fun Fact: I love art and am an avid gamer.
County: Midland

Anissa Overly
MSU-St Andrews- Professor John Hull



High School: Pinconning High School
Graduation Year: 2022
Extracurriculars: Student Council, Rotary Interact, Peer Mentors, Pep Band, NHS, Mock Trial, Robotics, Theater, and SAE (students in action for education). I am also a member of my school's student advisory committee and of the Northern Bay County Fund Committee.
Future Plans: Attend Lake Superior State University for Forensic Chemistry and Pre-Medicine and then medical school to become a medical examiner.
Fun Fact: I make art out of pretty much anything from recycled pill bottles to shattered glass, the sky's the limit
County: Bay



Graci Hernandez
SVSU- Dr. Tami Sivy



High School: Midland High School
Graduation Year: 2024
Extracurricular Activities: I have joined many STEM clubs in the past and hope to join more in the future.
Future Plans: My dream is to be my family's first college graduate. I plan to become an educator (particularly in the STEAM category) and want to go to a college in Texas.
Fun Fact: I love art and have been drawing for as long as I can remember.
County: Saginaw

Tristan Mosher
SVSU- Dr. Tami Sivy



High School: Bay City Central
Graduation Year: 2024
Extracurricular Activities: I enjoy playing drums and bass, and I am an avid bibliophile.
Future Plans: I plan to attend Oakland University and obtain a Bachelor's Degree in the Science of Nursing.
Fun Fact: My favorite book is The Green Mile by Stephen King, and my favorite field of science is Anatomy and Physiology.
County: Bay



Derek Schoch
CMU- Dr. Mueller



High School: Merrill High School
Graduation Year: 2024
Extracurricular Activities: I play basketball and track. Hobbies include hunting and trapping.
Future Plans: Attend Delta College to finish Associate Degree
Fun Fact: Favorite springtime activity is turtling.
County: Saginaw

Nasma Ibrahim
CMU- Virtual Professor Leela Rakesh



High School: Dearborn High School
Graduation Year: 2023
Extracurriculars: Volunteer literacy mentor at Center For Success, an organization supporting children from under-served schools with literacy proficiency, math tutor for children in grades 4-8. Secretary of my school's ASAP Youth chapter, an advisory council to increase awareness and address stigmas around mental health and substance abuse.
Future Plans: Major in neurobiology and go to medical school to become a surgeon.
Fun Fact: One of my favorite pastimes is learning to play new instruments. So far, I have learned how to play the violin, viola, and flute. I am currently learning how to play the piano.
County: Wayne County



Alejandra Ruiz
CMU- Virtual Professor Leela Rakesh





High School: W.A.L.K.S./W.E.B.S. High School

Graduation Year: 2024

Extracurriculars: Band, Historian of School's National Honors Society, Class Vice President, Volleyball player and Salvation Army Volunteer Group member

Future Plans: Chemical Engineering or other Chemistry major, then focus on green chemistry to help improve the environment.

Fun Fact: I like going to the gym and on adventures in nature specially to the beach. I also like arts and crafts.

County: Puerto Rico





18th Annual MSU ChEMS Department Research Forum, August 23

MSU ChEMS Department, East Lansing

The Department of Chemical Engineering and Materials Science (ChEMS) at Michigan State University invites you to join us at the 18th annual ChEMS Department Research Forum on Tuesday, August 23, 2022. The forum is a full-day event, running from 9:00 AM to 5:00 PM, and will be held at the Huntington Club at Spartan Stadium, 325 West Shaw Lane, East Lansing, on the campus of MSU.

The 18th annual ChEMS Research Forum will showcase department research advances in the areas of:

- Energy and Sustainability
- Nanotechnology and Materials
- Biotechnology and Biomedical Engineering

The one-day program will feature invited plenary speakers, oral presentations from faculty and students, and an extended poster session describing the latest department research results.

If you or your company shares an interest in chemical engineering and materials science, then this event offers a uniquely personal and informal view into the general research directions of the ChEMS department, its current research projects, and, most importantly, an opportunity to get to know the many talented graduate students that are at the heart of it all. We hope to welcome you to MSU on August 23!

Keynote Speakers:



- **Sean Palecek** – Chemical and Biological Engineering, University of Wisconsin-Madison
- **Caroline Szczepanski** – Chemical Engineering & Materials Science, Michigan State University
- **Jose Mendoza-Cortes** – Chemical Engineering & Materials Science, Michigan State University

Keynote Topics:

- **Biomanufacturing Cardiac Cells from Human Pluripotent Stem Cells – Identification of Critical Quality Attributes and Process Parameters**

Biomanufacturing cells and tissues from human pluripotent stem cells (hPSCs) typically strives to guide differentiation through developmentally relevant pathways in a well-defined, dynamic bioreactor environment. While great strides have been made in differentiating hPSCs to many somatic cell types, robust biomanufacturing remains a roadblock to the clinical progress of hPSC-derived cell and tissue therapies. In particular, scaling manufacturing to meet clinical needs, reducing cost, improving cell phenotypes, and improving process robustness are critical challenges. hPSC-derived cardiomyocytes have tremendous potential to restore cardiac function in heart failure patients. However, these cells suffer from poor survival and functional integration in preclinical models of heart disease. We have developed protocols to differentiate hPSCs to endothelial cells and cardiac fibroblasts and demonstrated that the inclusion of these cells during cardiomyocyte biomanufacturing accelerates the acquisition of maturation phenotypes such as morphology, sarcomere protein expression, and calcium handling in the cardiomyocytes. Importantly, these heterotypic cell interactions must be provided to cardiac progenitor cells, allowing the cell types to co-differentiate. To reduce costs and improve the scale of cardiomyocyte biomanufacturing, we have transitioned 2D cardiomyocyte differentiation to 3D, reducing cost by approximately 85% and permitting the manufacturing of greater than one trillion cardiomyocytes in a 300 mL spinner flask bioreactor. To improve biomanufacturing process robustness, we have performed a multi-omic characterization of differentiating cardiomyocytes and utilized unbiased data analytics to identify genes, proteins, and metabolites that when measured before day 5 predict successful vs. failed batches at day 15, determined by the percentage of cells expressing cardiac troponin T. We envision that these multivariate predictive critical quality attributes can be used to more quickly identify failed batches and eventually lead to closed-loop control strategies to improve biomanufacturing process robustness.

- **Effective Strategies for Hierarchically Structured Polymeric Materials**

Numerous natural materials have properties and performances that have inspired, intrigued, and motivated engineers. Examples include plant surfaces that are self-cleaning, adhesives that persist in aqueous environments, as well as insect shells that can harvest water from fog. Common amongst these natural materials are hierarchical structures, ranging from macromolecular design up to microscopic features and patterning. Unfortunately, an ongoing challenge with bio-inspired and bio-mimetic materials is identifying straight-forward, versatile techniques to recapitulate these intricate and complex designs. Research in Caroline Szczepanski's group confronts this challenge using strategies based on polymer chemistry and polymer engineering to yield multi-scale ordering that improves performance for applications in coatings, adhesives, and biomaterials. This talk will highlight recent work from the Szczepanski group, including studies on how localized, in situ stress gradients can be leveraged to create multi-scale, hierarchical structures at an interface. Additionally, recent efforts employing bio-inspired chemistries to improve dental adhesive performance will also be presented.

- **Machine Learning Meets First Principles and Big Data: Toward a Periodic Table of Materials and Reactions**

Computational algorithms are now powerful enough that they can predict many properties of materials and chemical processes before they are synthesized/performed. By implementing and developing new approaches to calculate materials and chemical properties in supercomputers, the Mendoza group has predicted over 300,000 materials for energy capture, conversion, and storage (e.g., batteries and catalysts). The computations predicted several new materials that were later synthesized and tested in the lab. The in-silico creation of our large amount of materials has prompted us to create our own type of atlas of materials and reactions. We have implemented different machine learning methods to find further (materials or reaction) design principles. Some of the applications of the design principles of materials have been used toward developing an alternative way to generate and store energy (e.g., next-generation Li-batteries, H₂ storage), prediction of materials with new properties (mechanical and electronic), and chemical reactions paths (CO₂ reduction, artificial photosynthesis).

Pre-registration for the forum is requested. Please register for the event at [2022 ChEMS Research Forum](https://www.chemsforum.org/). For more information, call the MSU ChEMS Department at 517-355-5135, or send an inquiry by email to chems@egr.msu.edu.



Water Quality Testing – Volunteer Adventure Opportunity, July 29–31

Dale LeCaptain, Councilor, Midland Section ACS

ACS MEMBER VOLUNTEER / BEAVER ISLAND MULTI-DAY EXPERIENCE

The ACS Midland Local Section H₂O Q Committee is offering three interactive exploration days of various fresh water sources in northern Lake Michigan in and around the Central Michigan University Biological Station (CMUBS). The excursion will focus on volunteer training in H₂O Q (the citizen science outreach program for middle and high schools) by exploring the water chemistry of various locations.



The excursion is open to members of the ACS Midland Local Section and their immediate families. Children under age 12 may be restricted from certain portions of the trips, and young children are welcome but are not included in the programming.

The three themed days of planned programming and their tentative order is listed here:

Friday, July 29 – Garden Island & Lake Michigan

Lakes and water sources of this uninhabited island just north of Beaver Island

- Small watercraft trip to Garden Island, inland hike to lake and other sites
- CMUBS analytical laboratory instrumentation tour
- Lake Michigan water quality and sampling (Emerald Isle Ferry) presentation
- *Evening adventure:* Harbor cruise aboard *The Resolute* (additional fees apply)

Saturday, July 30 – South Beaver Island

Lakes, marshes, creek, and bays of the low population density and diverse water systems

- Lake Geneserath, Fox Lake, Miller's Marsh, Iron Ore Bay & Creek
- Side explorations may include the south light house, a short hike, exploration of native snake populations, and other island iconic sites
- *Evening adventure:* Stories, wildlife, and adventures of Barney's Lake & Protar's Tomb

Sunday, July 31 – North Beaver Island

Water quality of developed use areas of Beaver Island in and around St. James

- Water chemistry of golf courses (additional fees apply)
- Font Lake and the harbor
- Water chemistry of brewing
- Side explorations may include hiking up Mount Pisgah, CMUBS Boat House (formerly US Coast Guard), Harbor Light, Gull Harbor, and other iconic sites
- *Evening adventure:* BBQ and bonfire at CMUBS

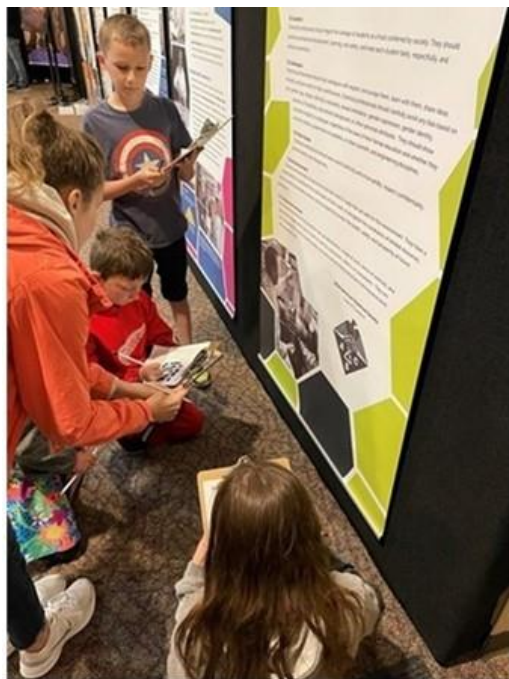
Room and board are being offered at cost to participants (\$50-\$70 per person per day). This water quality excursion is an ACS volunteer opportunity. CMUBS is an active Great Lakes research facility that is allowing us the opportunity to do mission-aligned volunteering in water quality chemistry outreach.

Early registration ends May 31 as space is limited and lodging will be assigned on a first come, first served commitment! **Registration will continue until July 15 as space permits.** Contact Dale LeCaptain at dale.lecaptain@cmich.edu for more details and sign-up information.

Exhibit Progress: We're Almost There!

Gina Malczewski, Director and Outreach Committee, Midland Section ACS

After three years and many pandemic-related challenges, the Midland ACS centennial exhibit is unofficially open again for special walk-throughs. A few school groups “tested out” the new display at Rowe Hall on the campus of Central Michigan University in May, and reviews have been good! We are still working on an update panel and all contents are not yet available for viewing, but most of the display is up and running.



Children work on an exhibit-related crossword puzzle (with Silly Putty prizes) during a recent school group visit to the ACS centennial exhibit at CMU's Rowe Hall.

Photo by Rebecca Petrone

The exhibit “A Century of Science and Service” includes three videos: “A Day without Chemistry” from the National ACS, “Midland ACS Outreach” put together by a technology class at Dow High, and “Unintended Consequences,” the story of the breast implant crisis. We also offer activities for children and will soon provide model-building and an augmented reality experience showing each of our featured molecules/polymer subunits (bromine, sodium polyacrylate, Silly Putty, polystyrene, and polyvinylidene chloride (Saran)) in three dimensions.

We also expect to sponsor educational programs and speakers over the exhibit run. This effort has been a successful collaboration between Midland ACS seniors and the CMU Museum Studies program.

Follow the blog on the Midland ACS Centennial website (www.midlandacs100.org) and stay tuned for word of the official opening!



Part of the almost-finished Midland ACS Centennial Exhibit as it has been laid out in Rowe Hall. Display cases not shown.

Photo: Jay Martin

SVSU Adjunct Chemistry Instructor Opportunities

Jennifer Chaytor, Professor and Chair, Department of Chemistry, Saginaw Valley State University



I am the Chair of the Department of Chemistry at Saginaw Valley State University, and we are searching for adjunct chemistry instructors. Would you be interested in, or do you know of someone who would be interested in, having a direct impact on undergraduate chemistry education in the greater Saginaw Valley region?

SVSU currently has openings available for adjunct chemistry instructors for the Fall 2022 (August 29 – December 17) and Winter 2023 (January 9 – April 29) semesters.

The current need is for instructors for general chemistry labs (both day and night) and for analytical chemistry labs (both day and night). All course curricula are already developed and will be provided to the adjunct instructors.

Please contact Jennifer Chaytor (jchaytor@svsu.edu) if you have an interest, or for any questions. Thank you.

Testing the Limits of Recycling

Mark Jones, Director and 2020 Chair, Midland Section ACS

Editor's note: This article is reprinted, in part, from the Thursday, June 16, 2022, issue of *ACS Industry Matters Newsletter*, an online news publication of the American Chemical Society. At the National ACS level, Mark Jones is a member of the ACS Committee on Public Relations and Communications and the National Historic Chemical Landmark Committee. In this article, Mark reports on an experiment using urine to fertilize his lawn.



I've frequently tested my limits and my wife's patience in my quest to be more sustainable. Pulling something out of the trash that she's just thrown away because it is recyclable always gets at least an eyeroll. Recent reporting prompted me to explore a new type of recycling. Reducing reliance on industrially produced fertilizers seemed like an idea worth exploring to me. Only half of my two-person household agreed. My investigation reaffirms that just because you can do something, it doesn't mean that you should.

Reading about two University of Michigan professors' "[pee for peonies](#)" urine diversion project to fertilize plants struck me as impractical as I read it. Not one comfortable with rash decisions, I decided to do a little research before dooming the idea.

Nitrogen, phosphate, and potassium are necessary plant nutrients. The three numbers on the bags of fertilizer tell the percentages of nitrogen, phosphate as equivalent P_2O_5 , and potassium as K_2O . These three nutrients are also found in human urine. Urine contains most of the nutrients we excrete, [more than 70% of the nitrogen, in excess of 50% of the phosphorus](#), and about [90% of the potassium](#). [Nitrogen](#), [phosphorus](#), and [potassium](#) all have natural cycles, cycles that we've disrupted. Modern agriculture depends on industrial inputs of all three key nutrients.

Phosphorus is supplied to agriculture as phosphate from mining. The same for potassium or potash. Nitrogen is a chemical product, supplied as ammonia made from air. All three key nutrients are the products of energy intensive processing. By most accounts, ammonia production is the [largest CO₂ emitter from the chemical industry](#). The environmental concern doesn't stop at production. Fertilizer lost to runoff damages ecosystems. Nitrogen oxides released to the air are [potent greenhouse gases](#). Modern wastewater treatment lets nutrients escape. We end up literally pissing the key nutrients away. The result is [damage to watersheds](#).

Fertilizers are globally traded commodities. Russia and Belarus are major suppliers, and now subject to embargoes. Together, the two countries account for about [37% of potash production](#), about [10% of ammonia](#), and about [1% of phosphate](#). They represent a larger [fraction of the export market](#), causing concerns about shortages in many countries.

Urine can, when recycled, address fertilizer production, supply chain issues, and damaging loss to the environment. Urea is the [second largest component of human urine](#) after water, making up to 2.5% by some accounts. Urea is an effective fertilizer, able to replace industrially produced ammonia. Other nutrients are at lower levels, with potassium being about 0.6% and phosphate at 0.1%. Life-cycle assessments [demonstrate the benefit](#) of urine as a fertilizer but ignore the capital intensity and logistical issues.

Urine comes with a bit of a [yuck factor](#). It isn't completely warranted. Thanks to the osmotic filtering in the kidneys, urine from a healthy human, [while not sterile](#), doesn't contain many dangerous micro-organisms. Collecting and fertilizing with diluted urine is touted by many. Love and Wigginton, the intrepid Michigan professors, are not the first to recognize the potential in urine. Community collection was [demonstrated and shown beneficial in hay production](#), as one example. "Pee for peonies" uses [imported Vermont urine](#), leveraging an existing program and highlighting the logistical challenges of local collection.

My testing was decidedly less involved. Urine diversion via a juice bottle proved easy enough, at least for half of my household. In round numbers, I produced about 1.7 L of urine a day. Focusing only on the urea, necessary for greening my lawn, I was [collecting about 25 grams a day](#), using one of the higher, peer reviewed



concentration estimates. [Dog urine](#), known to damage plants, and human urine are similar in composition. To be safe, I diluted my urine 10:1 before using it around the yard. I can buy a 50-pound bag of urea for \$35. At that price, my urine collecting efforts are worth about 4¢ a day in fertilizer. I avoid a couple of cents of water use through avoided flushing. I'm saving less than a dime a day.

My yard's yearly fertilizer needs could be met if all household urine for a year were diverted. Storage for at least 500 L of urine during the winter is not a pleasant proposition, something necessary given year-round production and

seasonal use. Urine releases ammonia when it degrades, causing a stink. Treatment with either acid or base stabilizes the urine. Some say sterilization is also required. Urine storage and stabilization, even at the household scale, just doesn't make economic sense and it is a lot of unpleasant work.

Ideally, the nutrients in my urine would be recycled to produce the food I consume. Those who have looked at the infrastructure requirements, from [diverting toilets](#) to the [energy required](#) to concentrate the urine to an economically applied fertilizer, conclude it is impractical. Urine diversion can be done, and it is environmentally responsible, yet is difficult to implement economically at scale.

Recycle of urine, while certainly possible, has yet to reach the threshold of practical. I also can't tell any difference in my yard. Fertilized and unfertilized areas are identical after my short test. I've ceased peeing in bottles and returned to flushing. Eye-rolling is now back to pre-diversion levels.

Please Consider the Midland ACS Scholarship Fund in Your 2022 Giving!

Gina Malczewski, Director and Scholarship Committee, Midland Section ACS

Last year in May, **Dr. Wendell and Marcia Dilling** (photo at right) issued a challenge relative to growing the Midland ACS Scholarship Fund. Thus far, over \$7,100 has been added to the fund which, with the promised match from the Dillings, will bring the total fund to \$79,300. With an additional match of \$10,800 from the Dillings and \$9,900 from other contributions we can reach our goal of \$100,000.



The Midland Section ACS has been proud to offer scholarships to deserving undergraduate students majoring in a chemical science since 2002. Annually, two to four scholarships are awarded to candidates who have graduated from a high school in one of the Section's five counties (Bay, Midland, Saginaw, Isabella, and Gratiot), are studying at a Michigan university, and are ideally intending to pursue a career in some aspect of chemistry or chemical engineering. Selections are made by a committee and are based on academics, service and extracurricular contributions, and an essay on the student's sources of motivation as well as future plans. Past scholarship recipients are often highlighted in issues of the *Midland Chemist*.

Awards usually range from \$1,000-2,000, depending on the financial performance of the Midland ACS Scholarship Fund (#399) administered through the Midland Area Community Foundation. A long-standing goal of the Section has been to raise the base amount to \$100,000 to serve more students.

Wendell and Marcia Dilling, both chemists and long-time supporters of the Midland Section ACS, are prepared to help us reach that goal by donating up to \$18,000 as part of a Challenge Grant to the Scholarship Fund, which currently stands at \$79,300. **They will match 1:1 any new contributions to the fund at the Midland Area Community Foundation over the next couple years.**

Please consider contributing to this worthwhile cause. **Your donations will help shape the future of chemistry!** If you have any questions about contributing to the Midland ACS Scholarship Fund, please call the Midland Area Community Foundation at 989-839-9661. Thank you.

An online donation form can be found through the following link:

[Midland Section American Chemical Society Endowed Scholarship Fund #399](#)

In Memoriam – Douglas Leng

Steve Keinath, Co-Editor, *The Midland Chemist*

Editor's note: The obituary notice for Doug Leng as it appears below is reprinted, in part, from the Wednesday, April 6, 2022, issue of the *Midland Daily News*. Doug joined the American Chemical Society in 1955, and at the time of his passing he was a 67-year member of the ACS.



It was on the beautiful first day of spring that Douglas Leng, 93, passed away peacefully at Midland King's Daughters Home. He was a great husband, father, grandfather, friend, and mentor. Doug was the only son of Douglas and Blanche Leng. He was born and grew up in Kitchener, Ontario, and obtained his bachelor and master's degrees from Queens University in Kingston, Ontario. He then immigrated to the United States where he attended Purdue University in West Lafayette, Indiana. It was there that he met fellow Canadian Marguerite Lambert whom he married on June 18, 1955. They both received their PhD degrees (Doug in Chemical Engineering and Marguerite in Biochemistry) that year and accepted positions in Research and Development at Dow Chemical Company in Midland, Michigan.

Doug had a long, successful career, retiring from Dow in 1996 as one of the top scientists in the company. Perhaps his greatest legacy was in establishing a Fluid Mechanics and Mixing capability that touched virtually every chemical process developed in the company. In addition to solving some really tough problems, Doug was devoted to mentoring countless young scientists.

Doug loved life and had many passions. Sailing his boat Panacea with his family in the North Channel of Lake Huron was perhaps his favorite. Quite often you could find Doug out on a Saturday with a "crew from the lab" racing Panacea in Saginaw Bay. Doug, as a true Canadian, was an avid and lifelong curler, being one of the founding members of the Midland Granite Club in 1964. Later, he helped see that legacy continue with the establishment of the new Midland Curling Center, where he continued curling well into his 80s and even scored a rare "Eight Ender." Doug and Marguerite were inducted into the Midland Sports Hall of Fame in 2010 for their pioneering efforts to bring curling to Midland. They also became US citizens in 2002.

Doug was also active in the Macintosh computer club (MIAMUG) serving as president in 2000. He had a relentless drive to learn (and fix) all things related to a computer, and to generously help others with their challenges. Doug was an avid photographer who enjoyed capturing the raw beauty of the lakes and islands, as well as the beautiful flowers at Dow Gardens. Doug and Marguerite loved attending the symphony at the Midland Center for the Arts, and dining with friends and family at the Midland Country Club. His devotion and care for his wife in her later years was a true inspiration to his family.

He is predeceased by Marguerite, his wife of 63 years. He is survived by three children, Ronald Leng (Tricia), Janet Tangi (Craig), and Douglas Leng (special friend Kara). He was blessed with nine grandchildren, Ryan Leng, Katherine Welker Leng (Ray), Jessica Sturgeon (Zac), Michael Dumas (Jessica), Philip Dumas (fiancée Madison), Craig Leng, Kristen Leng, Taylor Lowe (Kirk), and Kelsey Leng, and one great grandson, Karson Lowe.

Doug was loved and respected by many. The wonderful memories and funny jokes will be remembered with a smile, as he would want them to be.

The family thanks Dianne Callahan, the King's Daughters staff, and the many other health care professionals for their care and compassion shown our father over the last 18 months. A private "Celebration of Life" service for the family is planned. Those wishing to express condolences are encouraged to consider a gift to Midland King's Daughters or the Midland Curling Center in memory of Doug.

Smith-Miner Funeral Home (2700 West Wackerly Street, Midland, MI, Phone: 989-832-8844) is honored to be serving the Leng family. To share a special memory please visit www.smithminer.com.

In Memoriam – Jacob Eichhorn ***Steve Keinath, Co-Editor, The Midland Chemist***

Editor's note: The obituary notice for Jacob Eichhorn as it appears below is reprinted, in part, from the notice published on Monday, June 6, 2022, by the *Saginaw News* on the MLive.com website. Jacob joined the American Chemical Society in 1959, maintained his membership through May 2020, and at that time he was a 61-year member of the ACS.



Jacob Eichhorn of Midland, 97, passed away June 2, 2022. He was born September 14, 1924, in Sheboygan, WI, the son of Rev. Jacob and Elizabeth (Strauch) Eichhorn. His parents were Volga Germans from Russia who immigrated to the United States from Berlin, Germany, in 1924. The family moved to Saginaw in 1927 and Jacob (Jake) graduated from Arthur Hill High School in 1942. He was awarded the competitive four-year Arthur Hill Scholarship to the University of Michigan where he received his BS in 1946, MS in 1947, and PhD in 1950, all in Chemical Engineering. He was elected to Phi Kappa Phi, Phi Lambda Upsilon, Sigma Xi, and Tau Beta Pi honorary societies and was a member of Alpha Chi Sigma fraternity.

In 1950, he began a career with Dow Chemical Company that spanned 43 years. Much of his work was in the development and commercialization of new chemical, polymer, and fabricated plastic products. While at Dow, Jake authored 23 US patents. He made leading contributions in flame retardant plastic foam, saran film, and in expanding the use of polystyrene foam for food packaging. He was instrumental in growing Dow's packaging business globally and its entry into the Polycarbonate business. Later he became Laboratory Director of the Central Research Computing Center and helped accelerate the use of IT to support research. Jake was a member of the Board of Directors of Dolco Packaging Corp. and Bischoff Chemical Corp. In recognition of his contributions, he was named a Dow Development Scientist and held that role at the time of his retirement.

He was a member of the American Chemical Society (ACS) and the American Institute of Chemical Engineers (AIChE), where he served as President of the Midland section in 1957-58.

On December 27, 1959, Jake married Mary Kay Winn in Ann Arbor, MI. In retirement, he and Mary traveled frequently for family vacations, reunions, and annual trips to Europe, visiting friends, relatives, and doing genealogy. They initially focused on family genealogy but expanded to the overall history of the Volga Germans and helped others with their research. They co-authored a book written with Jake's cousin, Dr. Alexander Eichhorn of Germany, titled *The Immigration of German Colonists to Denmark and Their Subsequent Emigration to Russia in the Years 1759-1766*. He was a charter member of the American Historical Society of Germans from Russia and a member of the Midland Genealogical Society, presenting at both the local and national level.

Jake had a lifelong love of golf which began as a caddy at the Saginaw Country Club. He joined the Midland Country Club in 1951 and played with family and friends into his nineties.

Jake was an active U of M alumnus where he served as chairman of the 50th reunion of the Engineering Class of 1946 and celebrated his 89th birthday at a Michigan football game. He was also a graduate of the Management Development Program at the Harvard Business School, serving 20 years as President and Class Secretary and chairing the 30th class reunion. He was a longtime member of the Midland United Church of Christ where he served as a Deacon.

He is survived by his beloved wife, Mary; sons, Kurt (Carolyn) Eichhorn and their children Anna and William, of Westport, CT and Eric Eichhorn and his children Lindsay and Dylan of Bedford, NY; daughter, Karen (Eric) Comstock and their daughters Emily and Katarina of Fishers, IN. He is also survived by his brother, Dr. Erwin Eichhorn, MD (Donis) of Carmichael, CA and their children, Robert, Rebecca, and Nancy. He was predeceased by his parents, his sister, Prof. Irma Eichhorn, and his son, Peter.

The family is grateful to the staff of Primrose Retirement Community and Mackenzie of Careline Hospice for the special care they provided to Jacob.

Those planning an expression of sympathy are asked to consider the United Church of Christ of Midland or the donor's favorite charity. A celebration of life is planned for Saturday, September 10, 2022, at 11:00 AM at the United Church of Christ (4100 Chestnut Hill Drive, Midland, MI, Phone: 989-631-1136).

Ware-Smith-Woolever Funeral Home (1200 West Wheeler Street, Midland, MI, Phone: 989-631-2292, <https://www.wswfh.com/>) is honored to be serving the Eichhorn family.

Upcoming Dates, Events, and Other Updates

- July 11-15 (Monday to Friday, 9:00 AM to Noon) – FREE Virtual STEAM Stew V Summer Camp: “Crystal Crazy” via Zoom. **Please register by Tuesday, July 5.** For more information or any questions, please contact Gina Malczewski at reginamalczewski@gmail.com, or Clare Light at lightcla@msu.edu.
- July 29-31 (Friday to Sunday) – Three-day, ACS Member Volunteer / Beaver Island Multi-Day Experience – water quality testing, volunteer adventure, and camping excursion for families. See the article on page 16 for more information. Contact Dale LeCaptain at dale.lecaptain@cmich.edu for more details and sign-up information.
- August 1-5 (Monday to Friday, 9:00 AM to Noon, most days) – FREE In-Person STEAM Stew V Summer Camp: “H2-Whoa!” at MSU St. Andrews, in Midland. **Please register by Tuesday, July 19.** For more information or any questions, please contact Gina Malczewski at reginamalczewski@gmail.com, or Clare Light at lightcla@msu.edu.
- August 1 (7:00 – 8:00 PM) – Hybrid Midland Section ACS Board meeting, MSU St. Andrews, Midland (in person), and via a WebEx conference call connection at [Webex Board Meeting - August 2022](#), Meeting number: 2651 874 4771, or by phone at Phone number: 650-215-5228, Access code: 2651 874 4771.
- August 21-25, 2022 – ACS Fall 2022 National Meeting and Exposition, Chicago, IL. This meeting is being planned as an in-person and virtual hybrid meeting. Meeting theme: *Sustainability in a Changing World*. For more information, please see [ACS Meetings & Expositions - American Chemical Society](#).

- August 23 (9:00 AM – 5:00 PM) – 18th Annual MSU ChEMS Department Research Forum, Huntington Club at Spartan Stadium, 325 West Shaw Lane, East Lansing. Pre-registration for the forum is requested. Please register for the event at [2022 ChEMS Research Forum](#). For more information, call the MSU ChEMS Department at 517-355-5135, or send an inquiry by email to chems@egr.msu.edu.
- September 12 (7:00 – 8:00 PM) – Hybrid Midland Section ACS Board meeting, MSU St. Andrews, Midland (in person), and via a WebEx conference call connection at [Webex Board Meeting - September 2022](#), Meeting number: 2651 874 4771, or by phone at Phone number: 650-215-5228, Access code: 2651 874 4771. **Please note: This Board meeting is being held on the second Monday of September, not the usual first Monday of most months due to the Labor Day holiday.**
- September 14 (7:00 – 8:30 PM) – MSU St. Andrews Family Astronomy Night free virtual event programing resumes after taking a break for the summer months. Presentation topic: TBD. Please see <https://standrews.msu.edu/family-astronomy-night/> for more information about these ongoing monthly programs and to access prior archived presentations.
- October 3 (7:00 – 8:00 PM) – Hybrid Midland Section ACS Board meeting, MSU St. Andrews, Midland (in person), and via a WebEx conference call connection at [Webex Board Meeting - October 2022](#), Meeting number: 2651 874 4771, or by phone at Phone number: 650-215-5228, Access code: 2651 874 4771.
- October 29 (Save the Date) – Midland Section ACS Fall Scientific Meeting, Curtis Hall, Saginaw Valley State University. Meeting theme: *A Touch of Chemistry*. For any questions, please contact the FSM General Chair Hari Katepalli at hkatepalli@dow.com or fsm@midlandacs.org.
- November 3 (Save the Date) – Midland Section ACS Diversity & Inclusion Committee program, *A Day in the Life of an Industry Scientist*, Midland Center for the Arts, an event in partnership with the University of Michigan (Flint) and Kettering University. For more information, please contact Anne-Catherine Bedard at diversity@midlandacs.org.
- November 7 (7:00 – 8:00 PM) – Hybrid Midland Section ACS Board meeting, MSU St. Andrews, Midland (in person), and via a WebEx conference call connection at [Webex Board Meeting - November 2022](#), Meeting number: 2651 874 4771, or by phone at Phone number: 650-215-5228, Access code: 2651 874 4771.
- December 5 (7:00 – 8:00 PM) – Hybrid Midland Section ACS Board meeting, MSU St. Andrews, Midland (in person), and via a WebEx conference call connection at [Webex Board Meeting - December 2022](#), Meeting number: 2651 874 4771, or by phone at Phone number: 650-215-5228, Access code: 2651 874 4771.



The Midland Chemist is published twelve times a year by the Midland Section of the American Chemical Society, P.O. Box 2695, Midland, MI 48641-2695, <http://www.midlandacs.org>. Current and past issues are available at midlandchemist.org.

Volunteer Staff

Vickie Langer
Steve Keinath
Mike Malczewski

Editor (vlanger@dow.com)
Editor (skeinath54@charter.net)
Webmaster (web@midlandacs.org)

Please submit all articles and photographs to the editor at newseditor@midlandacs.org. Neither *The Midland Chemist*, nor the Midland Section, nor the American Chemical Society assumes any responsibility for the statements and opinions advanced by contributors of or to *The Midland Chemist*.

© Copyright 2022 Midland Section of the American Chemical Society

The Midland Chemist is available online with publication notification through an e-mail alert to its readership. If you have any questions or comments about the content of or submissions to *The Midland Chemist*, please contact the editor at newseditor@midlandacs.org.