

TEAM **M** MSE

In this issue we take a look at three of our awesome MSE 482 senior design projects (more to come next week!), plus share some exciting faculty awards and research, as well as new DEI and job opportunities. Happy reading and enjoy all this sunshine!

Questions, comments or ideas for TeamMSE? Contact Kristen at krisfres@umich.edu.

We'd love to hear from you!



Campus COVID Status

U-M mask policy remains unchanged. For now.

Although the federal Centers for Disease Control and Prevention and the Michigan Department of Health and Human Services have changed their face covering guidance for those who are fully vaccinated, [U-M's policy](#) will remain unchanged for now. The university is evaluating the changes and will provide more information about bringing campus practices into alignment with state guidance in the coming days, so stay tuned.

Confused about the latest mask rules? Read this.

The relaxed mask-wearing announcement late last week from the CDC brought feelings of relief, joy...and lots of confusion. If you're among the confused looking for clarification, Michigan Health has 11 things you should know. [Read more.](#)

Got your shot?

COVID-19 vaccine supplies are plentiful, and anyone who wishes to be

vaccinated can do so readily and at no cost. The vaccine is highly effective and safe. [Don't miss your shot](#), as we continue to strive to return to a more residential experience on campus and to more normal activities in our lives.

For students coming from abroad

If you're an international student who's choosing to live on campus in the fall, the university recognizes vaccines that are authorized for use by either the U.S. Food and Drug Administration or the World Health Organization (WHO) as meeting COVID-19 policies and requirements. Updated information is available in the Campus Maize and Blueprint site's [FAQs](#) and from our [International Center](#).

Changes to Covid testing sites

Asymptomatic COVID-19 testing [locations and hours](#) have been updated as demand has decreased significantly with the end of the winter term.

[Click here for U-M's COVID-19 Dashboard](#)

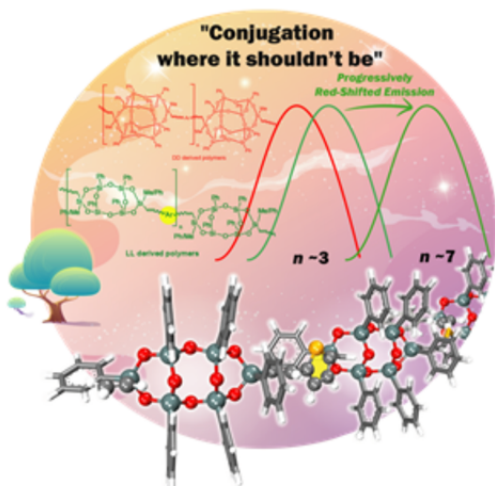
A horizontal banner with a dark blue background featuring a pattern of glowing, virus-like particles. The text "Research Highlights" is centered in a large, white, sans-serif font.

Research Highlights

From the Heron Lab: Harnessing the Hum of Fluorescent Lights for Efficient Computing



A team led by MSE Assistant Professor John Heron has developed a material that's at least twice as "magnetostrictive" and far less costly than other materials in its class. In addition to computing, it could also lead to better magnetic sensors for medical and security devices. [Read more.](#)



Laine Group recognized by NSF-CHE

The Laine group received a shout-out yesterday in an NSF-CHE communication for their work exploring the synthesis and properties of three-dimensional, structurally precise cages based on silicon and oxygen, or silsesquioxanes (SQs). [Read more.](#)

Faculty News & Recognition

Emmanuelle Marquis elected 2020 IFES Fellow

The International Field Emission Society (IFES) selected **Professor Emmanuelle Marquis** as a 2020 IFES Fellow for her work to "introduce correlative microscopy and improve our understanding of radiation damage, phase transformations, interfacial segregation and high temperature oxidation in materials, with many fruitful collaborations." She was also acknowledged for her efforts in training a new generation of researchers and her dedicated service and involvement in the society. Congratulations, Professor Marquis!

John Kieffer recognized by ACerS

Professor John Kieffer was recognized with the 2020 Alfred R. Cooper Distinguished Lecture Award from the Glass and Optical Materials Division of The American Ceramic Society. Congrats, Professor Kieffer!

Student News

Final Analysis: MSE 482 senior capstone design projects

Over the next few weeks we will take a look at the 2021 MSE 482 senior capstone design projects. Working with company sponsors ranging from Fortune 500 companies to small start-ups, nine teams of 5-6 students took on materials projects applied towards informatics, energy, health, and sustainable products... all while dealing with Covid restrictions.

"It's quite remarkable what the students were able to accomplish given all the

challenges with remote learning and social distancing this semester,” commented Yiyang Li, a co-instructor of the course along with Professor Max Shtein. Li added that working with the student design teams was a highlight of his first semester as an MSE faculty member.

In today’s issue, we will take a closer look at the teams sponsored by **Hi-Lex**, a tier 1 automotive supplier for closure and control cable products; **Citrine Informatics**, a company that uses cutting-edge machine learning and data management company to advance materials science; and **Taza Aya**, a start-up which specializes in using non-thermal plasmas to sterilize air across a range of industries and applications.

Project title: Sustainable Composite Selection for Automobile Door Modules

Project sponsor: Hi-Lex

Team members: Cameron Cafmeyer, Katie Ferguson, Marissa Lobbia, Conor Michaelson, Shao Zhang

Project goals:

Our sponsor, Hi-Lex, produces door modules for numerous automobile lines. These modules are injection molded prior to receiving the attachments such as window controls and speakers. Our team was tasked with finding a more sustainable composite for Hi-Lex to use as a replacement for the current composite, a polypropylene matrix with long glass fiber reinforcement. Our goal was to find a new material with mechanical properties in a +/- 20% range of the current composite's properties, consistent thermal properties in the effective temperature range, the ability to be injection molded, and some form of environmental benefit (recyclability, energy/water savings, etc.). Our team would also conduct testing on the materials of interest.

Most enjoyable part of the project:

Coming into the lab to use the scanning electron microscope and study the composites. It was also enjoyable to see the energy/water and cost savings associated with the materials we tested.

Most challenging aspect:

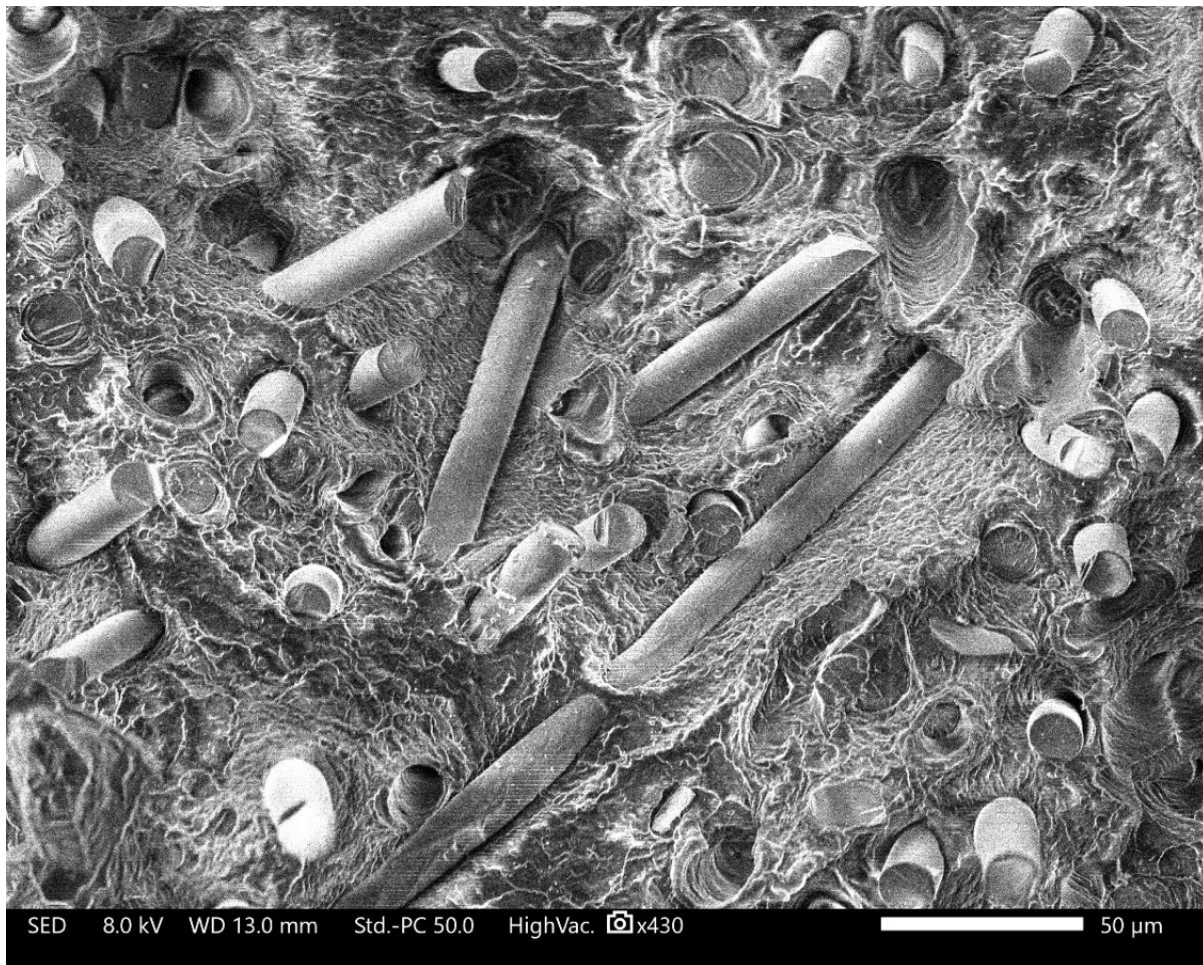
Time constraints and supply chain logistics. It is hard to collect large sets of useful data in a single semester, especially when one of our shipments went missing after arriving to campus!

Overall lessons learned:

Time constraints must always be considered when setting goals. Our group was not alone in realizing just how short a semester can be and how expectations must adapt accordingly.

From Yiyang Li: The team working with Hi-Lex identified a new material that is not only more environmentally sustainable but also potentially reduces the costs by hundreds of thousands of dollars every year. Hi-Lex is currently following up on this work and investigating using this supplier in their future products. It shows how sustainable materials can add significant value to the bottom line.

From Hi-Lex engineering manager Heather Golen: The students' work was thorough and insightful, adding value to the design development of our product. Their findings were shared with other global engineering centers within our organization to also benefit from their work. As material scientists, they took the material analysis beyond mechanical properties into SEM and DSC work. This is not something our organization would normally do when evaluating a new material. The SEM findings influenced our opinions about the materials.



The fracture surface of a tensile specimen.

Project title: Novel Polymeric Dielectric Material Discovery Through Machine-Learning Approaches

Project sponsor: Citrine Informatics

Team members: Kaylynn Crawford, Dan Evans, Jacob Pietryga, Tianqi Zhang, Alex Zimmerman

Project goals:

The purpose of this project was to leverage materials informatics techniques to find new polymer repeat units that may perform well as polymer dielectrics. We developed a model to predict the band gap and dielectric constant of polymer repeat units, used our model to predict the properties of repeat units not found in our dataset, and selected promising repeat units based on the predicted properties of each polymer as well as the uncertainty in those predictions.

Most enjoyable part of the project:

We enjoyed getting exposed to materials informatics and learning how we can apply our materials knowledge through data tools to expedite the discovery of high-performing materials.

Most challenging aspect:

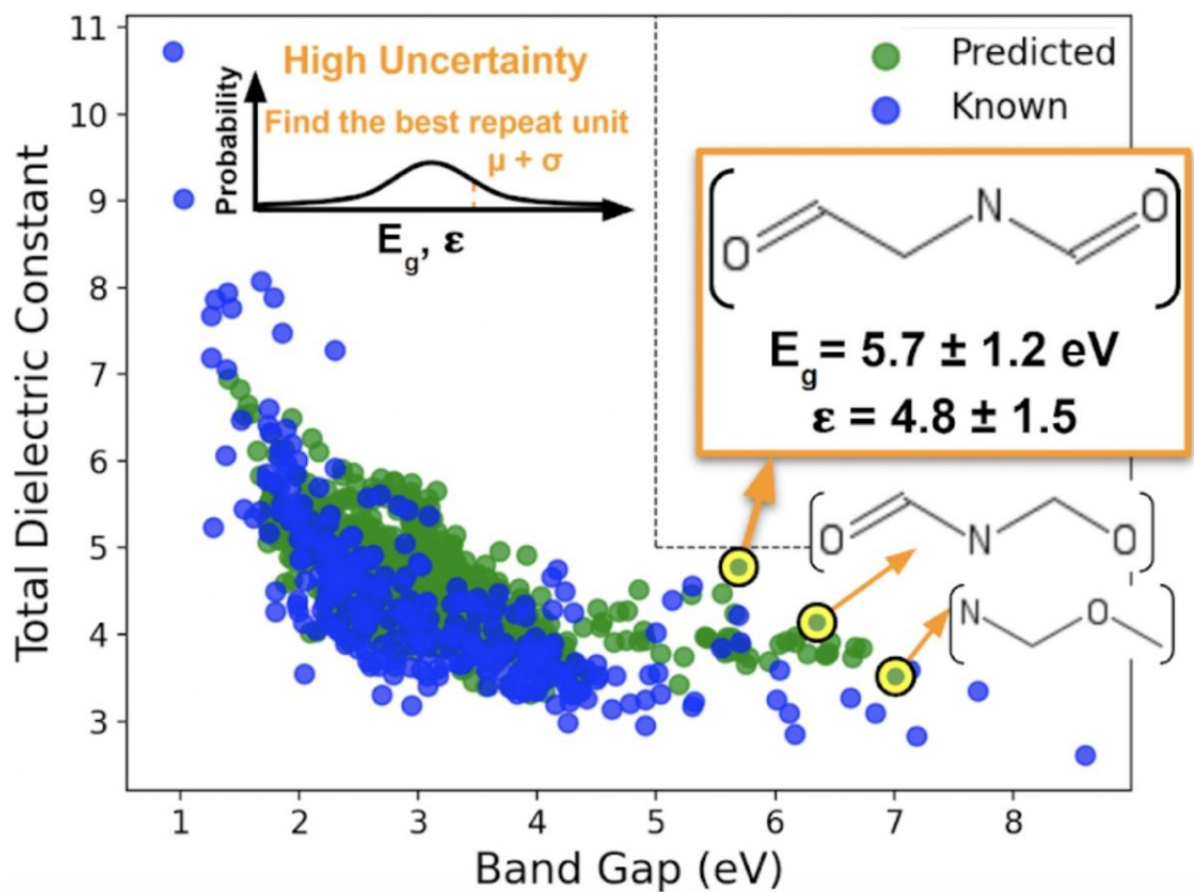
Many of us had limited experience with Python and machine learning, so it was difficult learning the requisite skills and carrying out a project in one semester.

Overall lessons learned:

We learned technical skills with regard to implementing a machine learning workflow, communication skills in presenting our results, and developed an understanding of both the difficulty and promise in accelerating the materials development cycle.

Comments from Yiyang Li: Materials informatics is a rapidly growing field. We are very grateful for the opportunity to work with Citrine, a leader in this area. It was impressive that, over the course of the semester, the students not only learned about materials informatics, but were able to contribute to this field by predicting several new potential state-of-the-art materials for polymer dielectrics.

Comments from Citrine: Citrine team members were impressed with both the level of preparedness and eagerness to learn among the capstone team. The students moved quickly and showed up to every meeting with new results to present and discuss, and the final output shows promising candidate materials. We look forward to future opportunities for partnering with U-M faculty and students.



Project title: Activated Carbon Filters for Ozone Filtration in a Plasma Generating Visor

Project sponsor: Taza Aya

Team members: Jacob Dean, Viktoriya Kovalchuk, Leah Marks, Allison Marozza, Deesha Shah

Project goals:

Taza Aya is currently developing a visor to serve as a face mask alternative for protection against airborne viruses. Viral deactivation in this device is accomplished by pulling in ambient air and guiding it through a small plasma-generating dielectric barrier discharge reactor. Exposing air to plasma facilitates an unavoidable conversion of oxygen to ozone — a compound that can pose considerable health risks. To mitigate user exposure to ozone, the incorporation of downstream activated carbon (AC) filters has been proposed. AC filters were chosen due to their ubiquity as filters of volatile organic compounds, such as

ozone. It is important that a filter not only reduces the amount of ozone being released, but also allows for optimal airflow downstream of the filter by inducing a small pressure drop. Thus, our team aimed to identify AC filters that facilitate optimal surface adsorption of ozone, while also minimizing pressure drop.

Most enjoyable part of the project:

As a team, one of our favorite moments was joining Professor Shtein in his lab to get advice on our test setup. Though our time spent in the lab was consuming, the output was worth it and we were excited to learn from Professor Shtein in person. We also enjoyed running the experiments, meeting with one another, and discussing the progress of our project. Our group enjoyed working with one another as everyone brought something new to the project.

Most challenging aspect:

About halfway through the semester, we had to re-prioritize the scope of the project, from dielectric materials to AC filtration. We had to start researching and planning this new direction, which not only altered our schedule but required our team to work twice as fast to accomplish our goals. This sudden change was very challenging, but our team was able to work diligently and communicate efficiently to stay on target. By the end of the semester, we were able to go beyond our standard goals and offer innovative solutions to our Taza Aya mentors. We also had a better understanding of the challenges that start-ups face, with rapidly changing milestones and priorities.

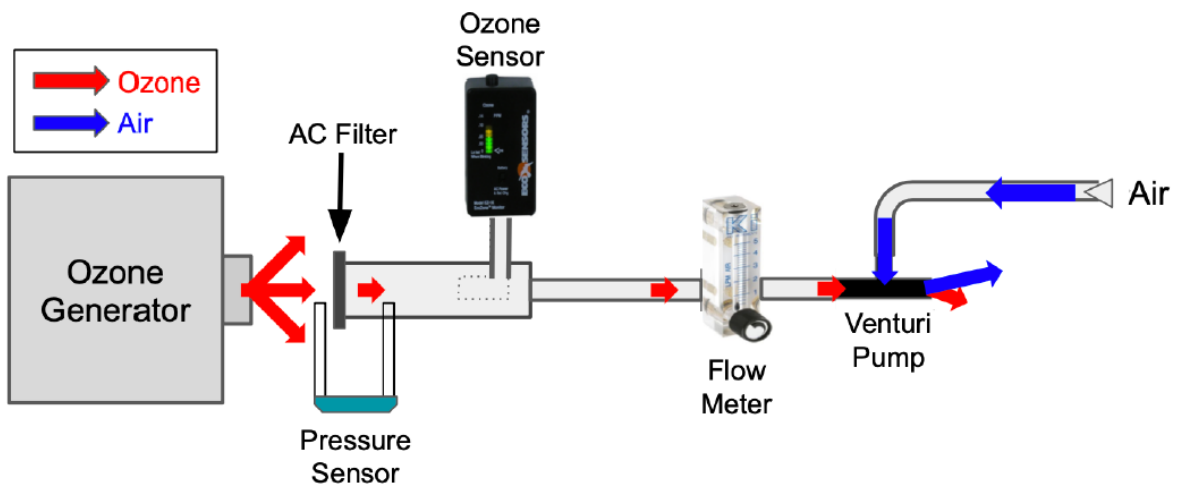
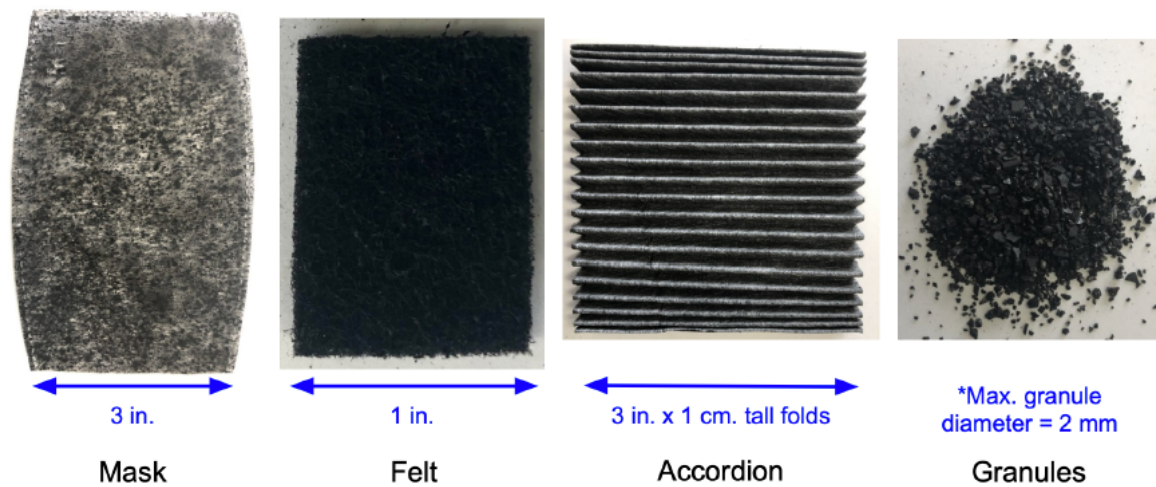
Overall lessons learned:

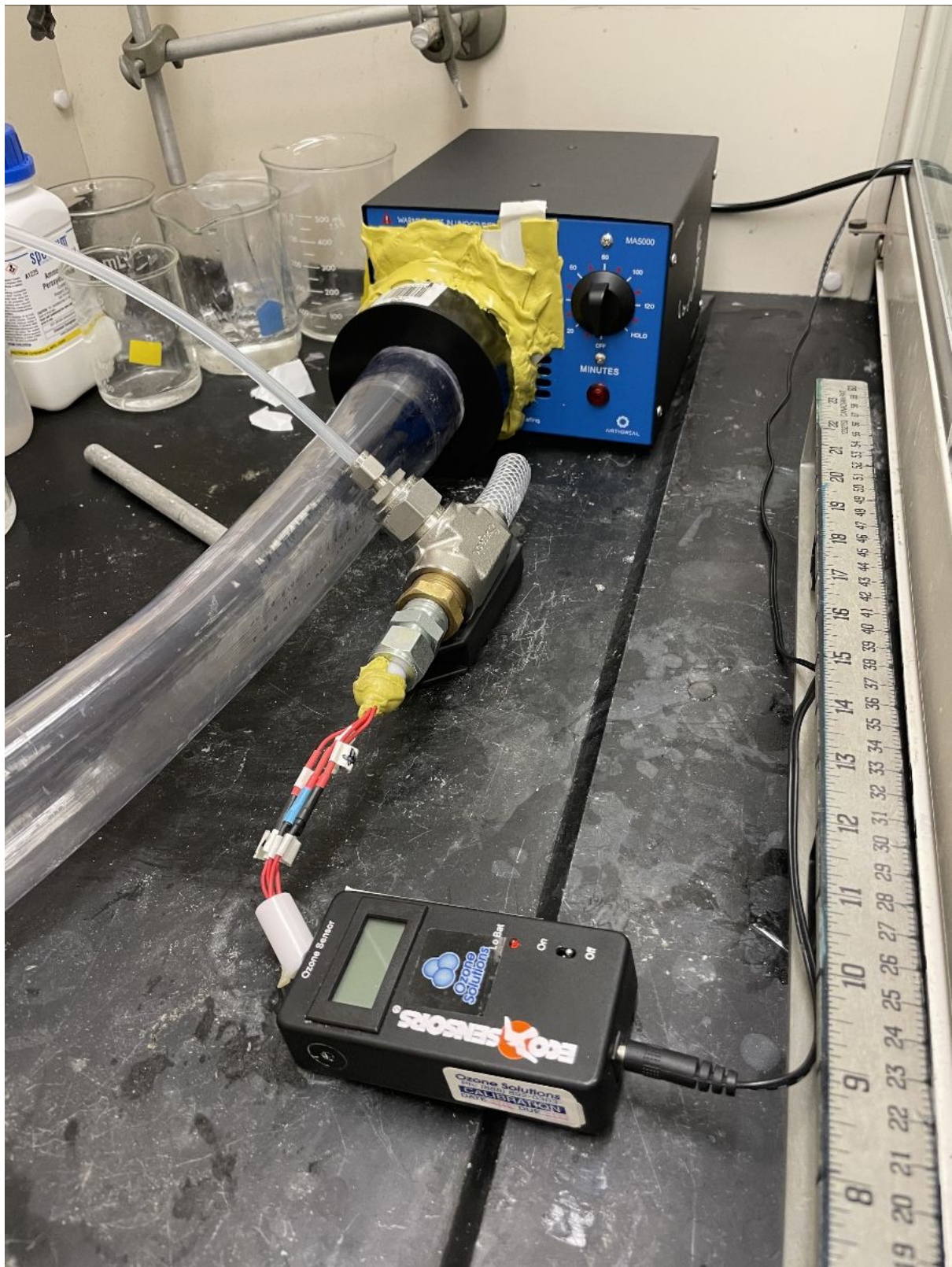
One of our greatest lessons learned during the project was to communicate effectively with one another. When the scope of our projected changed, we learned to communicate better than ever before. We also learned that when a challenge approached us, notifying each other, our mentors, and our professors was the best approach. This ensured that everyone was on the same page and aware of the situation. We also learned throughout the semester that design projects always take longer than expected and it is important to plan ahead. The use of a Gantt chart and schedule always kept us on track and ready for future deliverables.

Additional comments from Professor Max Shtein:

It was a pleasure working with this team. Being able to interact and see how abstract concepts map onto the apparatus and materials is always exciting to

me, so I loved hosting them in my lab for some of the experimental work on their project. I was also very impressed with the team's communication skills and the can-do attitude they took to working through the various challenges in the project. Personally, I'd not hesitate to hire these engineers for my projects.





WHEN
WILL IT
END?

The George Floyd Remembrance and Reflection for Victims of Law Enforcement Violence

Please [join us](#) for a moment of silence and remembrance on

Tuesday, May 25, 2021

12:00 p.m.

- Opening Remarks by Robert M. Sellers, Vice Provost and Chief Diversity Officer
- *Soon Ah Will Be Done* performed on the carillon by Tiffany Ng, Assistant Professor, School of Music, Theatre and Dance
- A Moment of Silence and Reflection for 9 minutes and 29 seconds

WATCH

Participate Remotely with a Symbol of Solidarity

Please submit photos of support of you kneeling and/or with signs featuring the names George Floyd, Breonna Taylor, Ahmaud Arbery, Tamir Rice, Sandra Bland, Philando Castile, Tony McDade or any other person who has been wrongfully harmed as a result of law enforcement violence.

Signs also could include "Black Lives Matter" or hashtags with your profession joined with ForBlackLives (i.e. #FacultyForBlackLives, #StudentsForBlackLives, #NursesForBlackLives).

These photos will be featured during the event. Please [submit photos](#) by **Thursday, May 20 by 12 p.m. est.**

SUBMIT A PHOTO



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Internship/Job Opportunities

U-M Office of Technology Transfer (OTT) looking for part-time fellows in physical sciences/engineering fields



Description

Tech Transfer Fellows work part time in a remote setting under the supervision of

Licensing Managers within the Office of Technology Transfer (OTT) to assist in early technical and commercial evaluation of new inventions at the University of Michigan. Typical projects include:

- Scientific, market, prior art, and patent research and analysis
- Assessing commercial viability of new inventions
- Technology marketing abstract composition
- Identifying potential licensees or investors

Expectations

Upon hiring, fellows will attend a virtual 1/2 day orientation and training session followed by at least a 1 year commitment to the program. Hours vary, but projects are designed to be completed in no more than 10 hours on a weekly basis, can be done remotely, and can be completed anytime within the deadline window (typically 1 week). Fellows are expected to have access to a computer and will be provided access to databases and other resources to complete their assignments. Fellows are expected to sign a non-disclosure agreement with the University of Michigan and maintain absolute confidentiality. Pay will range from \$16-\$18/hour depending on background and experience.

Eligibility and Qualifications

Applicants must either be a graduate student in good academic standing or a post-doc in a relevant discipline. Appointment to the fellows program is concurrent with full time status as a graduate student or post-doc for the duration of the appointment. Selection will be based on:

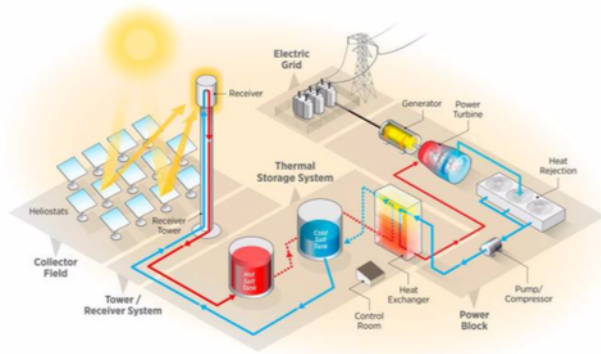
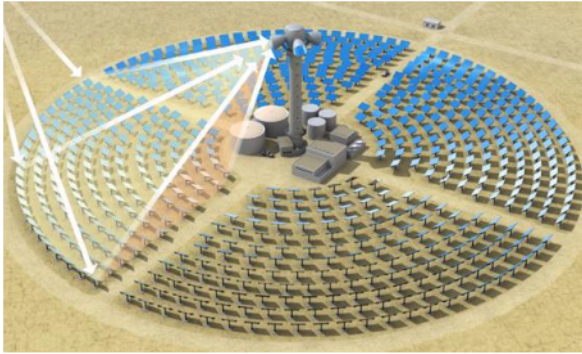
- Written and oral communication skills
- Scientific/technical background and academic performance
- Enthusiasm and willingness to take on new challenges
- Interest in technology transfer and/or prior experience (if any) in business or commercial environments
- Commitment and availability for up to 10 hours per week for a minimum of 1 year
- Professionalism and adherence to deadlines
- Work authorization to allow this type of appointment

We are currently focused on hiring Fellows in the physical sciences and engineering fields

Application

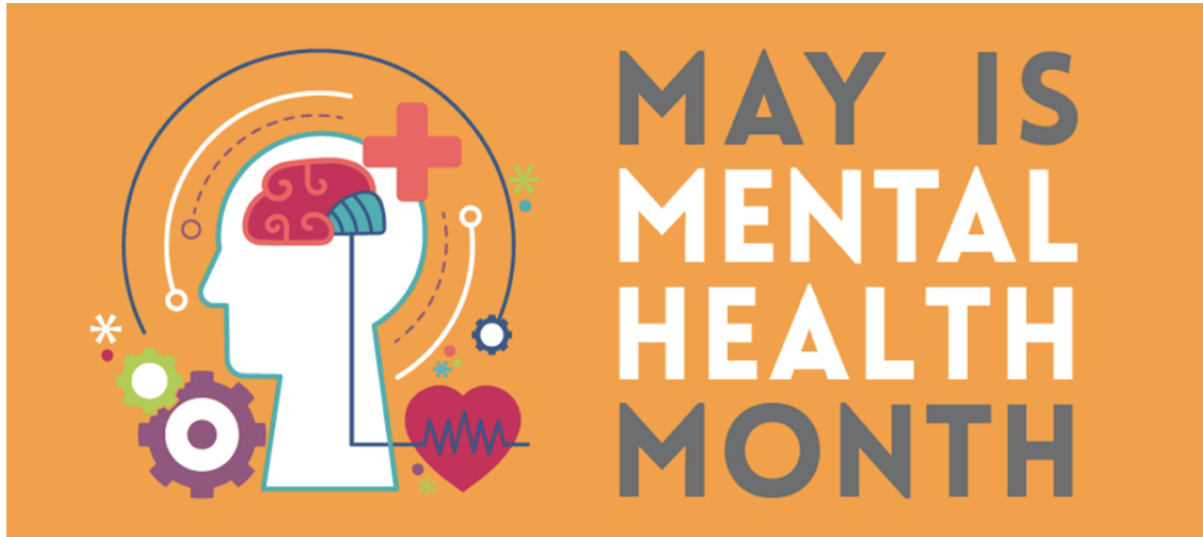
Applicants should submit a cover letter and resume in pdf format via email to **Janani Ramaswamy** (jananir@umich.edu). Applicants will be notified by email as to whether they will be invited to submit writing samples and interview.

Post-doc opening at Purdue University



A position for a Post-Doctoral Fellow working in the area of melt infiltration processing of shaped ceramic composites is immediately available in the research group of Ken H. Sandhage (Reilly Professor of Materials Engineering) in the School of Materials Engineering at Purdue University in West Lafayette, Ind. The aim of this position is to develop near net-shaped ceramic composites for use as thermally-, mechanically-, and chemically-robust materials for high-temperature heat exchangers (HEXs) in Concentrated Solar Power (CSP) systems (Figure 1), in order to raise the peak operational temperature relative to current HEXs comprised of structural metal alloys. The Post-Doctoral Fellow will join a multidisciplinary team of researchers at Purdue University, the Massachusetts Institute of Technology, and Thar Energy supported by the U.S. Department of Energy (DOE). This Post-Doctoral Fellow will conduct research on the development of a melt infiltration process for converting porous shaped preforms into dense, near net-shaped ceramic composites of desired chemistry and phase content. The position will also involve writing publications, making presentations, and preparing reports for DOE. Highly motivated, hardworking candidates with a strong background and good hands-on skills related to the fabrication of shaped porous ceramic preforms, reactive melt infiltration into such preforms, evaluation of interfacial reactions, and characterization of the microstructure and properties of ceramic composites are strongly encouraged to apply. Candidates should possess a Ph.D. in materials science and engineering, ceramic engineering, metallurgical engineering, or a related field, with good English speaking skills and a demonstrated ability to write technical articles in English. Qualified applicants should send resumes (with a publication list), 2-3 representative publications, a brief description of career goals and motivation

for joining this effort, and contact information (with phone numbers) for 3 references by e-mail to: sandhage@purdue.edu



The COVID-19 pandemic has had a profound impact on the mental health of people of all ages. Now, more than ever, it is critical to reduce the stigma around mental health struggles, because that stigma often prevents individuals from seeking help. Below are some resources that we anyone can use to improve their mental health and increase their resiliency regardless of your personal situation.

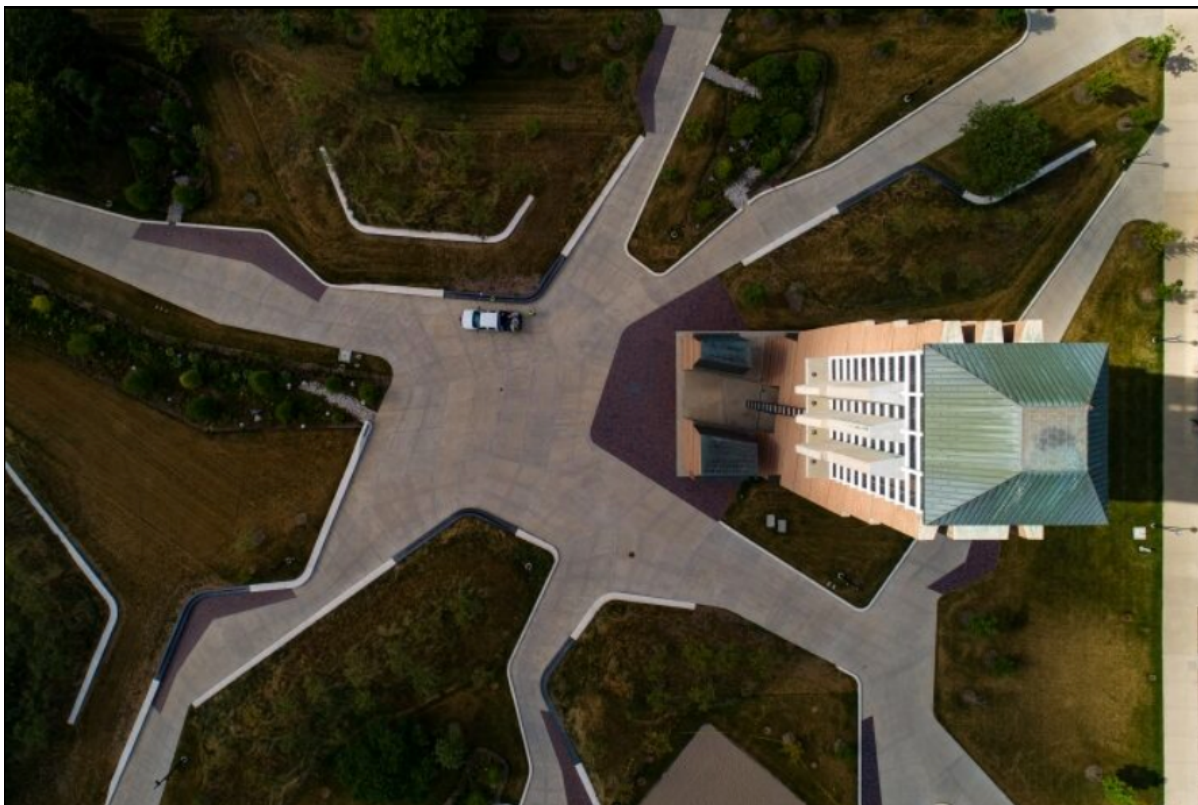
For national resources and crises:

<https://www.nimh.nih.gov/health/find-help/>

For U-M student resources: <https://uhs.umich.edu/stressresources>

For U-M engineering students: <https://care.engin.umich.edu/>

Birds-eye view of Lurie Tower



In case you missed it, this photo of Lurie Tower was one of many cool campus shots featured in today's University Record that were taken by a Michigan Photography drone. [View aerial photo gallery.](#)



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Our mailing address is:

2300 Hayward St.
3062 H.H. Dow Building
Ann Arbor, MI 48109