



March 2022

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## Faculty Spotlight

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### Dr. Pabitra Choudhury

Dr. Pabitra Choudhury, Associate Professor in the Chemical Engineering Department, has published a recent peer reviewed journal article in the *Journal of Physical Chemistry C*, which was selected for its cover of the latest issue. His lab has designed a potential Pt-free cathode fuel cell catalyst that has performed on par with a Pt cathode, at normal fuel cell operating conditions. Fuel cells are highly efficient and produce no environmental pollution while generating a higher energy density than batteries for long-term use. As a result, they are of great interest for commercial and industrial use. However, improvements are necessary for current fuel cell technology to become economically viable for large-scale use.



Dr. Pabitra Choudhury, Associate Professor in the  
Chemical Engineering Department

Platinum, an expensive precious metal, is currently used for the cathode reaction, in which oxygen is

reduced (ORR). This reaction has been a major barrier in the development of economically enticing fuel cell technology. High performance catalysts fabricated with little to no platinum for the cathode remain a significant challenge for commercial application. This work, supported by an ACS-PRF grant, will guide the development of earth-abundant, cost-effective, environmentally benign single-metal atom based next generation Pt-free fuel cell cathode catalysts. Naomi Hesel, a junior BS student in the Chemical Engineering Department, was involved in executing this work. She has been working on this project since her sophomore year and she has decided to continue with the accelerated MS degree program in the Chemical Engineering Department under the supervision of Dr. Choudhury.



Naomi Hesel, a junior BS student in Chemical Engineering Department

<https://doi.org/10.1021/acs.jpcc.2c00252>

## Undergraduate Student Spotlight

### Sara Lanctot

Sara Lanctot arrived at NMT, most recently, from Santa Fe Community College with an interest in pursuing a career building rovers or spacecraft for Space exploration. Presently, she is a senior mechanical engineering major with a minor in aerospace engineering. Early on, Sara sought out research opportunities to

participate in – and she has been immensely successful. Working with Dr. Mostafa Hassanalian (Mechanical Engineering) on several projects, Sara has given presentations and authored papers for the American Institute of Aeronautics and Astronautics (AIAA) Aviation Conference, AIAA Sci-Tech, and ASCEND 2021, to name a few.



Sara working in the lab

Her research experiences span work on lunar dust mitigation for EVA suits; moon exploration robotics to assist Artemis Missions; autonomous drones and rovers for underground mines, polar research, and space exploration; and drilling mechanisms for space and Earth ice sampling. Her research has been highlighted in local magazines and news outlets while her work on EVA suits was featured on Leonard David's INSIDE OUTER SPACE.

Along with research, she has been an intern for both NASA and Los Alamos National Lab (LANL). During the spring 2021 semester, Sara interned in the logistics department at NASA's Armstrong Flight Research Center followed by an internship at LANL where she is working in the Space group (at which she has recently accepted a full-time position!). Last summer, she launched her first project to the edge of space in a High Altitude Balloon. Outside the classroom and lab, Sara has participated in several NASA competitions, including NASA Community College Aerospace Scholar (NCAS), Big Idea Challenge, and L'Space Academy. She was a part of the NASA MINDS team at the Senior Level, where the team won second place overall and first place for presentation and Systems Engineering paper. This year, she is the team leader for the NASA MINDS team at the Senior Level, where her team expects to deliver a prototype of a Pillbug bio-inspired robot for Lunar exploration with machine learning capabilities. Sara is also a member of the American Society for Gravitational and Space Research where she serves as a Student/Early Career Associate. She is currently the president of the first international Society of Allied Weight Engineers (SAWE) club and Vice-Chair of the AIAA Club at New Mexico Tech. She was selected as a NASA STEM Star and the recipient of the Mechanical Engineering Service Award for her constant guidance and help to other students trying to succeed in internships.



Sara attending the October 2021 launch of LUCY launch NASA's Kennedy Space Center



Sara at the NASA MINDS Undergraduate Student Design Competition held in Baltimore, MD.

## Alumni Spotlight

### Hope Cahill

This past February, President Joe Biden announced Hope Cahill of Santa Fe Public Schools, and 2020 NMT graduate from the Master of Science for Teachers (MST) Program, as the NM K–6 Science awardee for the Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST), the Nation’s highest distinction for teaching in science, technology, engineering, mathematics, and/or computer science. As outlined in the announcement, “Awardees are recognized for their contributions to teaching and learning, along with their ability to help students make progress in science, technology, engineering, mathematics, and/or computer science. In addition to honoring individual achievement, the goal of the awards program is to showcase the highest standards of STEM teaching.”

Ms. Cahill has been teaching sixth and seventh grade science at El Dorado Community School since 2012. For her MST thesis project, she developed an instructional unit around the study of the Socorro magma body that mirrors the work of field scientists. This work was supervised by Dr. Gary Axen (Professor Emeritus, Earth & Environmental Science) and was featured in the summer 2021 edition of “The Earth Scientist,” a quarterly publication of the National Earth Science Teachers Association. She is also on the planning committee for STEM Santa Fe, a local nonprofit that sponsors the annual STEM Pathways for Girls, a conference for girls in fifth through eighth grades.

Dr. Megha Khandelwal, Director of the Teacher Education Programs at NMT, shared her excitement of learning about the award, indicating “Nothing else makes me more proud than to see students like Hope as they learn, grow, succeed and continue to pass on the STEM knowledge to their K-12 students. Hope gives the majority of the credit for her success to the faculty members who taught

MST courses as well as her graduate committee members who supervised her thesis project. We appreciate all NMT faculty and staff who help support our MST program and want them to know that teachers enrolled in the MST program take what they learned back to their classrooms, where each teacher can influence an average of 60 students each year.”

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## Integrating Research into the Biology Curriculum: SEA-PHAGES

The NMT Department of Biology is participating in the SEA-PHAGES program, jointly administered by Graham Hatfull's group at the University of Pittsburgh and the Howard Hughes Medical Institute's Science Education division. Its goal is to engage and retain students in the biological sciences by integrating research experiences into the curriculum that are accessible to first-year undergraduate students. These and other Course-based Undergraduate Research Experiences (CUREs) provide students hands on experience doing original research and offer faculty the opportunity to generate new information within their discipline. These have been shown to provide similar benefits to students as traditional, apprentice-based research (in self-efficacy, skill development, and persistence). They also have the added ability to scale to include all students in courses that are part of the core curriculum rather than being limited to individuals or small research teams who have the means to participate on either a volunteer basis or as a course elective.

Science Education Alliance-Phage Hunters Advancing Genomics and Evolutionary Science (SEA-PHAGES) is a national CURE program. It is a two-semester, discovery-based undergraduate research course sequence that begins with simple digging in the soil to find new viruses, progresses through a variety of microbiology techniques, and eventually includes complex genome annotation and bioinformatic analyses. NMT is the only university in New Mexico participating in the SEA-PHAGES program. Currently the department is offering one section of this course that they hope to expand to multiple sections in future semesters. Ashley Bradshaw, one of the program's participants, mentioned “The experience the SEA-PHAGES program has offered me is insurmountable. SEA-PHAGES gave me confidence and skills for research I would have never found had Dr. DeVeaux not presented me with this amazing opportunity. Not only have I been able to discover my own bacteriophage, appropriately named StanDitchman, but I have also found a support system I would not trade for the world.” Students in the current section of the course recently presented their research to prospective students attending NMT's Research @ Tech Day this past February.



Students in the SEA-PHAGES class hard at work in the lab



TEM image of Alivia Abernathy's isolated phage, named 'GordonGobbler'. The host bacterium was *Gordonia rubripertincta* (a common soil bacterium). It is a siphoviridae (part of a family of double-stranded DNA viruses in the order Caudovirales) with a prolate head.

## Research @ Tech Day: February 21, 2022

NMT hosted its annual Research @ Tech Day on February 21. The event brings prospective students and their families to campus to learn more about our academic programs and research opportunities. Over 330 students and their guests visited campus to interact with faculty, staff, and NMT students. Department visits and tours along with enrollment services sessions were the highlights of the day. To learn more about the event, please visit:

[https://www.nmt.edu/news/2022/research\\_at\\_tech\\_day\\_2022.php](https://www.nmt.edu/news/2022/research_at_tech_day_2022.php).

*"I would like to thank all of the departments and faculty who helped make this day special for the students, it is important to show prospective students and their families how accessible our faculty are here, and highlight the research of each department,"* says Associate Director of New Student Advising and Student Engagement, Jonique Sais. *"Allowing students to immerse and engage themselves in the departments really allows them to see what it's like to be a student here at NMT,"* she added. Thank you to everyone for their assistance!



Participants exploring the Joseph A. Fidel Student Services Center (photo credit: Jonique Sais).

## 2022 Science Olympiad held @ NMT

The New Mexico Science Olympiad began in 1986 and is hosted annually by New Mexico Tech. Dr. Sharon Sessions (Physics and Director for AA's Office of Outreach) and Ms. Ann Dunklee (MST & STEM Outreach Coordinator) led organizing this year's State Tournament, held on February 25 and 26, 2022. This national academic interscholastic competition includes 23 events from earth science, biology, chemistry, physics, and engineering.



Approximately 529 area students (from over 60 teams, and 45 schools) with their coaches, families, and other supporters attended this year's competition. An added challenge in hosting this year's program was it being a hybrid event, consisting of both online and in-

person components. Nevertheless, this was another successful program that was made possible through the efforts of over 110 volunteers, of which about 95 were NMT faculty, staff, and students. This program was sponsored by Sandia National Laboratories and NMT.



Students and volunteers at this year's Science Olympiad

*"It was really exciting to host a hybrid competition this year. Some teams were able to participate because of the virtual component for test only events, but many teams were so happy to participate in the build events in person. Socorro schools performed really well, with Socorro High School placing 3rd, and Cottonwood Valley Charter School headed for the national competition with a first place win."*

- Dr. Sharon Sessions





Third Place Division C Winners – our very own Socorro High School – accepting their trophies, plaques, and awards.

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Douglas P. Wells  
Vice President of Academic Affairs  
New Mexico Institute of Mining and Technology  
Socorro, NM 87801  
575-835-5363

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