

Research key to success

Who encouraged you to dream? Who took the time to understand your desire to do something more? Who introduced you to the intrigue of conducting research? The answer from many students across ND would be the inspiring instructors along their educational path.

For countless students, one of the keys to their success in education is the opportunity to be engaged in the research process. Research combines the various learning styles (visual, verbal, aural, and kinesthetic), offering students a different viewpoint from which to look at or learn about a topic; thereby providing another window of opportunity.

Studies show that experiential learning via undergraduate research increases student success and satisfaction with the chosen major and provides an environment in which students can gain practical skills.

As one example of the value of research, ND EPSCoR has received feedback from students involved in our Nurturing American Tribal Undergraduate Research and Education (NATURE) program that the research components proved essential to their pursuit of additional education, particularly in STEM disciplines. Spending time with a researcher who is passionate about exploring a topic, and who encourages students to share in that exploration, is often a key component to the next step in that student's educational journey.

Another example comes from a student who is finishing her Ph.D. in Coatings and Polymeric Materials at North Dakota State University (NDSU) (see the article on pages 7-8). **Ruvi Wright** noted that for her, research was like science in action. Rather than just theoretical knowledge of chemistry, her undergraduate research experience allowed her to see a very practical side of her efforts, where she could contribute something of value. Wright's experience helped her choose a career path, which she didn't even know existed before her research work.

North Dakota is a diverse state with students who have great potential to solve problems, serve our citizens, and expand ND's understanding of the world.

Yet for some students, especially those who may be a first generation to attend college, making the transition to higher education can be a scary leap. Our country's emerging demographic trends are leading to much more diverse student populations on our college campuses. Undergraduate research experiences can become a critical tool in supporting the overall student success; particularly for first generation and underserved/underrepresented student populations.

Thanks to funding from the National Science Foundation and the state of North Dakota, ND EPSCoR is able to provide important opportunities for undergraduate students to conduct research; thus becoming more engaged and strategically enhancing their academic success. We are honored to support and encourage students as they explore and develop an educational focus while building STEM skills that are necessary to North Dakota's expanding economy.

Finally, a warm welcome to the newest member of the State Steering Committee: **James Leiman**, Senior Manager of Strategy & Research at the ND Department of Commerce.

We are in the midst of another productive semester, and look forward to sharing the many new ND EPSCoR-funded research and outreach activities that are happening throughout the state.



Regards,
Kelly A. Rusch, Ph.D., P.E., BCEE
ND EPSCoR Executive Director

The value of partnerships

Interdisciplinary collaborations through the Center for Regional Climate Studies (CRCS) are key for the expansion of research at North Dakota universities and colleges, according to two researchers at the University of North Dakota (UND). These collaborations have led to some very successful projects and working relationships that incorporate agriculture, hydrology, economics, and atmospheric sciences disciplines.

"Most of the connections via CRCS has been with our colleagues at NDSU and other partner institutions across the state," says **Aaron Kennedy**, CRCS co-lead and assistant professor of Atmospheric Sciences at UND. "Probably the biggest impact has been learning what other work is being done, and the opportunity to brainstorm how our research may connect."

"My research group's strongest relationship is with the National Weather Service, and activities associated with CRCS have also helped build bonds with other climate/weather groups in the region, including the State Climatologist's office, and the High Plains Regional Climate Center." Kennedy added.

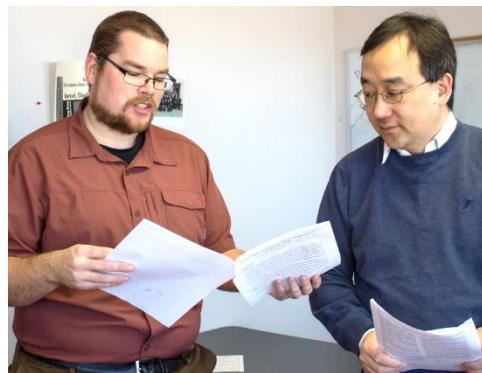


The National Weather Service Office in Grand Forks, ND, which is a frequent collaborator with Kennedy for CRCS research. Photo by Ashley Rone.

The benefits of individual departments working together on common problems provides multiple perspectives on how to solve issues. Collaborations across disciplines have been vital to the many projects currently underway by CRCS researchers.

Jianglong Zhang, CRCS co-lead and professor in Atmospheric Sciences at UND, and his graduate student advisee, **Jon Starr**, discussed some of the collaborations that have formed under the CRCS. Zhang cited one example using Starr's journal paper, just accepted for publication, which combines an agricultural simulation

model and an economic model to better predict the potential impacts of market fluctuations and policy changes on agricultural activities.



In terms of where they see the CRCS going in the future, Kennedy (left) and Zhang (right) proposed some big ideas. "More

private company participation. I envision a future where companies can come to us [CRCS] with questions and we can task our students with working on real-world problems," said Kennedy. "It would be nice to see these partnerships eventually form an internship program."

"A main goal of mine is to improve agricultural practice not only in North Dakota, but in larger regions with the use of new technological models," said Zhang. His focus has been primarily on regional issues but hopes to expand this vision to a larger scale.

As far as other partnerships are concerned, Zhang said in the future he would like to work with genetics and phenology (the study of cyclic natural phenomena). "One thing agriculturally related, is looking at genetically modified crops," said Zhang. "We've been looking at how agriculture is affected by the weather and by the economy, but it's also been affected by the increasing quality of seeds, which is an area we wish to explore."

Interdisciplinary research, developing collaborative efforts across academic and industry boundaries, and creating new predictive models: some of the CRCS goals that will help North Dakota and the region.

(Article written by Ashley Rone, a Health Sciences, French, and Honors major, and Jenna Peneueta-Snyder a Communication major, both at UND.)

Tiny bio-based titans

Some of the polymer and composite research done at NDSU is out of sight...almost literally. **Mohiuddin Quadir**, Center for Sustainable Materials Science (CSMS) researcher and assistant professor in NDSU's Coatings and Polymeric Materials (CPM), is leading a team that creates bio-based nanoparticles to perform specialized functions.

How small are these particles? A nanometer is a billionth of a meter, and most of the nanoparticles that

Quadir's research group assembles are from 100 to 200 nanometers in size. How does that compare to other common items? A sheet of paper is about 100,000 nanometers thick. A human hair is approximately 80,000 - 100,000 nanometers wide. This research uses organic and polymer chemistry principles to generate molecules and polymers that form nanoparticles.

The advantage of this tiny size is the ability of the particle to interact inside a cell, Quadir said. "The macromolecules that are created form specialized nanoparticles," he explained. "They are created with specific characteristics needed for biomedical or industry uses or to perform particular functions." The goal is to use bio-based materials, such as the soybean oil his research team is currently using, and improve the large scale production of nano-sized materials with less energy-consuming processes.

The nanoparticle characteristics can be engineered in the laboratory to modify their solubility or make them more useful for a specific purpose. In his current research, Quadir noted that the soybean oil-based nanoparticles stay spherical, don't fuse together, and are able to be evenly dispersed in water, even though they don't dissolve. "We developed novel methods, creating new polymers and modifying others to create nanoparticles that have a long shelf life and an ability to self-assemble, which is very important to industrial and medical users," said Quadir (below).



One of the many benefits of the bio-based materials is not only the unique characteristics of the polymers and nanoscale self-assembly, but also the reduced volatile organic compounds (VOC) which are often associated with the process of development. "Water is our primary solvent," Quadir said, "which is a significant benefit to manufacturing or other industry. It reduces their carbon footprint."

"Depending on what is needed, we can use the bio-based nanoparticles to *inhibit* an interaction or *facilitate* an interaction," Quadir explained. "Our next step is to take it from a successful lab experiment and translate it to larger quantities that can be used by industry."

Quadir noted that with the current research, there are agricultural, medical, and industry applications. To be able to trap certain materials and release them at a controlled time, is a significant benefit for these industries. "The materials are stable, efficient, and non-toxic," Quadir said. "It's a great benefit to the state because we can take these agricultural products, use them to make unique products that help many types of industries, and when the product life is finished, they are biodegradable and environmentally friendly."

With the upcoming CSMS Translational Summit on February 25-26, these tiny, bio-based nanomaterials may find opportunities for further development in industry in North Dakota and across the nation.

Gaining a new perspective

Jeremy Guinn, Track-1 principal investigator at United Tribes Technical College (UTTC), began his academic journey in 2003, when he noticed a flier posted in the NDSU biology department where he was a graduate student, studying under Jim Grier (now professor emeritus in Biological Sciences). The flier advertised an opportunity to spend a semester teaching at a tribal college. Guinn (like **Heather Marxen**, featured in our November 2018 newsletter) was interested, so he applied and got accepted for a teaching position at Sitting Bull College (SBC) on the Standing Rock Reservation that occupies a part of North and South Dakota.

Having grown up in Virginia, Guinn had limited exposure or experience with reservations, and had never even heard of tribal colleges, so everything was a new experience.

What stood out as a new teacher at SBC was the fact that everyone was so welcoming and helpful, taking time to introduce him to the culture and community. Having attended larger universities for graduate school and teaching lab sections, Guinn realized his niche might be teaching at a small college, engaging with students in small classes. At a tribal college, he appreciated the flexibility to be innovative in recruiting and retaining students in STEM programs. He said, "I knew from my own path that research experience could be used as an educational tool for engaging students who might not complete a program."

He also noted that one incredible benefit about teaching at a tribal college was exposure to Native American culture. Inclusion of culture in courses made the topics more relevant. Guinn said that in order to learn more, he began taking culture and language classes, eventually obtaining an associate degree in Native American Studies.

He spent the 2004 spring semester teaching an upper division Ornithology course and a 100-level Physical Science course. Guinn recalled that he was both impressed and surprised by what he saw at SBC: impressed that there were so many upper division courses offered and surprised by the large number of staff and instructors who wrote grants even though they were not researchers. But he was most impressed by the students. “The students were extremely respectful, honest, and were interested in getting to know me as a professional and as a person. One hundred percent of students at tribal colleges are trying to get a degree to make their lives and their family’s lives better,” he stressed. “There is nothing more important to me than being able to help people overcome obstacles. The students have many varied life skills that bring a new aspect to every project. Seeing our students fight through adversity and find success has been the greatest part of my career.”



Guinn in the field taking notes for an elk study. Photo by Kayley Schwab, UTTC Office of Public Information.

Guinn taught a full course load in environmental science at SBC until 2010. He then joined UTTC in

Bismarck as an environmental science instructor since they were looking to build their undergraduate research program. In January 2019, he was appointed the director of UTTC’s first research center, the Intertribal Research & Resource Center focusing on food, energy, and water sustainability on tribal lands in the Northern Plains. His wife, **Mandy Guinn**, is a CRCS researcher, NATURE Coordinator, and faculty member at UTTC, and is currently the chair of the Environmental Science & Research Department.

At UTTC, Guinn has selected research projects that would interest students and teach them skills that are employable in conservation agencies or useful for

graduate school. He expressed appreciation for the student support provided by ND EPSCoR to help students continue their education.

Guinn was trained as an ornithologist and has researched a number of bird projects, but also turtles, coyotes, elk, and general reptiles and amphibians. The link connecting all of these projects is examining human influences on predator populations and ecology, he said. “Currently, we are working on a relatively new elk population on Standing Rock and collaborating with Game & Fish Departments to gather more data for the Tribe and State as they determine the next steps in co-managing the population.

In his new role at UTTC, Guinn noted that the Intertribal Research & Resource Center (IRRC) allows UTTC to reach out to tribal communities to provide research, outreach, training, and education in a way that has not been possible before. Guinn said the IRRC will provide research in renewable energy, toxicology, resource use, agricultural biomaterials, wildlife ecology, sustainable food systems, and nutrition as well as community programming. As Center director, Guinn will coordinate partnerships and facilitate opportunities for the IRRC’s staff to work with tribes to develop programs that are relevant and useful. For more information, contact Guinn at jguinn@uttc.edu.

Polymer breakdown uses water

Can a cell-based polymer, such as lignin, be broken down into simpler (phenolic) compounds for use in the fuels and chemical industries? A simple and inexpensive method to provide this breakdown is the subject of current research that was presented at the January CSMS research team meeting by CSMS researcher and UND Chemistry graduate student **Audrey LaVallie**. She is part of a research team headed by **Alena Kubátová**, CSMS researcher and professor in Chemistry at UND.

Without using any additional reagents or catalysts, a specialized (subcritical) water treatment was evaluated for its baseline contribution to lignin breakdown. The research goals were two-fold, said LaVallie: To determine the types and quantities of products (chemical byproducts) in the liquid and solid breakdowns of treated lignin, and evaluate the water treatment as a possible viable industrial process to produce simple phenolics.

Analysis of the products created by the lignin breakdown was accomplished with a “lignomics toolkit” of methodologies, including thermal carbon analysis (TCA), liquid-liquid extraction/gas chromatography-mass spectrometry (LLE GC-MS) and thermal

desorption-pyrolysis/gas chromatography-mass spectrometry (TD-Py-GC-MS), as well as gel permeation chromatography (GPC).

LaVallie (right) reported results showing significant amounts of the large molecules in the liquid fraction were not accounted for by GC-MS processing. Out of the total mass of water-treated samples, only 3-



5% of the initial lignin weight was broken down to the more usable, low molecular weight phenolic molecules. In other testing, the high-molecular weight byproducts were a significant fraction of the water-treated lignin, but produced large amounts of gas, implying fewer crosslinkages (links to other polymers) as opposed to untreated lignin.

Other components of the researchers' toolkit provided complementary results to the lignin water treatment. LaVallie suggested that the research would support that this specialized water treatment of lignin may also be a viable method for lignin processing in terms of cost and environmental fit. She noted it would be useful if a treatment loop with continuous removal of product could be developed, which may be a future collaborative project between UND's Chemistry and Chemical Engineering Departments.

Translational summit

Taking new innovations into the marketplace is the focus of the **CSMS Translational Summit**, to be held February 25-26, 2019, at NDSU's Alumni Center. It's an opportunity for industry and researchers to connect, and to gain insights on translating bio-based material research to industry.

Guest companies invited include BASF SE, Bogobrush, Earth-Kind, John Deere, Nature Works, Oak Ridge National Labs, Patagonia, PPG Inc., 3D Fuel, 3M, Sana Packaging, and Sherwin Williams. **Dean Webster**, CSMS lead and department chair for CPM, along with **Mukund Sibi**, CSMS co-lead and distinguished professor in Chemistry and Biochemistry, will lead the discussions. Other guest speakers include **James Leiman**, Senior

Manager of Strategy & Research at the ND Department of Commerce and ND EPSCoR State Steering Committee member; David Grewell, chair of Industrial and Manufacturing Engineering at NDSU; **Chad Ulven**, CSMS researcher and professor in Mechanical Engineering at NDSU; and Scott Meyer, NDSU Executive Director of Entrepreneurship Initiatives in the College of Business.

With CSMS research now in its seventh year (CSMS was also funded under the prior NSF Track-1), there have been significant innovations and developments using sustainable materials.

CRCS stakeholder conference

CRCS is hosting the **Northern Plains Weather/Climate Product, Service, and User Engagement Workshop** on March 28, 2019, at the NDSU Memorial Union, from 8 a.m. to 4:30 p.m.

The workshop will bring together regional partners that disseminate weather and climate information; researchers from the fields of agriculture, hydrology, and atmospheric science; and end users that depend on weather/climate data, including the National Weather Service, ND State Climate Office, Weather Data on your Phone, ND Atmospheric Resource Board, High Plains Regional Climate Center, CRCS, USDA Climate Hub, and CRCS Stakeholders.

According to conference organizers, **Adnan Akyüz**, CRCS researcher and state climatologist at NDSU and **Aaron Kennedy**, CRCS co-lead and assistant professor in Atmospheric Sciences at UND, activities of the workshop will include educational talks, interaction with researchers discussing current research, and interactive discussions to understand needs and future wants of the end user.

There will be opportunities for students to present poster information during the session. Attendance is limited. Please register by March 14, 2019, at <https://apps.ndus.edu/northern-plains-climate-workshop>

Finding the "why"

He's created models that explain how farmers make crop choices, integrating crop information for five ND crops with climate, economics, and soil sciences. **David Roberts**, CRCS co-lead and associate professor in Agribusiness & Applied Economics at NDSU, is modeling how farmers respond to changing farming conditions.

"The growing season in North Dakota used to be too short for most corn varieties," he explained as one example. "Farmers grew wheat, barley, and a bit of

soybean in rotation, but starting in about 1995, corn began to replace a lot of the wheat in the rotation.” The “why” is a combination of factors, according to Roberts, including a longer growing season, availability of improved commodity crop varieties, the introduction of transgenic crops (e.g. Roundup-ready varieties), a substantial 155% corn yield increase from 1980 to 2015, and strong commodity prices from 2005 to 2012. The result has been a 400 to 800 percent increase in the corn and soybean acreage, exceeding the wheat acreage of a few years prior.



*Roberts (left), works with CRCS researcher and doctoral student **Bayarbat Badarch** on a research question.*

Robert’s work with the CRCS team involves using climate and hydrology information to create statistical models that will help predict what crops will be planted and in what acreage for barley, corn, soybeans, wheat, and oil producers (such as sunflowers, rapeseed, canola, and mustard). At this point, his statistical model is showing strong predictability for corn, soybeans, and wheat, while he is continuing to refine the barley and oil models.

“It’s a changing model, in part because what is planted also impacts the climate of the area,” he noted. “Crops that have a lot of leaf coverage or spread out will cover the soil and cool it, while others, like corn, release a lot of water vapor which increases the humidity.”

The goal of his research is to model future scenarios that will predict what farmers would plant in response to changes in climate, crops, and economics. The models would help farmers, as well as state and industry partners, better plan and find the optimal crops for changing conditions. “These models are useful for industry as well as farmers,” he noted, “because industry needs to know where they can find the grain sources and policy makers need to understand what conditions are driving the land use so they can develop more effective support for agricultural producers.”

Life cycle thinking impacts research

Before research is conducted, there are a few questions a scientist should ponder, according to **Ghasideh Pourhashem**, CSMS researcher, assistant professor in CPM at NDSU, and sustainability analyst.

“My work here is to help increase environmental and cost efficiency of our scientists’ research,” she said. “The goal is to ensure our research output is a good choice for society and for the environment. If I can help a scientist improve their design from an environmental impact perspective, so they build models and select materials that will be sustainable in the beginning, it’s far easier and more effective than waiting until it’s in the hands of the consumer.”

The researchers in CSMS are all working on novel and innovative materials, she said, and there are a lot of unknowns when making new products. “Consumers are demanding more sustainable products and industry is having to comply with more regulations to keep up with the consumer demand,” noted Pourhashem (below). “Our goal is to create bio-based materials with equal functionality to traditional petroleum-based materials, but with better environmental outcomes.”



Another marketability aspect of renewable materials is their production cost. She explained, “Many of the novel bio-based products have comparatively higher prices than traditional products in the market.” “Some traditional products are cheaper because their price doesn’t include the cost of their environmental effects. The market doesn’t have a good framework to connect the products with their environmental impacts,” she said. In her role at NDSU, she can work with researchers to design various scenarios for producing the novel investigated material, changing some of the inputs and process conditions, with each variation evaluated for cost and environmental impact. “These collaborative efforts among the disciplines have helped further CSMS’s national reputation for developing sustainable materials,” Pourhashem said.

Pourhashem's life cycle work begins by examining where source chemicals and raw ingredients originate, then follows the production all the way through a completed product and disposal, which includes measuring the environmental impact throughout all the steps. The "cradle to cradle" vision of the current CSMS research is an ideal fit for the analysis: the research uses bio-based source materials that researchers manipulate into useful products, and when the product usefulness is finished, the product can be biodegraded with benign environmental impacts.

"My work is trying to connect the lab scale research with the fully-scaled product and market analysis," Pourhashem said. As a part of the CSMS team working on emerging bio-based products, her life cycle analysis is a critical part of expanding the potential markets for current research as well as preparing future research proposals. Another benefit is helping students prepare for their next career step, she said, because they will have the experience in interdisciplinary work that includes analysis of sustainability.

Although based in CSMS, Pourhashem noted the life cycle analysis is applicable to any department or research process. "I'm a fan of interdisciplinary work," she said. "When you work together, you can solve bigger problems that allow ND to compete nationally."

UTTC hosts HPC students



High Performance Computing (HPC) was the topic presented by ND EPSCoR Cyberinfrastructure Assistantship interns from NDSU, **Russell Hofmann** (graduate student in Chemistry, shown presenting above), and **Jingyan Fu** (graduate student in Electrical and Computer Engineering). The workshop was hosted by UTTC on January 18, 2019, for 11 students and six faculty. The focus was on the benefits of using HPC capabilities of both NDSU and UND.

Science in action

She was a chemistry major when she was given the opportunity to be a part of an undergraduate research experience in the CPM department at NDSU. That's when **Ruvi Wright**, now a doctoral student in CPM, said she first became aware of the various options that she could explore with her major. "I got to participate in an interdisciplinary department that works with chemistry, engineering, biology, materials and more," she recalled. "It was not just telling you some theory, but science in action."

This student from a small town in Zimbabwe, Africa, has made her home in North Dakota and Minnesota for over a decade, and has discovered a passion for research. Since 2016, she has been a part of **Mohiuddin Quadir's** (assistant professor in CPM) research group working on CSMS projects, developing bio-based materials with specialized characteristics.

"One of our projects uses a soybean oil derivative, crosslinked with natural citric acid, creating a matrix that is fully bio-based," she said. These matrixes can be used to transport hydrophobic (water-insoluble) molecules, useful material for a wide range of applications, from agricultural fungicides or fertilizer to biomedical uses that release materials within living tissue. "Since the soybean oil and citric acid are both biodegradable, there is no environmental impact," she stressed.



Other research projects Wright (above) is involved with include making functional bio-based materials more adaptable for a variety of uses, including developing electro-responsive molecule-transport films that respond to changes in the environment by releasing the encapsulated molecules; fabricating nanoparticles from bio-based polymer for applications as nano-carrier systems or simply increasing the bio-based content to existing conventional polymeric systems while still maintaining desired characteristics. "We're looking to make useful materials based on polymers derived from renewable resources with the goal of achieving safer, healthier, and non-toxic

products even when the material or product degrades,” she enthused.

Wright credits the undergraduate research program for sparking her interest in pursuing doctoral studies. “It helped me prepare for the next step,” she said. “Experiencing this kind of interdisciplinary program, having the mentors here, collaborating with other disciplines, just makes the research better. With the research we’re doing now, and the possibility for applications in so many industries, imagination is your only limitation.”

Doctoral presentation



Brett Nespor, Ph.D. graduate student research awardee in Chemistry and CSMS researcher, (shown on the left, with Ales Kubat, ARC Metal Forming,

right) defended his dissertation on *Organic Speciation or Air Particulate Matter with Thermal Desorption-pyrolysis-gas Chromatography-mass Spectrometry*. His advisor, **Alena Kubátová**, CSMS researcher and professor in Chemistry at UND, noted that Nespor’s thesis focused on determining the origin of species in air particulate matter (PM).

His study contributes to the investigations of natural and anthropogenic PM sources essential for both accurate weather predictions, such as cloud formation, climate change studies, and impact on health. Nespor’s research was led by UND Chemistry faculty Kubátová and Jenya Kozliak. Kozliak had developed a new method of studying the PM fraction, which is organic in origin but not amenable to the modern “workhorse” of organic chemical analysis, i.e., gas chromatography (GC). The developed method employs thermal desorption and pyrolysis in combination, thus allowing research on the previously unaccounted non-volatile fraction of PM. Nespor’s work revealed that a significant fraction of the rural PM corresponds to compounds originating from lipids (plant components). However further research is needed to study the different types of PM.

Sunday Academy sessions

Sunday Academy is a once-per-month opportunity for K-12 students near the five tribal colleges to get a sample of research and practical experience in topics that are selected by the various campus instructors. The sessions started last September and will conclude on March 10.



Sunday Academy participants at Turtle Mountain Community College (left) test the hypothesis that making a basket from the left is easier than from the right

Each campus hosts a different topic each month which rotates to the next campus:

Understanding the anatomy of the eye led by **Ben Balas** (NDSU)

Digital preservation of natural and cultural resources led by **Stephanie Day** (NDSU)

Polymer synthesis from common materials led by **Alex Parent** (NDSU - CSMS)

Influenza outbreak led by **Natasha Petry** (NDSU) and **Don Warne** (UND)

Adaptation and climate change led by **Pam Puppo** and **Jill Hamilton** (NDSU)

Hypothesis and Product Testing developed by **Mafany Ndiva Mongoh** (SBC)

Sentiment Analysis developed by **Ravi Yellavajjala** (NDSU)

Activities of note

Ying Huang, 2016 ND EPSCoR Forward Leap award winner and associate professor in NDSU Civil and Environmental Engineering, was named the inaugural holder of the Welch Faculty Fellowship during a ceremony in January. The position is supported by the Timothy Welch and Donna LaQua-Welch Faculty Excellence Fund.

James Froberg, ND EPSCoR DDA awardee, presented on the *Detection of Pancreatic Cancer Exosomes using Graphene Nanodevices* at the Center for Diagnostic and Therapeutic Strategies in Pancreatic Cancer Presentation at NDSU on November 13, 2018,

and also gave a presentation on cancer research during the 6th Annual Pancreatic Cancer Vigil and Walk on November 15, 2018.

Paula Comeau, ND EPSCoR STEM manager, will be presenting on collecting information for the K-12 STEM Needs White Paper at the ND Science Teachers' Association conference in Dickinson, March 14-16, and will be available to talk about the White Paper at the River Watch Workshop at the Prairie Waters Education and Research Center near Valley City on March 21, 2019.

A team from Atmospheric Sciences at UND, including **Aaron Kennedy** (CRCS co-lead and assistant professor), **Aaron Scott** (CRCS researcher and Ph.D. graduate student), **Nicole Loeb**, **Kaela Lucke**, and **Caitlyn Mensch** (master's students), and **Megan McCabe** (undergraduate) provided hands-on winter weather activities geared for K-12 levels at the Aerospace Sciences Community Day on February 2, 2019, at UND Aerospace.



(left to right) Kaela Lucke, Megan McCabe, Caitlyn Mensch, and Nicole Loeb get set for K-12 student activity at the Aerospace Sciences Community Day.

Center for Sustainable Materials Science (CSMS)-related publications

Simultaneous High-temperature Gas Chromatography with Flame Ionization and Mass Spectrometric Analysis of Monocarboxylic Acids and Acylglycerols in Biofuel by **Ganna Flanagan**, **Anastasia Andrianova**, **Jana Casey**, **Eric Hellrung**, **Bonnie Diep**, **Wayne Seames**, and **Alena Kubátová**, (all UND) in *Journal of Chromatography A*, 2019, 1584 (11), 165-178. doi: 10.1016/j.chroma.2018.11.044

New Faculty Startup Award publications

Welding Parameters of Aluminum Alloys book chapter by **Meysam Haghsheenas** (UND), in *Encyclopedia of Aluminum and Its Alloys*, 2018, 2835-2855, CRC Press, Boca Raton. doi: 10.1201/9781351045636

Doctoral Dissertation Assistantship (DDA) awards

Congratulations to the latest DDA award winners at NDSU:

Mu'ath Al-Tarawneh, advisor is **Ying Huang**, assistant professor in Civil and Environmental Engineering

Zachary Geeraerts, advisor is **Kenton Rodgers**, professor in Chemistry and Biochemistry

Raquib Hasan, advisor is **Amanda Brooks**, assistant professor in Pharmaceutical Sciences

Sushant Lakkadwala, advisor is **Jagdish Singh**, professor in Pharmaceutical Sciences

Jurisdictional Travel Seed Awardee

Bakhtiyor Rasulev (CSMS researcher and assistant professor in CPM) and his graduate student, **Meade Erickson**, will travel to Jackson, Mississippi, to work with Jerzy Leszczynski (professor and presidential distinguished fellow, Physical Chemistry) at Jackson State University's Interdisciplinary Center for Nanotoxicity to study the *Computational Development of Photovoltaic Materials based on Bio-based Polymers and Fullerene Nanostructures*.

Translational Seed Awardees

Three Emerging Seed Awardees were also awarded Translational Seed Funding: **Ali Alshami** (UND), **Dilpreet Bajwa** (NDSU) and **Kerry Hartman** (NHSC).

Upcoming events

- **CSMS Translational Summit**, February 25-26, 2019, NDSU Alumni Center, Fargo. (Registration is closed)
- **Ghasideh Pourhashem**, CSMS researcher, assistant professor in CPM, and life cycle analyst, presenting March 6 at the Science Café, Stoker's Basement at the HoDo, Fargo, 7 p.m.
- **Tribal Nations Research Group Data Matters Conference**, March 20-21, 2019, at Sundance Casino & Resort, Belcourt, ND. (Registration is open at <http://www.tnrg.org/data-conference-registration.html>)
- **Northern Plains Weather/Climate Product, Service and User Engagement Workshop**, March 28, 2019, at NDSU Memorial Union (registration is open at <https://apps.ndus.edu/northern-plains-climate-workshop>)

- **ND EPSCoR Annual State Conference**, March 27, 2019, FargoDome, Fargo (registration is closed)
- **6th Annual Tribal College Research Symposium**, April 2, 2019, at Cankdeska Cikana Community College, Fort Totten, ND (registration opens soon)
- **CRCS and CSMS monthly meetings**: Hosted via IVN to all campuses. Dates are posted for each on their respective websites
- **CCAST interns**, presenting on HPC at your campus (upon request)

Funding and RFPs

ND EPSCoR will showcase EPSCoR-related funding opportunities when they become available. ***Please work with your own campus-sponsored program staff to ensure that you're meeting internal deadlines and crafting appropriate budgets.***

Travel Awards for ND EPSCoR RII Track-1 CRCS and CSMS Participants

Issued: February 4, 2019

Deadline: February 28, 2019, or until funding is exhausted

Who can apply: ND EPSCoR RII Track-1 Faculty

From: ND EPSCoR State Office

Limited funding available

To underscore the importance of industry collaborations in the sustainability of ND EPSCoR's current RII Track-1 centers for regional climate studies (CRCS) and sustainable materials science (CSMS), NSF has approved the funding for two travel seed awards of up to \$4,500 to travel to an industry partner's domestic (now excludes Canada and Mexico) location for the purpose of pursuing research collaborations in climate studies or sustainable materials. Please see https://www.ndepscor.ndus.edu/fileadmin/ndus/ndepscor/TravelAwards/EPSCoRIndustryTravelAwardsRFP_February_2019.pdf

ND EPSCoR Track-1 team updates

Please welcome new teammates or those with changing roles to the Track-1 effort:



Megan Even joined the ND EPSCoR State Office as the Administrative Coordinator. She has a BA in English and anthropology and an MA in English with a focus on the rhetoric of science. Even has worked in fundraising at a non-profit, taught English, and has helped graduate students from many disciplines get their research published.

Stay in touch

Our mailing address is:

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- For a link to ND EPSCoR's prior newsletters, <https://www.ndepscor.ndus.edu/news/newsletters/>
- To submit a story or idea by the end of the month to joyce.eisenbraun@ndus.edu, please complete: https://www.ndepscor.ndus.edu/fileadmin/ndus/ndepscor/documents/NewsTemplateFillable_2018-10.pdf
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Questions/comments: please contact Joyce Eisenbraun joyce.eisenbraun@ndus.edu

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