ND EPSCoR
Established Program to Stimulate Competitive Research

News & Notes

December 2018

Collaboration key for state

Closing out another year is an excellent time to reflect and to recognize the exceptional collaboration that has occurred across the state between various North Dakota University System (NDUS) and North Dakota Association of Tribal Colleges (NDATC) higher education institutions. Successful partnerships have developed between institutions of varying sizes and differing missions, with resulting benefits to students who have expanded opportunities, faculty who have found nearby collaborators in research, and citizens throughout North Dakota who have benefited from the enhanced research capacity and knowledge. In short, the whole of this statewide effort is truly greater than the sum of the individual efforts.

In this issue, you'll find reports that illustrate a few important collaborations. The state climatologist and researcher with the Center for Regional Climate Studies (CRCS), **Adnan Akyüz**, at North Dakota State University, (NDSU), discusses the importance of working with the agricultural community to help producers and industry understand the challenges and benefits of a slightly longer growing season: one of many impacts of our shifting climate. **Mikhail Bobylev**, Minot State University Chemistry professor and Center for Sustainable Materials Science (CSMS) researcher, is acknowledged for his mentorship of young researchers who are beginning their careers. The upcoming **CSMS Translational Workshop** will feature the work of faculty from Mayville and Minot State Universities, Sitting Bull College (SBC), as well as NDSU and the University of North Dakota (UND), who have developed innovative compounds and coatings that use bio-based products from our region.

State Steering Committee update

I want to welcome two members to new roles on the State Steering Committee, which is the ND EPSCoR 15-member advisory body.

Casey Ryan, M.D., was recently elected the Committee Chair, and serves as a representative of the State Board of Higher Education. He is the former president of Altru Health System, and is now a practicing physician specializing in endocrinology and internal medicine in Grand Forks, ND. Ryan also has been a past instructor and assistant dean at the UND School of Medicine. His background in private business provides a compelling voice for the sustainability of ND EPSCoR research.

Twyla Baker, Ph.D., was elected Vice Chair of the Committee. She is the president of Nueta Hidatsa Sahnish College (NHSC), in New Town, ND. She has a Bachelor of Science in environmental geology and technology, a Master of Science in education, and a Ph.D. in teaching and learning research methodology. Prior to becoming NHSC president in 2014, Baker served as director of the National Resource Center on Native American Aging at UND. Her background in education is an invaluable resource for the future of ND EPSCoR.

Our thanks to two legislative members who have served faithfully on the committee and are now retiring from legislative service: **Senator Carolyn Nelson** and **Representative Lois Delmore**. **Senator Ray Holmberg** and **Representative Tom Beadle** have graciously agreed to continue working with the committee, and we welcome **Senator Merrill Piepkorn** and **Representative Corey Mock** to the committee. I also want to welcome new representatives of the two research universities: **Mark Hoffmann**, Ph.D., UND Associate Dean for Research in the Colleges of Arts & Sciences and Chester Fritz Distinguished Professor in Chemistry and **Jane Schuh**, Ph.D., NDSU Vice President for Research and Creative Activity. The time and commitment of all the members given to the State Steering Committee is deeply appreciated, and we look forward to an engaging and collaborative effort in the new year on behalf of ND EPSCoR. Please join me in extending our thanks, and in welcoming new members and Drs. Ryan and Baker to their new roles.

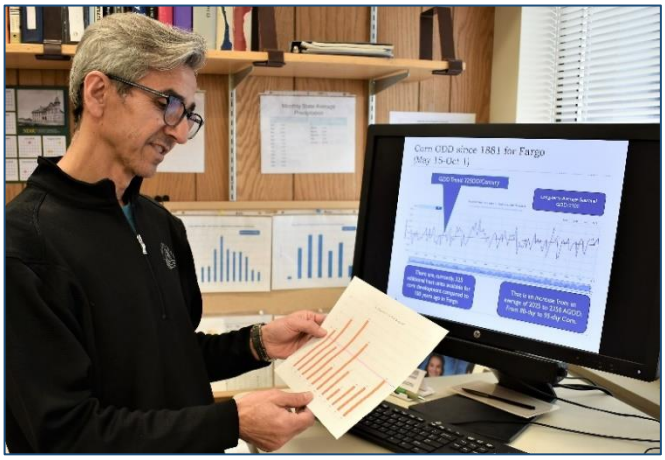
Best wishes for a wonderful winter break and a happy, productive new year.

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

Climate resource for ND… and the world

A small office in Morrill Hall on the NDSU campus is a window to the world of climate information and impacts: it's the North Dakota State Climate Office (SCO), headed by state climatologist and CRCS researcher, **Adnan Akyüz** (below). He is also a professor of climatological practice at NDSU in the College of Agriculture Food Systems and Natural Resources Agricultural Experiment Station.

The SCO provides subject-matter expertise on climate and weather in the state and is seen as a trusted source of information, Akyüz said. The SCO has a well-developed network at state, county and municipal levels and routinely provides weather, climate data and advice to optimize decision-making across a wide spectrum of activities, including emergency management, hazard mitigation, drought planning, and agricultural and natural resource management.



As a member of the CRCS team, he has been a valued source of data for the researchers, providing comprehensive long-term climate and current weather data from across the state. "When we compare data from 1890, we have an average of 12 additional growing days now," Akyüz said. "That information changes what crops or varieties farmers plant and when. For example with corn, what was risky in 1970 is now standard today. There are technology and genetic improvements, but with the increase in temperature, there are longer growing varieties that may bring higher yields." Through individual meetings and conferences like the recent Durum Growers Association Crop Outlook and International Durum Forum, Akyüz helps producers and industry understand the impacts of a shifting climate.

Akyüz noted that when compared with a century ago, the state has an average of 1.3" more rainfall, but hasn't seen an increase in storms or in excessively hot (over 90°) days. "The summer temperatures are not changing much," he said, "but the winters are now averaging 4.6° warmer than a century before."

Akyüz' expertise is not only appreciated within North Dakota but by the larger scientific community as well. He was recently nominated by the National Weather Service to serve on the World Meteorological Organization Commission, as a member of the Climatology Expert Teams and Rapporteurs, representing the United States. "It's a great honor to be nominated and to represent the U.S. in advising and guiding the activities of the World Climate Services Program," said Akyüz. "With temperatures increasing we need to continue to adapt to the changing climate." Akyüz' expertise in climate research will continue to benefit the CRCS research, citizens of North Dakota as well as members of our global community.

Webster receives patent

Dean Webster, CSMS co-lead and chair of NDSU's Coatings and Polymeric Materials (CPM), had the honor of receiving his latest patent presented personally by **Andrei Iancu**, director of the U.S. Patent and Trademark Office (USPTO). The presentation was part of a roundtable discussion on securing intellectual property and opportunities in technology development, hosted by **Senator John Hoeven**.

(Hoeven (l), and Iancu (r), present the patent to Webster (center)

The patent covers a bio-based polymer developed by Webster's CSMS research group to use as a cost-effective and safe resin, coating, and adhesive. Polyurethanes are important materials used in applications such as high performance coatings, soft and rigid foams, elastic fibers, and sporting equipment. They are usually made from petrochemical feedstocks and also use isocyanates, which are highly reactive toxic compounds.

In this work, Webster said, the researchers were able to show how polyurethanes for coatings could be made using renewable starting materials such as sugar and soybean oil plus carbon dioxide, without the use of isocyanates. As a result, Webster and his research

group, which included **James Docken, Jr.** and **Satyabrata Samanta,** former graduate research assistants in CPM, and **James Bahr**, senior research engineer in NDSU's Research and Creative Activity, were able to improve the sustainability of the polyurethanes as well as reduce the hazards associated with their manufacture.

Patent No: US 10,072,178 B2

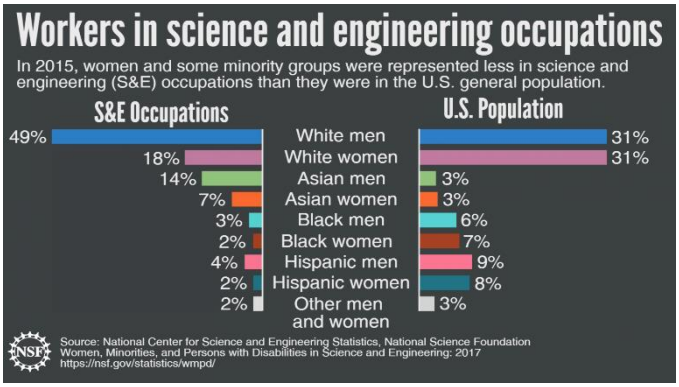
Date: September 11, 2018

Title: Biobased Cyclic Carbonate Functional Resins and Polyurethane Thermosets Therefrom

Enhancing the STEM pipeline

In a recent Science Café presentation, **Rachel Navarro** (Track-1 co-lead for Education and Workforce Development, associate dean for Research and Faculty Development in UND's Education and Human Development, and professor of Counseling Psychology), reported on recent research that identifies women and some minority groups as less represented in science and engineering occupations than they are in the general U.S. population, and suggested some implications for educational practice.

Her work, in collaboration with Lisa Flores (professor and program training director in Counseling and Psychology at the University of Missouri), investigated cultural, contextual, and social cognitive factors that promote students' engagement, satisfaction, and persistence in pursuing an undergraduate engineering degree. As one example, she cited the under-representation of Hispanic or Latinos who chose engineering as a major, and even fewer who graduate or go into an engineering profession. There has been little change in under-represented minorities over the past 20 years, she said, and that's one reason for studying the issue.



(Source: NSF at https://nsf.gov/statistics/wmpd/)

"People need to see others like them succeeding so they know they can succeed," Navarro stressed. "There's such a need for engineers to solve some of our societal issues, and we need to help women and people of color become an integral part of the solution."

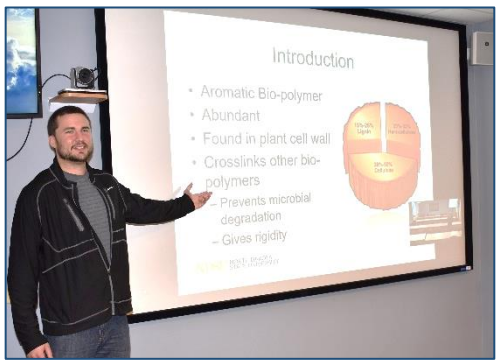
A panel comprised of engineering students and engineers from the community also talked about their experiences. Many expressed appreciation for the support they had received from others who had helped them be successful. Two members of the panel have been involved with ND EPSCoR: **Tyson Jeannotte** is UND's Native American Success in Science and Engineering mentor, while **Alexis Archambault** was a Graduate Student Research Assistantship (GSRA) Awardee in 2017, majoring in Geological Engineering at UND.

Navarro's research also has implications for her important work with ND EPSCoR. In trying to support the STEM pipeline in North Dakota, Navarro's team is looking at some of the issues she found in other research: building self-efficacy and outcome expectations among younger students may impact their career choices.

"Young students need to see others like them who are successful," Navarro said. "From peer modeling and mentorship to educational models that target self-efficacy and outcome expectations, we can do more."

Turning byproducts into coatings

Each month, CSMS researchers gather to hear from teammates about their latest research developments. Recently, Eric Krall (below), doctoral graduate assistant in CPM at NDSU, shared updates from his research, under the direction of his advisor, Dean Webster.



Krall outlined some of the benefits of the bio-based materials he and the team were testing. A primary improvement is the potential to make resins and other chemical compounds with a bio-based replacement for traditional petrochemical resins.

By developing new carbon-based materials from terrestrial or "above-ground" carbon sources instead of fossilized carbon, Krall said, it will help reduce humanity's dependence on petrochemicals such as oil. A practical and easily obtained existing carbon source is

lignin. Kraft lignin is currently a byproduct of the paper pulp industry, which makes it an excellent candidate for development into value-added products, such as these bio-based chemicals.

Krall's research is focused on turning the kraft lignin into a specialty, highly functionalized resin that can be used in different coating applications. Through this team's work, a novel approach has been developed to prepare the lignin without damaging the bulk lignin characteristics and without using harsh solvents. Model compounds were used to determine the reactivity and stability of the various hydroxyl groups found in lignin that could be used for a process called acetoacetylation.

Acetoacetate-functionalized resins are valued for their ability to crosslink or interact with a variety of chemicals, creating opportunities for new products and materials that have a bio-base, rather than petrochemical. "The versatile acetoacetate chemistry combined with the abundance of lignin makes this resin a potentially commercial bio-based replacement for petrochemical resins," Krall said. "We're taking byproducts and using them in new ways that can impact the coating industry."

Crossing disciplines = better results

He started his career in Atmospheric Sciences, but his current work involves a host of other disciplines. As co-lead of the Center for Regional Climate Studies (CRCS) research, **Jianglong Zhang**, UND professor in Atmospheric Sciences, has joined forces with CRCS teammates in agriculture (**David Roberts**, CRCS co-lead and associate professor in NDSU's AES Agribusiness and Applied Economics; **Jon Starr**, UND graduate student in Atmospheric Sciences), meteorology (**Aaron Kennedy**, CRCS co-lead and UND assistant professor in Atmospheric Sciences), hydrology (**Xuefeng Chu**, NDSU professor in Civil & Environmental Engineering), and economics (**Haochi Zheng**, UND assistant professor in Earth System Science & Policy), to develop working models for use in North Dakota.

"We're linking research from different disciplines together to look at the impact of social and economic factors on agricultural practices," he said. "We want to gain more insight into agricultural systems and their effect on atmospheric conditions."

Of specific interest, Zhang said, is the two-way interaction between solar radiation and agriculture. While solar radiation is a resource for plant growth, variations in agricultural fields, in turn, affect the reflected solar radiation. Using remote-sensing satellites, the impacts of the atmospheric phenomena on agriculture can be studied in depth.

(Zhang, standing, reviews with **Brittany Carson**, CRCS researcher and graduate student in UND's Atmospheric Sciences, some of the regional impacts from smoke)

"This past summer, we had a lot of smoke in the air," Zhang recalled as one example. "We used satellites to compare the areas covered by smoke with other areas, to assess the impact on the weather and crops."

Students working with CRCS have also had the opportunity to learn across disciplines, Zhang said. "Everyone speaks a different technical language, and they're all passionate about their research," he said. "The cross-disciplinary approach provides a good training opportunity for students to handle large data sets, and to learn how to analyze and find different approaches to the problems that impact our state."

Because of the work done through CRCS, Zhang said they are looking for additional opportunities to model market shifts and the impact on land use, soil health, yields, and individual farmers' agricultural practices. "Now that we have started these models with the help of ND EPSCoR, we will be looking for opportunities to sustain this research effort," he said. "We already submitted one journal paper on this topic and we are enthusiastic about developing more accurate and useful information for people across the state." For more information on CRCS, go to https://und-crcs.org/

Chemistry: a catalyst for change

Two women joined an interesting cohort at Minot State University—one came to Minot State to play on the women's soccer team, the other wanted to continue her biology degree—but both were intrigued, and encouraged, to add a chemistry major to their list of accomplishments. A common thread? Mentorship by CSMS researcher and Chemistry professor **Mikhail Bobylev**, a Research Experience for Undergraduates (REU) funded by ND EPSCoR, and an opportunity for hands-on research.

"I was terrified of chemistry in high school, but I loved biology," said **Tess Skinner**, fifth year senior

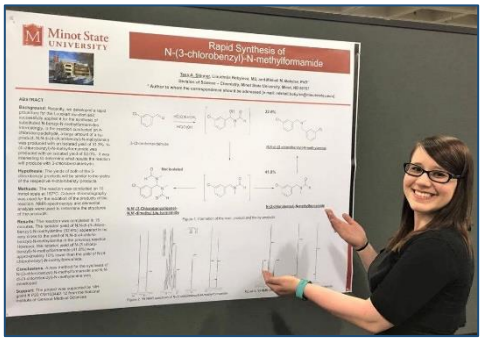
majoring in biology and chemistry. When she took a general chemistry class as a freshman at another institution, she was one of 1200 students, which didn't help. "When I retook the class at Minot State," she recalled, "I had a wonderful teacher who reignited my interest. If you had told me five years ago that I'd have a double major in chemistry and biology, I would have thought you were crazy."

Breanne Hatfield, who graduated in 2017 with a triple major in math, biology, and chemistry and is now a graduate research assistant at the University of North Carolina at Chapel Hill, tells a similar story. "Growing up I was a soccer player, and my main reason for coming to Minot State was to play on the women's soccer team," Hatfield recalled. "I thought I wanted to go into premed, so I had a biology major. Then my interest shifted to research when I took Bobylev's organic chemistry course."

(Bobylev, left, with Hatfield at the 2017 ND EPSCoR conference)

Both women had the opportunity to spend significant time in a research lab, thanks to ND EPSCoR's REU funding. "It was getting into the lab, doing hands-on research, and getting exposed to scientific thinking and experiments, that helped me get into grad school," Hatfield asserts. She credits both Bobylev and his wife, Lucy Bobyleva, Chemistry instructor at Minot State, for structuring the research process to be student-focused. "They let us own the project and think independently. Mrs. Bobyleva expects nothing but the best from you and will work with you, detail by detail, on how to do good research. Dr. Bobylev was so encouraging—you wanted to do good work."

Skinner said, "They were always available, and would provide helpful hints, so I learned how to troubleshoot and how to problem solve." Her research experience involved working with Bobylev to develop a rapid synthesis of dibenzylmethylamines, which include dibenzylamine fungicides (an anti-fungal compound). Because the new method reduced the processing time from days to minutes, is less expensive, and has a high yield with little waste, Skinner was enthused to be a part of a project with potential commercial applications. "This compound could be useful for dibenzylamine fungicides that keep crops free from fungal infections," she said, "helping farmers throughout this region."



(Skinner presenting her research at the 2018 American Chemical Society meeting)

Skinner is hoping her research experience will provide a foundation for her pursuit of a graduate program where she can be involved in organic synthesis and drug design, specifically targeted for drug therapy programs. "I've always been interested in genetics and hereditary changes, when one tiny change can cause developmental issues," she said. "I'd like to work with a drug therapy program that can help diminish or negate those developmental issues."

Hatfield said her career goals have also changed, thanks to her undergraduate experience. She was awarded the Clare Boothe Luce Science Fellowship, which is designed for women in science who want to attain a tenure track position. She credits her Minot State experience with changing her career path to research and helping build confidence. "We were all females in Dr. Bobylev's lab," she laughed, "and we kind of ruled the world. Now I want to reach out to let women and other underrepresented groups know that science is out there and you can do it."

(Skinner and Hatfield are part of an all-female cohort from Minot State. See the related story on Bobylev and the group's successes: https://www.minotstateu.edu/pio/news/2018/10/inbre-16-continues-to-excel.shtml

Sharing concepts in Africa

Chad Ulven, CSMS researcher and professor of mechanical engineering at NDSU, spoke at the Third International Conference on Composites, Biocomposites and Nanocomposites (ICCBN) in Port Elizabeth, South Africa Nov. 7-9, 2018. Ulven's talk focused on his research in natural fiber composites, specifically, the use of North American grown linseed flax or hemp fibers as reinforcement in plastics for many different structural composite applications.

"It was a great experience to participate in this conference, which brought hundreds of people from both academia and industry throughout South Africa to discuss advances in composite materials and how to

continue to incorporate these materials into various applications," Ulven (below) said.

Just as CSMS has demonstrated using natural fibers in North Dakota for agricultural value-add, Ulven said he was able to illustrate the potential of utilizing natural fibers native to South Africa for composite materials development.

Opportunities in ND

Clayton Lupe grew up on the Fort Apache Reservation in Arizona as a member of the White Mountain Apache tribe. After starting work with the Fort Apache Forestry Department, he decided to get a bachelor's degree in environmental science at Haskell Indian Nations University in Lawrence, KS.

At Haskell, he began seriously exploring a career in science. While reading the *Tribal College Journal*, Lupe discovered that SBC offered a Master's degree in Environmental Science; one of five tribal colleges in the country with a master's program. He applied and requested financial aid, but only received a portion of the total cost. But **Mafany Ndiva Mongoh**, SBC agriculture and science instructor and ND EPSCoR NATURE coordinator said, "Come anyway, and we will work out the funding." Lupe came to SBC, and funding was found via an assistantship and ND EPSCoR NATURE mentorship opportunities.

Lupe said he particularly appreciated the opportunities he received during his master's research experience at SBC. His advisor and SBC agriculture instructor, **Gary Halvorson**, said Lupe chose to look at the lead (Pb) levels in river sediments on the Standing Rock Indian Reservation. He was able to determine that Pb concentrations were correlated with clay content in sediment samples. Halverson noted, "There was actually very little information on Pb concentrations at Standing Rock, especially in the river sediments. This information gives us a much better idea of the fate of Pb in the alkaline sediments of local rivers and how it may impact the ecology of the state's river systems."

(Lupe in the SBC lab, center, with his advisor/mentor Halvorson, left, and Ndiva Mongoh, right)

In Lupe's previous work, he would collect water samples and send them off to another lab to be analyzed. At SBC, Lupe said he enjoyed the opportunity to use the instruments for water quality analysis. Halvorson said, "He had a steep learning curve, but he kept at it and did a very good job."

An important part of Lupe's SBC experience involved working with Ndiva Mongoh on the Nurturing American Tribal Undergraduate Research and Education (NATURE) program, funded by ND EPSCoR. Lupe had some prior experience working with younger students, but the format of Sunday Academy was new. Helping middle and high school students with activities in the lab was valuable, and he was impressed with how the NATURE program incorporated culture into STEM lessons—something he will integrate into future work.

Moving from Arizona to SBC was an adjustment in many ways, Lupe recalled, from the cold winters to labs that closed at 7 p.m., but he gave credit to his instructors for helping him succeed. After passing his thesis defense this past October, Lupe returned to the Fort Apache Reservation to work as a water quality officer. However, he has an offer for a Ph.D. assistantship in NDSU's soil science program, so there may be an opportunity in the future for another trip to North Dakota.

What's the spark?

NSF recently posed a question about what sparks a person's interest in science. For several of the individuals who responded, it was a simple idea or an instructor who encouraged.

The concept of using everyday materials is one that the NATURE Sunday Academy has used successfully for years, according to Sunday Academy coordinators **Julia Bowsher** (associate professor), and **Britt Heidinger** (assistant professor), in NDSU's Biological Sciences. The Sunday Academy experience allows middle and high school students the opportunity to experiment and discover.

(guar gum, above)

In a recent event hosted by Cankdeska Cikana Community College, **Alex Parent**, CSMS team member and assistant professor in Chemistry and Biochemistry at

NDSU, helped students get hands-on experience in creating a few polymers. By adding borax to warm bean juice, the students made guar gum. Guar gum is a common food and skin care product additive.

Another polymer was created when the students heated milk, then added vinegar, which reacts with the casein proteins in the milk (shown left).

Activities of note

Mohsen Tahmasebi Nasab, an NDSU doctoral candidate, presented his CRCS research on *Development of the Macro-Scale Hydrologic Processes Simulator (Macro-HyProS) and Applications in the Red River Basin and North Dakota* at the ND Special Water Resources Seminar, held November 9, 2018, in Fargo, ND. The seminar was designed to help understand water resources issues in the state and improve collaborations between federal/state agencies and academia.

Xuefeng Chu, CRCS researcher and associate professor in Civil and Environmental Engineering at NDSU, presented a talk, *Water Quantity and Quality Issues in Western North Dakota: Overview and Two Case Studies*, at the National Institutes for Water Resources Regional Symposium - Water Resources of the US Great Plains Region: Status and Future on October 24-26, 2018, in Lincoln, NE.

Jingyan Fu, intern with the Center for Computationally Assisted Science and Technology (CCAST) and NDSU graduate student in Electrical and Computer Engineering, provided training on using Singularity software for NDSU researchers in September and November 2018.

Arun Sukumaran Nair, UND CRCS doctoral student in electrical engineering, presented two papers at the Institute of Electrical and Electronics Engineering Canada Electrical Power and Energy Conference, October 2018. *Deep Neural Networks (DNN) for Day-Ahead Electricity Price Markets* was co-authored with **Radhakrishnan Angamuthu Chinnathambi**, **Siby Jose Plathottam**, **Tareq Hossen**, and **Prakash Ranganathan** (all UND). *Investigation of Price-Feature Selection Algorithms for the Day-Ahead Electricity Markets* was co-authored with **Radhakrishnan Angamuthu Chinnathambi**, **Mitch Campion**, and **Prakash Ranganathan** (all UND).

Alena Kubátová, CSMS researcher and professor of Chemistry at UND, presented at the November 13, 2018, Science Café on the topic of *Chemical Analysis as CSI Investigation from Biofuels to Atmospheric Particles*.

Andriy Voronov, CSMS researcher and professor in NDSU's CPM, was the expert scientist resource for a November 2, 2018, Indiana Public Media's *A Moment of Science* daily audio podcast, public radio program and video series providing the scientific story behind some of life's perplexing mysteries. This episode featured *What is Latex?* https://indianapublicmedia.org/amomentofscience/what-is-latex/

Center for Regional Climate Studies (CRCS)-related publications

SWAT Modeling of Non-Point Source Pollution in Depression-Dominated Basins under Varying Hydroclimatic Conditions by **Mohsen Tahmasebi Nasab**, **Kendall Grimm**, **Mohammad Hadi Bazrkar**, **Lan Zeng**, **Afshin Shabani**, **Xiaodong Zhang**, and **Xuefeng Chu** (NDSU and UND), in International Journal of Environmental Research and Public Health, 2018, 15(11), 2492. doi:10.3390/ijerph15112492

Macro-scale grid-based and subbasin-based hydrologic modeling: joint simulation and cross-calibration by **Xuefeng Chu**, **Zhulu Lin**, **Mohsen Tahmasebi Nasab**, **Lan Zeng**, **Kendall Grimm**, **Mohammad Hadi Bazrkar**, **Ning Wang**, **Xingwei Liu**, **Xiaodong Zhang**, and **Haochi Zheng** (NDSU and UND), in Journal of Hydroinformatics, 2018. doi:10.2166/hydro.2018.026.

Connecting the public with soil to improve human health by **Eric Brevik**, **Joshua Steffan** (both DSU), Jesus Rodrigo-Comino, Darrell Neubert, Lynn Burgess, and Artemi Cerda in European Journal of Soil Science, 2018. doi:10.1111/ejss.12764

TWI computations and topographic analysis of depression-dominated surfaces by **Kendall Grimm**, **Mohsen Tahmasebi Nasab**, and **Xuefeng Chu** (all NDSU), in Water, 2018, 10, 663, 1-12, doi:10.3390/w10050663.

Topo-statistical analyses of ponding area versus ponding storage of depression-dominated regions for macro-scale hydrologic modeling by **Mohsen Tahmasebi Nasab** and **Xuefeng Chu** (both NDSU), in Watershed Management, Irrigation and Drainage, and Water Resources Planning and Management, Proceedings of the 2018 ASCE World Environmental and Water Resources Congress, edited by Sri Kamojjala, American Society of Civil Engineers, 2018, 415-424. doi: 10.1061/9780784481400.2018

Center for Sustainable Materials Science (CSMS)-related publications

Renewable reactive diluents as practical styrene replacements in biobased vinyl ester thermosets by **Arvin Yu**, **Eric Serum**, **Anna Renner**, **Jonas Sahouani**, **Mukund Sibi**, and **Dean Webster** (all NDSU), in ACS Sustainable Chemistry & Engineering, 2018, 6, 12586-12592. doi:/10.1021/acssuschemeng.8b03356

Catalyzed non-isocyanate polyurethane (NIPU) coatings from bio-based poly(cyclic carbonates) by **Arvin Yu**, **Raul Setien**, **Jonas Sahouani**, **James Docken, Jr**., and **Dean Webster** (all NDSU), in Journal of Coatings Technology Research, in press, 2018. doi:10.1007/s11998-018-0135-7

Soy-based soft matrices for encapsulation and delivery of hydrophilic compounds by **Ruvimbo Chitemere**, **Shane Stafslien**, **Long Jiang**, **Dean Webster**, and **Mohiuddin Quadir** (all NDSU), in Polymers, 2018, 10 (6), 583. doi:10.3390/polym10060583

Effect of nature and extent of functional group modification on properties of thermosets from methacrylated epoxidized sucrose soyate by **Arvin Yu**, **Jonas Sahouani**, **Raul Setien**, and **Dean Webster** (all NDSU), in Reactive and Functional Polymers, 2018, 218, 29-39. doi:10.1016/j.reactfunctpolym.2018.05.003

Catalyst-free lignin valorization by acetoacetylation. Structural elucidation by comparison with model compounds by **Eric Krall**, **Eric Serum**, **Mukund Sibi**, and **Dean Webster** (all NDSU), in Green Chemistry, 2018, 2959-2066. doi:10.1039/C8GC01071D

Survey of several catalytic systems for the epoxidation of a biobased ester sucrose soyate by **Vamshi Chidara** (UND), **Samuel Stadem** (University of Minnesota Duluth), **Dean Webster** (NDSU), and **Guodong Du** (UND), in Catalysis Communications, 2018, 111, 31-35. doi:10.1016/j.catcom.2018.03.027

High performance bio-based thermosets from dimethacrylated epoxidized sucrose soyate (DMESS) by **Arvin Yu**, **AliReza Rahimi**, and **Dean Webster** (all NDSU), in European Polymer Journal, 2018, 99, 202-211. doi:10.1016/j.eurpolymj.2017.12.023

Upcoming events

- **CSMS Translational Summit**, February 25-26, 2019, NDSU Alumni Center, Fargo. Registration opening soon: https://epayment.ndus.nodak.edu/C22800_ustores/web/classic/store_main.jsp?STOREID=38&SINGLESTORE=true.
- **CCAST interns**, presenting on HPC at your campus (upon request)
- **CRCS and CSMS monthly meetings:** Hosted via IVN to all campuses. Dates are posted on the respective websites.
- **ND EPSCoR Annual State Conference,** March 27, 2019, FargoDome, Fargo (see article below).
- **CRCS Stakeholder Conference**, March 28, Fargo. (Registration coming soon).

ND EPSCoR's annual state conference is March 27, 2019

Mark your calendars for **Wednesday, March 27, 2019**, FargoDome, Fargo. Breakfast begins at 7:30 a.m.; **event closes at 4:30 p.m.**

This year, **CRCS/CSMS/EWD Faculty** will also present posters. In addition, students and faculty will provide oral talks on the results of the past five years of research.

Committee meetings will be Tuesday, March 26. If you're involved with the **External Advisory Board**, **State Steering Committee**, or a **RII Track-1 participant** you'll want to mark March 26 on your calendar as well. The **EMPOWERED-ND Corps** meeting will be held during breakfast on the 27th.

Deadline to register: February 1, 2019. Please register early as poster space is limited.

Registration is open at the ND EPSCoR website or by clicking below.
https://ndstate.co1.qualtrics.com/jfe/form/SV_dbOd2C329vaquNL?Q_DL=732B9TyYwralXpz_dbOd2C329vaquNL_MLRP_beb9vzQ86ccHvV3&Q_CHL=email

Funding and RFPs

Please work with your own campus-sponsored program staff to ensure that you're meeting internal deadlines and crafting appropriate budgets.

DOE EPSCoR Implementation Grants

Department of Energy will provide $20 million in EPSCoR grants for energy-related research. Please see below for added information on the grant: https://science.energy.gov/news/featured-articles/2018/11-14-18/?desktop=true

Key areas of interest:

Fossil Energy Topic 1: Multi-functional Catalyst Research and Development – Methane Upcycling for Sustainable Domestic Oil Production through Reduction of Flaring

Fossil Energy Topic 2: Selenium Reclamation from Amine Solvents
Issued: 11/13/2018
Submission Deadline for Pre-Applications:
Pre-Application due: 12/20/2018, 5 p.m. Eastern time
Pre-Application Response Date: 1/25/2019
Deadline: 3/27/2019 at 5 p.m. Eastern time

Travel Stipends for ND EPSCoR CSMS Translational Summit

Issued: November 15, 2018
Deadline: February 12, 2019 or until funding is exhausted
Who can apply: ND EPSCoR MCU, PUI, and TC RII Track-1 CRCS and CSMS Faculty and Students
From: ND EPSCoR State Office
https://www.ndepscor.ndus.edu/funding-opportunities/opportunities-researchers-and-nd-industry/ or at https://www.ndepscor.ndus.edu/funding/students/.

Jurisdiction Travel Seed Awards for CRCS and CSMS Faculty

Issued: November 15, 2018
Deadline: January 15, 2019 or until funding is exhausted
Who can apply: ND EPSCoR RII Track-1 Faculty
From: ND EPSCoR State Office
https://www.ndepscor.ndus.edu/funding-opportunities/opportunities-researchers-and-nd-industry/.

NSF EPSCoR: EPSCoR Research Fellows (RII Track-4) NSF 18-526 Limited Submission Program

Issued: December 4, 2018
All campuses: check with your sponsored program staff for earlier deadlines since this is a limited submission with **3 proposals from each submitting organization.**
Deadline: March 12, 2019 by 5 p.m.
Who can apply: The RII Track-4 Fellows program is an opportunity for **non-tenured faculty** to spend extended time at the nation's premier research facilities. The fellowship period may be used to initiate new collaborations, to expand existing partnerships in ambitious new directions, or to make use of unique equipment not available at the PI's home institution.
https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504901

ND EPSCoR Track-1 team updates

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

- **Tara Kopplin**, (UND), joined as co-lead for the Partnerships and Collaborations team. She is a licensing associate in Corporate Engagement & Commercialization, working with engineering and physical science-related technologies.

- **Rachel Navarro**, (UND), joined as co-lead for the Education and Workforce Development team. She is an associate dean for Research and Faculty Development in Education and Human Development, and professor of Counseling Psychology.

- **Brad Rundquist**, (UND), has accepted the role of new Communication lead for CRCS. He is the interim dean in the College of Arts and Science, and professor in the Geography department.

Stay in touch

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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
- To be added to the newsletter mailing list, please email ndepscor@ndus.edu, subject line: newsletter.

Questions/comments: please contact Joyce Eisenbraun joyce.eisenbraun@ndus.edu