

2017 ND EPSCOR EMERGING AREA SEED AWARDS: COLLABORATION

As part of our continued efforts to encourage collaborative research across the state of North Dakota, this year's Emerging Area Seed funding opportunity required partnerships between institutions in a project that combined or furthered the research efforts of both CRCS and the Center for Sustainable Materials Science (CSMS).

Awardees include:

1. Bio-Based Dielectric Substrate Based On Sunflower Seed Shells For Radio Frequency Antenna (\$40,000)

- [Principal Investigator \(PI\): Ali Alshami](#), Assistant Professor, Chemical Engineering, University of North Dakota (UND)
- [Co-PI: Khwaja Hossain \(Center for Sustainable Materials Science Researcher\)](#), Professor, Science and Mathematics, Mayville State University
- [Co-PI: Sima Noghianian](#), Professor, Electrical Engineering, UND

2. A Sustainable Approach for Improving Performance Characteristics of Biobased Poly (lactic acid) Polymer via Incorporating Functionalized Cellulose Nanocrystals (\$25,000)

- [Principal Investigator \(PI\): Dilpreet Bajwa](#), Associate Professor, Mechanical Engineering, North Dakota State University
- [Co-PI: Kerry Hartman \(Center for Regional Climate Studies Researcher\)](#), Academic Dean and Chair, Sciences, Nueta Hidatsa Sahnish College

CRCS Objective / Anticipated Outcome: The project explores the possible impact of using biobased and sustainable feedstocks on the climate variations. Results of the project will determine how the use of biobased cellulosic materials can help to reduce the use synthetic polymers which are tied to greenhouse gases that impact the climate.

CSMS Objective / Anticipated Outcome: The project determines how the use of nano-sized cellulosic materials can improve the performance characteristics of biobased polymers. The resultant biobased composite materials are expected to be environmentally friendly, biodegradable, safe and strong. The information gained from this project will also help to design strategies that enable nano-sized material to uniformly blend with biopolymers and expand the product portfolio of sustainable materials.

CRCS/CSMS Anticipated Output: The project output will be a conference presentation, peer reviewed publication or an external grant proposal.

3. Collaborative Sustainable Materials Research Program in the University of North Dakota (\$40,190)

- [Principal Investigator \(PI\): Surojit Gupta](#), Assistant Professor, Mechanical Engineering, University of North Dakota (UND)
- [Co-PI: Khwaja Hossain \(Center for Sustainable Materials Science Researcher\)](#), Professor, Science and Mathematics, Mayville State University
- [Co-PI: Yun Ji](#), Assistant Professor, Chemical Engineering, UND

4. Fate of Biobased Materials in Aquatic Environments: Impact on Physical, Chemical, and Biological Characteristics of Receiving Waters (\$25,000)

- [Principal Investigator \(PI\): Eakalak Khan](#), Professor Civil Engineering and Director of the NDSU Environmental & Conservation Science Program, North Dakota State University
- [Co-PI: Andre DeLorme \(Center for Regional Climate Studies Researcher\)](#), Professor and Chair, Department of Science, Valley City State University

CRCS Objective / Anticipated Outcome: The project explores possible impact of climate changes on the quality of feedstocks and in turn the characteristics of biobased materials. Results of the project will determine whether there is a linkage between climate variations and fate of biobased materials in surface waters.

CSMS Objective / Anticipated Outcome: The project determines the fate of biobased materials in surface waters focusing on potential impact such as solubility, toxicity, and harmful product precursors. Knowledge gained from the project will expand on the benefits of biobased materials or will unveil their environmental drawbacks.

CRCS/CSMS Anticipated Output: The project output will be a peer reviewed publication or an external grant proposal.

5. Novel Energy/Resource-Efficient Building Material Derived from Rapidly Renewable Materials (\$25,000)

- [Principal Investigator \(PI\): Long Jiang](#), Associate Professor, Mechanical Engineering, North Dakota State University
- [Co-PI: Mafany Mongoh \(Center for Sustainable Materials Science Researcher\)](#), Instructor, Agriculture/Science, Sitting Bull College

CRCS Objective and Outcome: This project links climate change induced variations in crop availability and suitability to the production of an agricultural residual based

building material. Results of the project will determine the suitable crop(s) whose residuals can be utilized for the production of the material under shifting climate.

CSMS Objective and Outcome: This project develops novel energy- and resource-efficient building materials using agricultural residuals as the feedstock via an environmentally friendly production method. The knowledge and products gained from this project will produce a new concept/prototype of building materials, expand the use of agricultural residuals, and reduce energy consumptions of buildings.

CRCS and CSMS Output: The project output will be peer reviewed publications, an intellectual property and external grant proposals.

6. Development of A Novel Porous Carbonaceous Material Enhanced for Control of Nitrous Oxide Emissions from Agricultural Soils (\$39,988)

- [Principal Investigator \(PI\): Feng Xiao](#), Assistant Professor, Civil Engineering, University of North Dakota
- [Co-PI: Eric Brevik \(Center for Regional Climate Studies Researcher\)](#), Professor of Geology and Soils and Chair, Department of Natural Sciences, Dickinson State University
- [Co-PI: Khwaja Hossain \(Center for Regional Climate Studies Researcher\)](#), Professor, Science and Mathematics, Mayville State University