

Multi-phase Flows and Phase Change Heat Transfer in the Food, Energy, and Water Nexus

Dr. Melanie M. Derby

Department of Mechanical and Nuclear Engineering
Kansas State University, Manhattan KS | Email derbym@ksu.edu

ME Graduate Seminar, 10/19/2018, 3:00-4:00 pm, JB 128

The production of food and power requires adequate fresh water, which is a critical focus of the Food, Energy, and Water nexus. Worldwide, agriculture is responsible for two-thirds of water withdrawals and, in the US, an average of 19 gallons of water are required to produce each kWh of electricity. In much of the Great Plains, the Ogallala Aquifer is the primary water source for food production, and is responsible for providing water for over 20% of corn, wheat, sorghum, and cattle produced in the United States. The competition for water between food and energy producers and diminishing Ogallala water levels create a strong need for sustainable water use at the intersection of the Food, Energy, and Water nexus.

Three projects in the Food, Energy, and Water nexus will be highlighted in this talk: 1) altered wettability to reduce soil evaporation, 2) recovery of water from cooling towers, and 3) passive oil water separation.



Biography: Dr. Melanie Derby graduated from Rensselaer Polytechnic Institute with a B.S. in 2008, M.S. in 2010, and Ph.D. in 2013. In 2013, she joined Kansas State University where she studies multi-phase flows and heat transfer; she is currently an Assistant Professor and holds the Hal and Mary Siegele Professorship in Engineering. Her work has been sponsored by NSF, ASHRAE, NASA, and industry. She is a recipient of a 2017 NSF CAREER Award, 2017 KSU College of Engineering Outstanding Assistant Professor Award, and 2017 ASME International Conference on Nanochannels, Microchannels and Minichannels (ICNMM) Outstanding Early Career Award.