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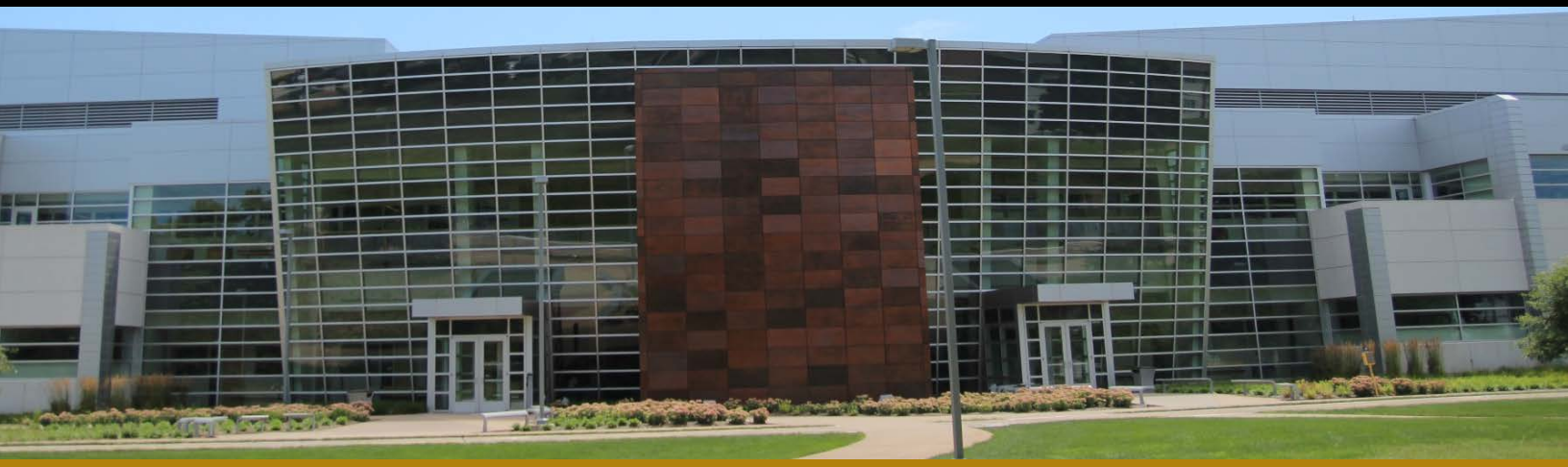

Birck Nanotechnology Center

Birck Nanotechnology Center Faculty Seminar Series

David Warsinger

Assistant Professor, School of Materials Engineering

Thursday, January 17, 2018
12:00pm – 1:00pm, BRK 2001\
(Lunch Provided)

Abstract: Climate change, degrading water resources, and economic and population growth are increasing the need for new science and technologies at the Water-Energy-Food Nexus. In enabling new and improved technologies to tackle these issues, a dual approach with nanoengineering and thermofluids systems is essential to improve efficiency, guide the design of new nanomaterials, allow for new power sources, use photonic structures for solar energy, and enable applications to agriculture. Following this approach, thermodynamic design of water treatment membrane technologies such as reverse osmosis (RO) and membrane distillation (MD) leads to innovations with superhydrophobic nanostructured surfaces for enhanced heat transfer, photocatalysis, time-varying "batch" cycles, and new system configurations. Furthermore, the systems-level optimization of heat and mass transfer in these technologies allows for choosing superior material properties and abilities of nanofabricated membranes and condenser surfaces. For example, superhydrophobic condenser surfaces enable jumping droplet condensation in air gap membrane distillation, and membrane surface coatings enable new anti-fouling techiques with protective air layers. These approaches not only yield significant improvements in water treatment and associated energy use, but also in providing water and energy needs for food applications.

PURDUE UNIVERSITY Discovery Park