



Birck Nanotechnology Center

Energy Conversion with Organic Semiconductors

Michael Chabynec

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11:00am – 12:00pm, BRK 1001

Bio: Professor Michael Chabynec is Chair of the Materials Department at the University of California Santa Barbara. He received his Ph.D. in chemistry from Stanford University and was an NIH postdoctoral fellow at Harvard University. He was a Member of Research Staff at (Xerox) PARC prior to joining UCSB in 2008. His research group studies fundamental properties of organic semiconducting materials and thin film inorganic semiconductors with a focus on materials useful for energy conversion. He has authored more than 170 papers across a range of topics and is inventor on more than 40 patents.

Abstract: Organic semiconductors provide the ability to directly manufacture thin film electronics including transistors, light emitting diodes, and solar cells. There has been recent interest in using organic materials as thermoelectrics for conversion of waste heat to electricity and also temperature control. The micro- and nanostructure of semiconducting polymers strongly controls their electrical properties. This feature makes it difficult to determine structure-property relationships for the upper-limits of performance based on the chemical structure of the polymer. We will discuss how soft X-ray scattering and high-resolution transmission electron microscopy can be used to reveal the charge transport pathways in semiconducting polymers. These studies provide a basis for understanding how electrical doping impacts their thermoelectric performance. We will present results from recent studies on the connection between morphology and thermoelectric performance for *p*- and *n*- type polymers. Using a predictive model based on experimental data and theory, we will discuss prospects for the future.