COLLEGE OF ENGINEERING
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Mechanical Engineering Seminar Series

Nanoengineering Materials for Thermal Transport

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2147 GG Brown

Abstract

Nanostructuring materials allows independent control of multiple materials properties. High conductivity materials such as carbon nanotube forests are useful as thermal interface materials (TIMs) for dissipating power in electronic devices, while low conductivity materials like nanoporous silicon for thermal barrier coatings and enhanced thermoelectric performance. Beyond thermal transport, storage of thermal energy is critical for effective heat removal for applications involving highly-transient heat fluxes, and during material processing. Often to achieve the desired functionality, multiples materials are combined together to form heterogeneous composites. For example, in lithium ion batteries, the particulate active materials (with micro- and nano-scale features) are sandwiched between metal electrodes and polymerbased separators with microscale thicknesses to form macroscale battery cells. This seminar will discuss methods to understand and control thermal transport and development of accurate and reliable experimental and analytical techniques for thermal characterization across multiple length scales. Further, I will highlight the integration of material synthesis with thermal property measurements and physics-based analysis to provide new avenues for improved materials and device performance.

Bio

Amy Marconnet is an Associate Professor of Mechanical Engineering at Purdue University. She received a B.S. in Mechanical Engineering from the University of Wisconsin – Madison in 2007, and an M.S. and a PhD in Mechanical Engineering at Stanford University in 2009 and 2012, respectively. She then worked briefly as a postdoctoral associate at the Massachusetts Institute of Technology before joining the faculty at Purdue University in 2013. Research in the Marconnet Thermal and Energy Conversion (MTEC) Lab integrates metrology and analysis of underlying transport mechanisms with design and development of nanostructured materials for heat transfer and energy conversion applications.

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