UF UNIVERSITY of FLORIDA

Spring 2009 Seminar Series

Department of
Mechanical & Aerospace Engineering

Ebaugh Lecture

Tuesday, February 10, 2009
4:00 pm
in Room 303 MAE-A

From Phonons to Fourier's Law: Effects of Microstructure on Thermal Transport

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Abstract

The mechanisms associated with phonon-mediated thermal transport in electrical insulators are discussed. In coarse-grained materials, the thermal conductivity is determined by phonon-phonon scattering. As the physical dimensions of device structures push relentlessly into the nanoscale, the effects of surfaces, grain boundaries and point defects become ever more important. However, experimentally, it is very difficult to probe the thermal conductivity on these length scales. Over the last few years, we have developed an integrated suite of atomic-level simulation methods specifically designed to dissect the interactions of phonons with elements of the microstructure. We have applied these techniques to both individual interfaces, multilayers, polycrystals and systems with point defects. In particular, by directly analyzing the interactions of phonon wave packets with interfaces, we have begun to develop an understanding of phonon-defect interactions and their role on the thermal-transport properties of nanostructured materials.

Biography

Simon Phillpot is a Professor of Materials Science and Engineering at the University of Florida. He received a Bachelors degree from Oxford and a PhD from the University of Florida, both in physics. Prior to joining UF in 2003, he spent 16 years at Argonne National Laboratory. His research uses computational methods to address important issues in the fundamentals of materials behavior and materials development. Current activities include heat transfer in solids, dielectric and ferroelectric materials, tribology, mass transport in oxides, radiation damage and simulation methodology development.

Refreshments served in 303 MAE-A beginning at 3:50 pm

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