COLLEGE OF ENGINEERING
MECHANICAL ENGINEERING
UNIVERSITY OF MICHIGAN

ME Department Seminar

Thermal Boundary Conductance and Some Unconventional Thermal Metrologies

Chris Dames

Vice Chair of Graduate Studies
Associate Professor of Mechanical Engineering
University of California- Berkeley

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4:00PM
1200 EECS

Abstract:
This talk will cover two topics related to the fundamentals of heat conduction:

(A) Heat transfer in nanoscale devices is often limited by the thermal boundary conductance (TBC), even for materials in atomically-intimate contact. I will summarize our recent review of the TBC [1], including a comparison of over 40 materials pairs.

(B) I will discuss several novel thermal metrologies motivated by various challenging samples. Examples include adapting the "3 omega" method to measure the thermal conductivity of soft biological tissues, as well as anisotropic thermal conductivity tensors of arbitrary orientation. And to measure temperature at a single point with spatial resolution below 50 nm, we have recently demonstrated an all-optical, far-field technique using a single luminescent nanoparticle.

[1] C. Monachon, L. Weber, and C. Dames, "Thermal Boundary Conductance: A Materials Science Perspective," *Annual Review of Materials Research* **46**, 433 (2016).

Bio:
Chris Dames is an Associate Professor, and Vice-Chair for Graduate Matters, in the Department of Mechanical Engineering at UC Berkeley. He received his Ph.D. in Mechanical Engineering from MIT in 2006, and was a faculty member at UC Riverside from 2006-2011 before joining UC Berkeley. He also worked as a research engineer for Solo Energy Corp. (1998-1999). His research has been recognized with a DARPA Young Faculty Award and NSF CAREER award, and was a lead organizer along with Prof. Pramod Reddy for the 8th triennial US-Japan Joint Seminar on Nanoscale Transport Phenomena (2014). Topics of current interest in Dr. Dames' lab include thermal and optical properties of nanocomposites, thermal mapping in biological systems, thermometry below 50 nm, and highly nonlinear and anisotropic thermal transport.