

Title: Contribution of Optical Phonons to Thermal Boundary Conductance

Authors: Thomas Beechem(*,1), John Duda(2), Patrick Hopkins(1), Pam Norris(2)

Affiliation: (1) Sandia National Laboratories, (2) University of Virginia

Abstract: The efficiency by which thermal energy is transmitted from one material to another, the so called thermal boundary conductance (TBC), is a performance determinant for an array of micro and nanosystems ranging from high powered electronics to thermoelectrics due the numerous interfaces contained as part of their architecture. To assess this transport, theoretical approaches often account for only the acoustic phonons as optical modes are assumed to contribute negligibly due to their low group velocities. Examining this approach, the often employed diffuse mismatch model is reformulated to account for more realistic dispersions containing optical modes. Using this reformulation, it is found that optical phonons contribute to TBC by as much as 80% for a variety of material combinations in the limit of both inelastic and elastic scattering.

Email Address: tebeech@sandia.gov

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