Heat Transport Measurements of Thin Films and Interfaces Using the 3ω Method

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We review our recent progress in the measurement and understanding of the thermal conductivity of thin dielectric films and the thermal conductance of solid-solid interfaces. The measurements cover the temperature range 80-400 K and two orders of magnitude in film thickness, $0.01 < t < 1$ µm. Data for device quality a-Si allow direct comparison of experimental data with theoretical predictions; experiments on microcrystalline TiO_2 show that the thermal conductivity of thin films can be a sensitive function of deposition parameters; and data for ultra-thin SiO_2 films demonstrate that for an amorphous dielectric, the finite thermal conductance of interfaces becomes important when $t < 50$ nm.