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Measurement of the Thermal Conductance at the Graphene-Quartz Interface by Optical Pump-Probe Spectroscopy CHUN HUNG LUI, KIN FAI MAK, YANG WU, TONY HEINZ, Columbia University — We have determined the interfacial thermal conductance of single and multi-layer graphene samples prepared on quartz substrates by mechanical exfoliation of graphite. The measurements were performed by suddenly heating the graphene sample with a femtosecond optical laser pulse and then monitoring the sample's subsequent temperature evolution through the slight changes in reflectivity experienced by a time-delayed optical probe pulse. For the study of thermal transport, the transient response occurring on a time scale of tens of picoseconds was relevant. A faster transient related to non-equilibrium electronic excitation was also observed at early delay times. By studying the dependence of the slow decay component on the number of graphene layers in the sample, we could identify interfacial heat flow as the relaxation mechanism. An interfacial conductance in excess of 5,000W/cm^{2}K was deduced for the graphene-quartz system which is in the same order of magnitude compared to similar measurements on carbon nanotube suspensions [Huxtable et al. Nature Materials 2003].

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