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**Heat transfer experiments on micro- and nanoscale: Interface and size effects** BERND GOTSMANN, IBM Zurich Research Laboratory, MARTIN HINZ, University of Ulm, Germany, MARK A. LANTZ, IBM Zurich Research Laboratory, URS DUERIG, IBM Zurich Research Laboratory, OTHMAR MARTI, University of Ulm, Germany, JOHANNES WINDELN, IBM Zurich Research Laboratory — We present heat transfer experiments using a heated silicon cantilever/tip at or near contact with a variety of surfaces. Under ambient conditions cooling of the cantilever results from conduction through the air, through the cantilever beam and through the tip-surface contact, as well as from radiation cooling. By varying the ambient conditions, the sample material and the tip-sample distance we can quantify the various contributions. Under ambient conditions the heat transport is dominated by conduction through the air and the cantilever. At distances of a few times the mean free path of air molecules the heat transfer is accompanied by surprisingly a large momentum transfer. In vacuum, with conduction excluded, heat transport through the nm-sized tip-surface contact can be measured. The heat transport is found to depend decisively on the size of the tip, the size of the mechanical contact and the surface material. Radiative heat transport becomes significant under vacuum conditions. At small separations we observe a strong distance dependence due to near field effects. This deviation from Stefan-Boltzmanns law also exhibits a strong material and temperature dependence.

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