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Thermal Interface Conductance across a Graphene-BN Heterojunction CHUN CHUNG CHEN, ZHEN LI, University of Southern California, SHI LI, The University of Texas of Austin, STEPHEN CRONIN, University of Southern California, UNIVERSITY OF SOUTHERN CALIFORNIA COLLABORATION, THE UNIVERSITY OF TEXAS OF AUSTIN COLLABORATION —
We deposit graphene on h-BN flakes and measure the thermal interface conductance of a graphene/h-BN interface by passing current through the graphene sheet to create Joule heating while monitoring the temperatures of the graphene and h-BN using Raman spectroscopy. During the electrical heating, the Raman G band, 2D band, and h-BN frequency downshift with the increasing of the applied power, indicating the heating in graphene and h-BN. The Raman temperature coefficient of the G band, 2D band, and h-BN frequency are calibrated by heating the device from 300K to 400K in a temperature-controlled stage, yielding values of 0.0102 and 0.0215 cm^{-1}/K for graphene, and 0.0246 cm^{-1}/K for h-BN. These electrical heating and the temperature calibration results suggest a maximum temperature gradient of 60K at the graphene/h-BN interface during the electrical heating. Multiple electrical heating experiments are conducted, showing consistent results, validating the reliability of the acquired data. From the power dependence of the temperature difference between the graphene and h-BN, we are able to establish the interface thermal conductance across the graphene/h-BN interface to be 7.41 $\pm$ 0.43 MW/m2K.

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