Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Thermal Conductance at the 2D MoS_2-hexagonal Boron Nitride Interface YI LIU, Natl Univ of Singapore, KEDAR HIPPALGAONKAR, Institute of Materials Research and Engineering, A*STAR, ZHUN YONG ONG, Institute of High Performance Computing, A*STAR, JOHN TL THONG, CHENGWEI QIU, Natl Univ of Singapore — In recent years, a number of 2D heterostructure devices have emerged, including graphene/hexagonal boron nitride (*h*-BN), graphene/MoS_2 and MoS_2/*h*-BN. Among them, MoS_2/*h*-BN field-effect transistors with MoS_2 channels and *h*-BN dielectric have been reported to have higher carrier mobility and reduced hysteresis compared to MoS_2 on SiO_2. Despite relatively high in-plane thermal conductivity of MoS_2 and *h*-BN, heat dissipation from these 2D devices is mainly limited by heat transfer in the vertical direction. Consequently, their operating temperatures are strongly influenced by the interface thermal conductance. In this work, we demonstrate the measurement of interface thermal conductance between MoS_2 and *h*-BN. This is realized by electrically heating MoS_2 and monitoring their temperatures through Raman spectroscopy. The obtained interface thermal conductance between MoS_2 and *h*-BN is 1.77 MW/m^2K, smaller than the reported value for the graphene/*h*-BN interface, due to the weak coupling of phonon modes between MoS_2 and *h*-BN based on our NEGF calculation. The low interface thermal conductance value suggests this interface is not favorable for heat dissipation, and should be considered carefully for the design of electronic and optoelectronic devices based on MoS_2/*h*-BN heterostructures.

Yi Liu
Natl Univ of Singapore

Date submitted: 05 Nov 2015 Electronic form version 1.4