Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Temperature dependent thermal conductivity of single- and bi-layer MoS_2 and $MoSe_2$ XIAN ZHANG, DEZHENG SUN, YILEI LI, Columbia University, GWAN-HYOUNG LEE, Yonsei University, YUMENG YOU, TONY HEINZ, JAMES HONE, XU CUI, Columbia University, JAMES HONE TEAM, TONY HEINZ TEAM — Thin layer transition metal dichalcogenide (TMDC) materials have received extensive interests in recent years. In this work, for the first time we systematically investigated and compared the thermal transport properties of two TMDC materials, MoS_2 and $MoSe_2$, and in single-layer (1L) and bi-layer (2L) forms. The optothermal Raman technique is used in the measurement process. With an improved and more robust experimental data analysis process, we discovered the thermal contact resistance and the interfacial thermal conductance of the four materials for the first time. These factors provide boundary conditions and are crucial in generating the final thermal conductivity for the suspended materials. For 1L MoS_2 and $MoSe_2$, the room-temperature thermal conductivities are (80 $\pm$ 17) W/mK and (72 $\pm$ 19) W/mK, respectively. For 2L MoS_2 and $MoSe_2$, we obtain values of (73 $\pm$ 25) and (39 $\pm$ 13)W/mK. The thermal conductivity of suspended 1L MoS_2 decreases to (66 $\pm$ 16) W/mK upon heating to 500K.

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Date submitted: 31 Dec 2014 Electronic form version 1.4