Temperature dependent optical properties and thermal conductivities of single- and few-layer MoS$_2$ XIAN ZHANG, DEZHENG SUN, GWAN-HYOUNG LEE, YUMENG YOU, XU CUI, TONY HEINZ, JAMES HONE, YILEI LI, Columbia University — The transition metal dichalcogenide, MoS$_2$ have shown unique optical and electrical properties, such as band structure transition, high mobility, and strong photoluminescence, in a monolayer form. Here we investigate the thermal transport properties in exfoliated monolayer and bilayer MoS$_2$. By measuring the Raman peak shift in response to laser heating, and the Raman peak shift with temperature variation, we obtain the room-temperature thermal conductivity and the interface conductance of about $(75+34/-26)$W/mK and $(0.24+0.06/-0.06)$MW/m$^2$K for supported monolayer MoS$_2$. And the thermal conductivity of the suspended monolayer MoS$_2$ is around $(81+12/-11)$W/mK at room temperature, and $(60+11/-9)$W/mK at 500K.

Xian Zhang
Columbia University

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