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Investigation of E^1_{2g} and A_{1g} Raman Modes of Few-Layer MoS_2 on HfO_2 Substrate HUI-CHUN CHIEN, JATINDER KUMAR, HSIN-YING CHIU, University of Kansas — The recent research work by Radisavljevic *et al.*[1] shows that the mobilities of monolayer MoS_2 transistors can be improved by employing a thin layer of hafnium oxide as top-gate dielectric. Dielectric screening has been successfully demonstrated to suppress the Coulomb interactions of charged impurities on the substrate. Therefore, we develop an alternative method of building monolayer MoS_2 transistors on HfO_2 substrate. Owing to the low contrast of few-layer MoS_2 flakes on thin HfO_2 layer, which makes the realization of such device configuration difficult. By utilizing the thickness dependence of in-plane and out-of-plane Raman peaks of MoS_2 flakes, E^1_{2g}andA_{1g}, respectively, we establish an efficient approach to improve the identification of MoS_2 layers by Raman spectrum instead of AFM. Our investigation of Raman spectrum of few-layer MoS_2 on HfO_2 shows the significant difference from those on SiO_2. The substrate dependence of Raman spectrum as well as its further application will be discussed in this talk.

[1] Radisavljevic, *et al., Nat. Nanotech.* **6**, 147 (2011)

Hui-Chun Chien
University of Kansas

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