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Measurement of electrostatic potential variations between 2D materials using low-energy electron microscopy[1] SERGIO DE LA BARRERA, PATRICK MENDE, JUN LI, RANDALL FEENSTRA, Carnegie Mellon University, Department of Physics, YU-CHUAN LIN, JOSHUA ROBINSON, Pennsylvania State University, Materials Science and Engineering, SURESH VISHWANATH, HUILI XING, Cornell University, Electrical and Computer Engineering — Among the many properties that evolve as isolated 2D materials are brought together to form a heterostructure, rearrangement of charges between layers due to unintentional doping results in dipole fields at the interface, which critically affect the electronic properties of the structure. Here we report a method for directly measuring work function differences, and hence electrostatic potential variations, across the surface of 2D materials and heterostructures thereof using low energy electron microscopy (LEEM). Study of $MoSe_2$ grown by molecular beam epitaxy on epitaxial graphene on SiC with LEEM reveals a large work function difference between the $MoSe_2$ and the graphene, indicating charge transfer between the layers and a subsequent dipole layer. In addition to quantifying dipole effects between transition metal dichalcogenides and graphene, direct imaging of the surface, diffraction information, and the spectroscopic dependence of electron reflectivity will be discussed.

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