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Engineering MoS2 contact with graphene electrodes under electrostatic doping EN-MIN SHIH, REBECA RIBEIRO-PALAU, GHIDEWON AREFE, YOUNG-DUCK KIM, JIA LI, JAMES HONE, CORY DEAN, Columbia University — Semiconductor transition metal dichalcogenides (TMDs) are 2D semiconductors that host attractive transport properties such as unconventional quantum Hall effect and spin-valley physics. However, metal contacts typically result in a Schottky barrier, making it difficult to access fundamental properties of the intrinsic charge transport. In this report, we utilize graphene electrodes to achieve ohmic contact to MoS_2 monolayer and bilayer. Our devices are fully capsulated by boron-nitride, which reduces the disorders from Si/SiO_2 substrate, and benefit from a dual-gate geometry, which allow us to independently dope the MoS_2 channel and graphene contact regions. The transition from non-ohmic to ohmic contacts is studied as a function of graphene doping and the MoS_2 carrier density. Our results reveal the operational range of these new devices, and provide new insight into future device design.

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