Abstract Submitted
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Phonon-mediated superconductivity in electrostatically and chemically doped single-layer MoS2[1] YIZHI GE, AMY Y. LIU, Georgetown University — MoS_2 is a semiconductor with a layered structure that can be exfoliated to make few-layer and single-layer samples. Superconductivity has recently been reported in electrostatically doped few-layer MoS_2 samples, with a transition temperature above 9 K, which is higher than the maximum T_c found in intercalated bulk MoS_2. Here we report a density functional theory study of electron-phonon coupling in doped single-layer MoS_2. With electrostatic n-type doping at levels comparable to those achieved in MoS_2 field-effect transistors, the electron-phonon coupling constant is calculated to be consistent with a superconducting T_c of 5-10 K. While deposition of alkali atoms on the surface also introduces carriers into the conduction band, we find that in some cases, it creates significant changes in the electronic structure, leading to a weaker interaction between electrons and phonons. The dependence of the electron-phonon interaction on carrier concentration, for both n-type and p-type doping, will be discussed.

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