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**Isotope dependence of the electronic structure in graphene**[1]
TAKASHI KORETSUNE, RIKEN CEMS, SUSUMU SAITO, Tokyo Institute of Technology — It has been known that the effect of electron-phonon couplings on the electronic structure of diamond is not negligible and recently, it has been confirmed that the experiments are well reproduced using first-principles calculations. In case of graphene, the renormalization of the Fermi velocity due to the electron-phonon couplings has been predicted. Thus, we theoretically study the possibility of band structure engineering in graphene using the electron-phonon couplings and the isotope effect. First, we consider the difference of pure 12C graphene and 13C graphene. On the basis of density functional theory, it is found that the depth of so-called Dirac point, that is, work function of graphene, shows isotope dependence, indicating that it is possible to shift the depth of the Dirac point locally without using a gate voltage. We also discuss the possibility of band-gap opening by a periodic patterning of the carbon isotope.

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