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Effects of Strain on Electronic Properties of Graphene YOUNG-WOO SON, Korea Institute for Advanced Study, Seoul, Korea, SEON-MYEONG CHOI, SEUNG-HOON JHI, Pohang University of Science and Technology, Pohang, Korea — We present first-principles calculations of electronic properties of graphene under uniaxial and isotropic strains, respectively [1]. The semi-metallic nature is shown to persist up to a very large uniaxial strain of 30% except a very narrow strain range where a tiny energy gap opens. As the uniaxial strain increases along a certain direction, the Fermi velocity parallel to it decreases quickly and vanishes eventually, whereas the Fermi velocity perpendicular to it increases by as much as 25%. Thus, the low energy properties with small uniaxial strains can be described by the generalized Weyl's equation while massless and massive electrons coexist with large ones. The work function is also predicted to increase substantially as both the uniaxial and isotropic strain increases. Hence, the homogeneous strain in graphene can be regarded as the effective electronic scalar potential. [1] S.-M. Choi, S.-H. Jhi and Y.-W. Son, arXiv.org:0908.0977.

Young-Woo Son
Korea Institute for Advanced Study, Seoul, Korea

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