Abstract Submitted
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The effect of depolarization fields on the electronic properties of two-dimensional materials[1] YOUNG-HAN SHIN, HYE JUNG KIM, MOHAMMAD NOOR-A-ALAM, Department of Physics, University of Ulsan, Ulsan 680-749, Republic of Korea — Graphene is a two-dimensional semimetal with a zero band gap. By weakening the sp^2 covalent bonding of graphene with additional elements such as hydrogen or fluorine, however, it is possible to make it insulating. We can expect that the band gap converges to that of a three-dimensional analogue by repeating such two-dimensional layers along the normal to the layer. If we control the position of additional elements to make a dipole monolayer, the system will have an intrinsic internal field decreases as the number of layers increases. But, for two-dimensional bilayers, depolarization field is so strong that its electronic properties can be much different from its monolayer analogue. In this presentation, we show that the internal fields induced by dipole moments can change electronic properties of two-dimensional materials such as graphene-like structures and complex metal oxides.

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