

ID: P1.18

Title: Local strain effect on graphene by a first-principles study

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We have systematically investigated the effects of local strain on the electronic properties of graphene using first-principles calculations. Two major types of local strains that are along the zigzag and armchair directions have been studied. We find that local strains with a proper range and strength along the zigzag direction result in opening of significant band gaps in graphene, in the order of 10-1 eV; whereas, local strains along the armchair direction cannot open a significant band gap in graphene. Our results show that appropriate local strains can effectively open and tune the band gap in graphene and thus the electronic and transport properties of graphene can also be modified.