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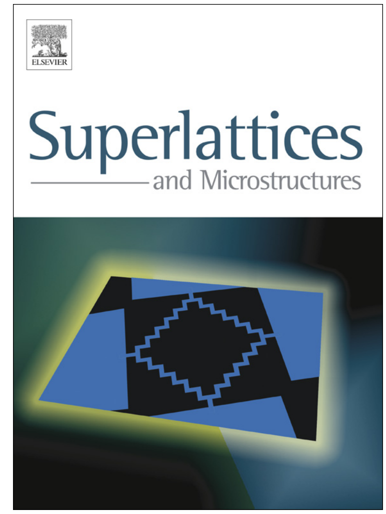

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Effect of uniaxial strain on electrical conductance and band gap of superlattice-graphene nanoribbons

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Abstract: In this paper, we study the electrical conductance and band gap of superlattice-graphene nanoribbons (SGNRs) attached to the two semi-infinite metallic leads. The calculations are based on the tight-binding model and Green's function method. We investigate the effects of uniaxial strains and the concentration of boron nitride (BN) slices as well as magnetic fields on the electrical conductance and the band gap of the system. Our numerical results show the electric conductance of the system reduces with increasing the concentration of boron nitride slices, x. Also, an energy gap opens at x=0. 25 and its value increases with the growing the BN concentration of the alloy. Therefore, the BN hybrid structure can induce a metal-semiconductor transition, and for large value of the BN concentration, the system behaves as a wide gap semiconductor.

We find that the impurities and oriented strains cause the metal-semiconductor phase transition, while the magnetic field creates a periodic metal-semiconductor transition.

We could control the conductance and band gap of the system by varying of the relevant parameters, such as the concentration of boron nitride slices, the value and direction of the applied strain and the magnetic field.

Keywords: Superlattice-Graphene Nanoribbons, Uniaxial Strain, Magnetic Field, Tight-Binding, Green's Function, Conductance.

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