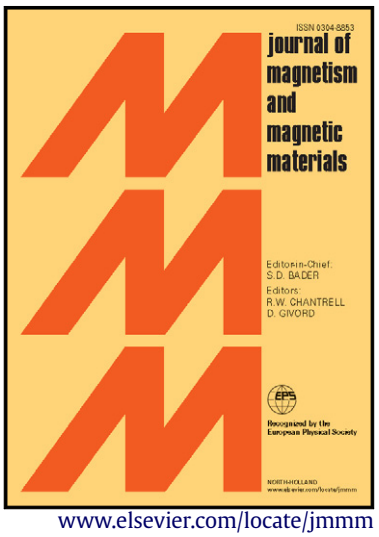

Spin polarization tuning in the graphene quantum dot by using in-plane external electric field

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Spin polarization tuning in the graphene quantum dot by using in-plane external electric field

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Abstract

Electronic, magnetic and transport properties of a nano graphene dot have been studied by using the DFT and tight binding methods. In the tight binding calculations, the interaction between electrons is modeled using the Hubbard Hamiltonian. By comparison between the eigen-values and density of states in the tight binding and DFT models, we tabulate a set of tight-binding parameters to describe graphene quantum dots for future works. The effects of a single vacancy and an in-plane external electric field on the spin-dependent transport of graphene quantum dot have been investigated. Transport through GQD between two GNR is studied by using the Green's function formalism. Our results confirm an intrinsic spin-dependent current and relatively large spin polarization through the GQD in the presence of a single vacancy and zigzag edge. It is also shown that an in-plane external electric field controls the spin-polarization in graphene quantum dot.

Key-word: Graphene quantum dot, nano-structure, Hubbard model, Spin-polarization, Green's function method