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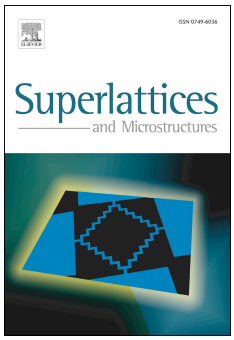

Investigation of charge injection and transport behavior in multilayer structure consisted of ferromagnetic metal and organic polymer under external fields

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Investigation of charge injection and transport behavior in multilayer structure consisted of ferromagnetic metal and organic polymer under external fields

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Abstract

In this paper a five layer organic electronic device with alternately placed ferromagnetic metals and organic polymers: ferromagnetic metal/organic layer/ferromagnetic metal/organic layer/ferromagnetic metal, which is injected a spin-polarized electron from outsides, is studied theoretically using one-dimensional tight binding model Hamiltonian. We calculated equilibrium state behavior after an electron with spin is injected into the organic layer of this structure, charge density distribution and spin polarization density distribution of this injected spin-polarized electron, and mainly studied possible transport behavior of the injected spin polarized electron in this multilayer structure under different external electric fields. We analyze the physical process of the injected electron in this multilayer system. It is found by our calculation that the injected spin polarized electron exists as an electron-polaron state with spin polarization in the organic layer and it can pass through the middle ferromagnetic layer from the right-hand organic layer to the left-hand organic layer by the action of increasing external electric fields, which indicates that this structure may be used as a possible spin-polarized charge electronic device and also may provide a theoretical base for the organic electronic devices and it is also found that in the boundaries between the ferromagnetic layer and the organic layer there exist induced interface

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