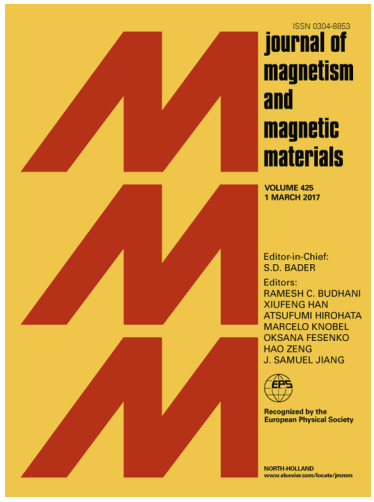

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Spin-dependent transport in GaAs nanowire-based devices

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Abstract

The transport properties of GaAs nanowire (NW)-based devices are investigated using non-equilibrium Green's function technique combined with density functional theory (DFT). Two types of NW-based devices are studied, which include the electrodes that are made of half-metallic GaMnAs NWs grown along the [0001] direction, and the scattering region that consists of a *tunneling* structure (GaMnAs/GaAs/GaMnAs) or a *conducting* structure (GaMnAs/GaAs:Be/GaMnAs), respectively. The proposed nanostructures both exhibit robust transport properties including spin-filtering, negative differential resistance (NDR) and giant magnetoresistance (GMR) effects, which are further analyzed with carrier channels and transmission spectra. These structures imply potential applications for low dimensional semiconductor spintronic devices such as spin valve.

KEYWORDS: half-metal, GaMnAs, transport, GMR, NDR, spin-filtering

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