

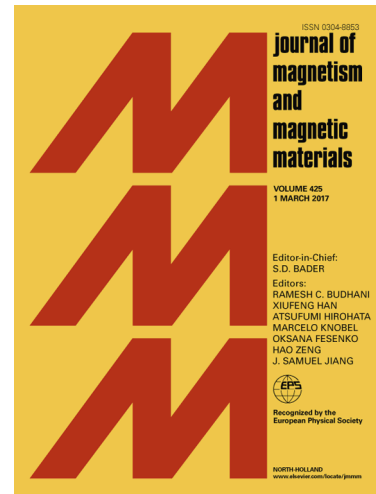
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Effect of asymmetric interface on charge and spin transport across two dimensional electron gas with Dressellhaus spin-orbit coupling/ferromagnet junction

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Abstract

We theoretically studied the effect of interfacial scattering on the transport of charge and spin across the junction of a two-dimensional electron gas with Dressellhaus spin-orbit coupling and ferromagnetic material junction, via the conductance (G) and the spin-polarization of the conductance spectra (P) using the scattering method. At the interface, not only were the effects of spin-conserving (Z_0) and spin-flip scattering (Z_f) considered, but also the interfacial Rashba spin-orbit coupling scattering (Z_{RSOC}), which was caused by the asymmetry of the interface, was taken into account, and all of them were modeled by the delta potential. It was found that G was suppressed with increasing Z_0 , as expected. Interestingly, a particular value of Z_f can cause G and P to reach a maximum value. In particular, Z_{RSOC} plays a crucial role to reduce G and P in the metallic limit, but its influence on the tunneling limit was quite weak. On the other hand, the effect of Z_{RSOC} was diminished in the tunneling limit of the magnetic junction.

Keywords: Rashba spin-orbit coupling scattering, Dressellhaus spin-orbit coupling, magnetic junction

2015 MSC: code, 2015

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