

Tunneling magnetoresistance in ferromagnetic planar hetero-nanojunctions

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Abstract

We present a theoretical study of the tunneling magnetoresistance (TMR) in nanojunctions between non-identical ferromagnetic metals in the framework of the quasiclassical approach. The lateral size of a dielectric oxide layer, which is considered as a tunneling barrier between the metallic electrodes, is comparable with the mean-free path of electrons. The dependence of the TMR on the bias voltage, physical parameters of the dielectric barrier, and spin polarization of the electrodes is studied. It is demonstrated that a simple enough theory can give high TMR magnitudes of several hundred percent at bias voltages below 0.5 V. A qualitative comparison with the available experimental data is given. © 2010 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

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Keywords

Magnetoresistance, Spin polarized transport, Tunneling