

Physical Review B - Condensed Matter and Materials Physics 2013 vol.88 N6

Impact of lattice strain on the tunnel magnetoresistance in Fe/insulator/Fe and Fe/insulator/La_{0.67}Sr_{0.33}MnO₃ magnetic tunnel junctions

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Abstract

The objective of this work is to describe the tunnel electron current in single-barrier magnetic tunnel junctions within an approach that goes beyond the single-band transport model. We propose a ballistic multichannel electron transport model that can explain the influence of in-plane lattice strain on the tunnel magnetoresistance as well as the asymmetric voltage behavior. We consider as an example single-crystal magnetic Fe(110) electrodes for Fe/insulator/Fe and Fe/insulator/La_{0.67}Sr_{0.33}MnO₃ tunnel junctions, where the electronic band structures of Fe and La_{0.67}Sr_{0.33}MnO₃ are derived by ab initio calculations. © 2013 American Physical Society.

<http://dx.doi.org/10.1103/PhysRevB.88.060405>
