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Calculation of Tunnel Magnetoresistance in Magnetic Tunnel Junctions with Particle Size Dispersion

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Abstract

© 2010-2012 IEEE. Simulation results are given for electron tunneling through the insulating layer of a magnetic tunnel junction with embedded nonmagnetic nanoparticles (NPs). The size dispersion of the NPs was an important part of the solution for tunnel magnetoresistance, which was calculated on the basis of the double-barrier model. Theoretical agreement with experimental data was achieved by adjusting the NP dispersion and quantization. A step-like quantization related to the initial distribution of the electrons over quantum-well states was considered for different size NPs.

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Keywords

conductance quantization, magnetic tunnel junctions, nanoparticles, Spin electronics, tunnel magnetoresistance