

Magnetic and Magnetotransport Properties of Magnetite/Co-Ferrite Trilayers

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The aim of this work was the investigation of the magnetic and magnetotransport properties of Fe₃O₄/CoFe₂O₄/Fe₃O₄ tunnelling junctions. The trilayers were fabricated by pulsed laser deposition from stoichiometric Fe₃O₄ and CoFe₂O₄ targets onto MgO (001) substrates at 450°C in an oxygen partial pressure of 10⁻⁵ mbar. Magnetization measurements indicate significant Co diffusion into the bottom magnetite layer. Vertical magnetotransport measurements were performed with the current flowing between the magnetite electrodes. The magnetoresistance was comparatively small and did not exceed 3% in a magnetic field of 0.5 T. At lower temperatures the magnetoresistance measurements showed two clearly separated maxima. Since the current-voltage characteristics were linear, spin dependent tunnelling is excluded as origin of this magnetoresistance. It is rather attributed to anisotropic and grain-boundary magnetoresistance in the magnetically hard and soft layers. Comparison of full and minor resistance hysteresis loops did not reveal any significant exchange coupling between the layers, presumably due to diffuse interfaces.

9.7 cm

13.4 cm

Subject category :

4. Spin Electronics and Magneto-Transport

Presentation mode :

poster

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