MAGNETIZATION REVERSAL IN Fe/Si/Fe FILM WITH FERROMAGNETIC INTERLAYER EXCHANGE

A.B. Chizhik[a], S.L. Gnatchenko[a], M. Baran[b], K. Fronc[b], R. Szymczak[b] and R. Zuberek[b]

[a]Institute for Low Temp. Phys. and Engin., NAS of Ukraine, 61103 Kharkov, Ukraine
[b]Institute of Physics, PAS, Al. Lotnikow 32/46, 02-668 Warsaw, Poland

9.7 cm

Process of magnetization reversal was studied in Fe/Si/Fe film at 300 K and 10 K. The Fe30A/Si14A/Fe30A sandwich was prepared by dc sputtering. The experiments were performed using the magneto-optical Kerr effect technique and SQUID magnetometer. The ferromagnetic resonance measurements have shown the presence of ferromagnetic and biquadratic interlayer exchange as well as cubic and in-plane uniaxial anisotropy. The directions of easy axes of in-plane uniaxial anisotropy differ in iron layers.

The jumps of magnetization in the magnetic field, which are accompanied by the local hysteresis takes place in the magnetization hysteresis loops. Different numbers of jumps were observed depending on the direction of the magnetic field in the film plane and on the temperature. The experimental results were analyzed based on the model taking into account the ferromagnetic and biqudratic exchange as well as cubic and uniaxial anisotropy. Numerical calculations of the field dependencies of the magnetization have been performed for room and helium temperature. It was found that the observed jumps of magnetization are associated with the overcoming of the energetic barriers related to hard axes in the two iron layers. The spontaneous and field induced magnetic configurations are determined as a result of comparison of experiment and calculation.

13.4 cm

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Corresponding author :
A. B. Chizhik

Address for correspondence :
Institute for Low Temperature Physics and Engineering
Academy of Sciences of Ukraine
61103 Kharkov
Ukraine

Email address :
chizhik@ilt.kharkov.ua