A.M.Saad, V.A. Kalaev, J.A. Fedotova et. al. Structure and magnetic properties of nanogranular composites CoFeZr-alumina // Rev. Adv. Mater. Sci. -2007.- V. 14.- p. 14-34.

The 5 to 15 ⌠m thick nanocomposite films $(Co_{0.45}Fe_{0.45}Zr_{0.10})_x(Al_2O_3)_{1-x}$ with 30 < *x* < 65 at.% sputtered in a chamber evacuated with pure Ar gas were studied using Mössbauer spectroscopy, magnetization, complex magnetic permeability, and magneto-force microscopy (MFM) measurements. In particular, the films with *x* < 40 at.% displayed superparamagnetic state at room temperature (the lack of sextets in Mössbauer specta, non-hysteresis character of the magnetization curves, invariability of real ⌠′ and imaginary ⌠″ parts of magnetic permeabilities with *x* and high resistivity. Near the percolation threshold (*x* H 40 - 45 at.%) Mössbauer specta displayed features of the ferromagnetic sextet and the values of ⌠′ and ⌠″ increased, approaching the maximum, as *x* increasing due to the decrease of inter-particle distances. Moreover, effects of dipole-dipole and exchange interactions of the nanoparticles resulted in the nucleation of the magneto-ordered granules (magnetoclusters) including a few metallic nanoparticles. The MFM allowed to visualizing the presence of magnetic labyrinth-like magnetic contrast that was formed by the metallic nanoparticles near the percolation threshold. At *x* > 45 at.% the films behave like the “bulk” ferromagnetic sample with occasional inclusions of dielectric phase.

Назад к списку публикаций