STUDY OF Fe-Co NANOCOMPOSITE FILMS

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Mössbauer study of nanogranular ferromagnetic FeCo films is presented. Two ways of production of nanocomposite systems were employed: (i) a hollow cathode plasma jet deposition process, and (ii) laser ablation from Fe-Co metallic target by means of a KrF excimer laser and r.f. magnetron sputtering. Conversion electron Mössbauer spectroscopy (CEMS) at ambient temperature using ^{57}Co/Rh source provided spectra which were decomposed into 3 sextets with hyperfine fields (B_{hf}) of 32, 33.8, and 35 T and one doublet. The relative areas of the components depend upon the composition of the sample and conditions of its preparation. Complementary information was obtainedby nuclear magnetic resonance (NMR) of ^{57}Fe and ^{59}Co nuclei performed in zero external magnetic fields at 4.2 and 300 K. The increase of B_{hf} at ^{59}Co by ~3.5 T with respect to Co powder agrees with the effect of Fe atoms in the nearest neighbourhood. Similar effect is responsible for an increase of B_{hf} at ^{57}Fe nuclei due to Co nearest neighbours. Distribution of B_{hf} indicates a presence of amorphous phase and very small crystalline particles. This was confirmed by HRTEM. The films are composed of crystalline nanoparticles, 5-20 nm in size, embedded in amorphous matrix.

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