J A Fedotova, J Przewoznik, Cz Kapusta, M Milosavljevic, J V Kasiuk, J Zukrowski, M Sikora, A A Maximenko, D Szepietowska and K P Homewood. Magnetoresistance in FeCoZr–Al_2O_3 nanocomposite films containing “metal core – oxide shell” nanogranules // J. Phys. D: Appl. Phys. – Vol. 44. – 2011. – P. 495001 (12pp).

Temperature and magnetic field dependences of electrical conductivity are systematically studied in granular films (Fe 45 Co 45 Zr 10) x (Al 2 O 3) 100− x (28 ≤ x ≤ 64) containing crystalline metallic α-FeCo-based nanoalloy cores encapsulated in an amorphous oxide shell embedded in an amorphous Al 2 O 3 matrix. Formation of 'metallic core–oxide shell' nanogranules is confirmed by transmission electron microscopy (TEM) and HRTEM. The structure of core and shell is governed with the difference in the oxidation states of Fe and Co ions investigated with EXAFS, XANES and Mössbauer spectroscopy. A considerable negative magnetoresistance (MR) effect of spin-dependent nature is observed in the whole range of x values. Its increase with decreasing temperature is correlated with the magnetic saturation of superparamagnetic metallic nanogranules. The enhanced MR effect in 'core–shell' granular films is related to the percolation of oxide shells and their influence through spin filtering processes. A considerable high field MR at low temperatures and the resulting deviation of MR and squared magnetization are attributed to a magnetic randomness and/or strong magnetic anisotropy of the magnetic oxide shell.

Назад к списку публикаций