PE06

Magnetic Behaviors and Enhanced Magnetoresistance in Granular $(La_{0.7}Pb_{0.3}MnO_3)_{1-x}(Fe_2O_3)_x$ Composites

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Recently, researches indicate [1,2] that grain boundaries and interfaces can be the major factors of magnetoresistance effects, which has attracted renewed interests on the colossal magnetoresistance materials. The enhancement of magnetoresistance can be explained through the model of spin-polarized tunneling with insulator layer as a barrier. In this article, the magnetic behaviours and magnetotransport properties of $(La_{0.7}Pb_{0.3}MnO_3)_{1-x}(Fe_2O_3)_x$ composites have been investigated. X-ray diffractogram for the $(La_{0.7}Pb_{0.3}MnO_3)_{1-x}(Fe_2O_3)_x$ composites are showed in Fig. 1. Ferromagnetism is gradually suppressed as the weight percentage of Fe_2O_3 isincreased as shown in Fig. 2. Saturation magnetization (M_S) decreases from 78.7 emu/g for x=0.0 to 60.6 emu/g for x=0.2, while ferromagnetic transition temperature (T_C) remains around 346K for all composites. The resistivity increases significantly as the x value increases in these composites. It is suggested that the introduction of Fe_2O_3 into the composites acts as a separation layer between $La_{0.7}Pb_{0.3}MnO_3$ grains. The enhancement of magnetoresistance has been verified with the addition of Fe_2O_3 into the composites.

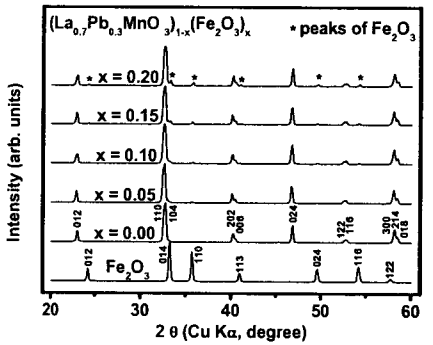

Fig. 1. X-ray diffractogram for the $(La_{0.7}Pb_{0.3}MnO_3)_{1-x}(Fe_2O_3)_x$ composites.

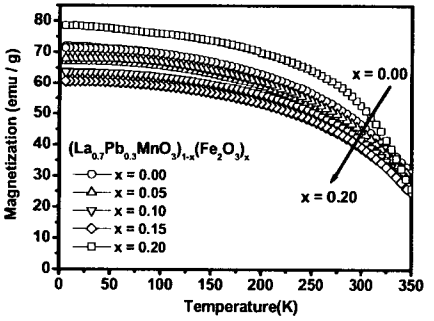

Fig. 2. Temperature dependence of magnetization curves in an applied field of 50 kOe for the $(La_{0.7}Pb_{0.3}MnO_3)_{1-x}(Fe_2O_3)_x$ composites.

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PE07

The Site Dependence on of Microscopic Interaction on Ferrous Ion for the Fe Spinel

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Chalcogenide spinel MCr_2X_4 (M = Fe, Cu, Co, Cd; X = S, Se) materials have various physics properties such as colossal magnetoresistane (CMR) effect, spin-frustration effects, metallic conduction, large magneto-optical effect, relaxor ferroelectricity and colossal magnetocapactive effect[1-3]. These features were attributed to competition of isomorphic ions with the topological frustration, Jahn-Teller distortion, and geometric frustration of magnetic moment. Here, we report the magnetic properties of the $FeCr_2S_4$ and $FeIn_2S_4$ with special emphasis on cation ordering related to the quadrupole interactions.

$FeIn_2S_4$ and $FeCr_2S_4$ exhibits cubic spinel structure *Fd3m*. $FeIn_2S_4$ is an inverse spinel, with In atoms occupying both tetrahedral (A) and octahedral (B) sites. On the other hand, $FeCr_2S_4$ has a normal spinel with Fe atoms occupying A site and Cr atoms occupying B site. The determined lattice constant a_0 for $FeCr_2S_4$ and $FeIn_2S_4$ were a_0 = 10.011 and a_0 = 10.616 Å, respectively.

The Mössbauer spectra of $FeCr_2S_4$ and $FeIn_2S_4$ have been studied. The Néel temperatures were found to be 175 and 15 K for the $FeCr_2S_4$ and $FeIn_2S_4$, respectively, by Mössbauer spectroscopy. It can be understood as the strength of inter-sublattice exchange interaction Fe^{2+}(A)-S^{2-}-Cr^{3+}(B) is stronger than that of the intra-sublattice exchange interaction Fe^{2+}(B)-S^{2-}-Fe^{2+}(B). The $FeCr_2S_4$ shows a single line resonance spectrum with an isomer shift of 0.72 mm/s at room temperature, while $FeIn_2S_4$ at room temperature has an isomer shift of 0.74 mm/s and a electric quadrupole splitting (ΔE_Q) of 3.22 mm/s. The charge state of Fe ions is ferrous (Fe^{2+}) as characterized by isomer shift (δ) for the samples. We interpret that the presence of the ΔE_Q is attributed to the trigonal field at the octahedral site, according to Fe^{2+} ions enter to octahedral B site.

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