EQ14

$La_{0.7}Ca_{0.3}MnO_3$ Nanoparticles Synthesized by Reactive Milling: Influence of Milling Time on Grain Morphology and Magnetic Properties

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$La_{0.7}Ca_{0.3}MnO_3$ (LCMO) nanoparticles were synthesized by reactive milling in ambient conditions [1]. Magnetic properties of single phase, nanocrystalline LCMO particles has been studied. LCMO nanoparticles exhibit superparamagnetism with the blocking temperature that decreases in the logarithmic function as increasing the applied magnetic field [2]. Besides the blocking temparature decreases with increasing milling time in range of (8 ÷ 16 h). The temparature dependence of the saturation magnetization shows a strong collective excitation due to the spin wave that depends on temperature as Tα with α = 1.7, which slightly deviates from the Bloch law [3].

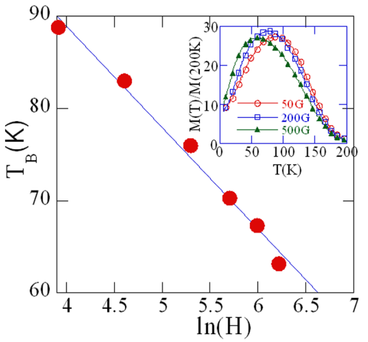

Fig. 1. The dependence of Blocking temperature on the applied magnetic field for LCMO particles after 8h milling time. Inset shows the change in the magnetization curve sharp at function of the applied magnetic field.

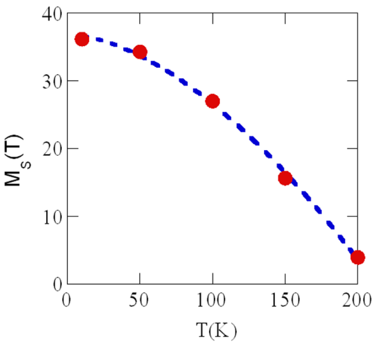

Fig. 2. Sarturation magnetization as a function of temperature for LCMO particles after 8 h milling time. Dashed curves is power law fit of the form $M_s = M_0(1 - H)T^{\alpha}$ to the data points.

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EQ15

Large Enhancement of GMI Effect in Multi Ferromagnetic Ribbons

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A kind of composite material consisting of stacked magnetic ribbons each isolated with thin plastic sheets to create high-performance sensor applications. The impedance measurements were conducted in the frequency range of 1 - 10 MHz and a varying dc magnetic field within ±300 Oe. The giant magnetoimpedance (GMI) effect and its field sensitivity were achieved in these composite materials. It was found that the GMI effect strongly increased with increasing number of ferromagnetic ribbons. The GMI ratio and its field sensitivity reached the highest values of 220% and 35%/Oe for the composite containing five ribbons. It indicates that the newly developed composite material is very promising for high-performance GMI sensor applications. It was revealed that the increase of the GMI effect in the composite sample was attributed to the decrease of electrical resistance and the increase of effective permeability.

Keyword: Magnetoimpedance effect, GMI sensor, Ferromagnetic ribbon