BS20

Synthesis, Characterization, and Magnetic Properties of Nanocrystalline Zr-doped $BiFeO_3$ Powders

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We report the synthesis of nanocrystalline powders of Zr-doped $BiFeO_3$ (i.e. $BiFe_{1-x}Zr_xO_3$; x = 0, 0.1, 0.2, 0.3, 0.4) by a simple sol-gel route. The precursors were calcined in air at 600°C for 30 min to obtain $BiFeO_3$-based nanocrystalline powders. The synthesized powders were characterized using Thermogravimetric Differential Analysis (TG-DTA), X-ray diffraction (XRD), Transmission electron microscopy (TEM), and Vibrating sample magnetometry (VSM). The samples showed ferromagnetic behavior at room temperature and exhibited saturation magnetization (M_s) values of 0.8-3.18 emu/g. The effects of Zr doping on the magnetic properties of $BiFeO_3$ were investigated. These results are also discussed in details.

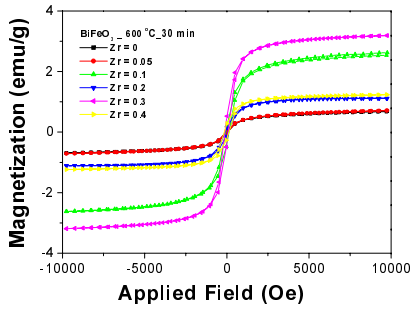

Fig. 1. The specific magnetizations of the $BiFe_{1-x}Zr_xO_3$; x = 0, 0.1, 0.2, 0.3, 0.4 samples calcined in air for 30 min at 600°C, as a function of field, measured at 20°C.

BS21

Magnetic Anisotropy and Planar Hall Effect in $La_{0.7}Sr_{0.3}MnO_3$ Thin Films

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We have grown the $La_{0.7}Sr_{0.3}MnO_3$ (LSMO) thin films on (001) $SrTiO_3$ (STO) single crystal substrate by using pulsed laser deposition technique. The processing parameters, including target-to-substrate distance (DTS), oxygen pressure (Po_2) and substrate temperature (TS) were systematically controlled to obtain the high quality of films. According to results of x-ray Cu Kα structural analysis the films are $R\bar{3}c$ phase. Surface morphology of the films was examined by scanning electron microscopy. Temperature and field dependences of magnetization were obtained by SQUID magnetometer, magnetic anisotropy measurements were performed with vibrating sample magnetometer (VSM), the applied field was in-plane of films. The LSMO films, obtained at D_{TS} = 5.5 cm, Po_2 = 400 mTorr, and T_S = 800°C, show good epitaxy, smooth surface and high Curie temperature (T_C). As-deposited 100 nm films show T_C = 348 K, which increases up to 361 K with post annealing process. To get the magnetic anisotropy of the films the dependence of magnetization on the angle (φ) between the applied field and the substrate edge (the films were of circled shape) was measured (see Fig. 1). We will discuss the planar Hall effect in connection with magnetic anisotropy and anisotropic magnetoresistance [1].

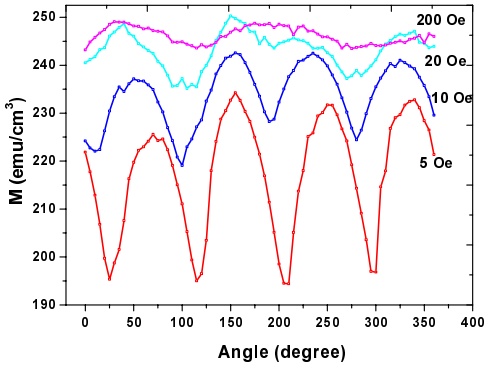

Fig. 1. Magnetization vs angle φ of selected LSMO film at room temperature.

REFERENCES

[1] Y. Bason, L. Klein, J-B. Yau, X. Hong, and C.H. Ahn, , Appl. Phys. Lett, 84, 2593 (2004).