BR09

Effect of Eu^{+3} on Flux Pinning Characteristics of Grain Aligned High-T_c Superconductor $Sm_{1-x}Eu_xBa_2Cu_3O_{7-\delta}$

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Flux pinning characteristics of grain aligned high-T_c superconductor $Sm_{1-x}Eu_xBa_2Cu_3O_{7-\delta}$ (where x = 0.0, 0.3, 0.5, 0.7, 0.9, 1.0) prepared by solid state reaction method were studied by magnetization data. The transition temperature (T_c) and critical current density (J_c) was found to enhanced in optimal doped samples (x = 0.5, 0.7). The peak position of volume pinning force density (F_{pmax}) is found to shift to higher field (1.8T) for optimally doped samples in contrast to 1.2T for undoped sample. According to the analysis on the temperature dependence of J_c, it is suggested that flux pinning mechanism in optimal doped samples is dominated by stress-field centers which may be induced by lattice mismatch, while experimental results of J_c for samples (x = 0.0, 0.3, 0.9, 1.0) are close to the model for spatial fluctuation of the charge carrier mean free path.

BR10

Electric and Magnetic Properties of $CoFe_2O_4$/PZT Bilayer Grown on (100)$SrTiO_3$ Substrate by PLD

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Multiferroic materials have attracted much attention due to their both magnetic and electric ordering simultaneously and hence many applications on electromagnetic sensor, microwave devices, and nonvolatile memory. Furthermore, it is expected that such multiferroic materials exhibit magnetoelectric (ME) coupling effects, i.e., a change in electric polarization by an external magnetic field and/or in magnetization by an applied electric field. However, an application of single-phase multiferroic compounds is limited due to the mutual exclusion of ferromagnetism and ferroelectricity. The net magnetic moment of typical multiferroics such as $YMnO_3$ or $BiFeO_3$ is too small to be used in practical device applications. Recently, alternative composites systems which combine well-known ferroelectrics and ferro-(or ferri-)magnets have been proposed. In composite multiferroic systems, a relatively large ME coupling effect resulting from a cross-coupling between magnetic and electric properties via lattice strain has been observed and extensively further investigated. The previously reported composites are classified roughly into two geometry types. One is a vertical heterostructure and the other is a horizontal nanostructure.

In this work, we have investigated various physical properties of $CoFe_2O_4$(CFO) / $PbZr_{0.2}Ti_{0.8}O_3$(PZT) bilayers grown on (100)$SrTiO_3$ (STO) substrate by pulsed laser deposition (PLD). Ferroelectric PZT(100nm) and ferrimagnetic CFO(70nm) layers were sequentially deposited on the (100)STO substrate with the bottom electrode $LaNiO_3$(50nm) layer at substrate temperature of 600-650^{0}C. X-ray diffraction (XRD) for PZT layer exhibited both the (200) and (002) peaks before the CFO deposition, and it suggested that after the CFO top-layer deposition a change in the relative volume fraction of c- and a-domains was quite small (Fig. 1). The electric properties of CFO/PZT bilayer were characterized by P-E loop, capacitance versus frequency or voltage. The well-defined P-E loop of the PZT layer has shown that the remnant polarization and coercive is slightly modified by the top-layer CFO deposition. The M-H loop for the CFO layer indicated that our CFO/PZT bilayer has a strong anisotropy between the out-of-plane and in-plane directions. The ME coupling between CFO and PZT bilayers was investigated by the measurement of capacitance with the external magnetic field.

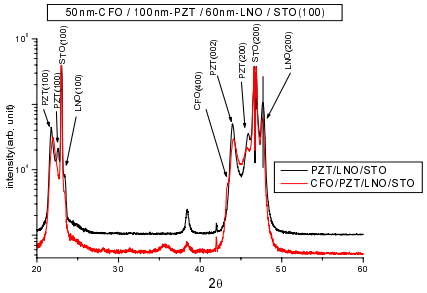

Fig. 1. XRD patterns of PZT/LNO/STO and CFO/PZT/LNO /STO films.

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