CQ07

Structural Studies of $(La_{0.52}Y_{0.15})(Ca_{0.17}Sr_{0.16})MnO_3/SrTiO_3$ Fhin Films

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Manganites are very interesting materials for their abundant physics and possible potential applications in industry. Well crystallized $(La_{0.52}Y_{0.15})(Ca_{0.17}Sr_{0.16})MnO_3/SrTiO_3$ (LYCSMO) thin films are fabricated on (001) $SrTiO_3$ substrate with TiO_2 end-surface by rf-magnetron sputtering. The cations of La,Y,Ca,Sr are disorderly interspersed occupying at A-site in ABO_3 unit cell, which benefits for growing LYCSMO films. The averaged surface roughness for the film of 0.37 nm is obtained. A two-dimension growth mode is deduced. A tetragonal distortion, which may results from the distribution between the alternated a-axis unit cell and b-axis unit cell, occurs for the films grown on STO although the target of LYCSMO is confirmed to be orthorhombic with the lattice parameters of 5.4537(7) Å, 7.7063(11) Å, and 5.4601(8) Å for a, b, and c, respectively. Two set of phi scanning reflections with four-fold symmetry corresponding to (163) and (361) reflections are obtained using high resolution X-ray diffraction, which indicates the well four-fold symmetry along b-direction. Temperature dependence of resistance shows that a metal-to-insulator transition occurs at ~270K, which well higher than that of the bulk (T~220K). A relatively larger magnetoresistance is also observed in this material, which we believe that the physical properties may result from the distortion in MnO_6 in the unit cell.

Keywords: colossal magnetoresistance, cation disorder, strain, thin film.

CQ08

Low Field Magneto-transport and Thermal Studies on (1-x) $Pr_{2/3}Ba_{1/3}MnO_3$ + x PdO Composite Manganites

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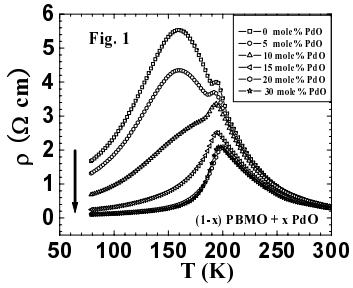
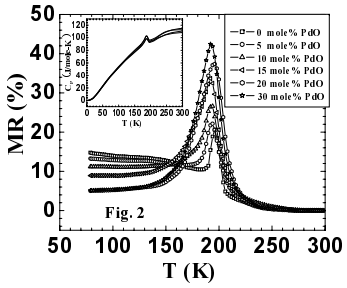
Magneto-transport and specific properties of (1-x) $Pr_{2/3}Ba_{1/3}MnO_3$ + x PdO (x =0-30 mole%) composite manganites have been investigated. Two Insulator-metal like transitions (T_{P1} ~194K and T_{P2} ~160K) are observed in the electrical resistivity of the pristine $Pr_{2/3}Ba_{1/3}MnO_3$ (PBMO) sample. While T_{P1} is a result of the competition between double-exchange and super-exchange mechanisms, T_{P2}, on the other hand, arises due to the large grain boundary effects that in turn are due to the large ionic size mismatch between Pr^{+3} (1.18Å) and Ba^{+2}(1.47 Å) ions [1]. The two transitions behaviour gets drastically affected in the composites with T_{P1} remaining unchanged and becoming sharper and T_{P2} disappears with higher PdO content (Fig. 1). The overall electrical resistivity also reduces in the composites [2]. Magnetoresistance (MR) measurement at 0.6T magnetic field show that MR at T_{P1} increases from 22% for PBMO sample to 45% for 30 mole% PdO composite (Fig. 2). MR at low temperature decreases in the composites. Specific heat measurements of the composite systems are identical with a peak below 194K due to the magnetic ordering in the sample (inset Fig. 2). These finding show that PdO addition can be a potent way of enhancing low field MR in manganites which is interesting from the application point of view. The results can be understood in terms of the dissociation of PdO into metallic Pd, opening of the new conducting channels and decrease in magnetic inhomogeneties in the composites.





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