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Structural, electrical and enhanced low field magneto-transport properties of $La_{0.7}Sr_{0.3}MnO_3$ and (1−*x*) $La_{0.7}Ca_{0.2}Sr_{0.1}MnO_3$ (LCSMO) + (*x*) MgO composites

M.A. Dar, Dinesh Varshney

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Structural, electrical and enhanced low field magneto-transport properties of $La_{0.7}Sr_{0.3}MnO_3$ and (1-*x*) $La_{0.7}Ca_{0.2}Sr_{0.1}MnO_3$ (LCSMO) + (*x*) MgO composites

M. A. Dar and Dinesh Varshney*

Materials Science Laboratory, School of Physics, Vigyan Bhawan, Devi Ahilya University, Khandwa Road Campus, Indore 452001, India.

Abstract: We report the effect of MgO phase on structural, electric and thermo electric properties of $La_{0.8}Sr_{0.2}MnO_3$ (LSMO) and manganite matrix-based composite series (1-*x*) $La_{0.7}Ca_{0.2}Sr_{0.1}MnO_3$ + (*x*) MgO with *x* = 0.0, 0.05, 0.10, 0.15 (abbreviated as LCSMO - MgO) synthesized by solid-state reaction method. X-ray diffraction (XRD) data infers that manganite LSMO compound possesses a rhombohedrally-distorted structure (space group *R*3*c*), LCSMO has an orthorhombic structure (*Pnma* space group) while to that MgO compound crystallizes in cubic structure (space group *Fd3m*). XRD shows coexistence of MgO and $La_{0.7}Ca_{0.2}Sr_{0.1}MnO_3$ phases in doped composites through their characteristic peaks. The temperature dependence of resistivity shows that the transport behavior of the composites is governed by the grain boundaries. These composites shows metal–insulator transitions at $T = T_{MI}$ which decreases with increasing MgO concentration. The magnetoresistance (MR) in this system increases with increasing MgO content, showing a maximum value (91% at 50K and at lower fields) for (0.85) LCSMO - (0.15) MgO sample, which is larger than the largest MR value of pure $La_{0.7}Ca_{0.2}Sr_{0.1}MnO_3$ (44% at 50 K). From thermoelectric power measurements, it is observed that electron-magnon scattering process is dominant mechanism in the low temperature region.

Keywords: Composite, X-ray diffraction, metal-insulator transition, magneto-resistance.
#**Author to whom any correspondence should be addressed.**
Electronic address: vdinesh33@rediffmail.com
Tel: +917312467028; TeleFax: +917312467028