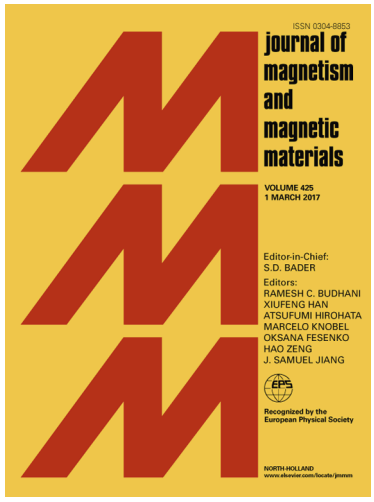

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Influence of Al doping on the magnetoresistance and transport properties of $La_{0.7}Ba_{0.3}Mn_{1-x}Al_xO_3$ ($0 \leq x \leq 0.15$) manganites

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Abstract

This report presents the structural, magnetoresistance, electrical and thermal transport properties of Aluminium substituted $La_{0.7}Ba_{0.3}Mn_{1-x}Al_xO_3$ ($0 \leq x \leq 0.15$) compounds synthesized by solid state reaction method. To obtain crystallographic parameters, the X-ray diffraction patterns are fitted in *R-3c* space group with Rietveld refinement method. The resistivity and magneto-transport measurements are performed using standard four-probe assembly with and without magnetic fields. The peak resistivity ρ_{peak} is noted at Metal-Insulator Transition temperature (T_{MI}) and lowering in T_{MI} is observed for higher concentrations of Al^{3+}. The resistivity data have been analyzed in two parts. Firstly, in the metallic region below $T_{MI}$the resistivity data is fitted with three degree polynomial.Secondly, in the semiconducting region above T_{MI}data have been fitted with Variable Range Hopping (VRH) and Small Polaron Hopping (SPH) models. The Seebeck coefficientis found to be positive throughoutthe temperature range (10K to 300K) with holes as dominating charge carriers. Similar to the resistivity profile,in metallic region the thermo-power is explained with qualitative model based on diffusion, magnon-drag, phonon-drag and spin fluctuation contributions whereas the semiconducting region is explained with small polaron hopping model.

Keywords: Rietveld refinement, Magneto-resistance, SPH and VRH model, Thermoelectric power.