Effect of Co substitution on magnetic and magnetoresistance effect in La0.67(Ba1-xCox)0.33mno3 system

Abstract

A series of polycrystalline perovskite manganite of La0.67(Ba1-xCox)0.33MnO3 (x=0.00, 0.30 and 0.50) were prepared by conventional solid-state route. XRD spectrum indicates that single phase rhombohedral perovskite structure had been obtained for x=0.00 sample. When Co is introduced in the Ba site, its structure is distorted from rhombohedral to pseudo-cubic. The SEM images show that the average grain sizes were found to be in 3-8μm (x=0.30) and 2-10μm (x=0.50) with less pore between the grain. For x=0.00, the sample is found in melted condition where no significant clear grain boundary can be found. Pure sample had TC of 343K. However, substitution of Co at Ba site brings down the Curie temperature, TC below 293K. Pure (x=0.0) sample shows Low Field Magnetoresistance (LFMR) effect and the effect weakens when Co is introduced. The highest low-field MR value is -13.0% for sample with x=0.00 in 0.1Tesla applied external magnetic field at 90K and the highest MR value of -22.5% is given by x=0.30 sample at 1Tesla applied magnetic field at 90K. Hence, these indicated that Co will not enhance the extrinsic MR which is due to the grain boundary effect and tend to destroy the LFMR effect.

Keyword: Colossal magnetoresistance; Low field magnetoresistance; Perovskite manganite