Magnetization and Colossal Magnetoresistance Effect of $La_{1-X}Bi_XMnO_3$ Systems

by

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Abstract

Perovskite-type $La_{1-x}Bi_xMnO_3$ (LBMO) crystals, which are prepared by the substitution of Bi atom with La atom from a performed $LaMnO_3$ crystal, have been clarified to have the colossal magnetoresistance (CMR) effect. These samples were produced using a sintering process in an atmosphere as a function of Bi composition ratio x. It was found that the Jahn-Teller distortion exists on LBMO crystal structures of orthorhombic (or rhombohedral) type with lattice parameter γ (=c/a)=1.02 in $0<x<0.3$, pseudo cubic type with γ =1.005 in $0.3<x<0.5$, and tetragonal type with γ =1.014 in a ratio more than $0.5<x$, from X-ray diffraction measurements. The CMR effect of LBMO for x=0.2 was approximately 400% at 88K. On the basis of result, it was defined that the occurrence mechanics of CMR for LBMO significantly contribute Mn^{3+}-Mn^{4+} double exchange interaction which is closely associated with the cooperative phenomena in Jahn-Teller distortion.

Keywords: *Perovskite type, Jahn-Teller effect, Colossal magnetoresistance (CMR), Mn magnetic moment, XPS*

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