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Room Temperature Metal-Insulator Transition Observed in Pb Substituted Lanthanum Manganite

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Abstract

Structural, magnetic and transport property of Pb substituted LaMnO_3 ($\text{La}_{1-x}\text{Pb}_x\text{MnO}_3$; $x = 0.1, 0.2, 0.3, 0.4, 0.5$) prepared by solid state reaction route have been studied systematically. X-ray diffraction, SEM, VSM, magneto-transport measurements were carried out on prepared samples. All the samples below $x = 0.4$ composition were crystallized into single phase with R-3C space group of trigonal crystal class. The explored physical properties like magnetoresistance (MR), resistivity, metal-insulator transition temperature (T_P), magnetization (M_s) and Curie temp. (T_C) varies with Pb concentration. Higher T_P (298 K) and minimum resistivity was recorded for $x = 0.3$ sample whereas no distinct peak corresponding to metal-insulator transition was observed for $\text{La}_{0.5}\text{Pb}_{0.5}\text{MnO}_3$. Appreciable magnetoresistance (MR%) values were obtained for all the samples at 300K. X-ray photoelectron spectroscopy (XPS) confirms the +2 oxidation state of Pb in all substituted samples. Fine tuning of T_c could be

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