Properties of perovskites $La_{1-x}Cd_xMnO_3$

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Abstract: The $La_{1-x}Cd_xMnO_3$ (x=0.1, 0.2, 0.3) perovskites have been prepared by solid reaction technology with sintering temperature of 1050 °C. The samples are of single phase with rhombohedral structure of R-3c symmetry. The field-cooled (FC) and zero-field-cooled (ZFC) thermomagnetic measurements at low field indicate the spin glass-like state (or cluster glass) at low temperatures and a sharp change of magnetization around the phase-transition point of composition $La_{0.7}Cd_{0.3}MnO_3$. This sample exhibits large value for maximum magnetic-entropy change $|\Delta S_m|_{max}$ of 2.88 J/kg K in the field of 13.5 kOe and reveals giant magnetocaloric effect. This value for $|\Delta S_m|_{max}$ is larger than that of $La_{0.7}Sr_{0.3}MnO_3$ and $La_{0.7}Pb_{0.3}MnO_3$ perovskites. The resistance measurements show that the conductivity of $La_{1-x}Cd_xMnO_3$ perovskites is metallic at low temperatures and semiconducting at high temperatures but the metal-semiconductor transition temperatures are not coinciding with paramagnetic-ferromagnetic transition ones. The results can not be explained by using double-exchange (DE) model only. In addition to the DE Jahn-Teller lattice distortion plays an important role.
Author Keywords: Magnetic oxides; Magnetocaloric effect; Perovskite structure; Spin-glass behavior
Index Keywords: Composition; Crystal structure; Energy dispersive spectroscopy; Entropy; Magnetization; Microstructure; Phase transitions; Scanning electron microscopy; Spin glass; Thermal effects; Double exchange (DE) models; Magnetic oxides; Magnetocaloric effects; Spin glass behavior; Perovskite

Year: 2005
Source title: Journal of Magnetism and Magnetic Materials
Volume: 290-291 PART 1
Page : 690-693
Cited by: 9
Link: Scorpus Link
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ISSN: 3048853
CODEN: JMMMD
DOI: 10.1016/j.jmmm.2004.11.338
Language of Original Document: English
Abbreviated Source Title: Journal of Magnetism and Magnetic Materials
Document Type: Conference Paper
Source: Scopus
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