

Influence of Cu substitution for Mn on the structure, magnetic, magnetocaloric and magnetoresistance properties of $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$ perovskites

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Abstract: Structural, magnetic, magnetocaloric and magnetoresistance (MR) studies on $\text{La}_{0.7}\text{Sr}_{0.3}\text{Mn}_{0.95}\text{Cu}_{0.05}\text{O}_3$ (No. 1) and $\text{La}_{0.7}\text{Sr}_{0.3}\text{Mn}_{0.9}\text{Cu}_{0.1}\text{O}_3$ (No. 2) perovskites are reported. The crystal structure of the samples is rhombohedral with a change of the lattice constants depending on the Cu content. FC and ZFC thermomagnetic measurements for both compositions at low field indicate that a spin-glass-like state (or cluster glass) occurs at low temperatures and a very sharp change of magnetization around the phase-transition point. The Curie temperature, T_C , does almost not depend on the content of Cu substitution. A maximum magnetic-entropy change, ΔS_{max} , of 1.96 and 2.07 J/kg K at 13.5 kOe and 350 K is observed for sample No. 1 and No. 2, respectively. Therefore, they can be considered as active magnetic refrigerant materials for room-temperature applications. Electrical-resistance measurements show that both samples are metallic conductor for $T < T_C$ and semiconductor for $T > T_C$; moreover, the MR is maximal around T_C . © 2002 Elsevier Science B.V. All rights reserved.

Author Keywords: Magnetic oxides; Magnetocaloric effect; Perovskite structure; Spin-glass behaviour

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