

Large magnetocaloric effect above 300 K and magnetoresistance in $(\text{La}_{0.5}\text{Pr}_{0.5})_{1-x}\text{Pb}_x\text{MnO}_3$ perovskites

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Abstract: Perovskite compounds $(\text{La}_{0.5}\text{Pr}_{0.5})_{1-x}\text{Pb}_x\text{MnO}_3$ ($x = 0.1 - 0.5$) with orthorhombic structure were prepared by using a solid-state reaction technique. In the studied samples, the spin-glass-like state occurs at low temperatures and the Curie temperature, T_c , increases from 170 K ($x = 0.1$) to 336 K ($x = 0.5$) because of a strong double exchange. The magnetic entropy change, $|\Delta S_m|$, reached its largest value of 2.06 J/kg·K at $\Delta H = 13.5$ kOe for the sample with $x = 0.4$ ($T_c = 323$ K). Due to the large $|\Delta S_m|$ and high T_c , these materials are suggested for use as active magnetic refrigerants for magnetic refrigeration technology at temperatures above room temperature. While the conductivity of the samples with $x = 0.1$ and 0.2 exhibits only a semiconducting behavior over the whole measured temperature range, there is insulator-metallic phase transition on the $R(T)$ curves of the samples with $x = 0.3 - 0.5$. The magnetoresistance of the samples was measured and large values for MR were found.

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

Year: 2008

Source title: Journal of the Korean Physical Society

Volume: 52

Issue: 5

Page : 1431-1434

Cited by: 3

Link: [Scopus Link](#)

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ISSN: 3744884

Language of Original Document: English

Abbreviated Source Title: Journal of the Korean Physical Society

Document Type: Article

Source: Scopus

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