Large magnetocaloric effect above 300 K and magnetoresistance in $(La_{0.5}Pr_{0.5})_{1-x}Pb_xMnO_3$ perovskites

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Abstract: Perovskite compounds $(La_{0.5}Pr_{0.5})_{1-x}Pb_xMnO_3$ (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, $|??S_m|$, reached its largest value of 2.06 J/kg?K at ??H = 13.5 kOe for the sample with x = 0.4 (T_c = 323 K). Due to the large $|??S_m|$ 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

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