

Tuning of the Magnetocaloric Effect in La Manganites

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The crystallographic and the magnetocaloric effects of $\text{La}_{0.7}\text{Ca}_{0.3}\text{Mn}_{0.99}^{57}\text{Fe}_{0.01}\text{O}_3$ (LCMO) powders were studied by using X-ray diffraction, vibrating sample magnetometer, and Mössbauer spectroscopy. To investigate the effect of sintering conditions on LCMO, the samples were sintered in air and in an evacuated sealed quartz tube at different temperatures. The calculated magnetic entropy changes in a magnetic field of 1.5 T for the samples sintered in air and in an evacuated sealed quartz tube were 1.6 J/kg K and 3.2 J/kg K, respectively. The magnetic entropy change increased considerably with increasing annealing temperature, but the Curie temperature T_c slightly decreased. However, the vacuum-annealed sample showed increases in both the T_c and the magnetic entropy change. The magnetocaloric effect and the working temperature of lanthanum manganites are tunable by using annealing conditions.

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