The Magnetocaloric Effect and Electrochemistry Corrosion of $\text{La}_{0.7-x}\text{Sr}_{0.3}\text{Eu}_x\text{MnO}_3$ Manganite

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doi: 10.20964/2021.06.31

Received: 12 February 2021 / Accepted: 29 March 2021 / Published: 30 April 2021

The structure, magnetic, and the magnetocaloric effect on the $\text{La}_{0.7-x}\text{Eu}_x\text{Sr}_{0.3}\text{MnO}_3$ sample prepared by the solid-state reaction method had been investigated. The structure data obtained from X-ray powder diffraction and Rietveld refinement analysis show that all these samples have single-phase and a rhombohedra structure with R-3c space group. With the substitution of the Eu^{3+} content, the volume of unit cells and Mn-O-Mn bond angle increase monotonically as well as the Curie temperature T_C , which is caused by the weakening of the double exchange interaction. A magnetic entropy change $(-\Delta S_M)_{\max}$ of $2.21 \text{ J kg}^{-1}\text{K}^{-1}$ is obtained under a magnetic field change of 20 kOe for $\text{La}_{0.66}\text{Eu}_{0.04}\text{Sr}_{0.3}\text{MnO}_3$ sample. All samples exhibit the FM-PM phase transition with a second-order nature. In the electrochemistry corrosion experiment for the sample, the mass loss rate of the sample is small, so the material possesses optimal anticorrosion performance. The lattice structure and the Curie temperature of the material can be manipulated to some extent with Eu^{3+} substitution, which provides a method for magnetic refrigeration in an electrolyte solution environment.

Keywords: Magnetocaloric effect, Manganite, Curie temperature, Phase transition

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