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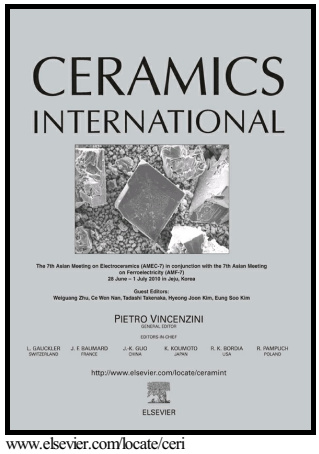

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Phan The Long[1,2*], T. V. Manh[3], T. A. Ho[4], Q. V. Dong[5], P. Zhang[6], S. C. Yu[3]

[1]Theoretical Physics Research Group, Advanced Institute for Materials Science, Ton Duc Thang University, Ho Chi Minh City, Vietnam

[2]Faculty of Applied Sciences, Ton Duc Thang University, Ho Chi Minh City, Vietnam

[3]Department of Physics, Chungbuk National University, Cheongju 361-763, South Korea

[4]Department of Materials Science and Engineering, Korea University, Seoul 136-713, South Korea

[5]Department of Materials Science and Engineering, Chungnam National University, Daejeon 34134, South Korea

[6]Hubei Collaborative Innovation Center for High-efficiency Utilization of Solar Energy, Hubei University of Technology, Wuhan, 430068, P. R. China

[*]Corresponding author: phanthelong@tdt.edu.vn

Abstract

We have prepared rhombohedral $La_{1-x}Sr_xCoO_{3-\delta}$ (x = 0.2-0.5) compounds with a mass density $\rho \approx$ 5.5 g/cm^3. Their magnetocaloric (MC) effect is studied via the magnetic-entropy change (ΔS_m) and relative cooling power (*RCP*), which are calculated from initial magnetization data recorded at different temperatures. Results reveal that the ΔS_m magnitude is maximum (ΔS_{max}) around the ferromagnetic-paramagnetic phase transition and dependent on both the applied-field (H) magnitude and Sr content (x). For H = 50 kOe, $|\Delta S_{max}|$ can be tuned in the range of 1.6~2.7 J/kg·K, corresponding to *RCP* values of 89~141 J/kg. Among the studied $La_{1-x}Sr_xCoO_{3-\delta}$ samples, the samples with x = 0.3-0.5 have the largest $|\Delta S_{max}|$ values. If combining these samples as MC blocks in refrigeration application, the working temperature range of a cooling device could range from 204 to ~280 K, with $|\Delta S_{max}|$ stable at ~2.6 J/kg·K and *RCP* ≈ 198 J/kg. We have also assessed the phase-transition type and magnetic order and found $La_{1-x}Sr_xCoO_{3-\delta}$ undergoing a second-order phase transition. Magnetic order tends to change from the long-range type to the short-range one when x varies from 0.2 to 0.5. This is in good agreement with the results obtained from the analysis of critical behavior.

Keywords: Perovskite cobaltites; magnetocaloric effect; second-order phase transition