

New Refrigerant $\text{La}_{0.7}\text{Ca}_{0.15}\text{Sr}_{0.15}\text{Mn}_{1-x}\text{Ga}_x\text{O}_3$ for Application in Magnetic Refrigeration

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Abstract : We present a new refrigerant $\text{La}_{0.7}\text{Ca}_{0.15}\text{Sr}_{0.15}\text{Mn}_{1-x}\text{Ga}_x\text{O}_3$ ($x = 0.0-0.1$) manganites. These compounds were prepared by the sol-gel method. The refinement of the X-ray diffraction reveals that all samples crystallize in a rhombohedral structure (space group $R\bar{3}c$). Detailed measurements of the magnetization as a function of temperature and magnetic applied field M (μ_0H , T) were carried out. From the $M(\mu_0H, T)$ curves, we have calculated the magnetic entropy change (ΔSM) according to the Maxwell relation. The temperature dependence of the magnetization $M(T)$ reveals a decrease of M when increasing the x content. The magnetic entropy change (ΔSM) reaches a maximum value near room temperature. It was also found that this compound exhibits a large magnetocaloric effect MCE which increases when decreasing Ga concentration. So, the studied compounds could be considered potential materials for magnetic refrigeration application.

Keywords : magnetic measurements, Rietveld refinement, magnetic refrigeration, magnetocaloric effect

Conference Title : ICUMC 2023 : International Conference on Ultracold Molecules and Chemistry

Conference Location : Jeddah, Saudi Arabia

Conference Dates : February 20-21, 2023