The substitution effect of chromium on the physical properties La$_{0.65}$Eu$_{0.05}$Sr$_{0.3}$Mn$_{1-x}$Cr$_x$O$_3$ nanocrystalline powders of La$_{0.65}$Ba$_{0.3}$Mn$_{1-x}$Cr$_x$O$_3$ perovskites have been synthesized by the sol-gel method. X-ray diffraction along with the Rietveld-refinement shows the formation of pure crystalline phase with rhombohedral symmetry (space group R-3C, no. 167). Magnetic measurements indicate that the ferromagnetic double exchange interaction is weakened with increasing Cr concentration, resulting in a shift in $T_c$ from 342K to 285K as $x$ varied between 0 and 0.15. Furthermore, all samples undergo a paramagnetic (PM) - ferromagnetic (FM) phase transition at $T_\text{M}$ = $T_c$. Based on the idea that doped manganites consist of ferromagnetic-metallic and paramagnetic-semiconducting (M-SC) regions coexisting in the same specimen, a good fit of the resistivity with the phenomenological percolation model, may be obtained by combining the contributions of the resistivity above and below $T_\text{M}$ by a single expression in the temperature region between 20 and 400K. We found that the estimated results are in good agreement with the obtained experimental data. The maximum magnetic entropy change ($\Delta S_M$) and the relative cooling power (RCP) for the composition $x=0.1$ are found to be, respectively, 4.20 J kg$^{-1}$ K$^{-1}$ and 238 J kg$^{-1}$ for a 5-T field change, making of this material a promising candidate for magnetic refrigeration near room temperature. Arrrott plot analyses and a universal curve method were applied to study the order of the magnetic transition in this system.

**Keywords:** Nanocrystalline manganites, Rietveld refinement, magnetic properties, modified sol-gel Pechini method