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Magnetic and magnetocaloric properties of NdMnO₃ nanoparticles¹ SAYAN CHANDRA, ANIS BISWAS, M.H. PHAN, H. SRIKANTH, University of South Florida, FUNCTIONAL MATERIALS LABORATORY TEAM — Recently nanosized manganites have attracted considerable attention as the reduction of particle size has exotic effect on their properties. We have studied the magnetic properties and magnetocaloric effect (MCE) of NdMnO₃ nanoparticles with particle size ~ 20 and 30 nm (denoted as S20 and S30 respectively). In temperature dependence of magnetization, $M(T)$, a paramagnetic to ferromagnetic transition is observed at $T_C \sim 70$ K for S20, which is 5 K higher than that for S30 indicating enhancement of ferromagnetic interaction with particle size reduction. In addition to this, an anomaly in $M(T)$ is observed at 20 K (T_{CA}) for both S20 and S30, which is attributed to the stabilization of a canted magnetic state (CMS) due to the ordering of Nd³⁺. The magnetic entropy change $[-\Delta S_M(T)]$ is calculated from isothermal magnetization curves using Maxwell relation. There are two maximas in $-\Delta S_M(T)$ at T_C and T_{CA} indicating large MCE over both temperature regions. Interestingly, the relative cooling power is enhanced in case of smaller particle size in which the influence of stabilization of CMS on MCE is less pronounced.

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