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Magnetocaloric effect (MCE) in Nickel Ferrite nanoparticles J. GASS, M.B. MORALES, N.A. FREY, M.J. MINER, S. SRINATH, H. SRIKANTH, University of South Florida — We report on the magneto caloric effect (MCE) in a Nickel ferrite (NiFe2O4) nanoparticle system. The nanoparticles were synthesized using chemical co-precipitation. Extensive characterization of structural and magnetic properties was done using XRD, TEM, DC and AC magnetization, and transverse susceptibility. The change in entropy was calculated using the thermodynamic Maxwell relation from the family of M-H curves taken at different temperatures. Maximum entropy change in nanoparticle systems is influenced by particle size, anisotropy, and collective dipolar behavior. While the MCE is not as large as that reported in bulk systems, there are advantages as ferrite nanoparticles are easily produced and the operational temperature is tuned by the average particle size. In our studies, we observed a sharp peak in M-T curves at around 60K in addition to the blocking transition which occurs at 120 K. This results in a larger entropy change in comparison with the MCE results on other reported ferrite nanoparticles. The origin of this anomalous MCE is analyzed in the context of surface anisotropy and other possible contributions in the NiFe2O4 system. Work supported by NSF through grant CTS-0408933.

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