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Magnetocaloric effect in ferrite nanoparticles D. REBAR, J. GASS, P. PODDAR, H. SRIKANTH, Physics Department, University of South Florida, Tampa, FL — Miniaturization of the electronic devices for space, military and consumer applications requires cooling devices to be fabricated on a chip for power efficient, noise-free operations. Refrigeration based on the adiabatic-demagnetization has been used for several decades for cooling down to sub-kelvin temperatures. Superparamagnetic particles also hold tremendous potential towards this application. We have studied magnetocaloric effect (MCE) properties in chemically synthesized ferrite nanoparticles over a broad range in temperature and magnetic fields. Nanoparticles investigated include Fe_3O_4 (average size = 8 nm, synthesized using co-precipitation method), $MnZnFe_2O_4$ (average size = 15 nm, synthesized using reverse-micelle technique) and $CoFe_2O_4$ (average size 8 nm, synthesized using pyrolectic technique). The magnetic entropy change was calculated by applying Maxwell's relations to magnetization vs magnetic field curves at various temperatures. Our results indicate that the single-domain particles in their superparamagnetic state show a considerable entropy change near the blocking temperature. The influence of interactions on MCE effect will also be discussed. Work supported by NSF through Grant No. CTS-0408933

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