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Influence of particle size on the magnetic and magnetocaloric properties of nanocrystalline $\mathbf{La_{2/8}Pr_{3/8}Ca_{3/8}MnO_3}$ P. LAMPEN, N.S. BINGHAM, M.H. PHAN, H. SRIKANTH, University of South Florida, T.H. HOANG, H.D. CHINH, Hanoi University of Technology — Bulk manganites $La_{5/8-y}Pr_yCa_{3/8}MnO_3$(LPCMO) exhibit a complex phase diagram due to coexisting and competing charge-ordered (CO) and ferromagnetic (FM) phases. Of particular interest is the CO phase that is unstable under various perturbations, such as carrier doping, strain, magnetic and electric field. We report systematic studies of the influence of particle size on the magnetic and magnetocaloric properties of nanocrystalline LPCMO (y=3/8) synthesized by sol-gel method. The nanocrystalline samples with mean particle sizes of 30 nm, 150 nm, and 250 nm were structurally characterized by XRD, SEM, and TEM. Magnetic and magnetocaloric measurements were conducted using a Quantum Design PPMS. We find that the 150 nm and 250 nm samples exhibit features similar to their bulk counterpart. However, the case is very different for the 30 nm sample where only a paramagnetic to ferromagnetic transition occurs. Size reduction has been found to suppress the CO phase, decrease the magnetization, and strongly modify the magnetocaloric effect in LPCMO.

Paula Lampen
University of South Florida

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