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Magnetocaloric Effect and Refrigerant Capacity in Charge-Ordered $\mathbf{Pr_{0.5}Sr_{0.5}MnO_3}$ N.S. BINGHAM, M.H. PHAN, H. SRIKANTH, University of South Florida, M.A. TORIJA, C. LEIGHTON, University of Minnesota — The influence of first- and second-order magnetic phase transitions on the magnetocaloric effect (MCE) and refrigerant capacity (RC) of charge-ordered $Pr_{0.5}Sr_{0.5}MnO_3$ has been investigated. The system undergoes a ferromagnetic transition at T_c ~255 K followed by a ferromagnetic charge-disordered to antiferromagnetic charge-ordered transition at T_{co} ~165 K. The first-order magnetic transition (FOMT) at T_{CO} induces a larger MCE but is limited to a narrower temperature range resulting in a smaller RC, versus that of the second-order magnetic transition at T_C. Large magnetic and thermal hysteretic losses associated with the FOMT below T_{CO} are also detrimental to an efficient magnetic RC. Magnetic measurements were performed using a commercial Physical Property Measurement system from Quantum Design. MCE was numerically calculated from the magnetization isotherms using the thermodynamic Maxwell relation. Overall, we show that PSMO is an excellent system that provides an interesting possibility of comparing the magnetic entropy across a FOMT and SOMT in the same material.

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