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| Title: | Rare-earth tuned magnetism and magnetocaloric effects in double perovskites R2NiMnO6 |
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| Abstract: | We present a comprehensive experimental study of magnetization (2 < T < 300 K, 1 < H < 8 T) and magnetocaloric effect in double perovskite materials R2NiMnO6 with R = Pr, Nd, Sm, Gd, Tb, and Dy. While a paramagnetic to ferromagnetic transition, with TC in the range $\sim 100-200\enspace $ K, is a common feature that can be attributed to the ordering of Mn4+ and Ni2+ magnetic moments, qualitatively distinct behavior depending on the choice of R is observed at low temperatures. These low-temperature anomalies in magnetization are also manifest in the change in magnetic entropy, −ΔSM, whose sign depends on the choice of R. In order to understand these results, we present theoretical analysis based on mean-field approximation and Monte Carlo simulations on a minimal spin model. The model correctly captures the key features of the experimental observations. |
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