

Magnetocaloric properties of polycrystalline compound PrCrGe_3

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Magnetic materials can be used in refrigerators based on the magnetocaloric effect. In this work, we studied the magnetocaloric properties of polycrystalline germanide PrCrGe_3 . The compound crystallizes in the hexagonal BaNiO_3 -type structure (space group of $P6_3/mmc$, No. 194), confirmed by powder X-ray diffraction. PrCrGe_3 is a metal and it exhibits two subsequent magnetic phase transitions of ferromagnetic character, one at $T = 95(1)$ K and another one at ~ 16 K, both evidenced as distinct anomalies in the temperature dependencies of the specific heat and the magnetization. For all recorded magnetic transitions, the normal magnetocaloric effect was observed. The specific heat data yielded the maximum value of the magnetic entropy change $\Delta S_m = -0.8(1)$ J kg^{-1} K^{-1} at $T = 94(1)$ K and $\Delta S_m = -0.6(1)$ J kg^{-1} K^{-1} at $T = 16(1)$ K, for the magnetic field change $\mu_0\Delta H = 1$ T. The adiabatic temperature change was estimated to be $\Delta T_{ad} = 0.31(1)$ K at $T = 94(1)$ K and $\Delta T_{ad} = 0.27(1)$ K at $T = 16(1)$ K, for $\mu_0\Delta H = 1$ T. The magnetocaloric parameters determined from the magnetization data are very close to the values derived from the specific heat.