

Magnetocaloric effect in spin-glass-like GdCu₄Mn compound

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Materials based on Gd with magnetic frustration may have high magnetocaloric application potential. GdCu₄Mn crystallizes in hexagonal CaCu₅-type structure with space group $P6/mmm$ (no 191, Pearson symbol: $hP6$). Obtained from x-ray diffraction pattern lattice parameters for our sample are equal to $a = 5.1140(3)$ Å and $c = 4.1513(3)$ Å. Due to the structural disorder (random distribution of Cu and Mn atoms on $2c$ and $3g$ positions) a spin-glass-like behavior is observed in this material at low temperatures. In addition to the standard measurements of dc magnetization and ac magnetic susceptibility, the spin-glass state was confirmed by the memory effect and relaxation behavior. The lack of long-range ordering was demonstrated by electronic transport and specific heat measurements. For a change in magnetic field from 0 to 5 T maximum values of the isothermal magnetic entropy change (ΔS_M), relative cooling power (RCP), and adiabatic temperature change (ΔT_{ad}) are equal to -1.3 J/(kg K), 125 J/kg, and 0.5 K, respectively.