

Magnetocaloric properties of amorphous $\text{Gd}_{65}\text{Fe}_{10}\text{Co}_{10}\text{Al}_{10}\text{X}_{55}$ ($\text{X} = \text{Al}, \text{Si}, \text{B}$) ribbons

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Magnetocaloric effect (MCE) is described as the adiabatic temperature change ΔT_{ad} or the isothermal magnetic entropy change ΔS_M , which is a function of the temperature and magnetic field. Here, we focused our attention on MCE in $\text{Gd}_{65}\text{Fe}_{10}\text{Co}_{10}\text{Al}_{10}\text{X}_5$ ($\text{X} = \text{Al}, \text{Si}, \text{B}$) alloys. The synthesized melt-spun materials have an amorphous structure confirmed by XRD. The T_C , determined from $M(T)$ curves by the inflection point method is equal to 145, 160 and 175 K for the alloys with 5 at.% of B, Al and Si, respectively. Maximum value of the magnetic entropy changes for the magnetic fields from 0 to 5 T is $7.1 \text{ Jkg}^{-1}\text{K}^{-1}$ for $\text{X} = \text{B}$, whereas related refrigeration capacity is 748 Jkg^{-1} . The maximum magnetic entropy changes for $\text{Gd}_{65}\text{Fe}_{10}\text{Co}_{10}\text{Al}_{15}$ and $\text{Gd}_{65}\text{Fe}_{10}\text{Co}_{10}\text{Al}_{10}\text{Si}_5$ amount $6.0 \text{ Jkg}^{-1}\text{K}^{-1}$ and $5.9 \text{ Jkg}^{-1}\text{K}^{-1}$, while RC parameter is equal 700 and 698 Jkg^{-1} , respectively.

References:

[1] C. Mayer, S. Gorsse, G. Ballon, R. Caballero-Flores, V. Franco, B. Chevalier, J. Appl. Phys 110 (2011) 053920