Magnetic properties of rapidly cooled Gd_6YPd_3

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Magnetic materials with relatively high Curie temperatures and large magnetocaloric effects (MCE) are researched as potential candidates for magnetic refrigeration [1-3]. The rc-cast Gd_6YPd_3 sample was prepared by the mould casting technique. The results were compared to the data of single crystal obtained by the Czochralski method from a levitating melt. The samples were characterized by means of X-ray diffraction, SQUID magnetometry and scanning electron microscopy in order to comparison magnetic and magnetocaloric properties in relation to the technological aspects. The Gd_6YPd_3 compound crystallizes in the hexagonal Th_7Fe_3 type of crystal structure. The investigated ferromagnetic system is sensitive to grain size. The Gd_6YPd_3 single crystal orders ferromagnetically at 299 K while the rc-cast Gd_6YPd_3 displays also ferromagnetic transition but at about 305 K. For the Gd_6YPd_3 single crystal the saturation magnetic moment per Gd ion is enhanced in relation to the theoretical value while for the rc-cast Gd_6YPd_3 only a slight overestimation is observed. The magnetocaloric effect decreases with the decrease of the grain size.

References:

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