Magnetic Study of Intermetallic $Ce_{1-x}Tb_xMn_2Ge_2$ ($0 \leq x \leq 1$) Compounds

Oznur Cakir[a], Ilker Dincer[a], Ayhan Elmali[a], Eyüp Duman[b], Yalcin Elerman[a], [a]*Department Engineering Physics, Faculty of Engineering, Ankara University, 06100 Besevler-Ankara, Turkey.* [b]*Experimental physik, Universität Duisburg-Essen, D-47048 Duisburg, Germany*. E-mail: ozcakir@eng.ankara.edu.tr

In this study, the crystal structure and magnetic properties of $Ce_{1-x}Tb_xMn_2Ge_2$ ($0 \leq x \leq 1$) compounds have been investigated by means of x-ray powder diffractions and magnetization measurements. X-ray diffraction patterns at room temperature indicated that all compounds are single phase and crystallize in the $ThCr_2Si_2$ type structure with space group I4/mmm. With increasing x, lattice parameters and unit cell volume have decreased linearly, obeying the Vegard`s law. The magnetic properties of $Ce_{1-x}Tb_xMn_2Ge_2$ were investigated by means of field-cooled and zero-field-cooled magnetization measurements in the temperature range 5 K $\leq T \leq$ 600 K. In $CeMn_2Ge_2$[1] and $TbMn_2Ge_2$[2], the interlayer magnetic coupling in the Mn sublattice is, respectively, ferromagnetic and antiferromagnetic below about 350 K. At low temperatures, Tb sublattice orders and reconfigures the ordering in the Mn sublattice while Ce does not order at any temperature. In this study, we investigated the variations in the magnetic properties of $Ce_{1-x}Tb_xMn_2Ge_2$ as a function of rare earth concentration by examining the evolution of the features in the temperature dependence of the magnetization. The results are summarized in the magnetic phase diagram.

[1] Venturini G., Welter R., Ressouche E., Malaman B., *J. Magn. Magn. Mater*., 1995, **150**. [2] Venturini G., Welter R., Ressouche E., *J. Alloys Compounds*, 1996, **240**.

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