Magnetocrystalline anisotropy in single crystal Gd₅Si₂.₇Ge₁.₃
DAVID JILES, Wolfson Centre for Magnetics, Cardiff University, UK, RAVI HADIMANI, YEVDEN MELIKHOV, JOHN SNYDER — We have determined the magnetocrystalline anisotropy, easy and hard axes and the anisotropic constants for single crystal Gd₅Si₂.₇Ge₁.₃ using magnetization vs. angle of rotation and magnetization vs. magnetic field measurements carried out on a vibrating sample magnetometer (VSM). Magnetization was measured as a function of angle with an applied field of 0.12 MA/m (1500 Oe) in the ‘ab’, ‘bc’ and ‘ca’ planes with angles measured from the ‘a’, ‘c’ and ‘c’ axes respectively. It was determined from the measurements that the ‘b’ axis has the highest susceptibility and hence is the easy axis, while the ‘a’ and ‘c’ have lower and approximately equal susceptibilities and hence are the hard axes. The magnetic anisotropy energy $E_{an}$ was calculated using $E = \mu_0 HM$. The first order uniaxial anisotropic constant $K_1$ was determined by fitting the $E_{an}$ vs. $\theta$ curve to uniaxial anisotropy energy equation $E_{an} = K_1 \sin^2 \theta$ and was determined to be $1.451 \times 10^4$ J/m$^3$. This research is supported by the Royal Society under a Wolfson Research Merit Award.

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