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Magnetostriction close to the phase transition in $\text{Gd}_5(\text{Si}_x\text{Ge}_{1-x})_4$ ¹

R. L. HADIMANI, Y. MELIKHOV, J. E. SNYDER, D. C. JILES, Wolfson Centre for Magnetism, Cardiff University, CF24 3AA, U.K. — $\text{Gd}_5(\text{Si}_x\text{Ge}_{1-x})_4$ is a potential material for magnetic refrigeration. It has the highest magnetocaloric effect observed for the composition $0.41 \leq x \leq 0.5$ near its first order coupled magnetic-structural phase transition. We have investigated the relation between the magnetic transition from ferromagnetic to paramagnetic phase and the structural transition from monoclinic to orthorhombic. A series of measurements have been carried out showing magnetostrictive strain as a function of temperature at various magnetic field strengths and magnetostrictive strain as a function of magnetic field at various temperatures with a magnetic field of up to 7 Tesla. There was fine structure observed in the magnetostriction curve λ vs. H near the critical point. The magnetostriction measurements show that close to the critical temperature there is a sudden increase in the magnetostriction of about 100 ppm just before the field induced first order phase transition. This anomaly was observed for both strain vs. magnetic field at various temperatures and for strain vs. temperature at various magnetic field strengths measurements.

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