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Determination of second order phase transition temperature of monoclinic phase of $\mathbf{Gd_5(Si_xGe_{1-x})_4}$ DAVID JILES, RAVI HADIMANI, Iowa State Unversity, Y. MELIKHOV, Cardiff University, MAGNETIC RESEARCH GROUP TEAM, WOLFSON CENTRE FOR MAGNETICS TEAM — $Gd_5(Si_xGe_{1-x})_4$ has a first order phase transition from high temperature paramagnetic monoclinic to low temperature ferromagnetic orthorhombic phase for $0.4<x<0.51$. It is not possible to determine experimentally the second order phase transition temperature of orthorhombic or monoclinic phase. Previous studies have estimated second order phase transition temperature of the orthorhombic phase using a modified Arrott plot technique. The composition $0.3<x<0.4$ $Gd_5(Si_xGe_{1-x})_4$ has mixed monoclinic and orthorhombic phases without a clear transition between the two phases. We have determined the second order phase transition temperatures of both orthorhombic and monoclinic phases for $Gd_5Si_{1.5}Ge_{2.5}$ using modified Arrott plots. Magnetic moment vs. magnetic field for various temperatures was measured using a SQUID magnetometer. Arrott plots were plotted from $M^{1/\beta}$ and $(H/M)^{1/\gamma}$ isotherms using critical exponents of $1/\gamma= 0.85$ and $1/\beta=1.85$. We obtained two sets of parallel lines for the orthorhombic phase and the monoclinic phase. The temperature of the isotherm that passes through the origin for both orthorhombic and monoclinic phase was estimated to be 299.5 K and 197 K respectively.

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