

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Unusual Phase Transitions in Single Crystals of $\text{Gd}_5\text{Si}_{1.3}\text{Ge}_{2.7}$ and $\text{Gd}_5\text{Si}_{1.4}\text{Ge}_{2.6}$ R.L. HADIMANI, Iowa State Univ, Y. MELIKHOV, Polish Academy of Science, D.L. SCHLAGEL, T.A. LOGRASSO, K.W. DENNIS, R.W. MCCALLUM, Ames Laboratory, US Dept. of Energy, D.C. JILES, Iowa State Univ, IOWA STATE UNIVERSITY COLLABORATION, POLISH ACADEMY OF SCIENCE COLLABORATION, AMES LABORATORY, US DEPT. OF ENERGY COLLABORATION — $\text{Gd}_5(\text{Si}_x\text{Ge}_{1-x})_4$ has been widely studied over the composition range $0.41 < x < 0.51$ where the coupled magnetic and structural first order phase transitions occur close to room temperature. It has a mixed phase region in the phase diagram with both orthorhombic I and orthorhombic II phases for compositions $0.32 < x < 0.41$. Previously we have used modified Arrott plots to determine the second order phase transition temperature when it is suppressed by the first order phase transition in samples with compositions $x < 0.51$. we also used these modified Arrott plots on the mixed phase composition of $\text{Gd}_5\text{Si}_{1.5}\text{Ge}_{2.5}$ ($x = 0.375$) to determine the second order phase temperatures of both the monoclinic and the orthorhombic II phases. We have now investigated two more single crystals of $\text{Gd}_5\text{Si}_{1.3}\text{Ge}_{2.7}$ and $\text{Gd}_5\text{Si}_{1.4}\text{Ge}_{2.6}$ whose compositions fall in the mixed phase regions of orthorhombic I and orthorhombic II in the phase diagram. The second order phase transition temperatures of the samples were estimated to be 383 K for $\text{Gd}_5\text{Si}_{1.3}\text{Ge}_{2.7}$ and 365 K for $\text{Gd}_5\text{Si}_{1.4}\text{Ge}_{2.6}$. These temperatures are much higher than the expected second order phase transition temperature of orthorhombic II phase (280 K). This may be due to the presence of the orthorhombic I phase in larger volume fraction.

Ravi L. Hadimani
Iowa State Univ

Date submitted: 14 Nov 2014

Electronic form version 1.4