Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Examination of the Coupled Magnetic-Structural Phase Transition in Gadolinium-Silicon-Germanium Magnetocaloric alloys at temperatures well above Tc[1] RAVI HADIMANI, EUGENE MELIKHOV, JOHN SNYDER, DAVID JILES, Wolfson Centre for Magnetics, Cardiff University, WOLFSON CENTRE FOR MAGNETICS TEAM — The first order phase transition in $Gd_5(Si_xGe_{1-x})_4$ from monoclinic phase to orthorhombic phase was investigated from 296-300 K at magnetic fields of up to 9 Tesla. The rate of change of transition temperature with magnetic field was found to be 4.9 K/ Tesla in the field range up to 2.5 Tesla. This linear rate of change of transition temperature with field persisted even at higher magnetic fields of up to 9 Tesla.. Measurements were made on single crystal $Gd_5Si_{1.95}Ge_{2.05}$ and $Gd_5Si_2Ge_2$ using a high field VSM and a SQUID magnetometer. The single crystal samples were prepared by the Bridgman method at Ames Laboratory US DoE. The first order phase transition temperatures of single crystal samples at nearly zero field were determined to be 264 K and 267 K respectively. The magnetic field required to induce the first order phase transition at 289 K for the single crystal $Gd_5Si_{1.95}Ge_{2.05}$ was 4.8 Tesla and at 300 K it was 8 Tesla. For the single crystal $Gd_5Si_2Ge_2$ sample, the magnetic field required to induce the first order transition at 289 K was 4.5 Tesla and at 300 K it was 8.4 Tesla. The magnetic field required to induce the first order phase transition increased linearly with the difference T-Tc.

[1]This research is supported by the Royal Society under a Wolfson Research Merit Award.

David Jiles
Wolfson Centre for Magnetics, Cardiff University

Date submitted: 22 Nov 2008 Electronic form version 1.4