Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Magnetic and magnetoelastic properties of Ge/Co co-substituted cobalt ferrite[1] NARESH RANVAH, EUGENE MELIKHOV, JOHN SNYDER, DAVID JILES, Wolfson Centre for Magnetics, Cardiff University, WOLFSON CENTRE FOR MAGNETICS TEAM — The highly magnetostrictive material cobalt ferrite and its derivatives based on substitution of cations have been shown to have extreme sensitivity of their magnetization to stress. In order to control their properties (e.g. magnetostriction, magnetic anisotropy, strain derivative, and hysteresis) substitution of specific cations are needed. We have shown Ge^{+4}/Co^{+2} co-substituted cobalt ferrites ($Co_{1+x}Ge_xFe_{2-2x}O_4$)to have very interesting combinations of magneto-elastic properties. In the present study the variation of magnetic anisotropy with composition and temperature was investigated, for the new germanium/cobalt co-substituted cobalt ferrite $Co_{1+x}Ge_xFe_{2-2x}O_4$.. Hysteresis loops were measured in the range T = 10 - 400 K, with $\mu_0 H_{max}$ = 0 - 5 T. The high field regions of these loops were then fitted to the Law of Approach to Saturation (LA) for cubic materials as given by $M = M_s$[1-(8/105)$(K_1/\mu_0 M_s H)^2$], plus a linear forced magnetisation term. Values for first order cubic anisotropy constant K_1 were calculated and it was found that anisotropy increased as temperature decreases for all compositions. At most temperatures anisotropy decreased with increase in x.

[1]This work was supported by the UK EPSRC under grant number EP/D057094 and by the US NSF under grant number DMR-0402716.

David Jiles
Wolfson Centre for Magnetics, Cardiff University

Date submitted: 22 Nov 2008 Electronic form version 1.4