Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Random magnet with competing anisotropies in $\mathbf{Fe}_x\mathbf{Ni}_{1-x}\mathbf{F}_2$ alloys[1] TRENT JOHNSON, FELIO PEREZ, TUDOR STANESCU, DAVID LEDERMAN, West Virginia University — A series of epitaxial (110) $Fe_xNi_{1-x}F_2$ films were deposited on (110) MgF_2 via molecular beam epitaxy. The Fe concentration x was determined by measuring the lattice parameter along the [110] direction using x-ray diffraction. The film thicknesses and the roughness of each interface were found by fitting of x-ray reflectivity data. The magnetic ordering as a function of x was analyzed by SQUID magnetometry. Enhancement of the Néel temperature in alloys as well as evidence of spontaneous magnetization along the c-axis after field-cooling were observed for samples with x>0.1; for samples with x<0.1 the magnetization was perpendicular to the c-axis. Two phase transitions were observed for alloy samples with x>0.1. The phase diagram of the upper transition was consistent with mean field theory of a system with competing anisotropies. The transition at lower temperatures was unaffected by the application of a magnetic field, whereas the upper temperature transition was broadened by the application of fields as small as 50 Oe. This suggests the presence of a spin-glass phase at lower temperatures, followed by melting of the spin glass prior to the main transition to paramagnetic behavior as the temperature is raised.

[1]This work was supported by the National Science Foundation.

Trent Johnson
West Virginia University

Date submitted: 10 Nov 2011 Electronic form version 1.4