Abstract Submitted
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Ferromagnetic $Gd_{100-x}Fe_x$ (x = 4 - 40) Nanostructures D. SCHMITTER, J. GOERTZEN, G. SHELBURNE, University of Nebraska - Lincoln, T. M. PEKAREK, University of North Florida, J. E. SHIELD, University of Nebraska - Lincoln, P. M. SHAND, University of Northern Iowa, D. HASKEL, Argonne National Laboratory, D. L. LESLIE-PELECKY, University of Nebraska - Lincoln — Iron in concentrations as small as 4 at. % (where the distance between Fe atoms is more than three lattice spacings) produces ferromagnetic behavior at temperatures up to 50 K above the Gd Curie temperature T_C in $Gd_{100-x}Fe_x$ nanostructures. X-ray diffraction and XAFS show that $Gd_{100-x}Fe_x$ nanostructures made by inert-gas-condensation and melt-spinning have nanoscale hcp Gd grains with Gd-Fe grain boundaries. Magnetization and XMCD measurements indicate that, above the bulk Gd $T_{C,}$Fe atoms polarize Gd atoms and produce ferromagnetic behavior with coercivities on the order of 50-100 Oe. The coercivity decreases as the temperature decreases toward the Gd $T_{C,}$which we attribute to random anisotropy averaging produced by ordering of the hcp-Gd grains.

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