Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Synthesis and magnetic properties of highly crystalline Fe_3O_4 nanorods R DAS, K STOJAK REPA, V KALAPPATTIL, Univ. of South Florida, J ALONSO, Univ. of South Florida, BCMaterials, MH PHAN, H SRIKANTH, Univ. of South Florida — Anisotropic one-dimensional magnetic nanostructures have drawn considerable attention due to their high surface to volume ratio, which drastically influences physical and chemical properties. In the past decade, most attention has been paid to the synthesis of Fe_3O_4 nanoparticles (NPs), mainly focusing on a spherical morphology. In this work, we report the first systematic study of the magnetic properties of highly crystalline Fe_3O_4 nanorods (NRs), which were synthesized by the hydrothermal method. XRD and TEM confirm the formation of highly crystalline Fe_3O_4 NRs with narrow size distribution. For high aspect ratio NRs (656nm), room temperature saturation magnetization is close to that of bulk Fe_3O_4 (˜90emu/g) and much larger than that of spherical NPs of the same volume (60-70emu/g). DC magnetization vs. temperature data display a sharp change in the magnetization at 120K, which is attributed to the Verway transition, whose presence affirms the excellent crystallinity of Fe_3O_4 NRs. Owing to their high effective anisotropy and saturation magnetization, the Fe_3O_4 NRs show enhanced heating efficiency relative to their spherical NP counterparts when tested in a standard hyperthermia set-up.

Kristen Stojak Repa
Univ. of South Florida

Date submitted: 05 Nov 2015 Electronic form version 1.4