Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Metallic Iron Nanoparticles for MRI Contrast Enhancement
HAFSA KHURSHID, MICHAEL BONDER, SRINIVASAN BALAKRISHNAN, University of DE, COSTAS HADJIPANAYIS, Emory University School of Medicine, GEORGE HADJIPANAYIS, University of DE — This study is focused on our chemically synthesized iron nanoparticles, coated with carboxyl-methyl terminated polyethylene glycol to make them biocompatible and water dispersible. The particles have an average size of 14 nm and a magnetization of 110 emu/g. TEM studies revealed their core shell structure with iron in the core and iron oxide in the shell. The effects of these nanoparticles on MRI contrast enhancement were studied in vitro using a clinical MRI scanner at a magnetic field of 1.5 T. Both the r_2 $(1/T_2)$ and $r_2^*(1/T_2^*)$ were found to be significantly higher than those of iron oxide nanoparticles with a similar size. This behavior is attributed to their stronger magnetic susceptibility, leading to spin dephasing and shortening of T2 effects and thus darkening of the MRI contrast. These results suggested that the iron nanoparticles are expected to be more useful for MRI contrast enhancement and other biomedical applications than the currently used iron oxide nanoparticles.

hafsa khurshid
University of DE

Date submitted: 30 Nov 2008 Electronic form version 1.4