Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Iron oxide nanoparticles with controlled morphology for advanced hyperthermia[1] ZOHREH NEMATI PORSHOKOUH, HAFSA KHURSHID, Univ of South Florida-physics, JAVIER ALONSO MESSA, Univ of South Florida-physics and BC Materials (Spain), MANH-HUONG PHAN, HARIHARAN SRIKANTH, Univ of South Florida-physics — Magnetic nanoparticles (NPs) are interesting for a wide range of applications. In biomedicine, they have been exploited for use in drug delivery, magnetic resonance imaging, and magnetic hyperthermia. While magnetic hyperthermia, using NPs to convert electromagnetic energy into heat to destroy the cancer cells, represents a novel cancer treatment technique, a poor heating conversion efficiency of the existing NPs restricts its practical use. Different strategies have been proposed to overcome this limitation, mainly by tuning the size, saturation magnetization and effective anisotropy of the NPs. Here we report a magnetic hyperthermia study on Fe3O4 NPs, where the effective anisotropy was tuned by varying particle morphology from the spherical to octopod shape. The Fe3O4 NPs were synthesized using a thermal decomposition method. Transmission electron microscopy (TEM) and high-resolution TEM images show high crystalline monodisperse nanoparticles. X-ray diffraction patterns confirm the presence of Fe3O4 phase. Hyperthermia experiments indicate that the octopods possess a higher SAR as compared to their spherical counterpart. Our findings provide an effective approach to improve the SAR of NPs by manipulating the shape anisotropy of the nanoparticles.

[1]Research was supported by USAMRMC through grant numbers W81XWH-07-1-0708 and W81XWH1020101/3349

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Date submitted: 13 Nov 2014 Electronic form version 1.4