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MRI contrast enhancement using Magnetic Carbon Nanoparticles RAKESH P. CHAUDHARY, Department of Physics, University of Texas at Arlington, KIM KANGASNIEMI, MASAYA TAKAHASHI, University of Texas Southwestern Medical Center, SAMARENDRA K. MOHANTY, ALI R. KOYMEN, Department of Physics, University of Texas at Arlington, DEPARTMENT OF PHYSICS, UNIVERSITY OF TEXAS AT ARLINGTON TEAM, UNIVERSITY OF TEXAS SOUTHWESTERN MEDICAL CENTER TEAM — In recent years, nanotechnology has become one of the most exciting forefront fields in cancer diagnosis and therapeutics such as drug delivery, thermal therapy and detection of cancer. Here, we report development of core (Fe)-shell (carbon) nanoparticles with enhanced magnetic properties for contrast enhancement in MRI imaging. These new classes of magnetic carbon nanoparticles (MCNPs) are synthesized using a bottom-up approach in various organic solvents, using the electric plasma discharge generated in the cavitation field of an ultrasonic horn. Gradient echo MRI images of well-dispersed MCNP-solutions (in tube) were acquired. For T2 measurements, a multi echo spin echo sequence was performed. From the slope of the 1/T2 versus concentration plot, the R2 value for different CMCNP-samples was measured. Since MCNPs were found to be extremely non-reactive, and highly absorbing in NIR regime, development of carbon-based MRI contrast enhancement will allow its simultaneous use in biomedical applications. We aim to localize the MCNPs in targeted tissue regions by external DC magnetic field, followed by MRI imaging and subsequent photothermal therapy.

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