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**Effect of magnetic anisotropy and particle size distribution on temperature dependent magnetic hyperthermia in $Fe_3O_4$ ferrofluids** MAHESHIKA PALIHAWADANA ARACHCHIGE, Wayne State University, HUMESHKAR NEMALA, Illinois Wesleyan University, VAMAN NAIK, University of Michigan Dearborn, RATNA NAIK, Wayne State University — Magnetic hyperthermia (MHT) has a great potential as a non-invasive cancer therapy technique. Specific absorption rate (SAR) which measures the efficiency of heat generation, mainly depends on magnetic properties of nanoparticles such as saturation magnetization ($M_s$) and magnetic anisotropy (K) which depend on the size and shape. Therefore, MHT applications of magnetic nanoparticles often require a controllable synthesis to achieve desirable magnetic properties. We have synthesized $Fe_3O_4$ nanoparticles using two different methods, co-precipitation (CP) and hydrothermal (HT) techniques to produce similar XRD crystallite size of 12 nm, and subsequently coated with dextran to prepare ferrofluids for MHT. However, TEM measurements show average particle sizes of 13.8 3.6 nm and 14.6 3.6 nm for HT and CP samples, implying the existence of an amorphous surface layer for both. The MHT data show the two samples have very different SAR values of 110 W/g (CP) and 40W/g (HT) at room temperature, although they have similar $M_s$ of 70 4 emu/g regardless of their different TEM sizes. We fitted the temperature dependent SAR using linear response theory to explain the observed results. CP sample shows a larger magnetic core with a narrow size distribution and a higher K value compared to that of HT sample.

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