Abstract Submitted
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Fe3O4 Nano-clusters for Ultrafast Hyperthermia[1] SHIRIN POURMIRI, Univ of Delaware, VASILEIOS TZITZIOS, GEORGIA BASINA, NCSR Demokritos, Greece, COSTAS HADJIPANAYIS, Mount Sinai Beth Israel, GEORGE DIAMANTOPOULOS, Khalifa University of Science, UAE, FRANK ABEL, GEORGE HADJIPANAYIS, Univ of Delaware — In this work, we studied the hyperthermia behavior of chemically synthesized Fe3O4 nano-clusters (NCs). The PVP concentration was found to significantly affect the shape, size and magnetic properties of the NCs. TEM images show that the NCs have a mean diameter of $\leq$100nm and consist of isolated Fe3O4 nanoparticles with a mean diameter of 6-8nm. Magnetic measurements show that the room-temperature saturation magnetization (Ms) value increases from 20.2 to 61.7emu/g with increase in PVP concentration from 0.5g to 4g. To increase the water solubility and stability of the NCs, the as-made materials were first functionalized by PVP and then by citrate ions. HR-TEM images suggest a flower-like morphology with 30-40nm mean diameter. Magnetic measurements revealed that these NCs are superparamagnetic with Ms of 39emu/g and 58emu/g for the PVP and citrate coated materials, respectively. Hyperthermia measurements on NCs in water solution (10mg/ml), with a 10kA/m applied field at 150kHz frequency, showed a temperature increase from 293 to 338K after only 79s of field exposure with a high rate of 0.57C/s for the citrate functionalized particles and a rate of 0.31C/s for the PVP coated particles.

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