Heating Characteristics of Magnetite Nanoparticles for Magnetic Hyperthermia

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Magnetic hyperthermia using magnetite nanoparticles has recently emerged as a promising therapeutic approach for cancer treatment. The magnetite nanoparticles can serve as tumor-destroying hyperthermia agents due to their ability to generate heat efficiently when exposed to an external alternating current magnetic field. In our research, the magnetic nanoparticles were synthesized though the polyol solvothermal process, which was well understood as a versatile chemical approach for the synthesis of nanoparticles with well-defined shapes and controlled sizes. We investigated the heating characteristics of the magnetic nanoparticles for different process variables such as particle concentration, frequencies and amplitudes of the applied magnetic field. Both higher applied frequency and higher amplitude resulted in the higher heat generation and thus faster temperature growth. The magnetic nanoparticles exhibited an excellent heat generation for several continuous cycles of applied field which could reflect the ability of particles for long time treatment.