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Effect of zinc doping on water-based manganese ferrite nanofluids for magnetic hyperthermia application

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Nanoparticles with different zinc concentrations in magnesium ferrite were prepared by chemical co-precipitation technique as a potential candidate for magnetic hyperthermia. Synthesized material was characterized by powder X-ray diffraction (XRD) and Vibrating sample magnetometer (VSM) for structural and magnetic properties respectively. The XRD study revealed phase identification, crystal structure, and average crystallite size of the prepared sample. It confirms cubic spinel structure of $Fd3m$ space group and average crystallite size decreases from 18 nm to 12 nm with increasing the doping concentration of zinc. Vibrating sample magnetometer (VSM) analysis were indicated the superparamagnetic behavior of prepared material with substitution of zinc in manganese ferrite nanoparticles at room temperature. Induction heating system was used to carry out the magnetic hyperthermia study. The induction heating results shows a small amount (2 mg/mL) of nanoparticles can able to achieve temperature of 42°C for 267s and 563s respectively at 4.0 kA/m.

Topics

[Doping](#), [Ferromagnetic materials](#), [Magnetic equipment](#), [X-ray diffraction](#), [Electrodynamics](#), [Nanofluidics](#), [Nanoparticle](#), [Transition metals](#), [Co-precipitation](#), [Thermoregulation](#)

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