Preparation and Characterization of Manganese Ferrite Nanoparticles via Co-precipitation Method for Hyperthermia

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Abstract

In this work, Mn ferrite nanopowders were prepared by co-precipitation method and were characterized. Phase identification of the nanopowders was performed by X-ray diffraction method and the mean particle size of the nanopowders was calculated by Scherrer's formula, using necessary corrections. Magnetic parameters of the prepared nanopowders were measured by a vibrating sample magnetometer. A sensitive thermometer was used to measure the increase in temperature due to application of an alternating magnetic field on suspended magnetic nanopowders in water. Transmission electron microscope investigations showed that the particle size distribution was homogeneous and their size was in a good agreement with those obtained by Scherrer's formula. The results show that a single phase Mn ferrite can be obtained by co-precipitation method at 70 °C with a mean particle size of 5 nm and a 5 °C temperature increase is achievable in an AC magnetic field.