MAGNETIC HYPERTHERMIA OF MAGNETIC NANOPARTICLES DOPED WITH RARE EARTHS IN AQUEOUS MEDIUM

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Introduction: At present, the use of nanotechnology for biomedical applications has had an important development, specifically the use of magnetite at nanoscale, where the main challenge is to obtain particles with high crystallinity and low polydispersity in aqueous medium for biomedical applications. Aim: Optimize the transfer of rare earth co-doped magnetic nanoparticles to aqueous media through ligand exchange for applications in magnetic hyperthermia. Methods and materials: We studied the synthesis of rare earth co-doped magnetic nanoparticles. The synthesis was performed by thermal decomposition. Subsequently, the size of the MNPs synthesized using TEM, as well as their crystallinity using their XRD spectrum, and their magnetic properties were determined with a vibrating sample magnetometer. Finally the nanoparticles were transferred to aqueous medium through the binder exchange reaction using DMSA and DMSO. Results: Results showed that the maximum particle size obtained was 8 nm with superparamagnetic characteristics in aqueous medium having a temperature increase of 7 °C when these nanoparticles are subjected to an alternating magnetic field of 500 kHz. It should be noted that when the nanoparticles are doped, the increase was 10.3% greater with respect to magnetic nanoparticles without doping with rare earths. Conclusions: The transfer to aqueous medium was suitably carried out, because the nanoparticles showed a high colloidal stability and showed a high performance in magnetic hyperthermia.

Keywords: Magnetic nanoparticles, functionalization, biomedical applications

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