



PREPARATION, CHARACTERIZATION AND APPLICATION OF MAGNETIC NANOFLOWERS

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ABSTRACT

The colloid aqueous dispersion of superparamagnetic iron oxide nanoparticles (SPIONs) is very popular partly due to their potential theranostic application. Their favourable magnetic properties can be further improved by preparing flower-like structures. The MNFs were prepared both in an autoclave and in a round-bottom flask (either with or without continuous mixing) in organic solvent mixture. The results verified the crucial importance of some preparation conditions, such as the composition of the reaction solvent mixture, reaction time and rate of heating and cooling. Transmission electron microscopic images (TEM) of the nanoparticles revealed that as an effect of mixing, more fluffy structures with an average particle diameter of 18.3 ± 2.3 nm were obtained. As a stabilizing agent, based on earlier results, poly(acrylic acid-co-maleic acid) (PAM) was applied both during and after synthesis. The optimal amount of stabilizing polymer was confirmed by both zeta-potential and dynamic light scattering measurements. Magnetic hyperthermia measurements were carried out to confirm the possibility of application in cancer treatment, which also proved the increased effect of magnetic nanoflowers to spherical-shaped magnetic nanoparticles.

Keywords: magnetic nanoparticles, nanoflowers, hyperhermia

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