Nanocomposites and nanomaterials

Magnetic properties of iron oxide nanoparticles modified with silanes and their heating ability in alternating magnetic field

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Magnetic iron oxide NPs are thoroughly investigated for application as a magnetic phase of heat mediators in magnetic hyperthermia (MH) [1]. The first strategic objective in MH is to optimized its morpho-structural dependent magnetic properties, and functionalize they suitability with a view to asses' appropriate cytotoxicity and nanoparticle uptake by tumor tissue. Other promising direction is development of material which can be used simultaneously for diagnostic (MRI, CT, etc) and cancer therapy (MH) [2].

The aim of this work is to create the magnetic particles with optimal covering layer, with good biocompatibility and magnetic properties for obtaining the stable dispersion in non-polar media – medical preparation Lipiodol, for further application in magnetic hyperthermia. Magnetite nanoparticles with controlled particle size and hexadecyltrimethoxysilane (HDTMS) surface coatinghave been synthesized as a model system to investigate the colloidal stabilityand the effect of surface coating on the specific loss power (SLP) under exposure to low-power alternating magnetic field.

The obtained results show that (i) this method make it possible to modify the surface of magnetite nanoparticles with silanes without loss in magnetic properties and SLP values; (ii) the hydrophobic properties of the surface of the modified particles ensure the stability of their dispersion in oil-containing media with a strictly defined coating thickness.

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