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Review Article

Advanced applications of spinel ferrite nanoparticles in medicine: Magnetic hyperthermia, magnetic resonance imaging and targeted drug delivery

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Abstract

Spinel ferrites nanoparticles are among the most important magnetic materials and their applications in different areas have increased significantly in the last two decades. The idea of using ferrites nanoparticles in medical applications, caused attraction of attention of researchers in worldwide to this field and increase number of studies on the subject. The increase of the magnetic resonance imaging (MRI) contrast is one of the most important medical applications of spinel ferrite nanoparticles. The imaging results of live organisms show that the spinel ferrite nanoparticles can increase the contrast of images of cancerous cells and therefore help tumors diagnosis. Magnetic hyperthermia is another application of spinel ferrite nanoparticles, in which several factors affect the specific adsorption rate and efficiency of the method. However, this method has not yet been applied to human kind, and it is being studied in laboratories on animals like mouse etc. Targeted drug delivery is the third application of spinel ferrite nanoparticles in the field of medicine. This method is one of the most advanced treatment routes. In this method, several parameters must be considered to achieve the best results. Considering the importance of health and treatment, the main purpose of this review is to give the latest results of studies on the three mentioned methods on using the spinel ferrite nanoparticles for medical purposes.

keywords: magnetic nanoparticles, spinel ferrites, medical applications

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