عنوان مقاله:

Synthesis and study of structural and magnetic properties of superparamagnetic Fe3O4@SiO2 core/shell nanocomposite for biomedical applications

محل انتشار:

مجله علوم نانو, دوره 1, شماره 2 (سال: 1393)

تعداد صفحات اصل مقاله: 8

نویسندگان:

Mitra Helmi Rashid Farimani - *Department of Physics, Ferdowsi University of Mashhad, Mashhad, Iran | Nanoscience Center, Ferdowsi University of Mashhad, Mashhad, Iran*

Nasser Shahtahmassebi - *Department of Physics, Ferdowsi University of Mashhad, Mashhad, Iran | Nanoscience Center, Ferdowsi University of Mashhad, Mashhad, Iran*

Mahmoud Rezaee Roknabadi - *Department of Physics, Ferdowsi University of Mashhad, Mashhad, Iran | Nanoscience Center, Ferdowsi University of Mashhad, Mashhad, Iran*

Narges Ghows - *Department of Chemistry, Ferdowsi University of Mashhad, Mashhad, Iran*

خلاصه مقاله:

Objective(s): This paper describes coating of magnetite nanoparticles (MNPs) with amorphous silica shells. Materials and Methods: First, magnetite (Fe3O4) NPs were synthesized by co-precipitation method and then treated with stabilizer molecule of trisodium citrate to enhance their dispersibility. Afterwards, coating with silica was carried out via a sol-gel approach in which the electrostatically stabilized MNPs were used as seeds. The samples were characterized by means of X-ray diffraction (XRD), transmission electron microscopy (TEM), Fourier transform infrared (FT-IR) spectroscopy and vibrating sample magnetometer (VSM). Results: The results of XRD analysis implied that the prepared nanocomposite consists of two compounds of crystalline magnetite and amorphous silica that formation of their core/shell structure with the shell thickness of about 5 nm was confirmed by TEM images. The magnetic studies also indicated that produced Fe3O4@SiO2 core/shell nanocomposite exhibits superparamagnetic properties at room temperature. Conclusion: These core/shell structure due to having superparamagnetic property of .Fe3O4 and unique properties of SiO2, offers a high potential for many biomedical applications

کلمات کلیدی:

Magnetite, Silica, Core-shell structure, Superparamagnetism, Biomedical applications