

Jordan University of Science and Technology

Novel method for synthesis of Fe₃O₄@TiO₂ core/shell nanoparticles

Authors: Saud Khashan, Sawsan Dagher, Nacir Tit, Anas Alazzam, Ihab Obaidat

Abstract: A simple and efficient method has been developed to synthesize Fe₃O₄@TiO₂ nanoparticles (NPs). Firstly, magnetite (Fe₃O₄) NPs are prepared by co-precipitation method during which an additive coating with polyethylene glycol (PEG) is applied. Then, the core/shell structured NPs are achieved by including the surface coating of Fe₃O₄ NPs with a thin layer of titania (TiO₂), using modified sol-gel method. The NPs' size, structure, morphology, surface charge, thermal stability, optical and magnetic properties have been investigated by various characterization techniques. The results demonstrate the successful coating of the Fe₃O₄ NPs surfaces with TiO₂. Fe₃O₄@TiO₂ NPs have a spherical shape with an average size of 73 nm. The as-prepared Fe₃O₄@TiO₂ NPs exhibit UV wavelengths absorption and visible light emissions. Furthermore, they exhibit excellent magnetic properties suitable for magnetic separation and targeting. Being thermodynamically stable, the characteristics of the NPs can be explored in photonics and further applications like for instance environmental purifications