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Magnetic and optical properties of PEG and dextran coated magnetic nanoparticles

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The development of the synthesis of stable aqueous suspensions of superparamagnetic iron oxide nanoparticles stabilized with unmodified polyethylene glycol (PEG) at two molecular weights (4000 and 6000 Da) and dextran-40 has been reported. The obtained biocompatible polymer (PEG)m and dextran coated nanoparticle dispersive solution with pH ≈ 6.5 and solid phase content ranging from 0.02-0.75 % w/v has been investigated for optical and magnetic properties. Biomedical application requires the biocompatible superparamagnetic iron oxide nanoparticles (SPION), which are stable and well dispersed in water at physiological pH or in physiological salinity. Biocompatible 10-20 nm sized SPIONs have been synthesized via co-precipitation method in the vacuum environment. These SPIONs have been modified with PEG and dextran in one-pot synthesis. Vibrating Sample Magnetometer (VSM) studies show the effect of phase transformations on the magnetic properties of the nanoparticles and surfactant influence on the characteristic of the magnetization at room temperatures into high and low magnetic fields.

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One step prepared albumin mineralized optical/MRI/CT trimodal probe for *in vivo* tumor targeted imaging

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Multiple model imaging is often employed to complement each other for obtaining more overall information in disease diagnosis. However, the multiple model imaging reagent based on ultra-small nanoparticles which could be fast cleared, still are rarely reported. Hence, we developed the optical/CT (computed tomography)/MR (magnetic resonance) triple modal probe using biomineralization method with BSA as a template. In this research, the optimized synthesis conditions, the chemical and physical properties of the as-prepared nanoparticles were investigated; the biocompatibility and tissue distributions of the nanoparticles were also investigated. The result showed that the as-prepared AuGd nanoparticles (NCs) showed ultra-small size, good biocompatibility and it was predominantly cleared by renal clearance. The optical/CT/MR imaging investigation indicated that the nanoparticles showed good optical, CT and MR imaging abilities. Through conjugating the AuGd NCs with vitamin M (FA), we also achieved the targeted tumor optical/CT/MR imaging *in vivo*, and the nanoparticles did not induce potential toxicity *in vivo*.

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