

Single Step Synthesis Of Multimodal Magneto-fluorescent Core-shell Superparamagnetic

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Inventors: Dr. Jaspreet Kaur Randhawa, Ahish Tiwari, Dr. Chayan Kant Nandi, Anup Singh

ABSTRACT

Present invention relates to single step synthesis of fluorescent carbon coated core-shell SPIONs and fluorescent carbon nanodots and insitu tunability of their magneto-optical properties hitherto, by varying the amount of oxidizing agent during the synthesis; such that shell-thickness-controlled carbon coated SPIONs maybe synthesized. Moreover it discloses a composition comprising of the said two products - fluorescent carbon coated core shell SPIONs and fluorescent carbon nanodots together wherein the said synergistically integrated nanomaterials have applications such as multimodal cancer cell imaging.

KEY APPLICATION AREAS

- 1.Cancer theranostics (combined diagnosis and therapy).
- 2.Multimodal biomedical imaging.
- 3.Nanomedicine and targeted drug delivery.
- 4.Magnetic hyperthermia for cancer treatment
- 5.Biomedical diagnostics and biosensing.
- 6.Fluorescence-based cell imaging and tracking.

POTENTIAL USE

- 1.Dual-mode imaging: Simultaneous MRI and optical fluorescence imaging using a single nanoparticle.
- 2.Targeted cancer imaging: Imaging and detection of cancer cells with enhanced specificity.
- 3.Targeted drug delivery: Nanocarrier for controlled delivery and release of therapeutic molecules.

4. Magnetic hyperthermia: Heat-based cancer therapy using magnetic nanoparticles.
5. Single-particle fluorescence imaging and tracking: Real-time monitoring of nanoparticle behavior in biological systems.
6. Magnetically guided therapies: Remote magnetic manipulation for imaging and therapy.
7. Optical biosensing: Fluorescent carbon nanodots (FCNDs) for biomarker detection and biosensors.