

# Nanosized magnetofluorescent Fe<sub>3</sub>O<sub>4</sub>-curcumin conjugate for multimodal monitoring and drug targeting

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**Abstract:** Magnetic drug targeting, the targeting of a drug conjugated with a magnetic material under the action of external magnetic field constitutes an important drug delivery system. This paper describes the strategy to design a multifunctional, nanosized magnetofluorescent water-dispersible Fe<sub>3</sub>O<sub>4</sub>-curcumin conjugate and its multiple ability to label, target and treat the tumor cells. The conjugate possesses magnetic nano Fe<sub>3</sub>O<sub>4</sub> core, chitosan (CS) or oleic acid (OL) as outer shell and entrapped curcumin (Cur), serving dual function of naturally autofluorescent dye as well as anti-tumor model drug, delivered to the cells with the help of macrophage (Cur possesses anti-oxidant, anti-inflammatory and anti-tumor ability). Fe<sub>3</sub>O<sub>4</sub>-Cur conjugate exhibited a high loading cellular uptake which was clearly visualized dually by Fluorescence Microscope, Laser scanning confocal microscope (LSCM) as well as magnetization measurement (Physical properties measurement systems, PPMS). Preliminary magnetic resonance imaging (MRI) study also showed a clear contrast enhancement by using Fe<sub>3</sub>O<sub>4</sub>-Cur conjugate. © 2010 Elsevier B.V.

**Author Keywords:** Chitosan (CS); Curcumin (Cur); Laser scanning confocal microscope (LSCM); Macrophages; Magnetofluorescent Fe<sub>3</sub>O<sub>4</sub>; Oleic acid (OL); Physical properties measurement systems (PPMS)

**Index Keywords:** Anti-inflammatories; Anti-oxidants; Anti-tumors; Cellular uptake; Contrast Enhancement; Curcumin; Drug delivery system; Drug-targeting; Dual function; External magnetic field; Fluorescence microscopes; High loadings; Laser scanning confocal microscope (LSCM); Laser scanning confocal microscopes; Magnetic drug targeting; Magnetization measurements; Magnetofluorescent FeO; Multimodal; Nano-Fe; Nano-sized; Outer shells; Physical properties measurement systems (PPMS); Physical-properties measurement systems; Tumor cells; Water dispersible; Chitin; Chitosan; Drug delivery; Laser applications; Macrophages; Magnetic fields; Magnetic materials; Measurements; Microscopes; Oleic acid; Physical properties; Resonance; Scanning; Tumors; Magnetic resonance imaging; chitosan; curcumin; fluorescent dye; magnetic nanoparticle; magnetite; magnetite curcumin; oleic acid; unclassified drug; water; animal cell; animal experiment; animal model; article; autofluorescence; cell labeling; confocal laser microscopy; contrast enhancement; controlled study; dispersion; drug conjugation; drug delivery system; drug targeting; drug transport; fluorescence microscopy; macrophage; magnetism; monocyte; mouse; nonhuman; nuclear magnetic resonance imaging; particle size; phagocytosis; priority journal; target cell; tumor cell

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