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Preparation of core-shell Magnetic Nano-upconversion Materials and Its Targeting
Effect

Na Li^a, Yue Zhao^a, Chao Cheng^b, Yuxiang Yang^{a*}, Hongming Yuan^c and
Riccardo Carlini^{d*}

^a*School of Chemistry and Molecular Engineering, East China University of Science & Technology,
Shanghai 200237, China*

^b*Department of Nuclear Medicine, Changhai Hospital, The Second Military Medical University,
Shanghai 200237, China*

^c*State Key Laboratory of Inorganic Synthesis and Preparative Chemistry, Jilin University,
Changchun 130012, China*

^d*Chemistry and Industrial Chemistry Department, Genoa University, 16146 Genoa, Italy;*

**Corresponding author: yxyang@ecust.edu.cn, riccardo.carlini@unige.it*

Abstract

In this paper, magnetic upconversion $\text{Fe}_3\text{O}_4@\text{SiO}_2@\text{NaGdF}_4:\text{Yb,Er}$ (UCP) composite particles were prepared by $\text{Fe}_3\text{O}_4@\text{SiO}_2\text{-NH}_2$ nanoparticles reacting with $\text{NaGdF}_4:\text{Yb,Er}$ modified by α -bromoisobutyric acid for the first time. The products were characterized by transmission electron microscopy (TEM), X-ray diffraction (XRD), EDS and fluorescence spectrum. The results show that UCP composite nanoparticles have upconversion fluorescence emission peaks as $\text{NaGdF}_4:\text{Yb,Er}$ but weaker emission intensity. In contrast to $\text{NaGdF}_4:\text{Yb,Er}@\text{Fe}_3\text{O}_4$ particles, UCP composite nanoparticles have better fluorescence luminescence properties, but poor magnetic properties. Biological distribution and magnetic nano-uptake of radioactive in mouse show nanomagnetic UCP particles loaded with drugs can be accumulated in the tumor site of spleen and pancreas by magnetic controlled targeting, in order to achieve drug magnetic targeted therapy.

Keywords: magnetic nanoparticles, up-conversion, fluorescence, targeting.

Highlights:

$\text{NaGdF}_4:\text{Yb,Er}$ particles prepared by solvothermal method

Fe_3O_4 nanoparticles coated to generate the $\text{NaGdF}_4:\text{Yb,Er}@\text{Fe}_3\text{O}_4$

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