

THIRD HARMONIC GENERATION ANGIOGRAPHY WITH α -FeOOH NANOPARTICLE

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Abstract

Emerging advances in iron oxide nanoparticles exploit their high magnetization for various applications, such as catalysis, bioseparation, hyperthermia, and magnetic resonance imaging (MRI). In contrast to the excellent magnetic performance, their photoluminescence have not been thoroughly explored, thus limiting their development as a tool in photomedicine. In this work, we develop a seed/growth-inspired synthesis combined with primary mineralization and a ligand-assisted secondary growth strategy to prepare mesostructured α -FeOOH nanorods (NRs). Because α -FeOOH rods are all iron-based composites, they exhibit low cytotoxicity towards cells. Surprisingly, these mesoporous α -FeOOH mesostructures display strong third harmonic generation (THG) signals under near-infrared excited wavelength at 1230 nm. They exhibited a much stronger THG intensity compared to naked α -FeOOH NRs. Using these unique nonlinear optical properties, we demonstrate that α -FeOOH rods can serve as contrast agents in THG microscopy for the cell tracking as well as angiography in vivo. Vessel walls can be revealed after the clearance of particles. Our results provide a new strategy of material synthesis for obtaining high THG imaging contrast.