

Self-assembled fluorescent magnetic nanoprobe for multimode-biomedical Imaging

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We fabricated multimode nanoprobe for acquisition of biological information at different object levels, i.e., in vivo detection and ex vivo validation for characterizing tumor angiogenesis. Fluorescent magnetic nanoprobe (FMNP) were synthesized by using amphiphilic pyrenyl polyethylene glycol (Py-PEG) and superparamagnetic MnFe₂O₄ magnetic nanocrystals (MNCs). Py-PEG, which is synthesized by conjugation of hydrophilic PEG with hydrophobic and fluorescent 1-pyrenebutyric acid through an esterification process, is capable of self-assembly and maintaining a high UV fluorescent intensity in aqueous phase. Py-PEG can be used as a fluorescent surfactant that simultaneously and efficiently encapsulates MNCs to exhibit fluorescent and magnetic properties as well as maintaining high water-solubility. Consequently, we proved that our biologically non-toxic FMNPs were prominent multimode imaging probes by showing not only excellent MR sensitivity but also high illumination intensity with strong signal strength under short exposure time of UV light from the extensive imaging studies of in vitro/vivo and ex vivo using orthotopic and xenograft mice models.