

A Robust Scaffold for Multimodality Using a Plasmonic Gold Core and a Mesoporous Fe₃O₄ Shell

Aastha Kukreja, 강병훈, 김현욱, 장은지, 손혜영¹, 박광열¹,
허용민¹, 함승주[†]
연세대학교; ¹연세대학교 의과대학
(haam@yonsei.ac.kr[†])

Multifunctional nano-systems are an enticing approach towards designing nanoparticles with desired characteristics, which emerge from interaction between various components of the system. Nano-particle based multi-modal contrast agents can offer various complementary properties, and hence, can be detected by several in vivo imaging techniques. CT and MR image acquisition and registration are foremost step in radiation therapy planning. These provide valuable information in target definition and determination of radiation dosage. In this study, we have demonstrated a one-pot approach for the synthesis of Au core/ porous-Fe₃O₄ shell nanoparticles (AuFe NPs) for MR/CT dual imaging, loaded with doxorubicin (Dox). The particle surface was coated with polyethylene glycol and matrix metalloproteinase (MMP) peptide for targeting. The gold core provides a strong X-ray absorption and the Fe₃O₄ shell enables the MR imaging. The drug loading capacity of the porous iron oxide nanoshell was also demonstrated and a surface quenching effect of the gold nanoparticles is proposed and correlated with the release of Dox from the porous core/shell system.