Supporting Information

Multifunctional Metal Rattle-type Nanocarriers for MRI-guided Photothermal Cancer Therapy

Yuran Huang^{†, +}, Tuo Wei[†], Jing Yu[†], Yanglong Hou[†], Kaiyong Cai^{+}, Xing-Jie Liang^{†*}*

[†] CAS Key Laboratory for Biological Effects of Nanomaterials & Nanosafety, National Center for Nanoscience and Technology, 11Beiyitiao, Zhongguancun, Beijing, 100190 (China)

⁺ Key Laboratory of Biorheological Science and Technology, Ministry of Education, College of Bioengineering, Chongqing University, 174 Shazhengjie, Shapingba, Chongqing, 400031 (China)

[†] Department of Advanced Materials and Nanotechnology, College of Engineering, Peking University, Beijing.

Address correspondence to: liangxj@nanoctr.cn; kaiyong_cai@cqu.edu.cn

Fe Concentration (mg/ml)	2	4	8
Number of Fe ₃ O ₄ NPs	1-3	6-10	>20
TEM Images

Figure S1. Table of Fe₃O₄@T-Si nanocomposites with different iron concentration during synthesis.

Figure S2. a₁-a₂) TEM images for Fe₃O₄@SiO₂ nanocomposites without co-condense of TSD; b₁-b₂) TEM images for Fe₃O₄@T-Si nanocomposites; c) FT-IR result for mesoporous silica nanoparticles (MSN), Fe₃O₄@SiO₂ nanocomposites and Fe₃O₄@T-Si nanocomposites.

	$\text{Fe}_3\text{O}_4@\text{T-Si}$	$\text{Fe}_3\text{O}_4@\text{T-Si}@\text{AuSeeds}$	$\text{Fe}_3\text{O}_4@\text{T-Si}@\text{AuShells}$	MNRs
Average Size (nm)	120.47	122.38	151.47	151.64
ζ -potential(mV)	+33.4	+7.79	-8.14	-6.79

Table S1. Size and ζ -potential changes of nanostructures in different steps to synthesize MNRs.

Figure S3. SEM images of MNRs and its magnification.

Figure S4. EDS profiles of Fe₃O₄@T-Si@AuShell nanocomposites and MNRs.

Figure S5. a) Temperature rise of MNRs in different time points under laser irradiation;
b) Temperature rise of MNRs with different concentration in aqueous solution.