

Supporting information

Ultrasmall superparamagnetic iron oxide nanoparticles for enhanced tumor penetration

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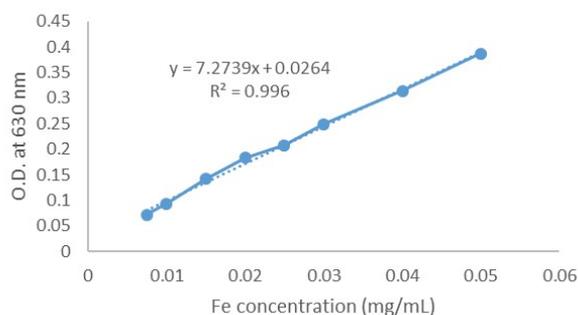


Figure S1. Standard curve of iron in 6M HCL via Prussian blue reaction.

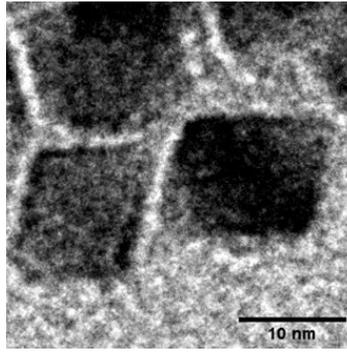


Figure S2. TEM image of typical octahedral 15 nm Fe_3O_4 -OA nanoparticles. Scale bar, 10 nm.

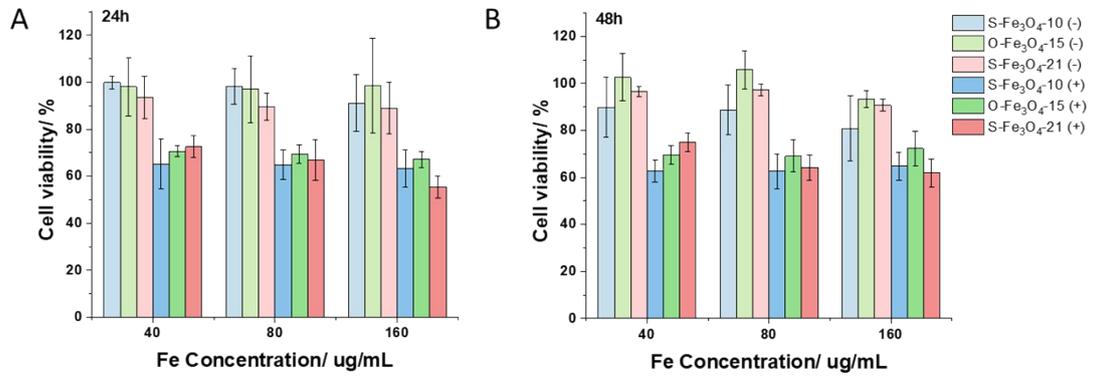


Figure S3. The cell viability of MCF-7 monolayer cells after treatment with different types of Fe_3O_4 nanoparticles at (A) 24 h and (B) 48 h. (Mean values \pm standard deviation, $n=5$).

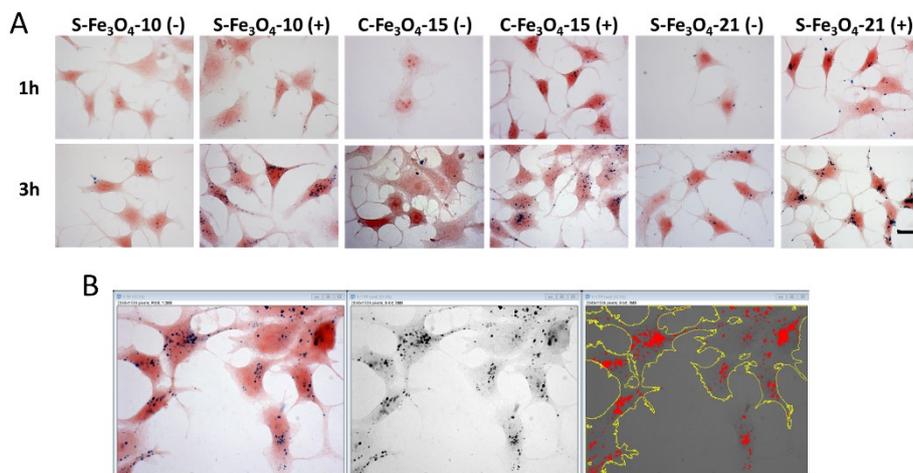


Figure S4. (A) Distribution of different types of nanoparticles in MCF-7 cells for incubation times of 1 h and 3 h. The cells were observed by an objective lens of 63X. Scale bar, 30 μm . (B) Pictures illustrated the process of calculating the relative area of the Fe_3O_4 nanoparticles to cells in ImageJ. The yellow lines indicate the cellular areas and the red dots indicate the accumulation of Fe_3O_4 nanoparticles.

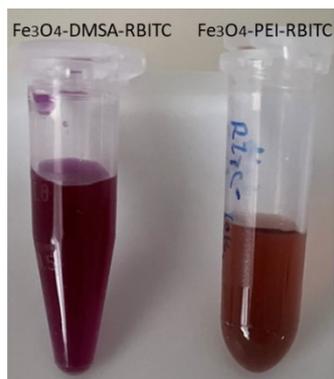


Figure S5. Picture displaying the Fe_3O_4 -DMSA nanoparticles possessing higher dye loading efficiency than Fe_3O_4 -PEI nanoparticles, showing deeper purple colour when the iron concentrations of the two types of nanoparticles are the same.

Table S1. Characterization of six types of Fe_3O_4 nanoparticles with different sizes, shapes and surface charges.

Sample name	Dynamic light scattering		Zeta potential (mV) (n=3)
	Size (Number mean, nm) (n=3)	Polydispersity index (PDI) (n=3)	
S- Fe_3O_4 -10 (-)	12.9 ± 2.6	0.321 ± 0.02	-49 ± 2.3
O- Fe_3O_4 -15 (-)	14.4 ± 0.2	0.42 ± 0.01	-30.8 ± 2.3
S- Fe_3O_4 -21 (-)	23 ± 5.2	0.487 ± 0.007	-37 ± 1.4
S- Fe_3O_4 -10 (+)	59.5 ± 1.7	0.209 ± 0.01	34.8 ± 0.6
O- Fe_3O_4 -15 (+)	122 ± 14.8	0.179 ± 0.02	22.7 ± 2.6
S- Fe_3O_4 -21 (+)	306.8 ± 8.1	0.594 ± 0.02	30.5 ± 0.2