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Electronic Supplementary Information

Enhenced UV stability of *N*-halamine-immobilized Fe_3O_4@SiO_2@TiO_2 nanoparticles: synthesis, characteristics and antibacterial property

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§1. Characterization of $Fe_3O_4@SiO_2$ with different amounts of tetrabutyl titanate

Under the same preparation conditions, the amount of TiO_2 hydrolyzed to the surface of $Fe_3O_4@SiO_2$ was various with different doses of tetrabutyl titanate (TBOT) which directly led to different shell thickness of TiO_2. Fig. 1S was the SEM (left) and TEM (right) pictures of *N*-halamine-modified $Fe_3O_4@SiO_2@TiO_2$ nanoparticles that the dosage of TBOT is 0.2 mL, 0.4 mL and 0.6 mL, respectively. As shown in Fig. 1S-a1 and a2, the TiO_2 particles on the surface of SiO_2 were maldistribution and even could not completely cover the SiO_2 layer, which may be due to the low dose of TBOT. Fig. 1S-c1 and c2 were SEM and TEM of F@S@T-0.6 samples. The stacking gap between the TiO_2 nanoparticles was slightly larger, and there were extra single TiO_2 particles outside the sample, and there was a certain agglomeration phenomenon between the F@S@T-0.6 particles, which may be caused by the excessive dose of TBOT. From the SEM and TEM images of F@S@T-0.4 in Fig. 1S-b1 and b2, it was observed that the TiO_2 particles of F@S@T-0.4 were different from the other two, which were dense and the particle distribution is more uniform.

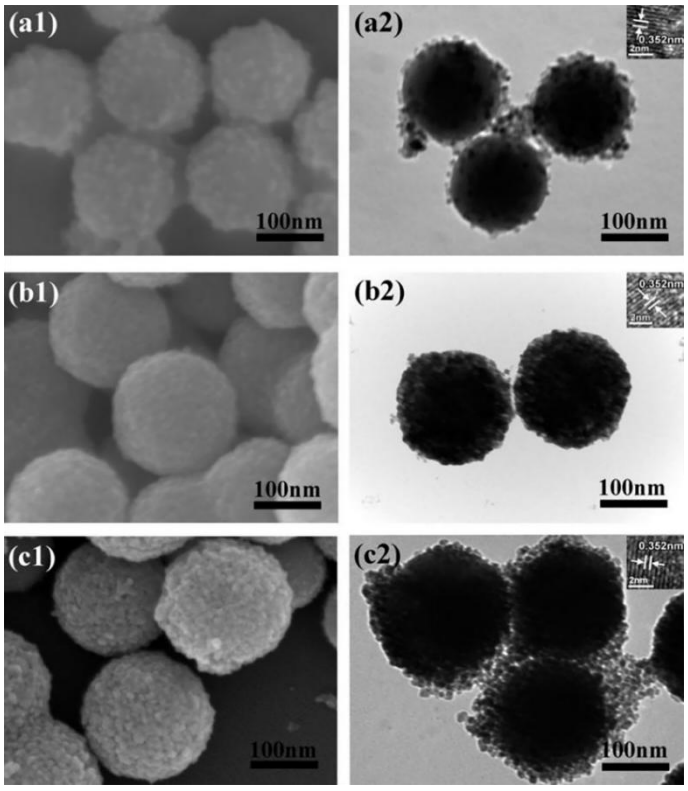

Fig 1S. SEM (left) and TEM (right) pictures of (a1 and a2) F@S@T- 0.2, (b1 and b2) F@S@T-0.4 and (c1 and c2) F@S@T-0.6, illustrated with corresponding sample TiO_2 shell HTEM pictures.

The XRD of *N*-halamine-modified Fe_3O_4@SiO_2@TiO_2 nanoparticles with different doses of TBOT is shown in Fig 2S.

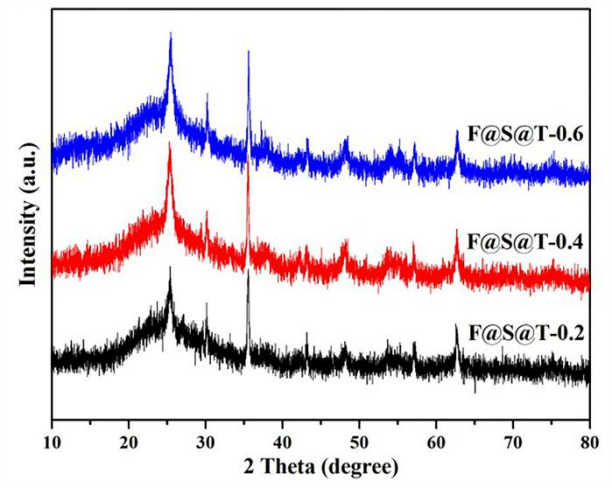

Fig 2S. XRD of Fe_3O_4@SiO_2 with different amounts of TBOT

§2. MIC and MBC of *N*-halamine-immobilized Fe_3O_4@SiO_2@TiO_2

Table 1S. MIC of Fe_3O_4@SiO_2@TiO_2 and *N*-halamine-immobilized Fe_3O_4@SiO_2@TiO_2 nanoparticles

Bacteria	MIC（mg/mL）	MBC（mg/mL）
	F@S@T-Cl	F@S@T-Cl
S.aureus	0.256	0.520
E.coil	0.510	0.725