Supporting Information for

Enhancement of hydroxyl radical generation of solid state photo-Fenton reagent based on magnetite/carboxylate-rich carbon composites by embedding carbon nanotubes as electron transfer channel

Tingting Han, Lingling Qu, Zhijun Luo, Xiangyang Wu and Daoxiao Zhang

a School of Chemistry and Chemical Engineering, Jiangsu University, Zhenjiang, 212013, P. R. China;
b School of The Environment, Jiangsu University, Zhenjiang, 212013 P. R. China;
Corresponding author. Tel.: +86 511 88790955
E-mail address: lzj@ujs.edu.cn
Experimental Section:

Preparation of magnetite/carboxylate-rich carbon particles (MCRCPs)

FeCl$_3$ (0.5 g) and sodium gluconate (3 g), and PVP (1.0 g) were dissolved in 60 mL deionized water, and then transferred into a Teflon-lined stainless-steel autoclave with a capacity of 100 mL. The autoclave was sealed and heated at 180 °C for 24 h. After cooling down to room temperature, the black products were washed several times with deionized water and absolute ethanol. Finally, the washed precipitation was dried in vacuum oven at 60 °C for 24 h.

Preparation of magnetite/CNTs composites

CNTs (0.1 g) and Fe(acac)$_3$ (0.2 g) were added to a solvent mixture of ethylene glycol (20 mL). The suspension was poured into 50 mL stainless steel autoclave and sealed after the suspension bubbled with N$_2$. And then the autoclave was heated at 180 °C for 24 h. After cooling down to room temperature, the black products were washed several times with deionized water and absolute ethanol. Finally, the washed precipitation was dried in vacuum oven at 60 °C for 24 h.

Preparation of Fe$_3$O$_4$ nanoparticles

FeCl$_3$.6H$_2$O (2.43 g) and FeSO$_4$.7H$_2$O (1.67 g) were dissolved in 50 mL deionized water under nitrogen gas with vigorous stirring at 80 °C. Then 2 M NaOH aqueous solutions were rapidly added into the solution until the pH of the solution was adjusted to 10. After heating, the black suspension was cooled to room temperature naturally. The black products were washed several times with deionized water and absolute ethanol. Finally, the washed precipitation was dried in vacuum oven at 60 °C for 12 h.
Results and discussion

Fig. S1. (a) Low magnification SEM image of the MCRCPs, (b) high magnification SEM image of the surface of MCRCPs,

Fig. S2. TEM of the magnetite/CNTs

Fig. S3. The effect of pH on MB degradation using MCRCPs/CNTs as catalyst.
Fig. S4. the XRD pattern (left) and TEM image (right) of the Fe$_3$O$_4$ nanoparticles

Fig. S5. UV-Vis absorption spectra of Fe$_3$O$_4$ nanoparticles, MCRCSs, and MCRCPs/CNT

Fig. S6. The methylene blue adsorption capacities of MCRCSs and MCRCPs/CNTs