Supporting Information

Hydrothermal synthesis of hierarchical core-shell manganese oxide nanocomposites as efficient dye adsorbents for wastewater treatment

Wei Wang,[a,b] Tifeng Jiao,*[a,b,c] Qingrui Zhang,*[b] Xiaona Luo,[b] Jie Hu,[b] Yan Chen,[b] Qiuming Peng,[a] Xuehai Yan[c] and Bingbing Li*[d]

[a] *State Key Laboratory of Metastable Materials Science and Technology, Yanshan University, Qinhuangdao 066004, P. R. China. E-mail: tfjiao@ysu.edu.cn*

[b] *Hebei Key Laboratory of Applied Chemistry, School of Environmental and Chemical Engineering, Yanshan University, Qinhuangdao 066004, P. R. China. E-mail: zhangqr@ysu.edu.cn*

[c] *National Key Laboratory of Biochemical Engineering, Institute of Process Engineering, Chinese Academy of Sciences, Beijing 100190, P. R. China.*

[d] *Department of Chemistry and Biochemistry, Science of Advanced Materials Doctoral Program, Central Michigan University, Mount Pleasant, MI 48859, USA. E-mail: li3b@cmich.edu*

Table S1. Physical properties deduced from N_2 adsorption at 77 K of as-prepared nanocomposites samples.

Samples	BET Surface area (m^2/g)	Average pore volume (cm^3/g)	Average pore diameter (nm)
MnO_2	40.5	0.154	15.215
Fe_3O_4@MnO_2 at 3h	60.3	0.148	12.438
Fe_3O_4@MnO_2 at 6h	72.5	0.143	7.878
Fe_3O_4@MnO_2 at 9h	63.2	0.151	13.254
Fe_3O_4@MnO_2 at 15h	59.6	0.146	13.461
Fe_2O_3@MnO_2 at 6h	52.2	0.118	14.716

Table S2. Kinetic parameters for MB and RhB absorptions onto different nanocomposites at 298 K (experimental data from Fig. 6).

MB	Pseudo-first-order model			Pseudo-second-order model		
	q_e (mg/g)	R^2	K_1 (x 10^2) (min^{-1})	q_e (mg/g)	R^2	K_2 (x 10^2) (g/min·h)
Fe_3O_4/MnO_2	9.24	0.946	32.2	9.71	0.999	6.97
Fe_2O_3/MnO_2	8.87	0.944	26.4	9.70	0.996	3.69
MnO_2	7.90	0.972	2.98	9.36	0.975	0.411
RhB	Pseudo-first-order model			Pseudo-second-order model		
	q_e (mg/g)	R^2	K_1 (x 10^2) (min^{-1})	q_e (mg/g)	R^2	K_2 (x 10^2) (g/min·h)
Fe_3O_4/MnO_2	1.69	0.947	2.36	2.05	0.988	1.31
Fe_2O_3/MnO_2	1.55	0.963	2.26	1.86	0.991	1.42
MnO_2	1.48	0.980	1.35	1.85	0.977	0.788