Electronic Supplementary Information (ESI) for
Fabrication of Fe_3O_4@reduced graphene oxide composite via novel colloid electrostatic self-assembly process for removal of contaminants from water

Jie Ding,[a] *Baojun Li,*[a] *Yushan Liu,*[*,a] *Xiaoshe Yan,*[a] *Sha Zeng,*[a] *Xudong Zhang,*[a] *Lifen Hou,*[a] *Qiang Cai,*[b] *Jianmin Zhang*[*,a]

[a] College of Chemistry and Molecular Engineering, Zhengzhou University, 100 Science Road, Zhengzhou 450001, P R China

[b] Key Laboratory for Advanced Materials of Ministry of Education and College of Materials Science and Engineering, Tsinghua University, Beijing 100084, PR China

*Corresponding author. E-mail: liuyushan@zzu.edu.cn and zhjm@zzu.edu.cn

Synthesis of $Fe(OH)_3$ colloid and GO:

GO was synthesized by using the following modified Hummer's method [S1]. Typically, graphite (2 g) was mixed with concentrated H_2SO_4 (69 mL) and the mixture was stirred for 30 min within an ice bath. $KMnO_4$ (8 g) was added very slowly into the dark suspension and the reaction mixture was stirred and sonicated for another 15 min under a reaction temperature of 20 °C. Then the ice bath was removed, and the mixture was stirred at 35 °C overnight. Distilled water was added to the pasty solution under magnetic stirring and the color of the solution turned to yellowish brown. After another 2 h of vigorous stirring, H_2O_2 (30wt %, 25 mL) was added and the color turned golden yellow immediately. The mixture was washed with HCl (5 %) for several times and then deionized water until the solution became acid free. The reaction mixture was filtered and dried under vacuum at 65 °C. The GO was obtained as a gray powder and used for the further experiments.

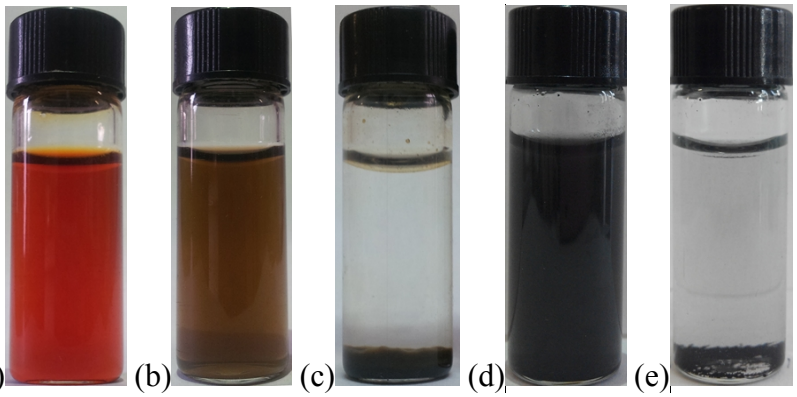
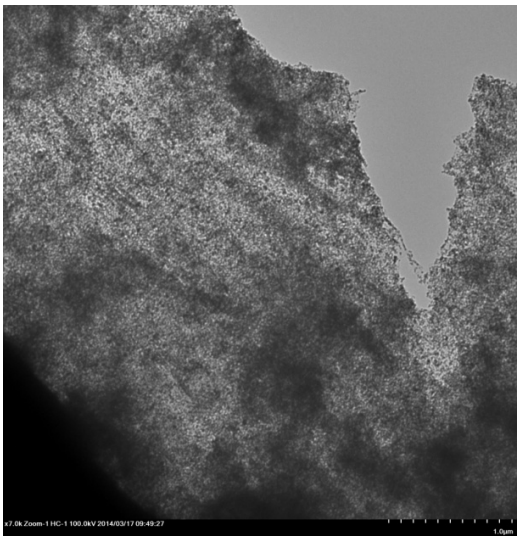
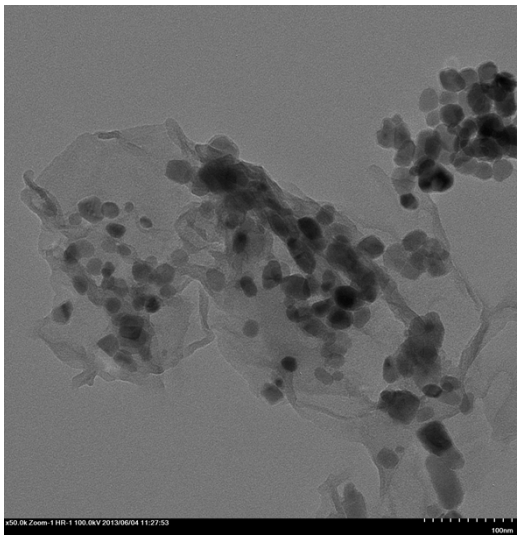


Figure S1. Photograph of (a) $Fe(OH)_3$ colloid solution, (b) GO suspension, (c) $Fe(OH)_3$/GO

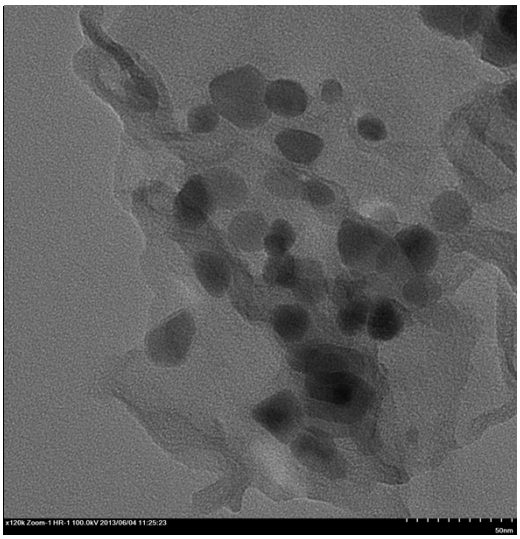
composite, (d) suspension of FGNC in water, (e) sedimentation of FGNC at bottom.



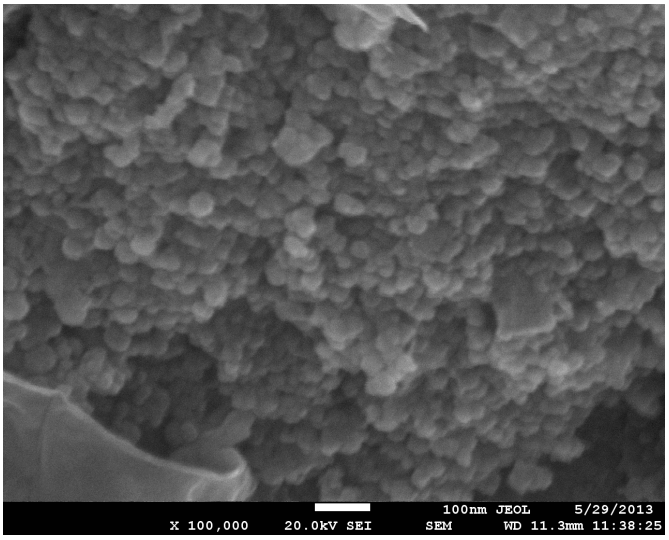
(a)



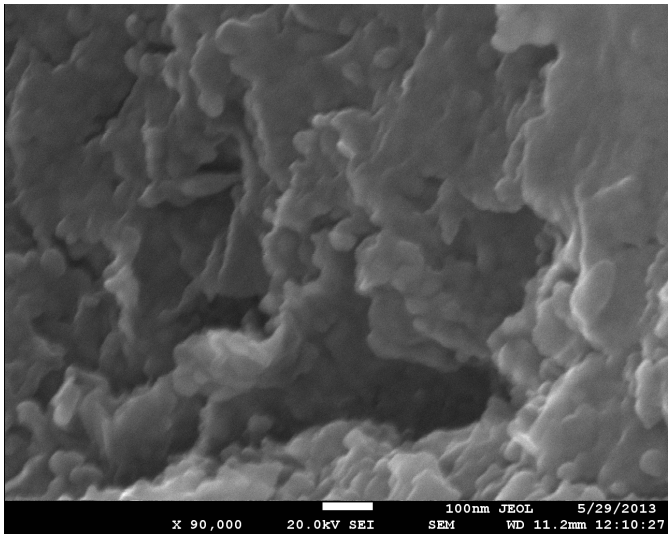
(b)



(c)



(d)



(e)

Figure S2. (a) TEM images of $Fe(OH)_3$ colloid/GO composite, (b, c) TEM image of FGNC, and (d, e) SEM images of FGNC.

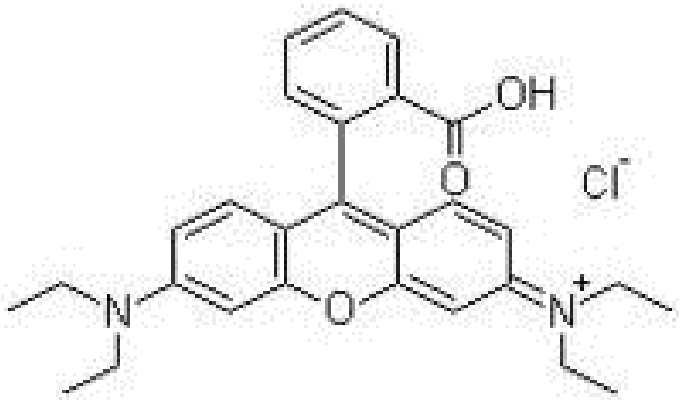


Figure S3. The molecule structure of RhB.

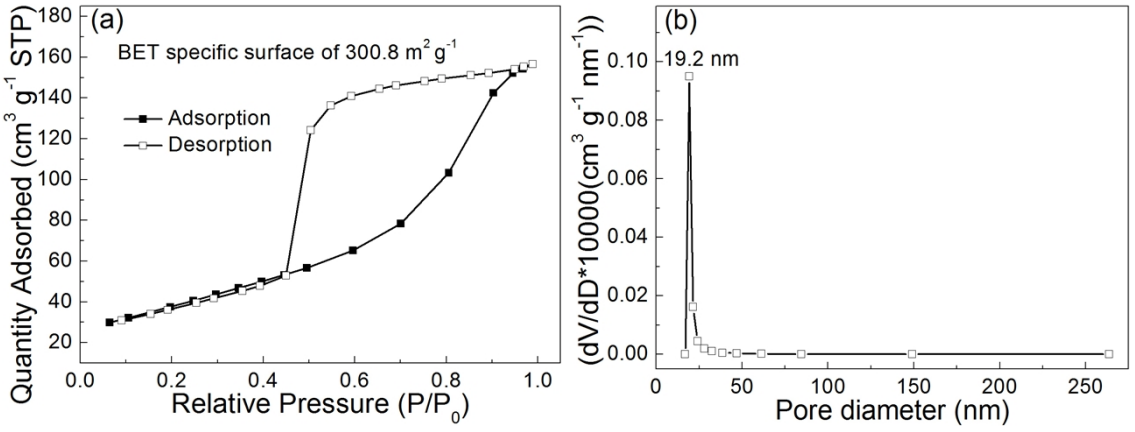


Figure S4. （a）Nitrogen adsorption desorption isotherms at 77K. and （b） pore width distribution of FGNC.

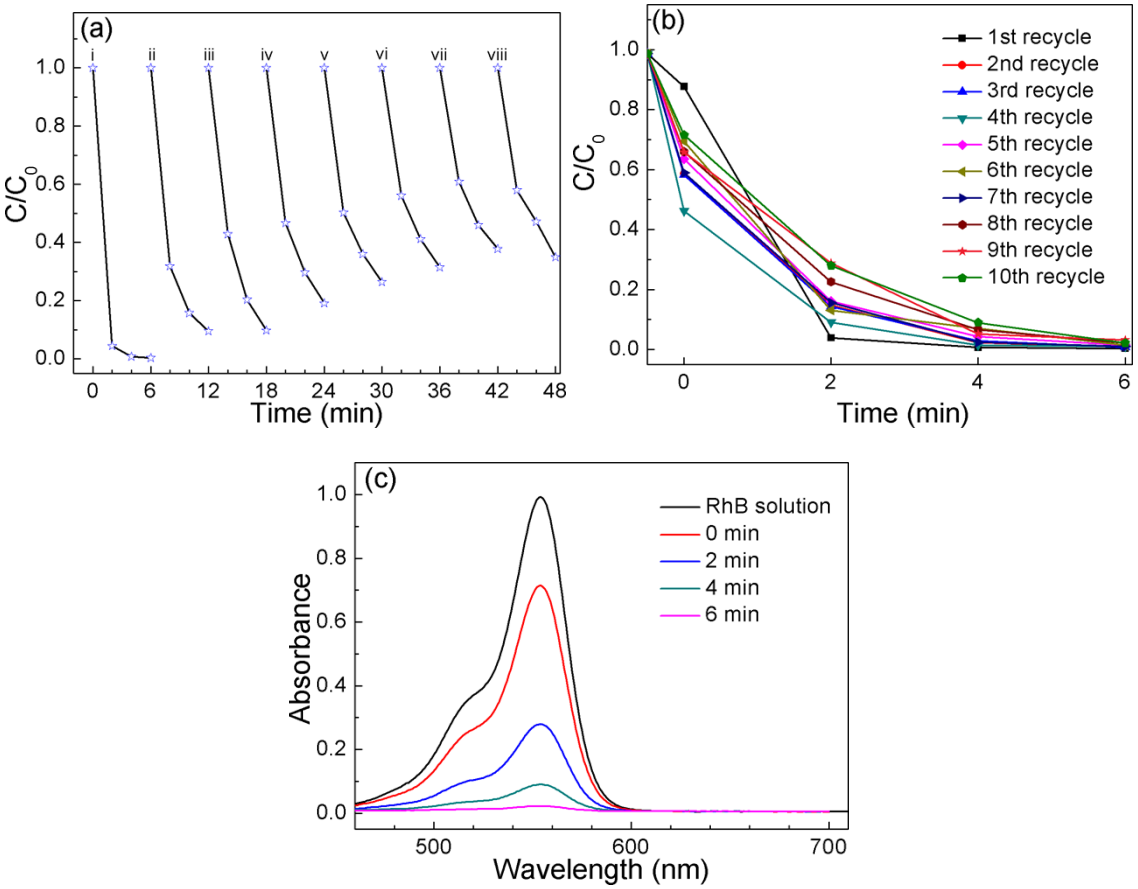


Figure S5. (a) FGNC in various cycles, i: 1st, ii: 2nd, iii: 3rd, iv: 4th, v: 5th, vi: 6th, vii: 7th cycle, viii 8th cycle; (b) FGNC in first cycle of 10 times regeneration; (c) UV-vis spectra of the original RhB solution (1.0×10^{-5} M, 20 mL) and those after treatment with FGNC (50 mg) in different time of first recycle of 10th regeneration.

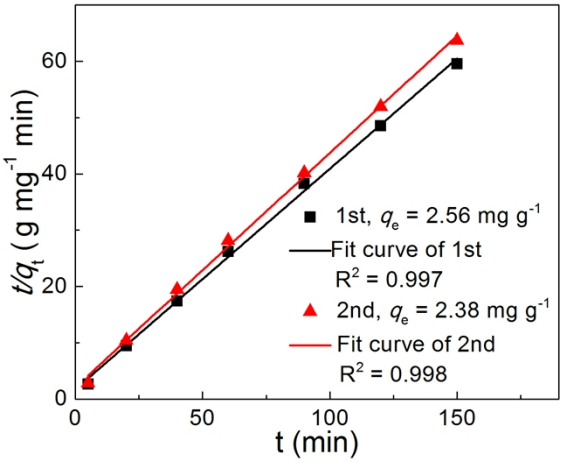


Figure S6. Pseudo-second-order kinetic plot for the adsorption of As(V) (5 mg/L) of 1st regeneration recycle and 2nd regeneration recycle.

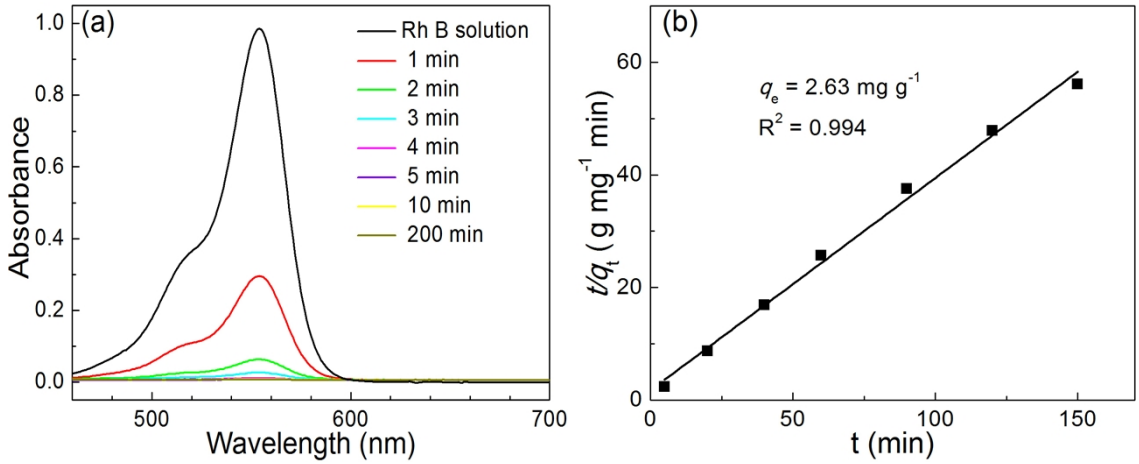


Figure S7. (a) UV-vis spectra of the original RhB solution (1.0×10^{-5} M, 20 mL) and those after treatment with FGNC (50 mg) in different time of binary system (rhodamine B + arsenic ions) from aqueous solution, (b) pseudo-second-order kinetic plot for the adsorption of As(V) in different time of binary system (rhodamine B + arsenic ions) from aqueous solution.

Table S1. Equilibrium Adsorption Isotherm Fitting Parameters for As(V) onto FGNC

FGNC		
As(V) Langmuir isotherm	q_m(mg g^{-1})	3.36
	K_L(L/mg)	1.17
	R^2	0.984
As(V) Freundlich isotherm	n	3.40
	K_F($mg^{1-(1/n)}$ $L^{1/n}$ g^{-1})	1.79
	R^2	0.982

Table S2. Parameters of a Pseudo-second-order Kinetic Model Fitting Arsenic Adsorption Kinetics**.**

Sorbent	isotherm constant	As(V)
FGNC	q_e	2.60
	k_2	0.068
	V_0	0.46
	R^2	0.997

References

S1. W. S. Hummers and R. E. Offeman, *J. Am. Chem. Soc.*, 1958, **80**, 1339–1339.