Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information

Facile synthesis of thiazole-functionalized magnetic microspheres for highly specific separation of heme proteins

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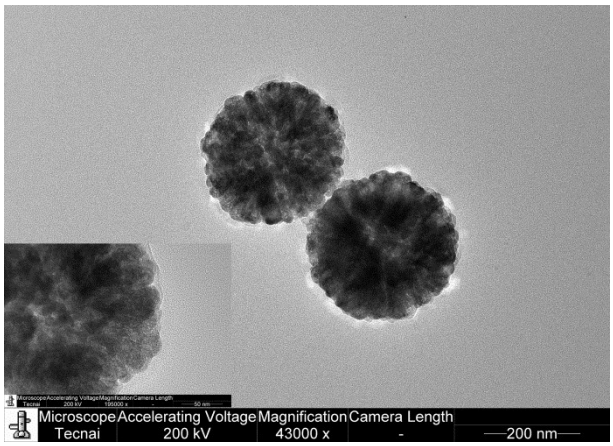

Fig. S1 HRTEM image of Fe_3O_4 microspheres

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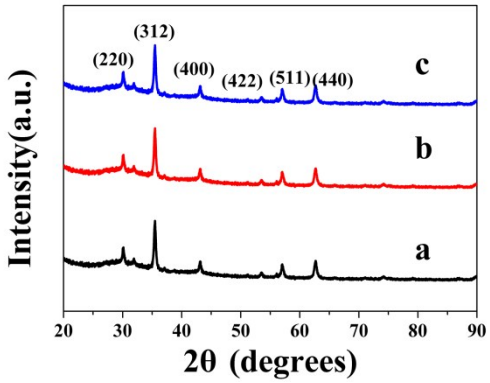

Fig. S2 XRD patterns of Fe_3O_4 (a), Fe_3O_4@SiO_2 (b) and Fe_3O_4@SiO_2@AT (c)

The diffraction peaks (2θ=30.1°, 35.5°, 43.1°, 53.4°, 57.0° and 62.6°) for Fe_3O_4, Fe_3O_4@SiO_2, Fe_3O_4@SiO_2@AT were indexed as (220), (311), (400), (422), (511) and (440), respectively. The positions of these peaks matched well with database for magnetite in the JCPDS-International Center for Diffraction Data (JCPDS Card: 19-629) file. The XRD patterns indicated that the Fe_3O_4 crystalline structure did not change before and after each step of the chemical modification reaction.

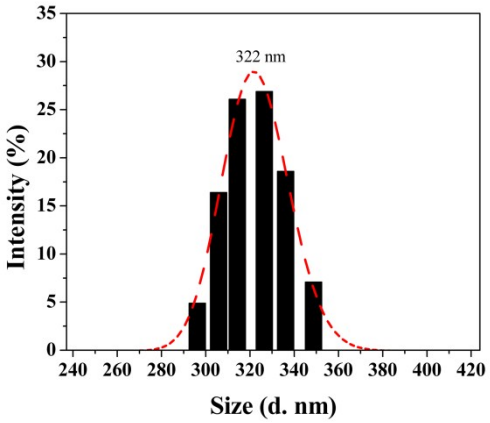

Fig. S3 The size-distribution analysis of Fe_3O_4@SiO_2@AT with a log-normal fit

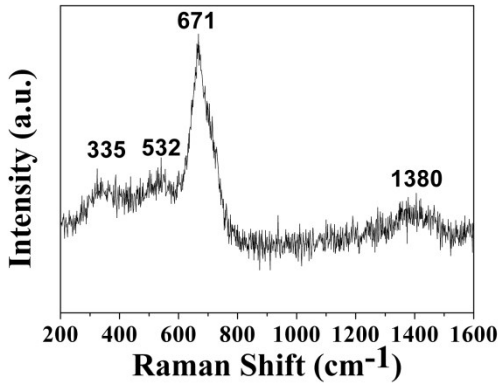

Fig. S4 Raman spectra of Fe_3O_4 microspheres

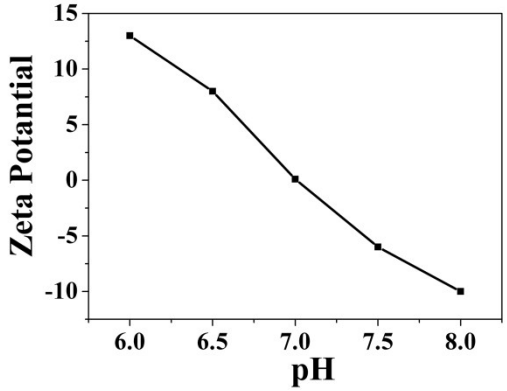

Fig. S5 Zeta potentials of Fe_3O_4@SiO_2@AT in different pH solutions

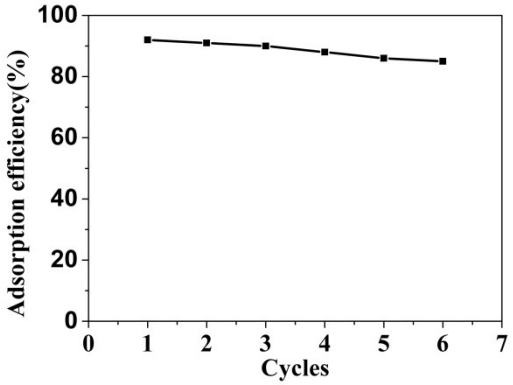

Fig. S6 The use of the recycled Fe_3O_4@SiO_2@AT for hemoglobin adsorption

The result of recycle experiment was shown in Fig. S6. The hemoglobin adsorption-desorption process was repeatedly used for 6 cycles, and the adsorption efficiency was still maintained at 85%. It indicated that the prepared microspheres were very stable for separation of hemoglobin.

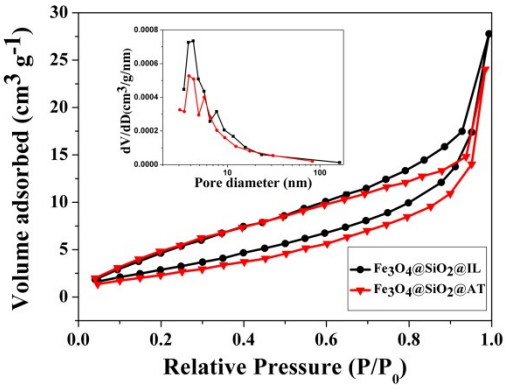

Fig. S7 N_2 adsorption/desorption isotherms (at 77K) and the pore size distribution curves (inset) of the Fe_3O_4@SiO_2@AT and Fe_3O_4@SiO_2@IL composite

Table S1 Properties of different adsorbents for hemoglobin capture

Adsorption material	Size	Capacity for hemoglobin	Capture time
Mesoporous silica[62]	50 and 10 μm (pore diameters from 6 to 20 nm)	300 mg/g	30 min
Mesoporous TiO_2–SiO_2[63]	Wall thickness ~5 nm (pore diameters from 5.8 to 7.25 nm)	301.8 mg/g	12 h
Fe_3O_4@SiO_2@IL(previous work)[49]	~300 nm (pore diameter 13.71 nm)	~2.0 g/g	15 min
Fe_3O_4@SiO_2@AT (This work)	322 nm (pore diameter 11.6 nm)	2.02 g/g	15 min

References

[49] Y. Wei, Y. Li, A. L. Tian, Y. T. Fan and X. Wang, *J. Mater. Chem. B*., 2013, **1**, 2066.

[62] P. Laveille, A. Falcimaigne, F. Chamouleau, G. Renard, J. Drone, F. Fajula, S. Pulvin, D. Thomas, C. Baillyc and A. Galarneau, *New J. Chem*., 2010, **34**, 2153.

[63] L. L. Luo, F. Kong, S. Chu, Y. J. Liu, H.Y. Zhu, Y. Wang and Z. G. Zou, *New J. Chem*., 2011, **35**, 2832.