Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Supporting Information

Synthesis of fluorescent ionic liquid-functionalized silicon nanoparticles with tunable amphiphilicity and selective determination of Hg^{2+}

Quan Li[a], Kaite Peng[a], Yanzhen Lu[a], Aoxin Li[a], Fenfang Che[a], Yuanyuan Liu[a], Xingjun Xi[b], Qiao Chu[b], Tao Lan[b], Yun Wei[a]*

[a]State Key Laboratory of Chemical Resource Engineering, Beijing University of Chemical Technology, Beijing 100029, P. R. China

[b]China National Institute of Standardization, No. 4 Zhichun Road, Haidian District, Beijing 100191, P. R. China

Corresponding Author

* E-mail: weiyun@mail.buct.edu.cn;

Fax: +86 10 64442928; Tel: +86 10 64442928

Experimental

1.1. Synthesis of [SmIm]Cl ILs

18.6 mL of 3-choropropyltrimethoxysilane and 8.0 mL of N-methylimidazole were mixed well and refluxed at 80 °C under N_2 gas for 2 days. The resultant mixture was washed for three times with hexane to remove unreacted impurities. Then, the excess hexane was removed by using rotary evaporation. Finally, a viscous and light yellow 1-(trimethoxysilyl)propyl-3-methylimidazolium chloride (ILs) was obtained.

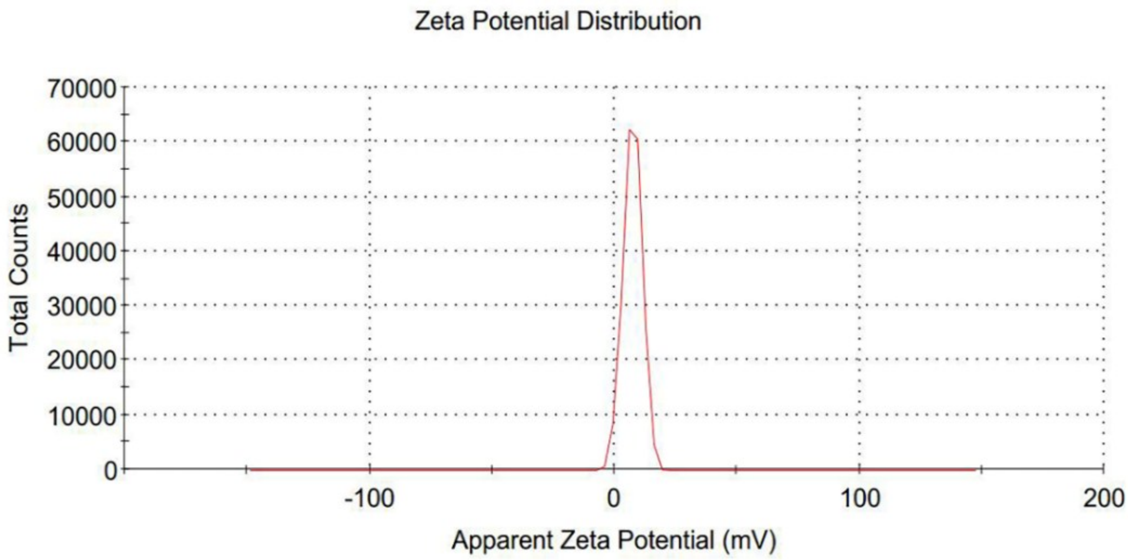

Fig. S1 Zeta potentials of IL@SiNPs.

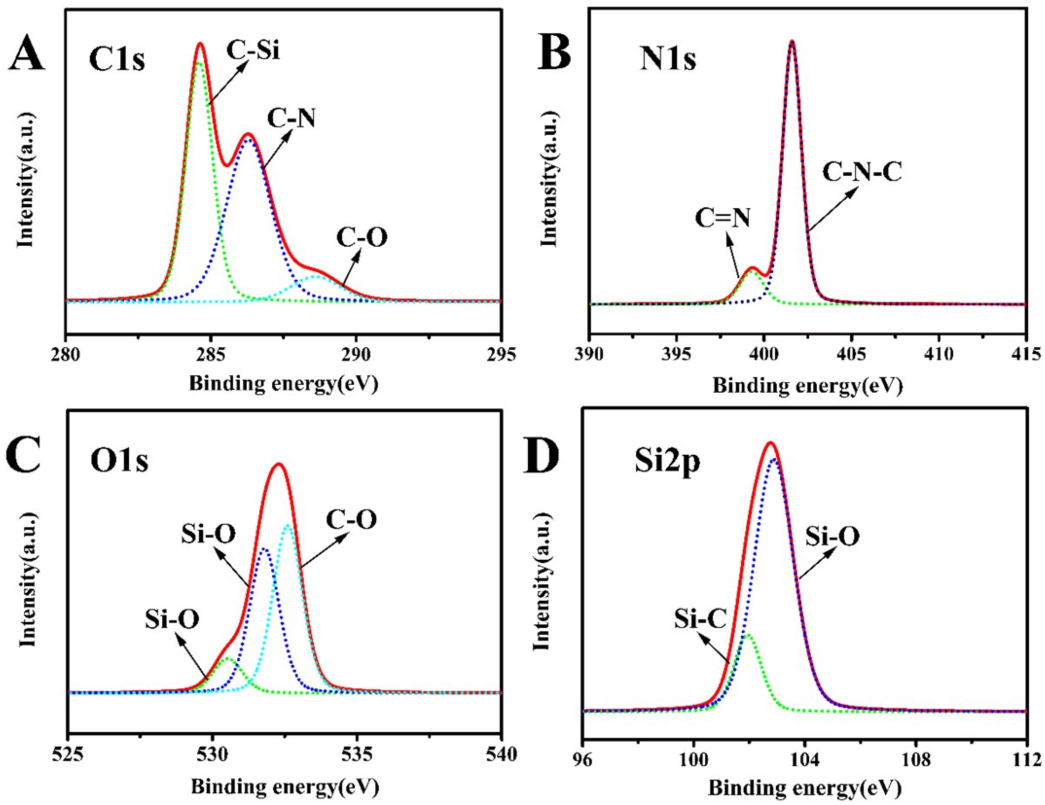

Fig. S2 High resolution XPS spectra of (A) C 1s, (B) N 1s, (C) O 1s and (D) Si 2p peak of IL@SiNPs.

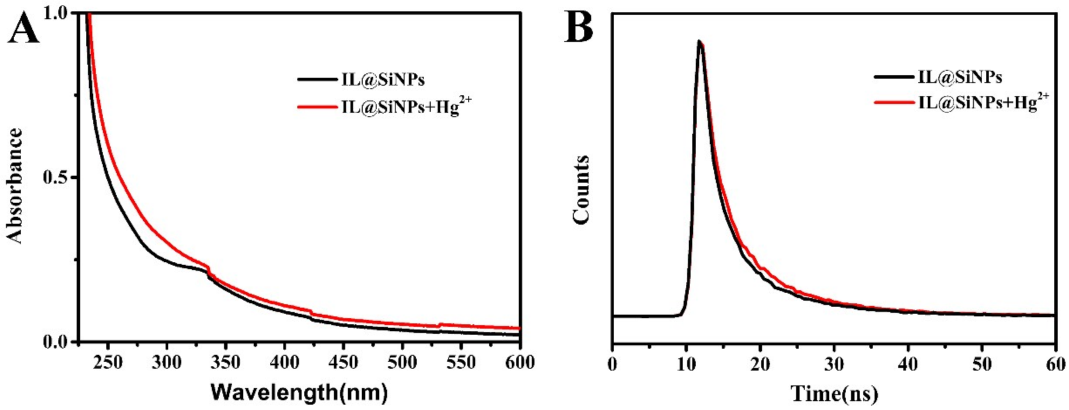

Fig. S3 (A) The UV-vis absorption spectra of IL@SiNPs in the absence (black curve) and presence (red curve) of Hg^{2+}. (B) The fluorescence lifetime of IL@SiNPs measured by monitoring the emission at 440 nm when excited at 350 nm.

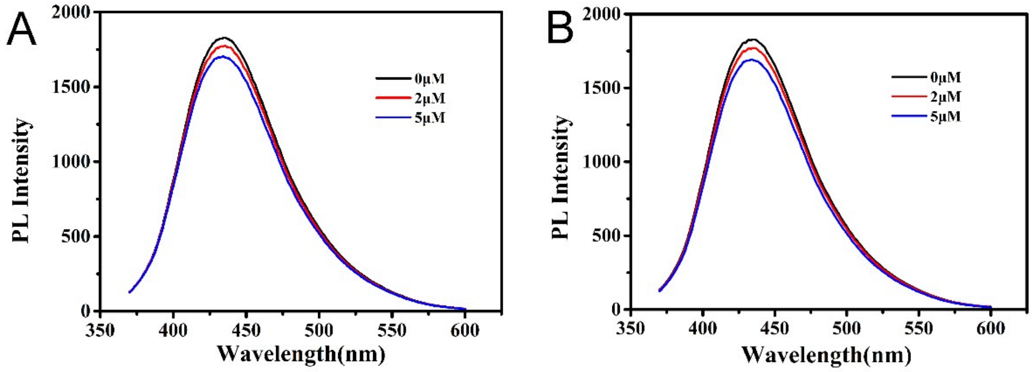

Fig. S4 (A) Fluorescence spectra of the IL@SiNPs in the presence of different Hg^{2+} concentrations (from top to bottom: 0, 2, 5μM) in tap water. (B) Fluorescence spectra of the IL@SiNPs in the presence of different Hg^{2+} concentrations (from top to bottom: 0, 2, 5μM) in river water.

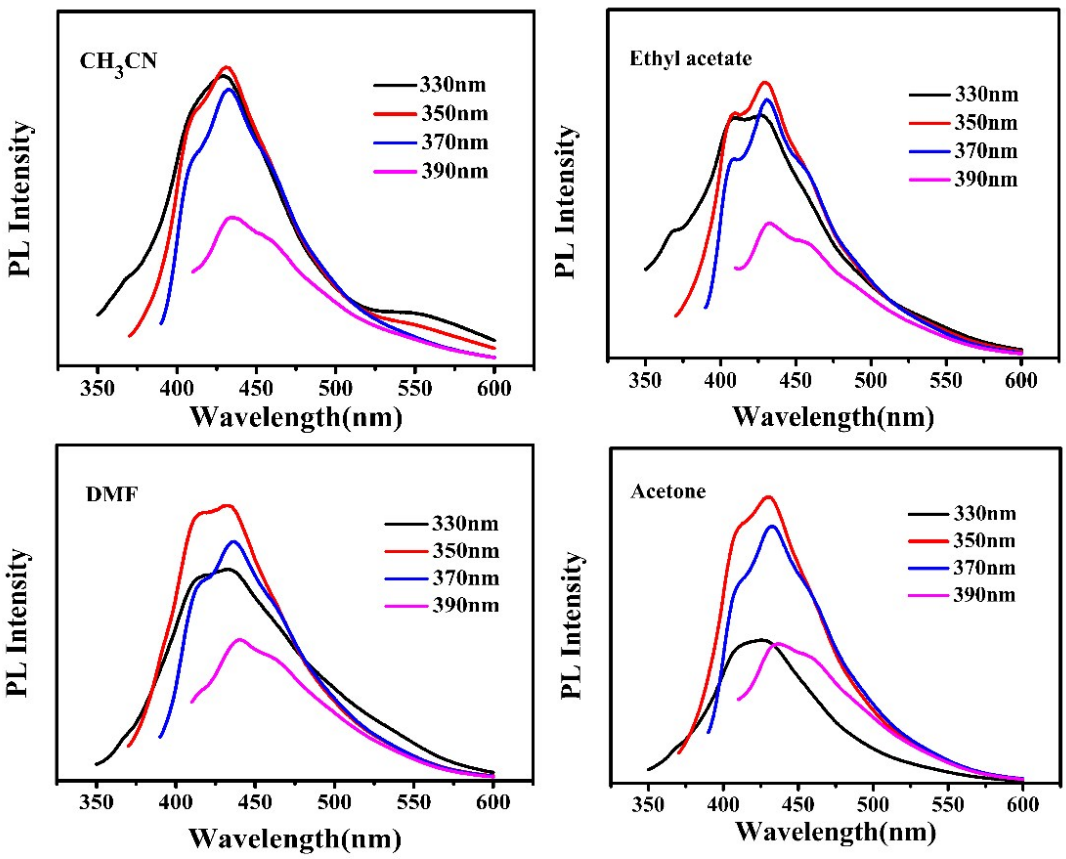

Fig. S5 The PL emission spectra at different excitation wavelengths of IL@SiNPs$_{-NTf2}$ in acetonitrile, ethyl acetate, DMF, and acetone, respectively.

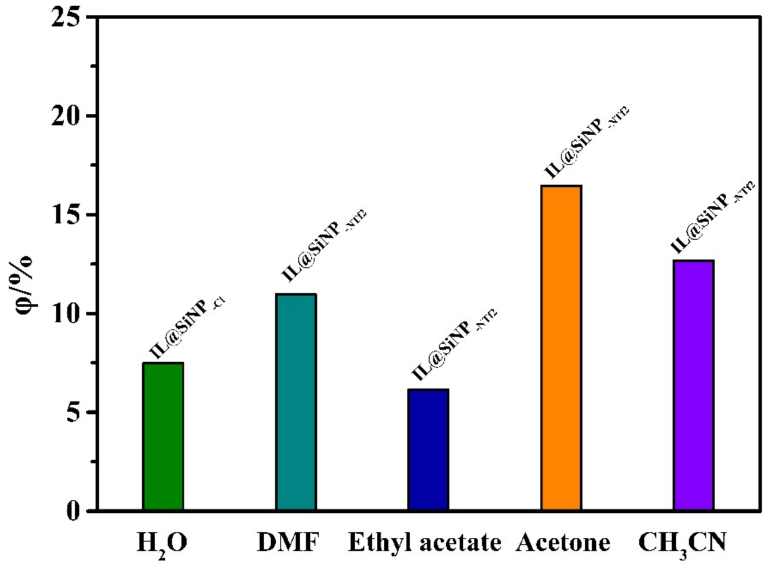

Fig. S6 The Quantum yield φ of IL@SiNPs$_{-Cl}$ and IL@SiNPs$_{-NTf2}$ in various solvents.

Table S1 Comparison of different fluorescent probes for Hg^{2+} detection.

Materials	Linear range (μM)	LOD (μM)	Ref
Tyrosine-based bsensor	0-0.1	0.01	1
Naphthalimide-MNPs	0.1-4.5	0.07	2
Graphene quantum dots	0.8-9.0	0.10	3
Polymer Sensor	1-30.0	0.73	4
N-doped Carbon Dots	0-25.0	0.23	5
N,S-doped Carbon Dots	0-40.0	2	6
IL@SiNPs	0-40.0	0.45	This work

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