Supporting information

A dual-emission ratiometric fluorescent nanoprobe based on silicon nanoparticles and carbon dots for efficient detection of Cu(II)

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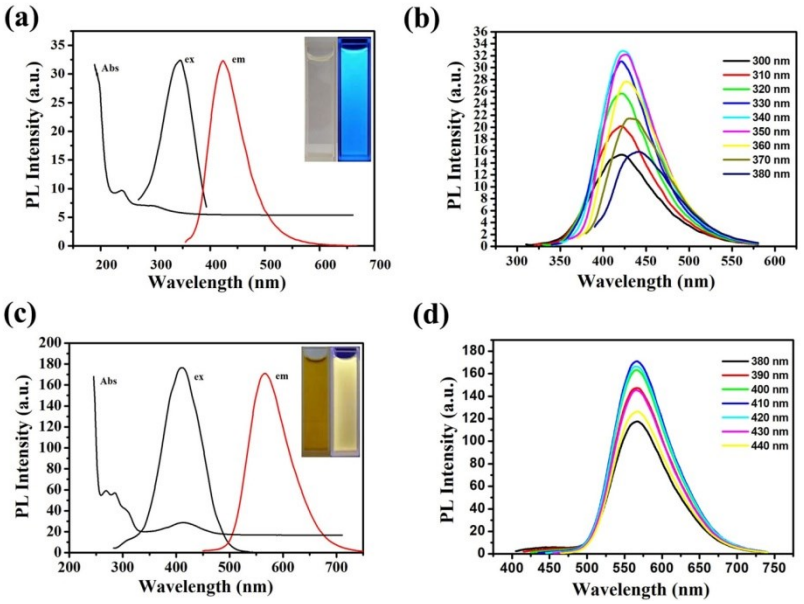

Fig. S1. (a) (Abs) UV–Vis absorption, (ex) excitation and (em) emission spectra of Si NPs in aqueous solution; (inset) photographs of solutions of the Si NPs under (left) room light and (right) UV light illumination. (b) fluorescence spectra of the Si NPs in aqueous solution with different excitation wavelengths. (c) (Abs) UV–Vis absorption, (ex) excitation and (em) emission spectra of CDs in aqueous solution; (inset) photographs of solutions of the CDs under (left) room light and (right) UV light illumination. (d) Fluorescence spectra of the CDs in aqueous solution with different excitation wavelengths.

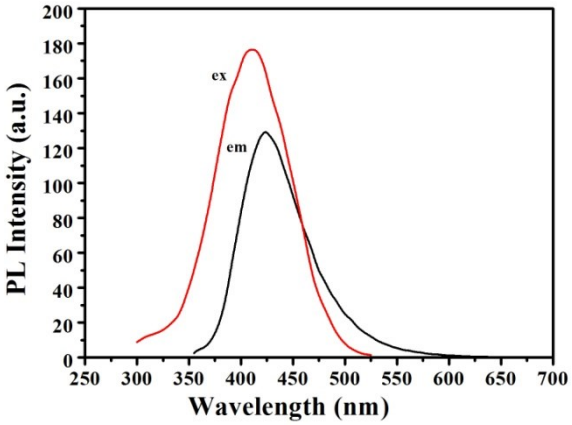

Fig. S2. Emission spectrum of Si NPs and excitation spectrum of CDs, excited at 390 nm.

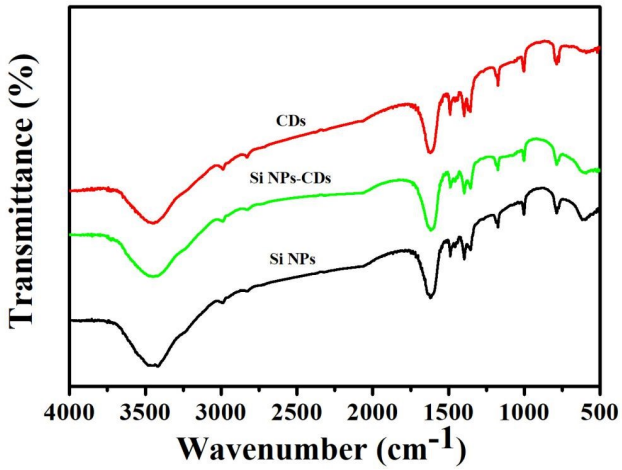

Fig. S3. FTIR spectra of Si NPs,CDs and Si NPs-CDs dual-emission fluorescent nanoprobe.

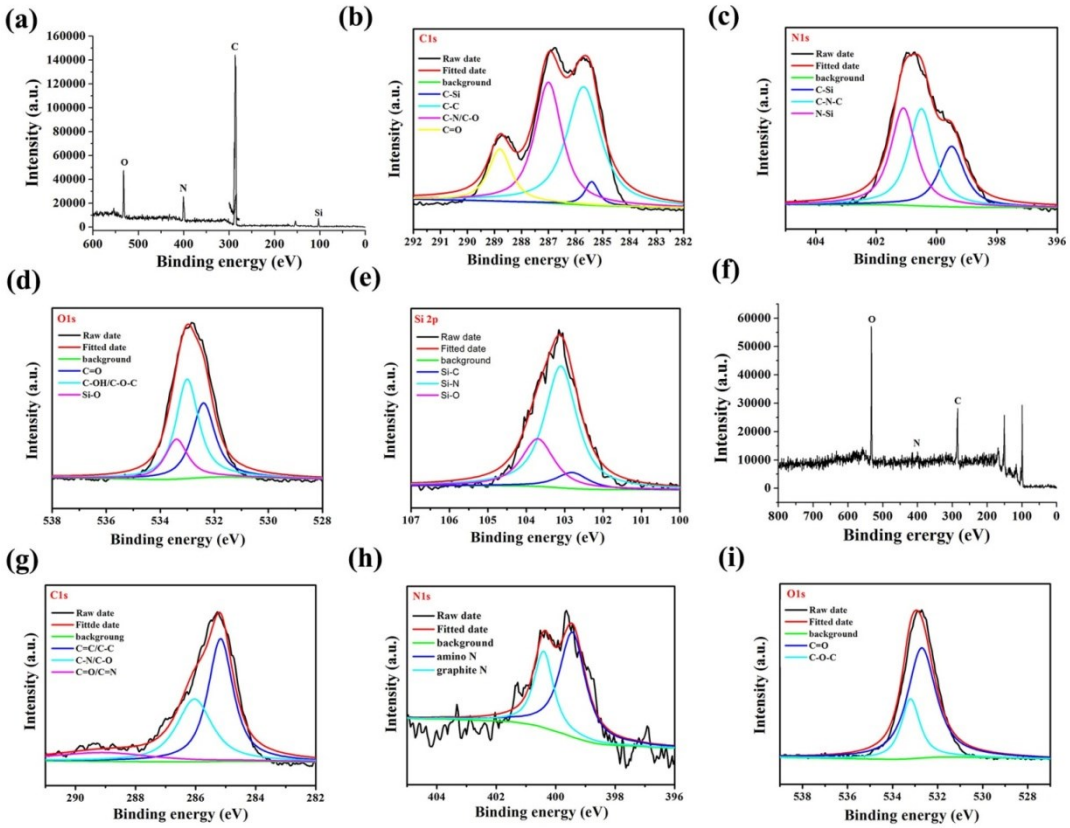

Fig S4. (a) Full XPS spectra of Si NPs and (f) CDs; (b-e) High-resolution C1s, N1s, O1s and Si 2p XPS spectra of Si NPs; (g-i) High-resolution C1s, N1s , O1s XPS spectra of CDs.

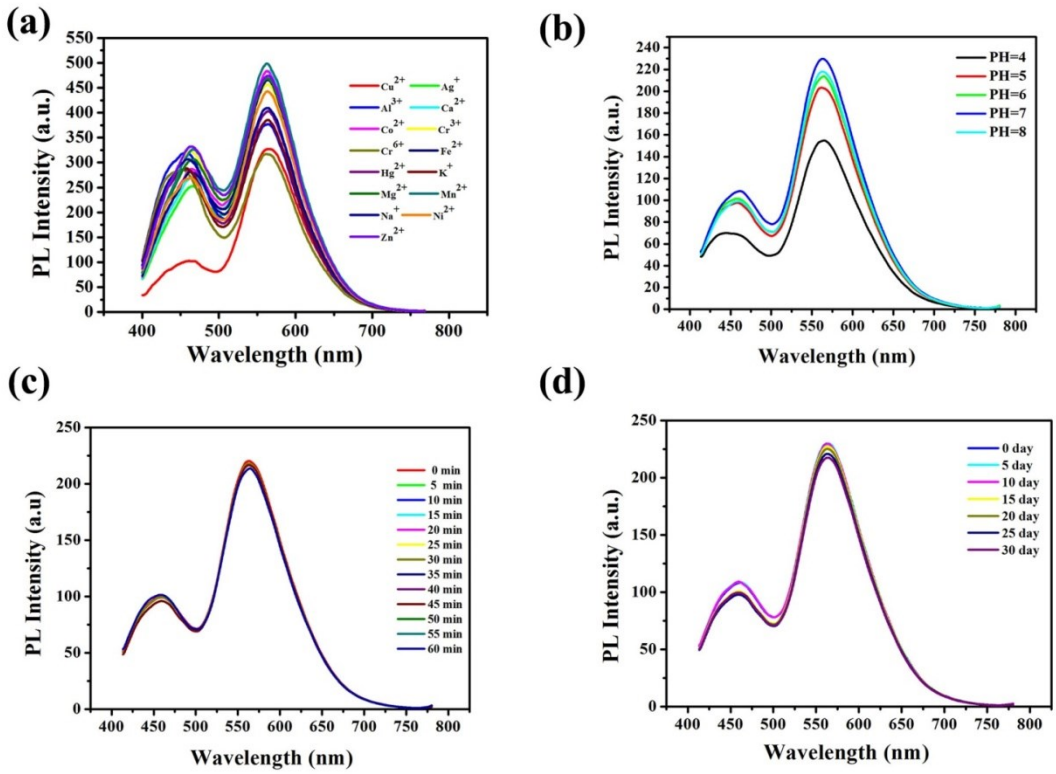

Fig S5. (a) Fluorescence response of the Si NPs-CDs dual-emission nanosensor to 10 μM of different metal ions.The photostability of the Si NPs-CDs dual-emission nanosensor in (b) the pH range of 4–8, (c) after exposure to a 365 nm UV lamp for (d) 60 min and (d) stored for 30 days storage in ambient environment without any protection.

Table S1. Determination of Cu^{2+} spiked in real sample by the Si NPs-CDs nanoprobe.

Sample	Cu^{2+} added (μM)	Cu^{2+} detected (μM)	Recovery (%)	RSD (n = 3) (%)
Tap water	0.020	0.021	105.0	1.4
	0.100	0.103	103.0	2.5
	1.00	0.962	96.2	3.1
Lake water	0.020	0.019	95.0	2.2
	0.100	0.097	97.0	3.6
	1.000	1.020	102.0	2.7