SUPPORTING INFORMATION

Thermal treatment of hair for the synthesis of sustainable carbon quantum dots and the applications for sensing Hg^{2+}

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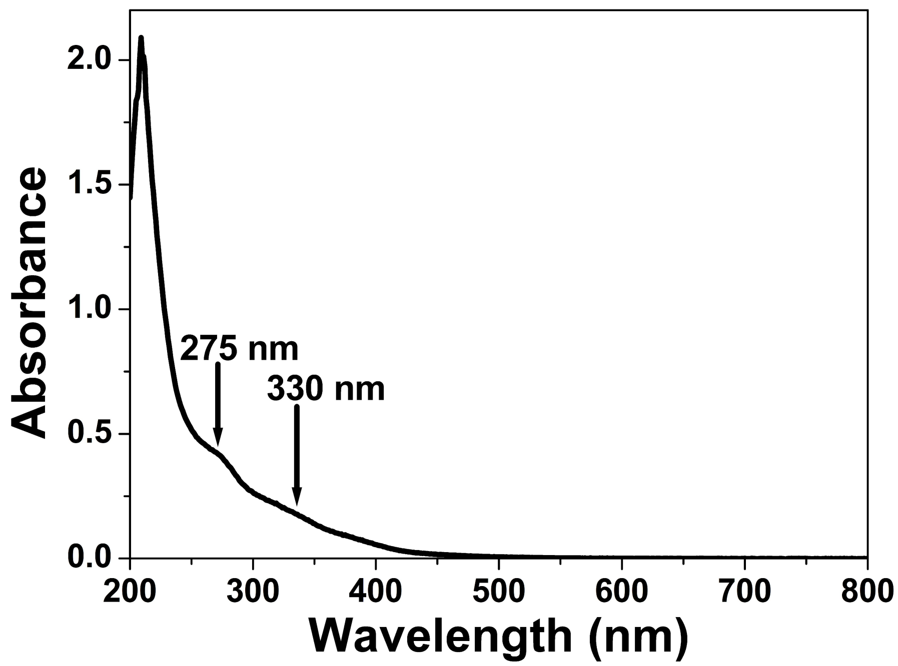

Figure S1 UV-vis absorption spectrum of CQDs.

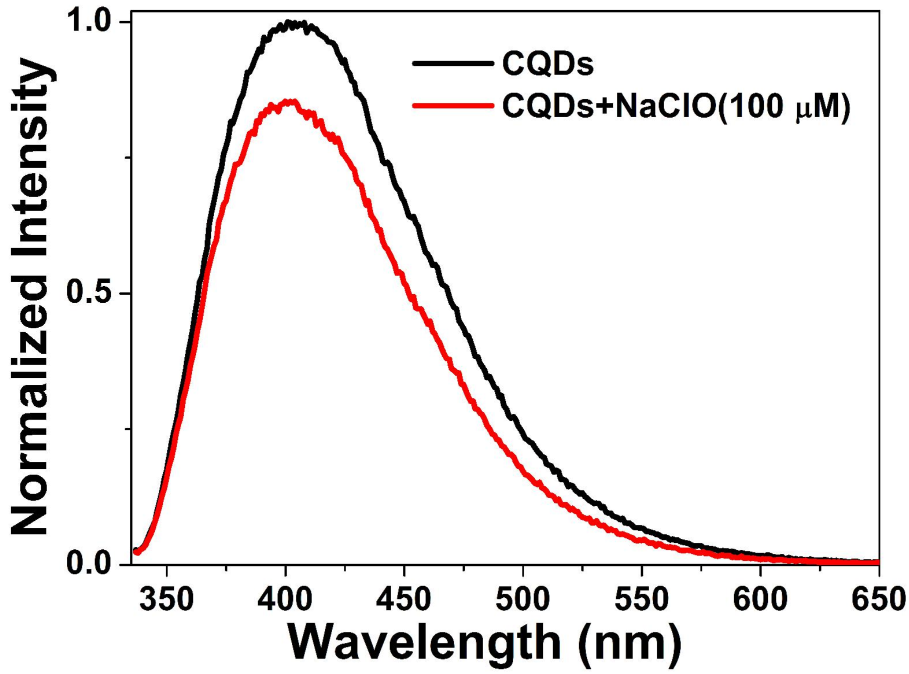

Figure S2 Emission spectra of CQDs in the absence and presence of 100 μM NaClO (Excitation wavelength is 330 nm.).

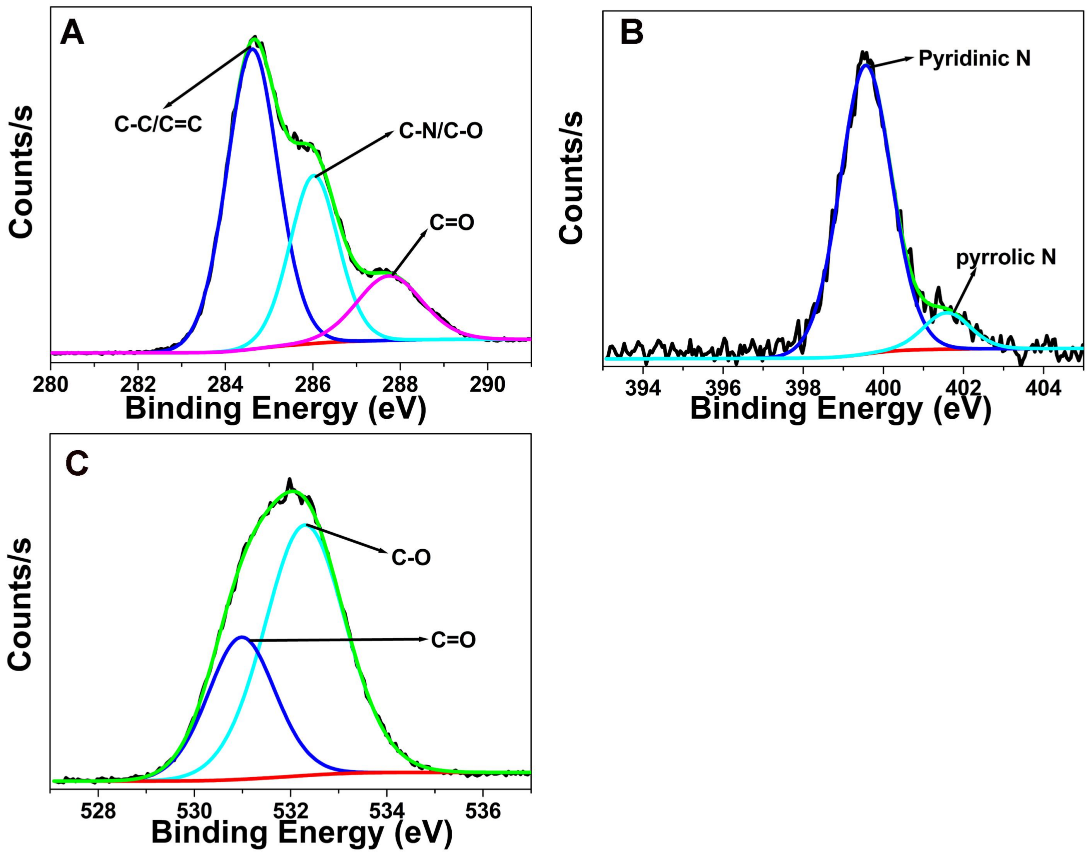

Figure S3 High resolution XPS spectra for C1s, N1s, and O1s of CQDs.

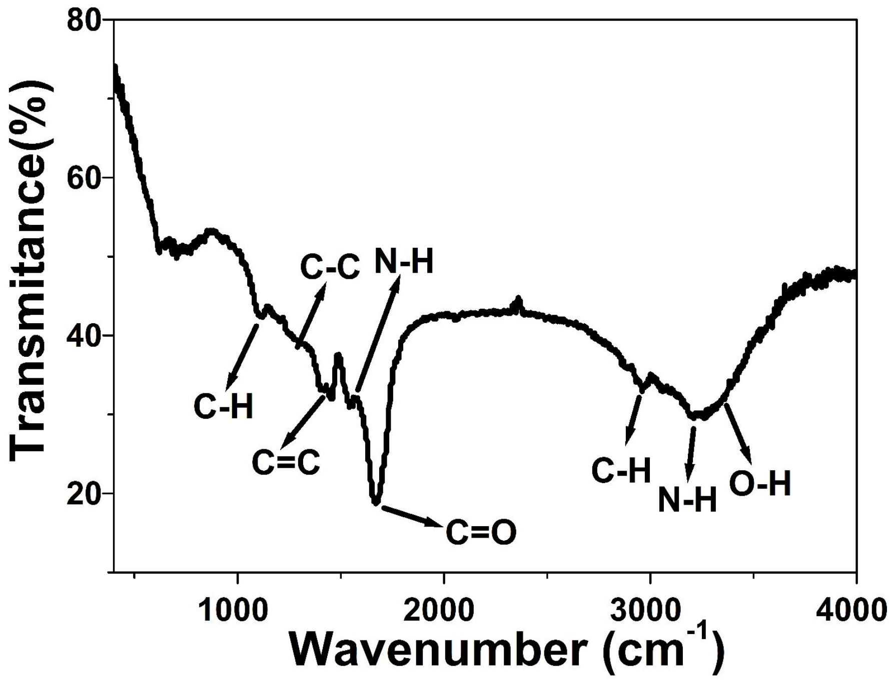

Figure S4 FT-IR absorption spectrum of CQDs.

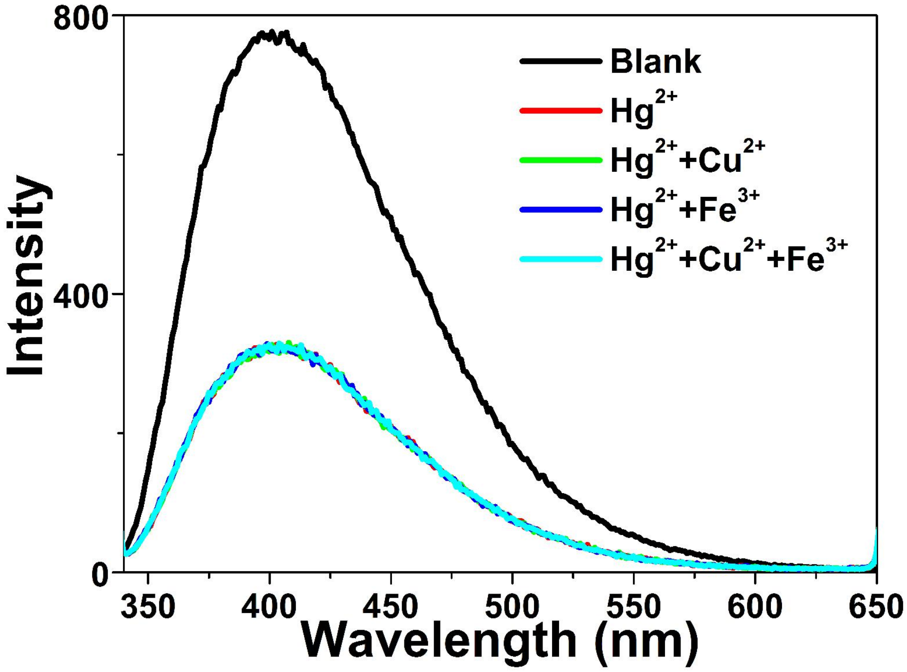

Figure S5 Fluorescence emission spectra of CQDs in the absence and presence of Hg^{2+} (100 μM), Cu^{2+} (20 μM) and Fe^{2+} (20 μM).

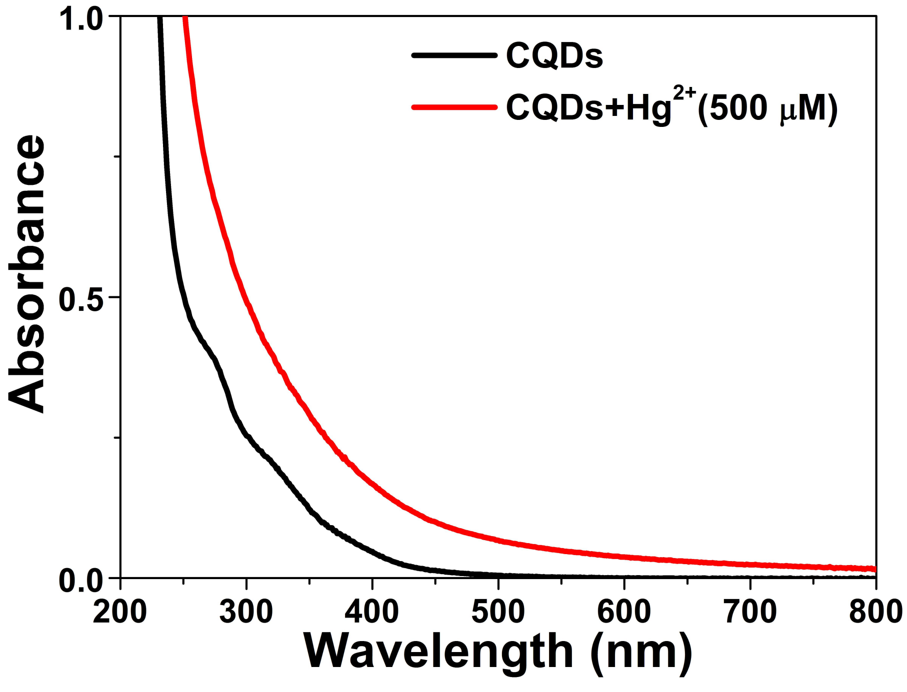

Figure S6 UV-vis absorption spectra of CQDs in the absence and presence of 500 μM Hg^{2+}.

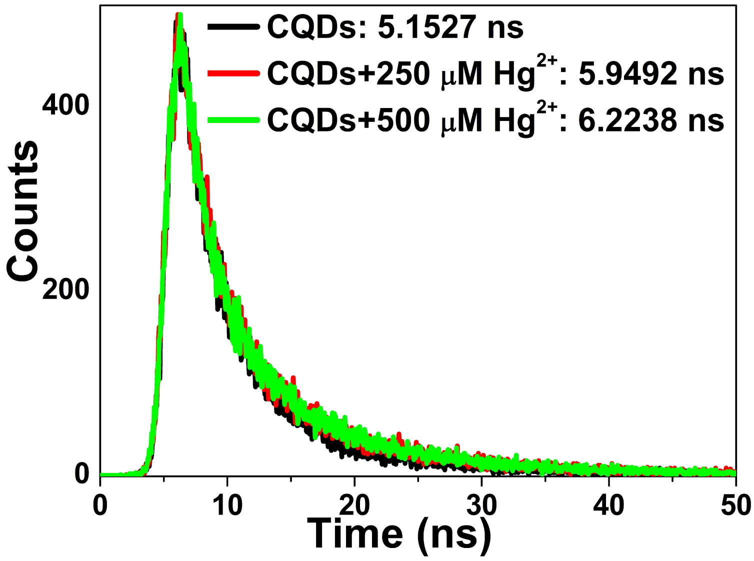

Figure S7 Fluorescence decay curve of CQDs in the absence and presence of 250 μM and 500 μM Hg^{2+} (Excitation wavelength is 330 nm, emission wavelength is 415 nm.).

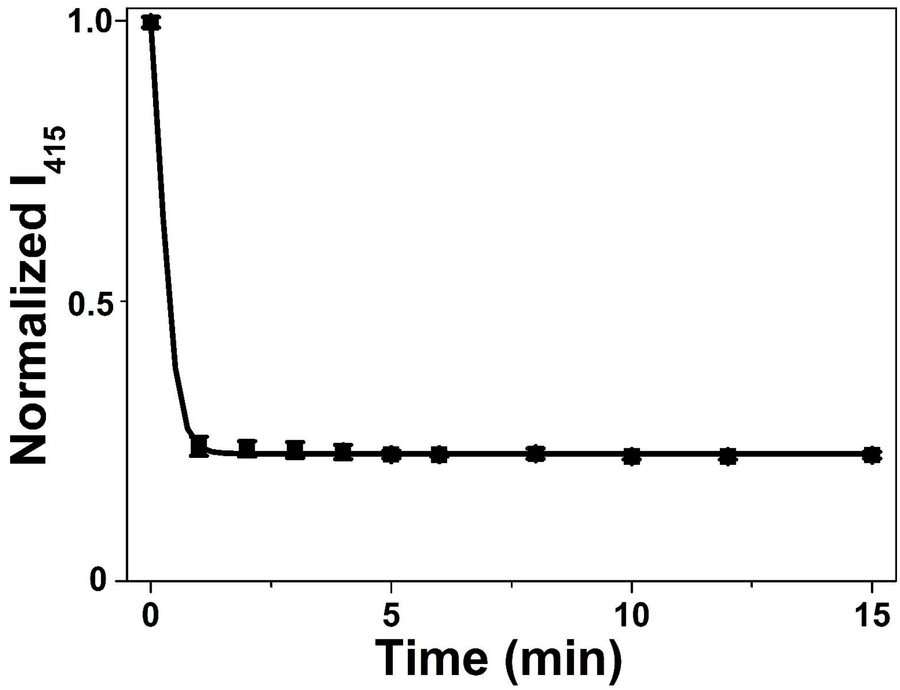

Figure S8 The effect of incubation time on the fluorescence intensity of CQDs at 415 nm in the presence of 500 μM Hg^{2+} (performed in pH 5.0, 50 mM NaAc-HAc buffer; excitation wavelength is 330 nm.).

Table S1. Comparison of the performance of different CQDs for Hg^{2+} detection.

Probes	Detection limit	Linear range	Quantum yield (%)	Reference
CQDs	10 nM	0-5 μM	68	1
Nitrogen-doped CQDs	0.23 μM	0-25 μM	15.7	2
Carbon nitride quantum dots	0.14 μM	0.1-10 μM, 10-30 μM	27.1	3
Eu^{3+}/CQDs@MOF-253	13 nM	0-150 μM	42.3	4
CQDs	1.6 μM	6-80 μM	4.7	5
CQDs	1.51 nM, 126 nM	0-10 nM, 100-5000 nM	44.8	6
CQDs	10 nM	0-75 μM	10.75	This work

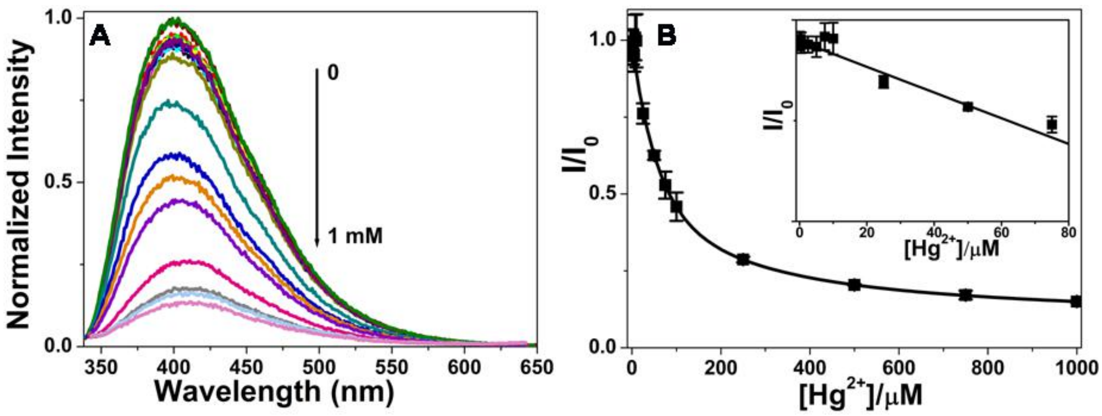

Figure S9 (A) Fluorescence emission spectra of CQDs in the presence of different concentrations of Hg^{2+} in tap water. (B) The plot of I/I_0 versus the concentration of Hg^{2+} in tap water, the inset is the linear section of the plot (performed in pH 5.0, 50 mM NaAc-HAc buffer; I_0 and I correspond to the fluorescence intensity of CQDs at 415 nm in the absence and presence of Hg^{2+}, respectively; excitation wavelength is 330 nm.).

References:

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of mercury ions. *Carbon* **52**, 583-589 (2013).

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