Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

Highly selective fluorescent carbon dots probe of mercury(II) based on thymine-mercury(II)-thymine structure

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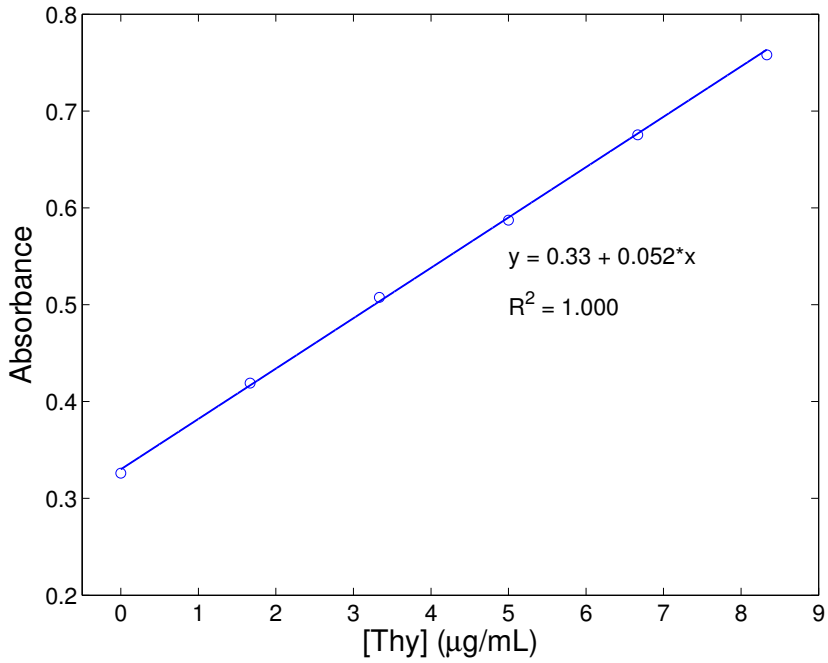

Figure S1. Plot of the absorbance intensity at 270 nm as a function of thymine-1-acetic acid concentration in the presence of 100 μg/mL the CDs-Thy (0.1 M PBS buffer, pH 7.4).

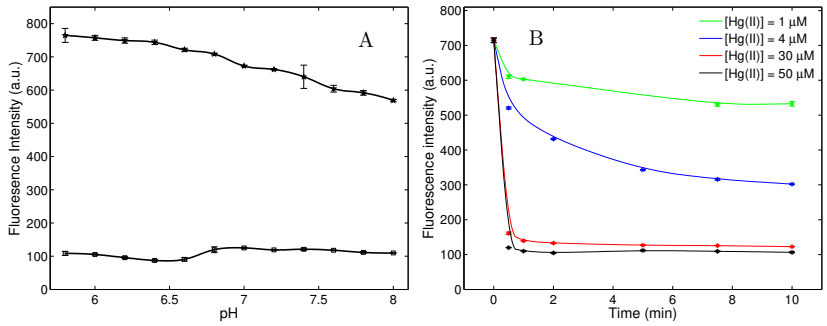

Figure S2. (A) Fluorescence response of probe (0.1 mg/mL) in the absence (top line) and presence (bottom line) of Hg^{2+} (33.3 μM), respectively. (B) Reaction-time profiles of probe (0.1 mg/mL) in the presence of Hg^{2+} (1, 4, 30, and 50 μM). The fluorescence intensities at 441 nm were monitored in aqueous solution (0.2 M PBS buffer, pH 7.4) (λ_{ex} = 354 nm, slit: 5/5 nm).

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Fig. S2A shows the fluorescent intensities of the CDs-Thy under different pH from pH 5.8 to 8.2 in the absence and presence of Hg^{2+}, respectively. Without Hg^{2+}, the fluoresence intensity of the CDs-Thy have a slightly decrease with the increasing of pH. But the fluoresence intensities still stayed at a strong emission level. Upon addition of Hg^{2+}, the fluorescence spectra of CDs-Thy had a relatively weak emission and remained unaffected during this pH range. Therefore, the CDs-Thy can successfully detect Hg^{2+} in the pH range from 5.8 to 8.2 and a PBS buffer (pH = 7.4) was chosen for all subsequent detection assays.

Fig. S2B shows the quenching kinetics of the CDs-Thy with different Hg^{2+} concentration at different time by recording the fluorescence spectra. The dramatic fluorescence quenching was observed within less than 30 seconds when 30 μM and 30 μM Hg^{2+} was introduced into the sensing system containing 0.1 mg/mL

of the CDs-Thy, indicating that quenching kinetics was fairly fast. Moreover, the fluorescence emission was quenched to a stable state in 10 minutes even in the case of lower concentrations of Hg^{2+}. Thus, this sensing system could be used for the real-time monitoring of Hg^{2+} in practical analysis.

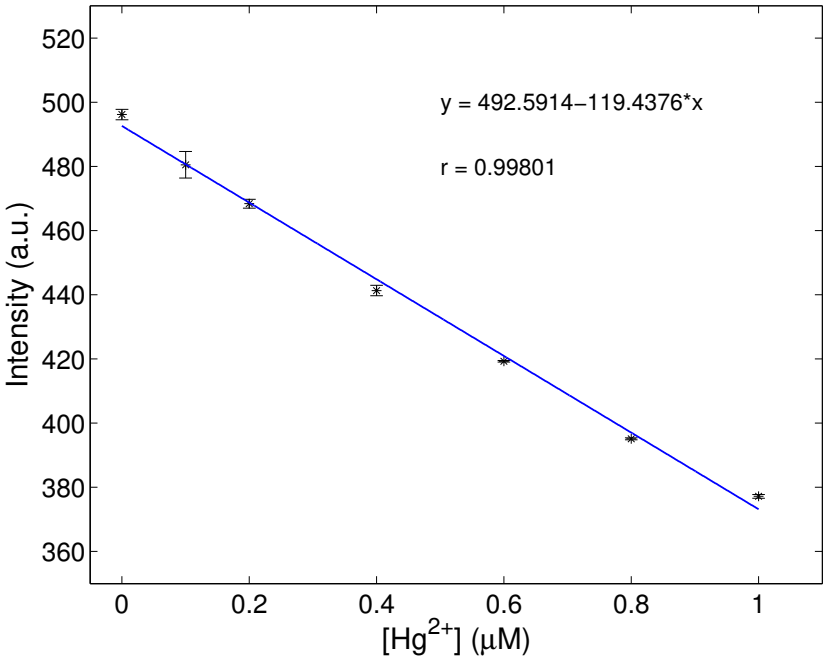

Figure S3. Linear plots of the fluoresence intensities of CDs-Thy (33.3 μg/mL) upon addition of Hg^{2+} (0, 0.1, 0.2, 0.4, 0.6, 0.8, and 1.0 μM) in PBS buffer solution (0.1 M, pH 7.4).

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Table S1. Fluorescence lifetimes of CDs-PEI and CDs-Thy

Sample	τ_1 (ns)	A_1	Percent (%)	τ_2 (ns)	A_2	Percent (%)	τ_{avg} (ns)
CDs-PEI	2.24	0.017	11.99	12.16	0.023	88.01	10.97
CDs-Thy	3.81	0.017	19.27	11.69	0.023	80.73	10.17

τ_1 and τ_2 refer to the short and long lifetime, respectively.