

## Supporting Information

### TABLES

Table S1 Comparison between fluorescent detection of Hg<sup>2+</sup> using different nanocarbon probe.

Fluorescent probe	DL ( $\mu\text{M}$ )	Linear range ( $\mu\text{M}$ )	Ref.
CDs	1.3	0-2.69	[35]
F-CDs	0.02	0.1-1.2	[36]
N-CDs	0.23	0-25	[37]
N,S-CDs	0.18	0-20	[38]
N,S-CDs	2	0-40	[39]
N-GQDs	0.032	0-5	[34]
S,N-GQDs	9.14	12-125	[40]
N-GQDs	2.5	2.5 – 800	[41]
RhB-GQDs	0.00016	0.001-0.01,50-1000	[42]
N,S-GQDs	0.00014	0.001-0.05,0.05-15	[43]
N-GQDs	0.019	0.05-25	This work

CDs, carbon dots; F-CDs, F doped CDs; N-CDs, N doped CDs; N, S-CDs, N and S co-doped CDs; N-GQDs, N doped GQDs; S,N-GQDs, sulfur and nitrogen co-doped GQDs; RhB-GQDs, Rhodamine B assisted GQDs; N,S-GQDs, N and S co-doped GQDs.

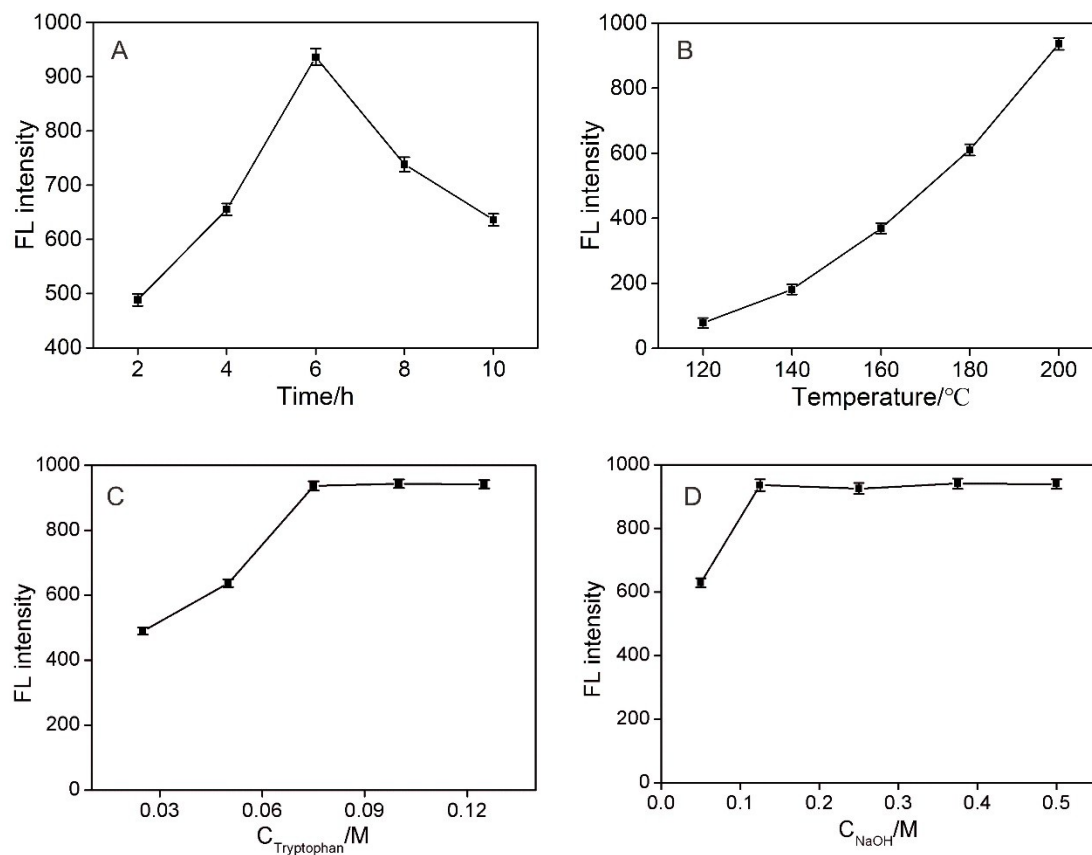
Table S2 Comparison between fluorescent detection of L-Cys using turn-on mode.

Fluorescent probe	DL ( $\mu\text{M}$ )	Linear range ( $\mu\text{M}$ )	Ref.
N,S-CDs-Fe <sup>3+</sup>	0.54	10-200	[44]
CDs-Hg <sup>2+</sup>	0.29	2-20	[45]
N-CDs@V <sub>2</sub> O <sub>5</sub>	0.05	0.1-15	[46]
N-CDs-Hg <sup>2+</sup>	0.0458	0-40	[47]
Eu-GQDs-Cu <sup>2+</sup>	0.310	0.5-50	[48]
N-GQDs-Hg <sup>2+</sup>	0.0013	0.05–30	[49]
N-GQDs-Hg <sup>2+</sup>	0.036	0-5	[34]
N-GQDs	0.0292	0.1-30	This work

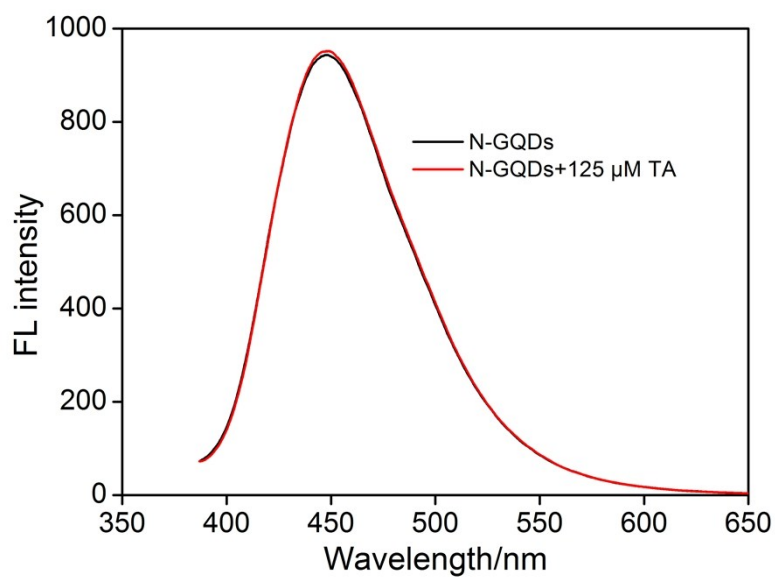
Table S3 Detection of L-Cys in environmental water samples.

Sample	Concentration ( $\mu\text{M}$ )		RSD (n=3, %)	Recovery (%)
	Added L-Cys	Found by N-GQDs-Hg <sup>2+</sup>		
1	3.00	2.87, 2.82, 2.78	1.6	94.1
2	10.0	9.37, 9.71, 10.0	3.2	96.9
3	20.0	19.3, 19.0, 20.4	3.7	97.8

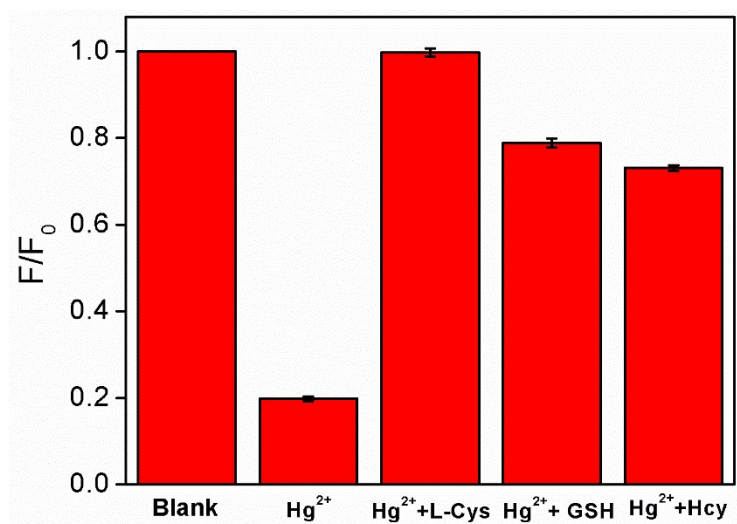
## FIGURES



**Fig. S1** FL intensity of N-GQDs prepared using different time (A), temperature (B), concentration of tryptophan (C) or NaOH (D).



**Fig. S2** FL emission spectra of N-GQDs in the absence and presence of TA (125  $\mu\text{M}$ ).



**Fig. S3** The relative FL ratio of N-GQDs with Hg<sup>2+</sup> in the presence of L-Cys, GSH and Hcy.