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Electronic Supplementary Information

A simple one-pot synthesis of highly fluorescent nitrogen-doped grapheme quantum dots for the detection of Cr(VI) in aqueous media

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Table S1. QY of the as–synthesized N-GQDs

Sample	Integrated emission intensity (*I*)	Abs at 360 nm wavelength (*A*)	Refractive index of solvent (*n*)	Quantum Yield (%)
Quinine sulfate	3200	0.045	1.33	57.7
N-GQDs	732	0.032	1.33	18.6
GQDs	104	0.035	1.33	2.4

Table S2. Relative fluorescence intensities (F/F_0 at 430 nm) of the N-GQDs solution after addition of some organic compounds and polymers.

The tested organic substances and polymers	Reported concentration	Ref.	Selected concentration	F/F_0* (%, mean±SD)
Acetic acid	13.01 mg L^{-1}	[1]	50 mg L^{-1}	101.14±0.31
Propionic acid	1.72 mg L^{-1}	[1]	10 mg L^{-1}	99.44±2.09
n-butyric acid	2.71 mg L^{-1}	[1]	10 mg L^{-1}	102.03±1.53
Isobutyric acid	1.25 mg L^{-1}	[1]	10 mg L^{-1}	103.02±0.25
valeric acid	n.d	[1]	10 mg L^{-1}	99.54±0.86
Phenol	8.43 μg L^{-1}	[1]	10 μg L^{-1}	99.13±1.40
Humic acid	3.5 mg L^{-1}	[2]	5 mg L^{-1}	96.14±0.23
2,4-dinitrophenol	0.2-6 μg L^{-1}	[3]	10 μg L^{-1}	96.27±0.59
Pyrrole	/	/	0.01 M	98.58±3.24
Pyrrole	/	/	0.03 M	91.51±1.18
Pyrrole	/	/	0.05 M	82.94±4.48
Chitosan	/	/	0.01% (w/w)	97.72±0.73
Chitosan	/	/	0.03% (w/w)	96.44±1.67
Chitosan	/	/	0.05% (w/w)	86.83±1.39

* F_0 and F are the fluorescence intensities of N-GQDs in the absence and presnce of the tested substances, respectively.

References

1. M. Huang, Y. Li and G. Gu, Desalination, 2010, 262, 36-42.
2. L. Li, Y. Huang, Y. Wang, W. Wang, Anal. Chim. Acta, 2009, 631, 182–188.
3. E. Pocurull, R.M. Marce, F. Borrull, J.L. Bernal, L. Toribio, M.L. Serna, J. Chromatogr. A, 1996, 755, 67–74.

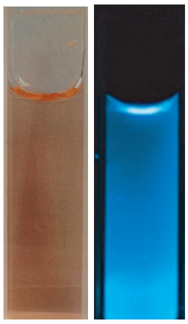

Figure S1. The photographs of 52 mg L^{-1} N-GQGs without (left) and with (right) an irradiation of 365 nm UV light.

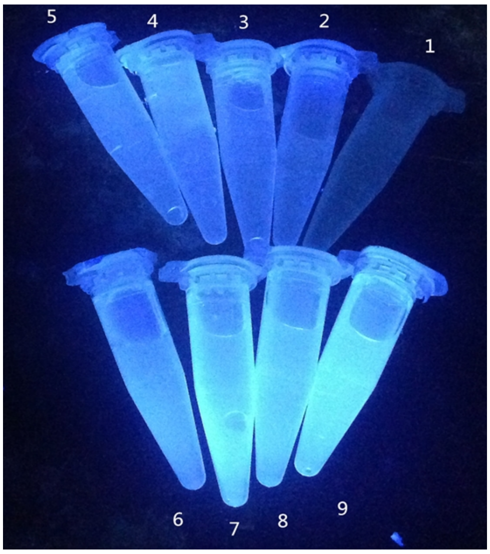

Figure S2. The photograph of the as-prepared products from different molar ratios of ammonia to CA with an irradiation of 365 nm UV light. The products were prepared by hydrothermal reaction of different molar ratios of ammonia to CA at 200 °C for 10 h. The molar ratios of ammonia to CA for 1 to 9 in the photograph are 0:1, 1:1.5, 1:3, 1:5, 1:8, 1.2:1, 3:1, 6:1, and 12:1, respectively.

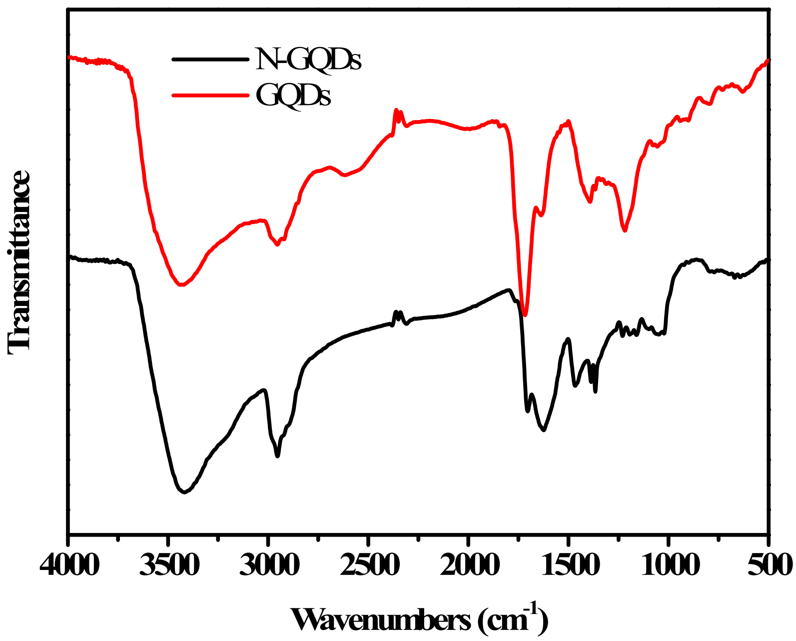

Figure S3. FT-IR spectra of GQDs and N-GQGs.

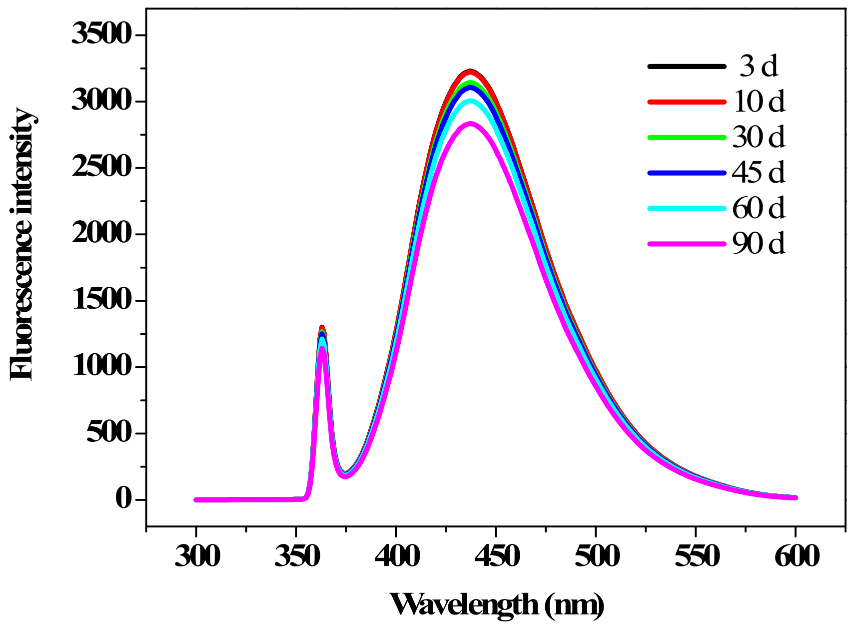

Figure S4. Variation of the fluorescence intensity of 52 mg L^{-1} N-GQGs with time.

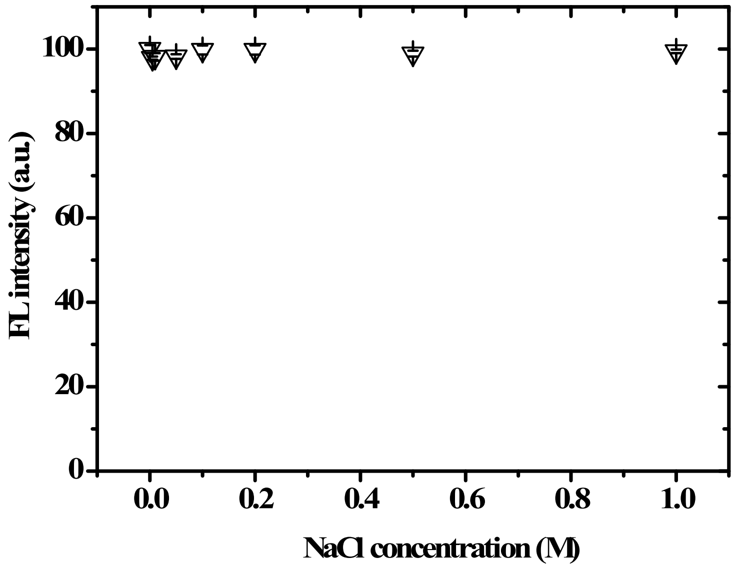

Figure S5. Effect of NaCl concentration on the fluorescence intensity of 52 mg L^{-1} N-GQGs. Error bars represent one standard deviation for three measurements.

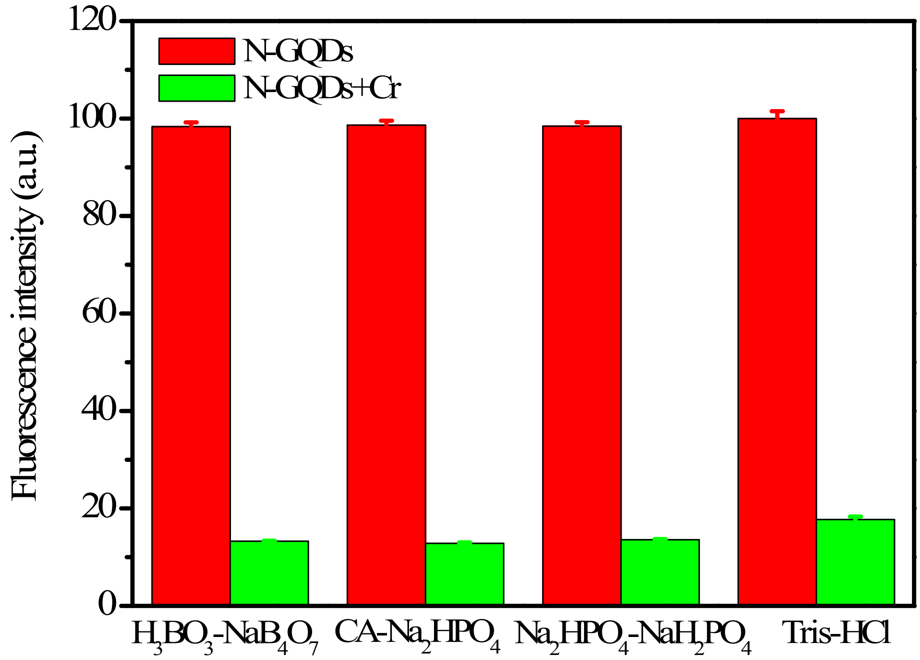

Figure S6. Effect of different buffer system (pH=7.4) on the FL response of N-GQDs.

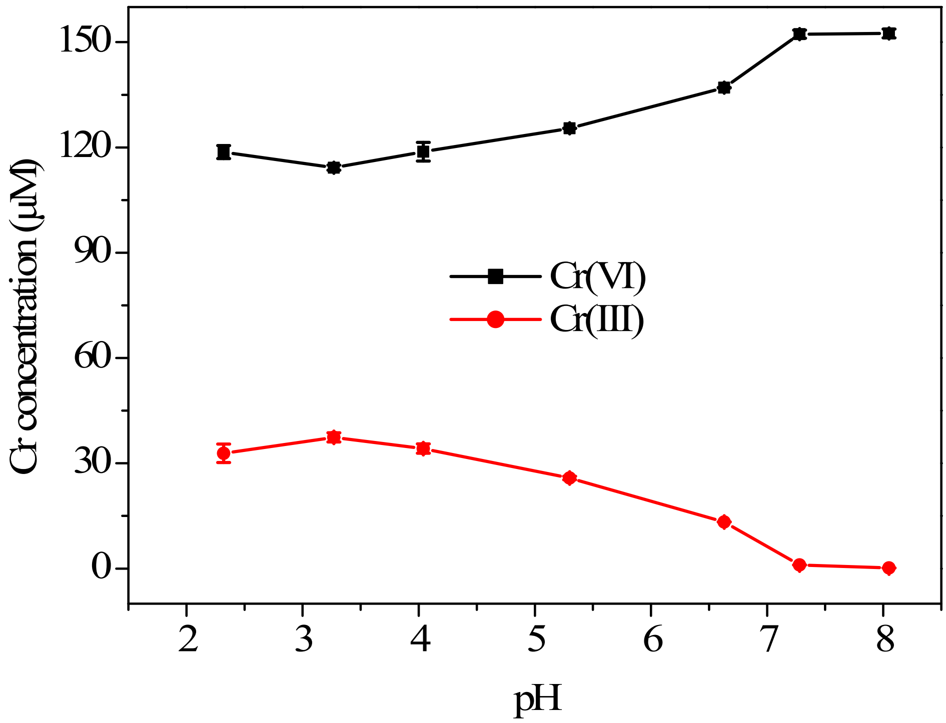

Figure S7. Concentrations of Cr(III) and Cr(VI) at different initial pH values after reaction between N-GQDs and Cr(VI).

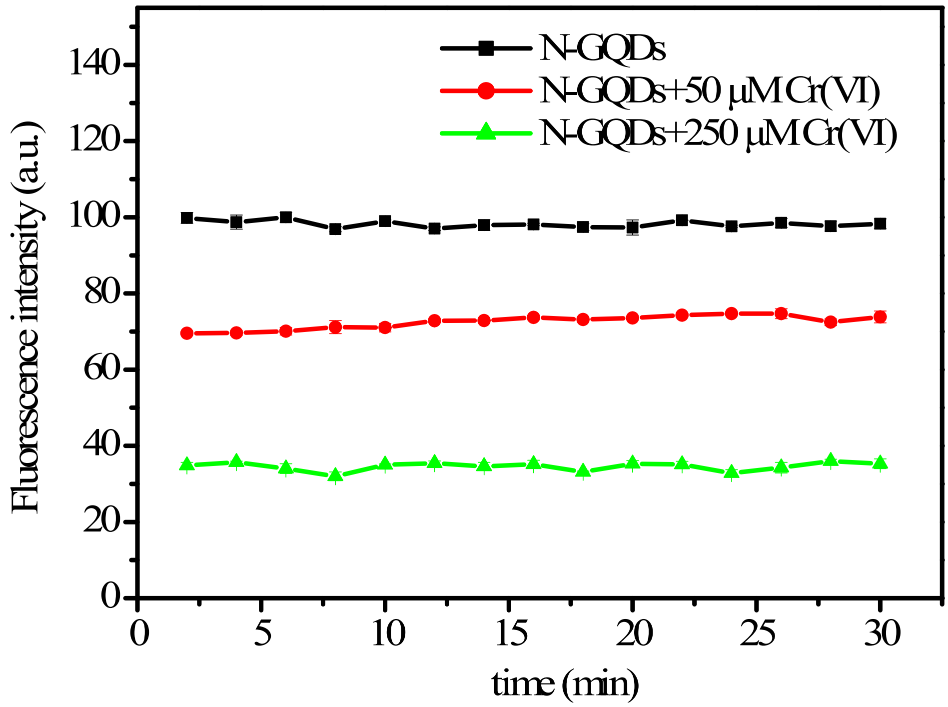

Figure S8. Kinetics of reactions between N-GQDs and Cr(VI).

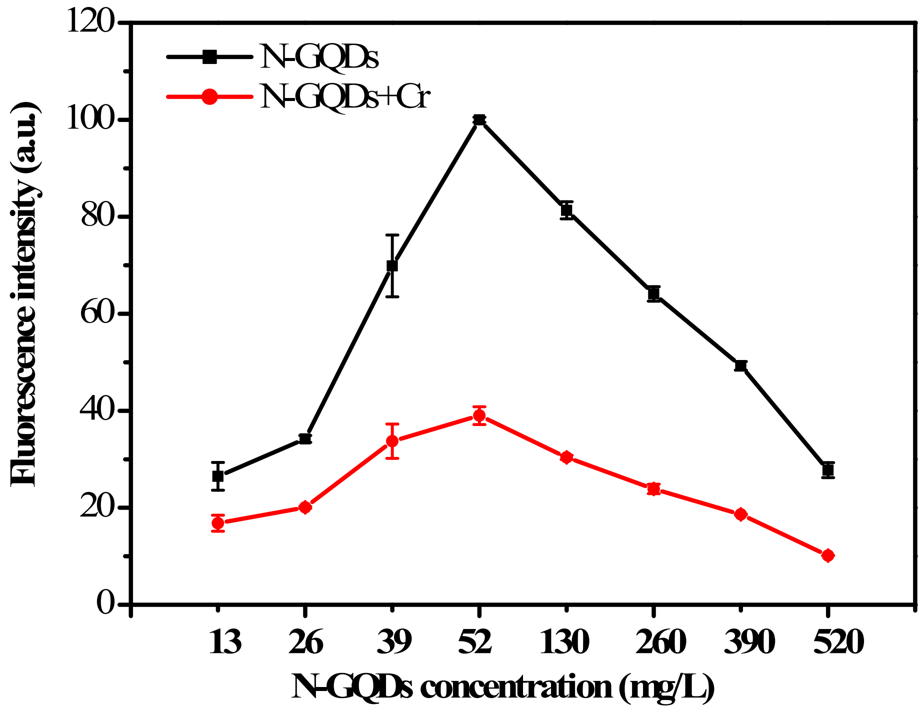

Figure S9. Effect of N-GQDs concentration on the fluorescence intensity in the absence and presence of 140 μM Cr(VI). Error bars represent one standard deviation for three measurements.

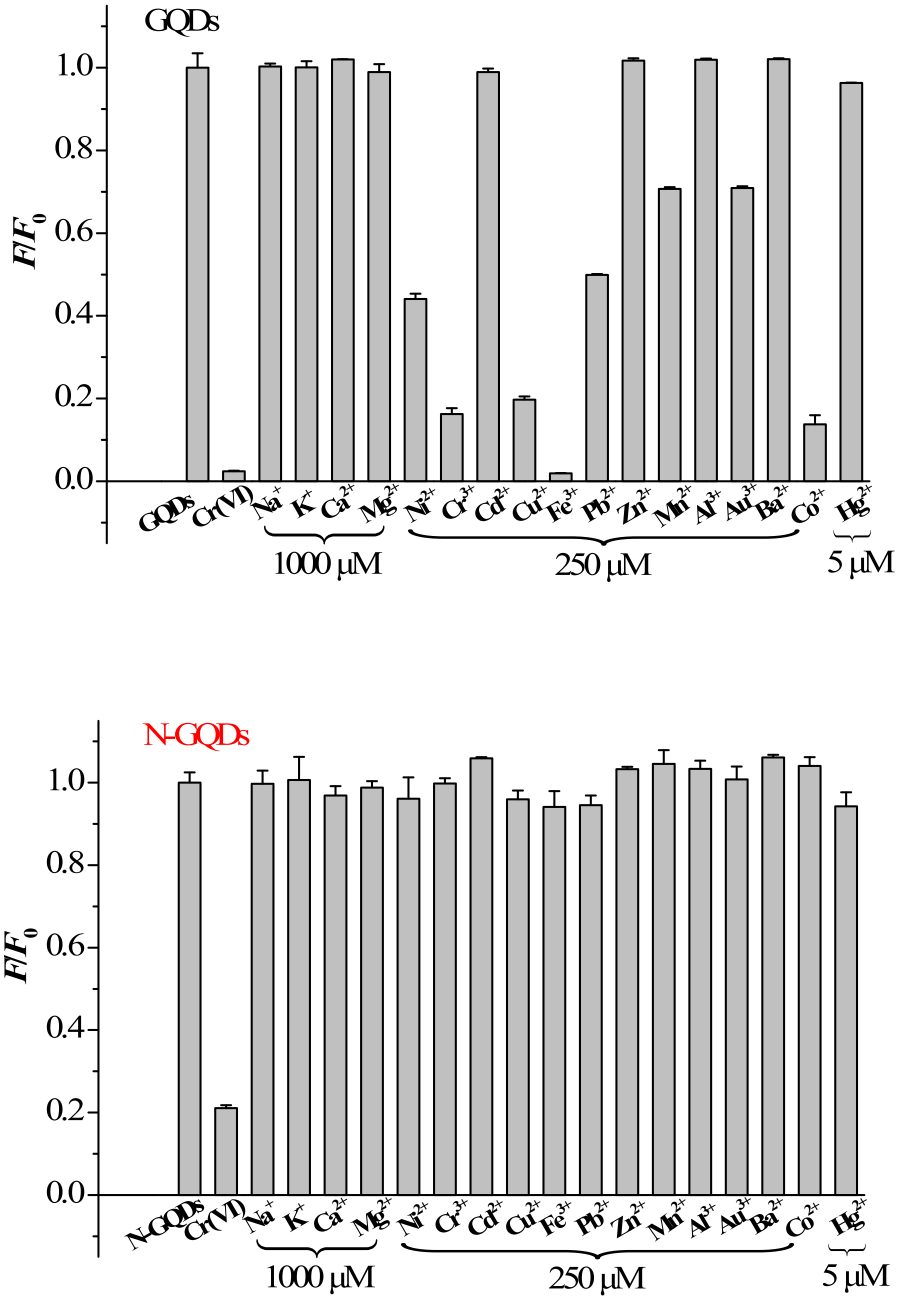

Figure S10. Relative fluorescence intensities (F/F_0 at 430 nm) of the GQDs and N-GQDs solutions after addition of 140 μM Cr(VI) and various other ions at 5 to 1000 μM. The error bars denote standard deviations based on three independent measurements.