Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics

Supplementary Information

A "turn-on" fluorescent sensor for Pb^{2+} based on graphene oxide and G-quadruplex DNA

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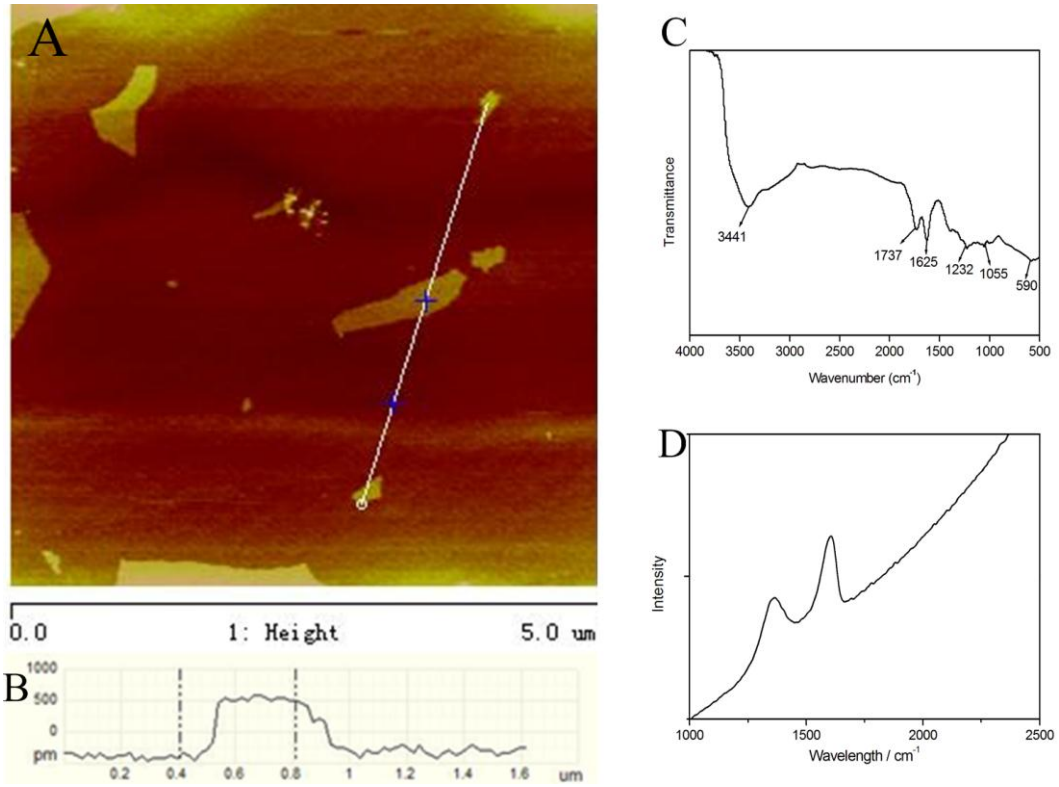

Fig. S1 (A) AFM image of GO, (B) Height profile of GO. (C) FT-IR spectrum of GO. (D) Raman spectra of GO.

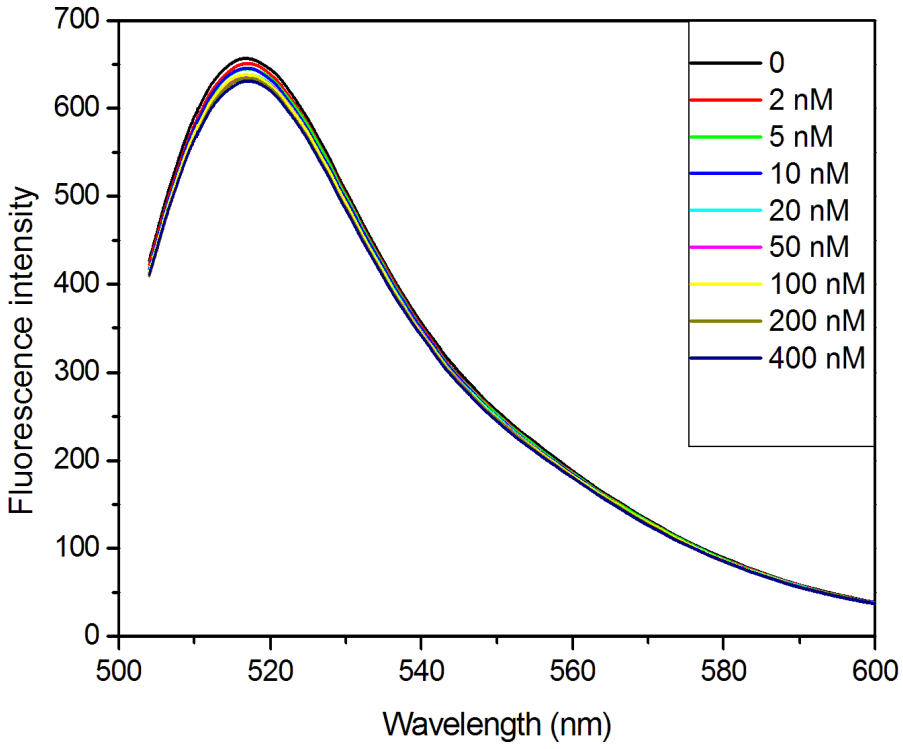

Fig. S2 Fluorescence emission spectra of FAM-labeled TBAA (10 nM) upon incubation with different concentrations of Pb^{2+}.

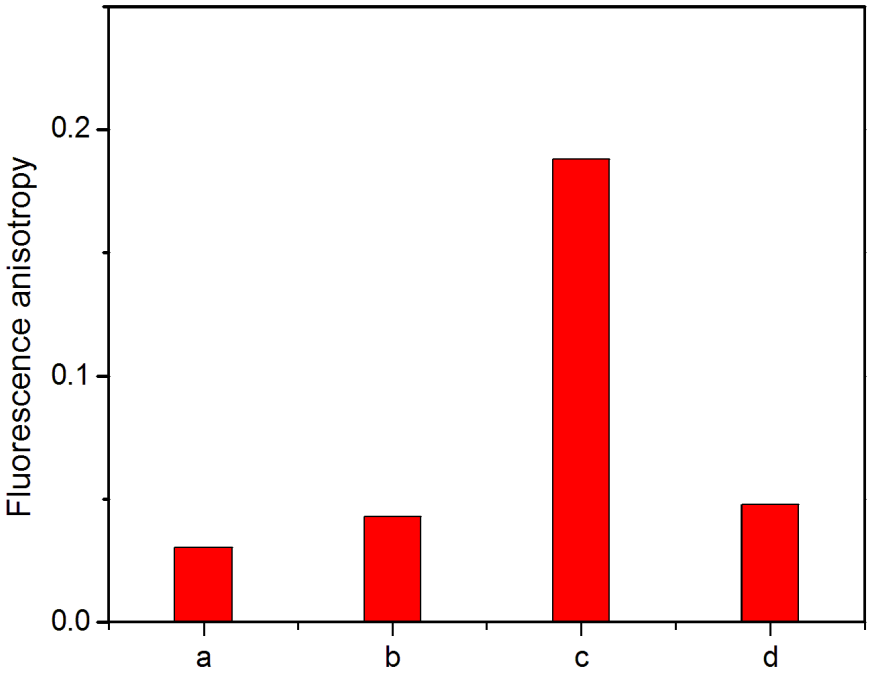

Fig. S3 Changes of the fluorescence anisotropy of (a) TBAA (10 nM), (b) TBAA (10 nM) + Pb^{2+} (100 nM), (c) TBAA (10 nM) + GO (10 μg/mL), (d) TBAA (10 nM) + Pb^{2+} (100 nM) +GO (10 μg/mL).

Table S1: Comparison of fluorescence methods for determination of Pb^{2+} by DNA-based methods

technique and method	interference ions	probe unite	LOD; linear range	real sample	ref
fluorescence	no	G-quadruplex/ ZnPPIX	20 nM; 20 nM–1 μM	No	S1
fluorescence	Hg^{2+}	Double-labeled G-quadruplex	0.3 nM; 0.5 nM -30 nM	soil sample	S2
fluorescence	Hg^{2+}	G-quadruplex/AUR	0.4 nM; 0-1 μM	soil sample	S3
colorimetric/luminescent	Hg^{2+}	G-quadruplex/ABTS	32 nM/1 nM; 10^{-5}-10^{-7} M/$10^{-6.5}$-10^{-9} M	lake water	S4
fluorescence	no	Single-labeled GR-5 DNAzyme/GO	0.3 nM; 1 nM-100 nM	river water	S5
fluorescence	Zn^{2+}, Co^{2+}, Mn^{2+}, Cd^{2+}	Labeled-free 8-17 DNAzyme/PG	10 nM; 10 nM-100 nM	lake water	S6
fluorescence	Zn^{2+}, Co^{2+}, Mn^{2+}, Cd^{2+}	Double-labeled 8-17 DNAzyme	20 nM; 0 nM-500 nM	No	S7
fluorescence	no	Single-labeled G-quadruplex/GO	0.4 nM; 2 nM-50 nM	tap water	this study

ZnPPIX: Zinc protoporphyrin; GO: graphene oxide; PG: Picogreen

Table S2: Recovery experiments of Pb^{2+} in the tap water samples

Tap water	Pb^{2+} spiked (nM)	Pb^{2+} recovered (nM)	Recovery (%)
1	10	$9.5^{a} \pm 0.6^{b}$	95
2	25	$26.2^{a} \pm 2.4^{b}$	104.8
3	50	$49.3^{a} \pm 3.5^{b}$	98.6

[a] Mean values of three determinations. [b] Standard deviation.

Table S3 Analysis Pb^{2+} in the river water samples by the proposed sensor

Pb^{2+} in the dilution solution (nM)	Pb^{2+} detected by our sensor in dilution solution (nM)	Recovery (%)
5	$4.6^{a} \pm 0.3^{b}$	92
20	$21.2^{a} \pm 0.9^{b}$	106
40	$39.3^{a} \pm 2.4^{b}$	98.3

[a] Mean values of three determinations. [b] Standard deviation.

References:

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