Electronic Supplementary Information

A dual-mode colorimetric and fluorometric "light on" sensor for thiocyanate based on fluorescent carbon dots and unmodified gold nanoparticles

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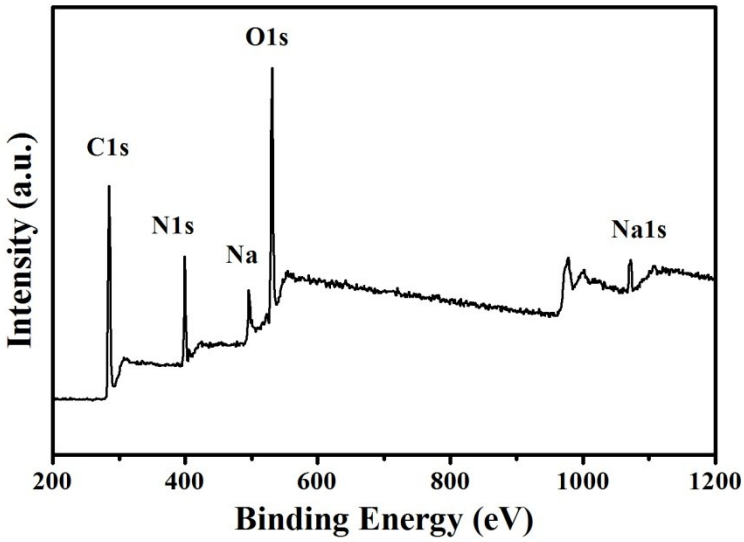

Fig. S1. XPS pattern of the as-prepared CDs.

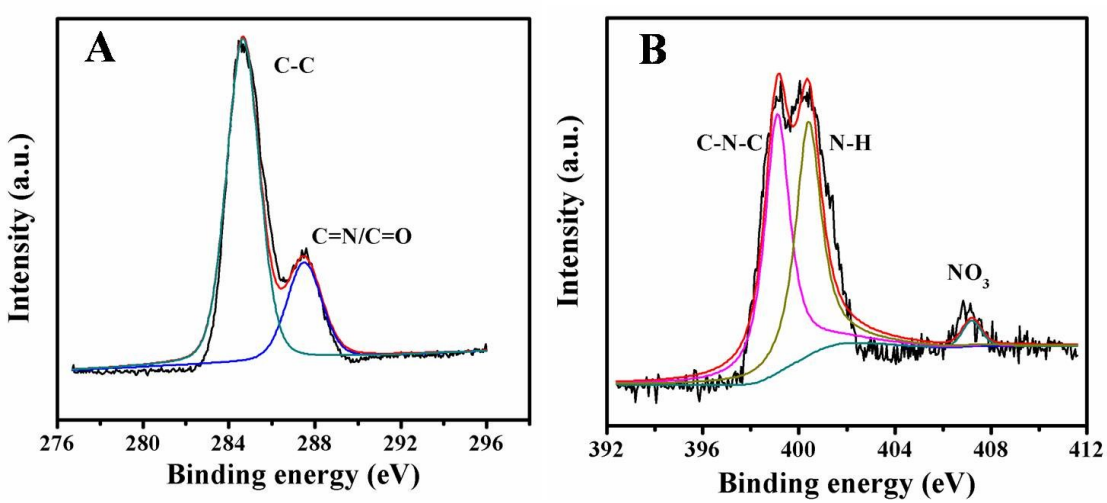

Fig. S2. XPS of CDs. (A) C 1s spectrum. (B) N 1s spectrum .

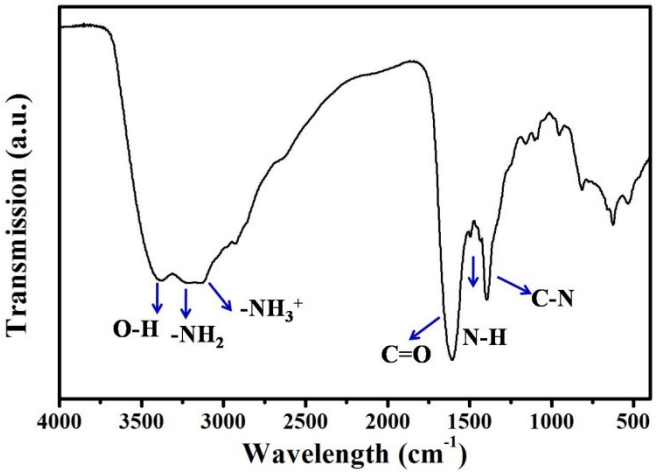

Fig. S3. FTIR spectrum of the as-prepared CDs.

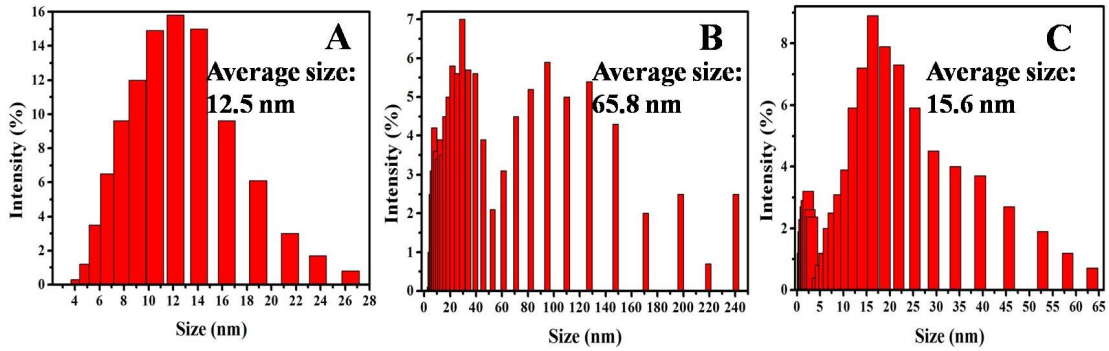

Fig. S4. Particle size distribution measured by DLS. (A) Dispersed AuNPs, (B) aggregated AuNPs+CDs, and (C) AuNPs+SCN^-+CDs.

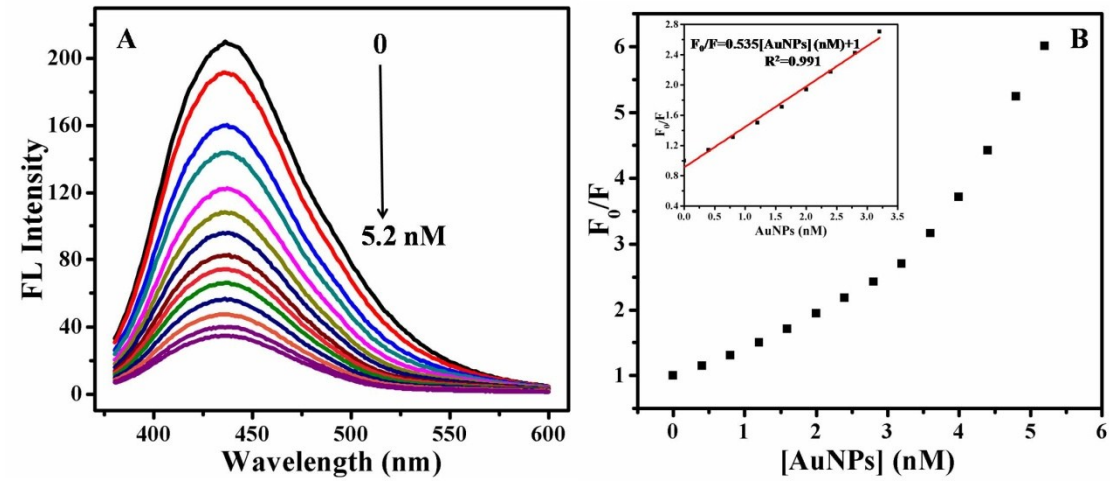

Fig. S5. (A) Fluorescence emission spectra of CDs in the presence of various concentrations of AuNPs in 10 mM PBS buffer (pH=7.0). CDs, 30 μL; AuNPs (from top to bottom): 0, 0.4, 0.8, 1.2, 1.6, 2.0, 2.4, 2.8, 3.2, 3.6, 4.0, 4.4, 4.8 and 5.2 nM, respectively. (B) Plot of the F_0/F value of fluorescence at 438 nm as a function of the concentration of AuNPs. Inset shows the Stern-Volmer plot of CDs quenched by AuNPs.

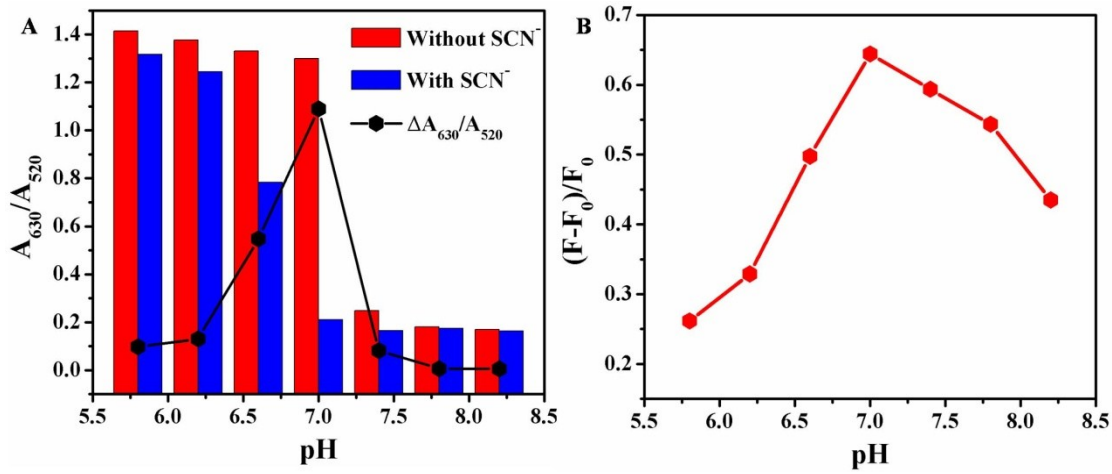

Fig. S6. (A) The absorbance ratio A_{630}/A_{520} and (B) fluorescence enhancement efficiency $(F-F_0)/F_0$ of the proposed assay as a function of various pH values in the absence and presence of SCN^- (5 μM). CDs: 30 μL.

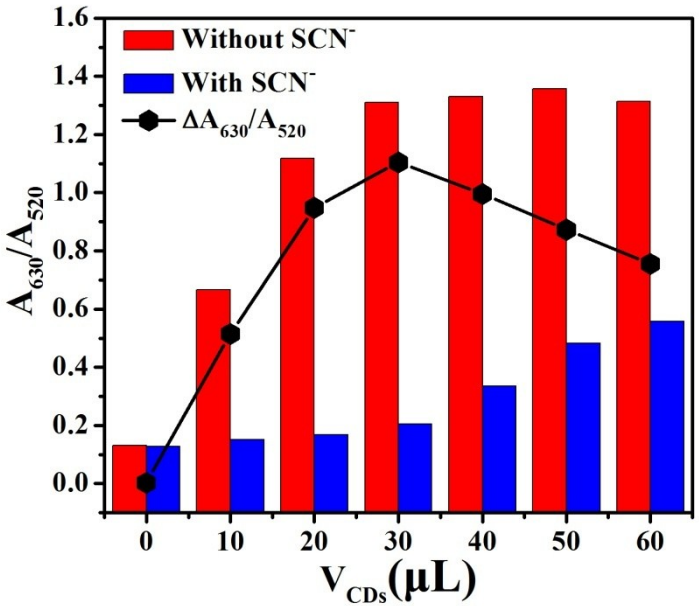

Fig. S7. The absorbance ratio A_{630}/A_{520} as a function of volume of CDs in the absence and presence of SCN^- (5 μM). AuNPs: 3.3 nM, and pH: 7.0.

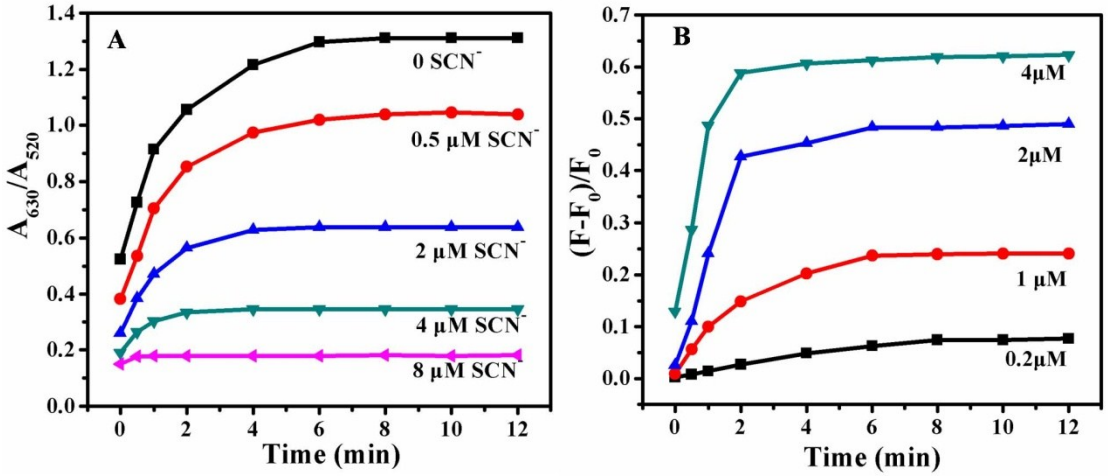

Fig. S8. (A) The absorbance ratio A_{630}/A_{520} and (B) fluorescence enhancement efficiency $(F-F_0)/F_0$ of the proposed assay in the presence of different concentrations of SCN^- as a funciton of time. AuNPs: 3.3 nM, CDs: 30 μL and pH: 7.0.

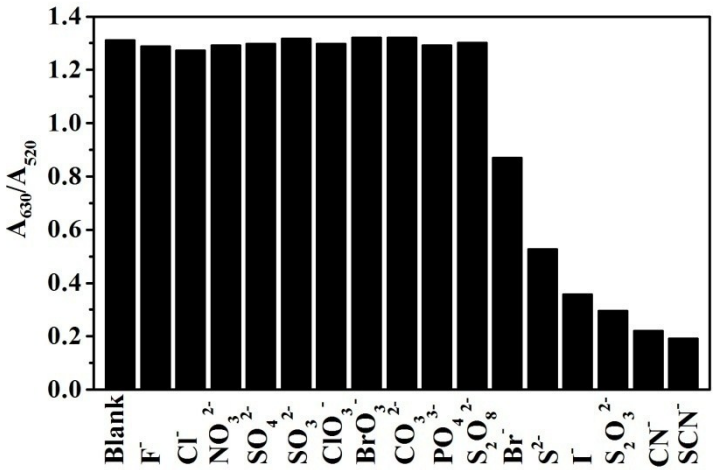

Fig. S9. The A_{630}/A_{520} response of the sensing assay toward different anions. Conditions: 30 μL CDs, 10 mM PBS (pH=7.0), and 100 μM for anions.

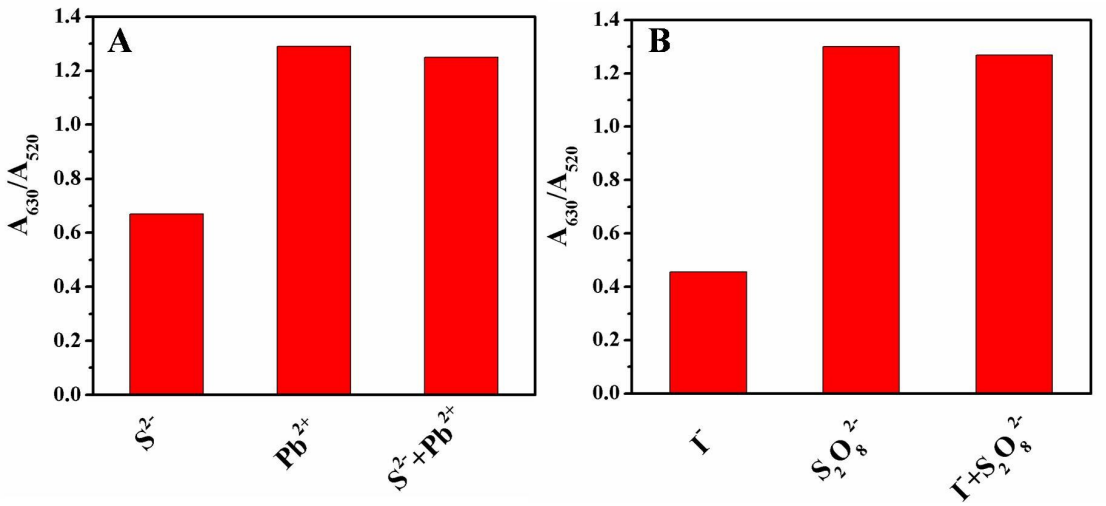

Fig. S10. The A_{630}/A_{520} response of the proposed assay for S^{2-} (A) and I^- (B) in the absence of a masking reagent. The concentration of anions: 20 μM for I^- and S^{2-}, 100 μM for Pb^{2+} and $S_2O_8^{2-}$.

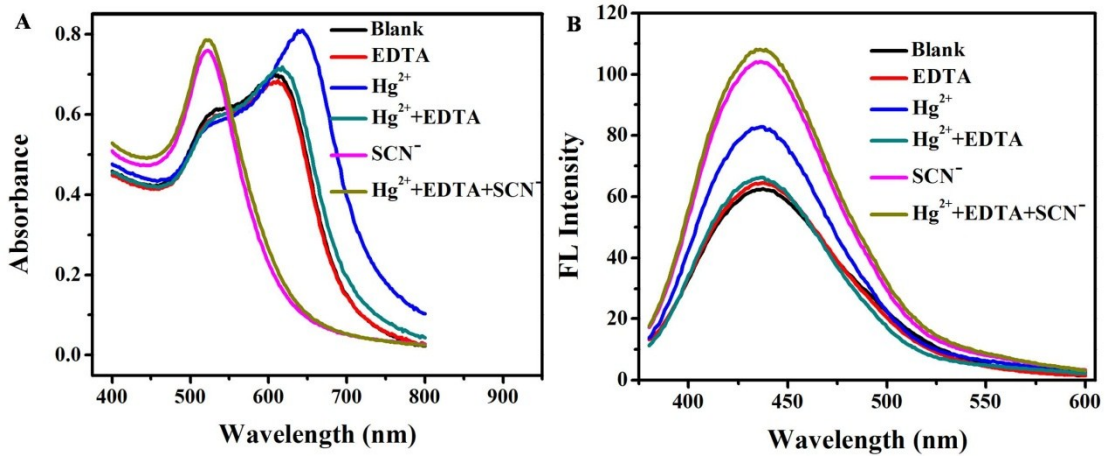

Fig. S11 (A) UV-vis spectra and (B) fluorescence spectra of the proposed system in the presence of different substances. Concentrations: 5 μM for SCN^- , 2 μM for Hg^{2+} and 20 μM for EDTA.

Table S1. Comparison of different optical nanosensors for thiocyanate determination.

Probe	Mode	Linear range	LOD	Time	Remark	Ref.
Tween 20-AuNPs	Colorimetry-"Light off"	0.25-2 μM	0.2 μM	5 min	Possible false signals	15
AuNPs-H_2SO_4	Colorimetry-"Light on"	0.25-2 μM	0.14 μM	5 min	Unpleasant reagent, Single colorimetric readout	16
AuNPs-2N [*a]	Colorimetry-"Light 0n"	0.2-2 μM	0.2 μM	5 min	Laborious surface premodification	17
2',7'-dichlorofluorescein	Fluorimetry-"Light on"	0.017-1 μM	0.017μM	4 h	Time consuming	11
RAT [*b]	Fluorimetry-"Light on"	1.0 -10 μM	0.01μM	—	Complicated synthesis	12
Fluorescein-AuNPs	Fluorimetry-"Light on"	1.0-40 nM	0.09 nM	10 min	Single fluorometric readout	30
CDs-AuNPs	Colorimetry-"Light on"	0.2-2 μM	0.14 μM	6 min	Simplicity, selectivity, and dual-mode readout	This work
	Fluorimetry-"Light on"	0.1-1.6 μM	0.036 μM			

[*a] N, N-dimethyl-1-naphthylamine. [*b] Rhodamine–thiophene conjugate