Supplementary Material

Fluorescent "on-off-on" sensor based on N, S co-doped carbon dots from seaweed (*Sargassum carpophyllum*) for specific detection of Cr(VI) and ascorbic acid

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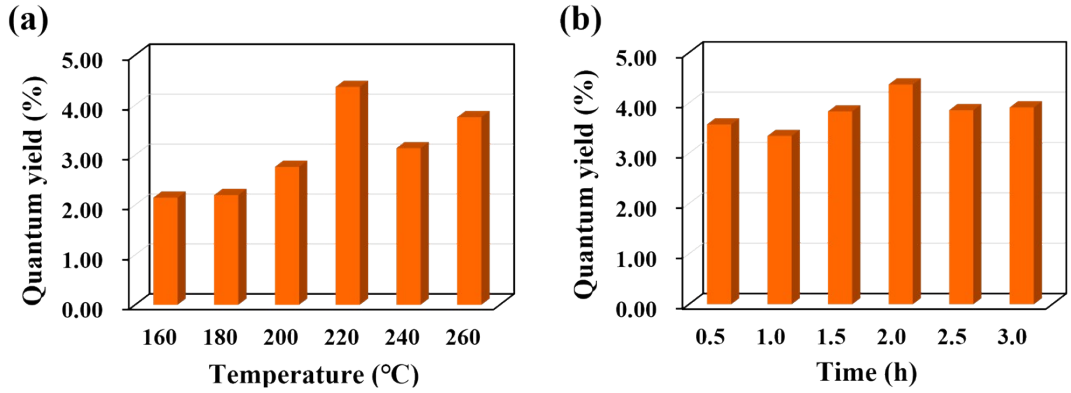

Fig. S1 (a) The effect of temperature on the QY. **(b)** The effect of time on the QY.

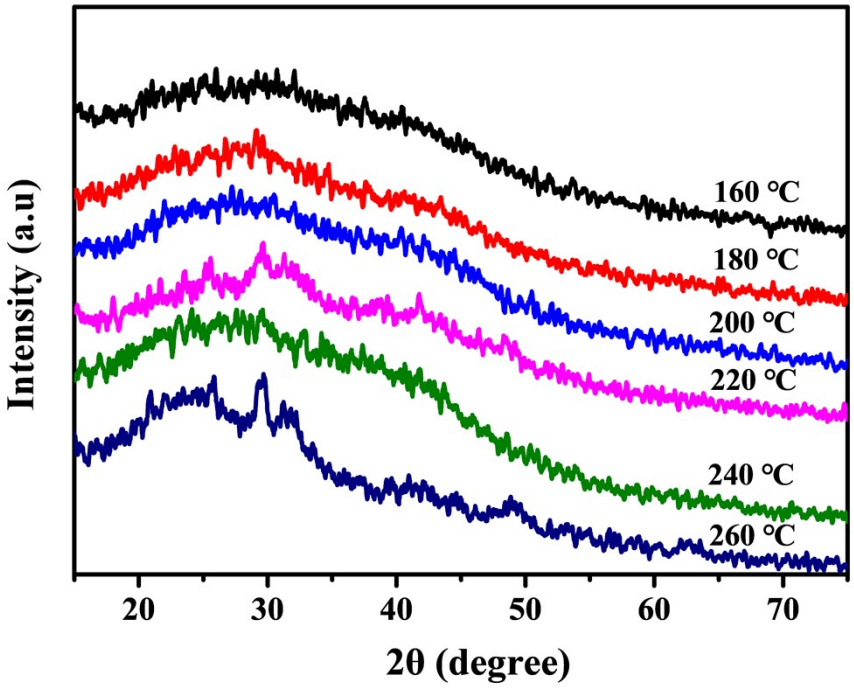

Fig. S2 XRD patterns of N,S-CDs at different temperature.

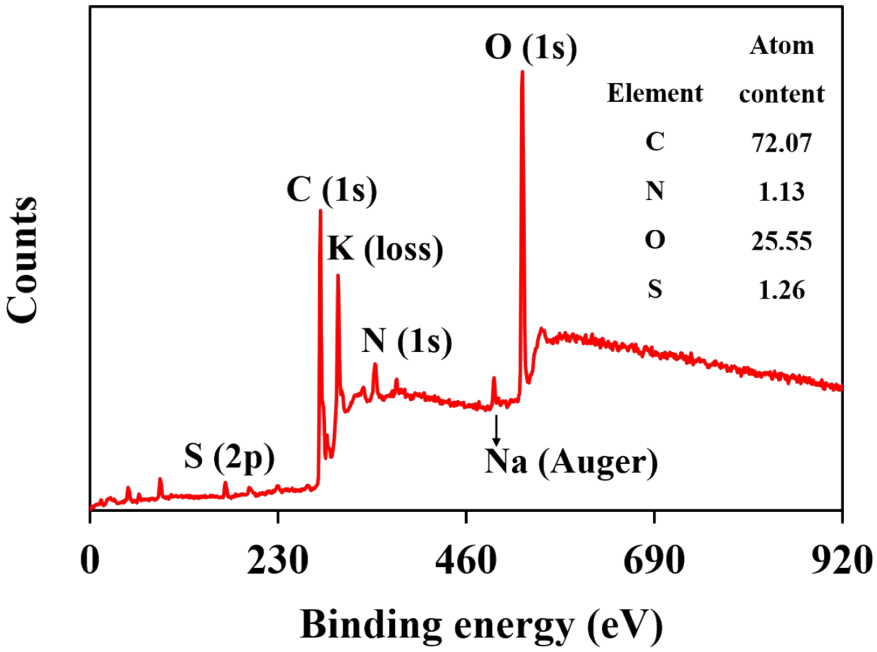

Fig. S3 XPS survey spectrum of N,S-CDs

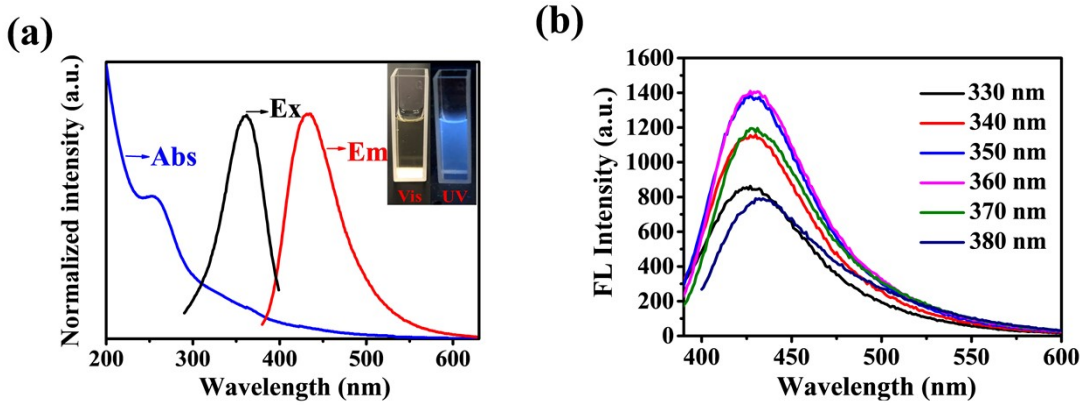

Fig. S4 (a) UV–vis absorption spectrum, excitation FL spectrum (360 nm) and emission FL spectrum (430 nm) of N,S-CDs. **(b)** FL spectra of N,S-CDs at different excitation wavelengths.

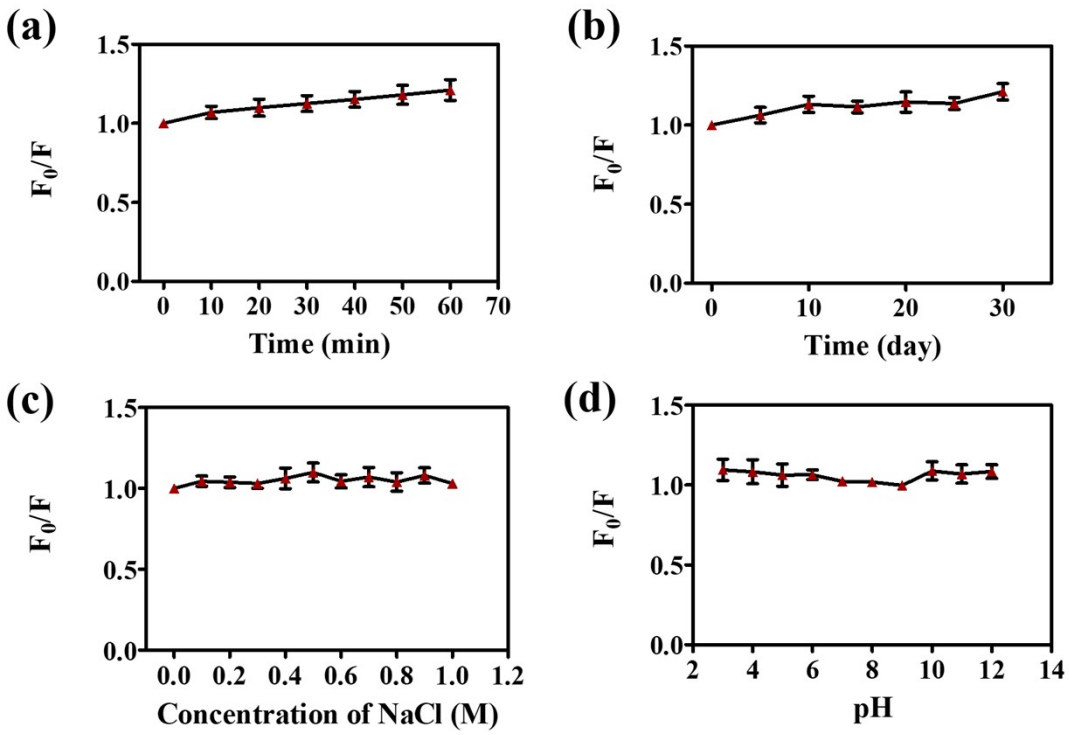

Fig. S5 (a) The photobleaching characteristic of N,S-CDs. **(b)** Effect of storage time (days) on the FL of N,S-CDs. **(c)** Effect of the ion strength on FL of N,S-CDs. **(d)** Effect of the pH on FL of N,S-CDs.

Table S1 Comparison of different reported methods for Cr(VI) detection

Methods	Response time	Solvent	detection system	LOD (μM)	Linear range (μM)	Reference
CDs fluorescence probe	20 min	PBS solution (pH 5.0)	Fluorescence spectra	2.10	2-180	[1]
Pb(II)-organic framework	-	H_2O	Luminescence spectra	13.2	0-1000	[2]
Metal organic frameworks	5	deionized water	Photoluminescence Spectra	41	0-500	[3]
PVC-membrane electrode	<30 s	citric acid/sodium citrate buffer	Ion-selective electrode	2.5	$5.2\text{-}1.0\times10^5$	[4]
MR-CDs	10 min	HCl-KCl solution (pH 2.5)	Fluorescence spectra	0.02	0.2-50	[5]
N,S-CDs	5 min	deionized water	Fluorescence spectra	1.04	0-120	This work

Table S2 Comparison of different reported methods for Cr(VI) and AA detection

Methods	Origins	Linear range of Cr(VI) (μM)	LOD of Cr(VI) (μM)	Linear range of AA (μM)	LOD of AA (μM)	Reference
N,S-CDs	ammonium citrate and cysteamine hydrochloride	0.35-126.0	0.11	0.57-264.0	0.17	[6]
N-CDs	citric acid and glutamic acid	0.01–250	5 nM	1-750	0.3	[7]
N-CDs	glucosamine and ethylenediamine	0.5–125	0.08	0.25-175	0.15	[8]
PNCQDs	glucose, 1,2-ethylenediamine and concentrated H_3PO_4	1.5-30	23 nM	5.0-200	1.35	[9]
S,N-CDs	glucose, 1,2-ethylenediamine and concentrated H_2SO_4	0.065-198	0.56 nM	6.6-892	76 nM	[10]
N,S-CDs	seaweed (*Sargassum carpophyllum*)	0-120	1.04	320-650	2.99	This work

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