

Sulfur quantum dot-based "ON-OFF-ON" fluorescence platform for detection and bioimaging of Cr(VI) and ascorbic acid in complex environmental matrices and biological tissues

Mengke Xia<sup>1</sup>, He Mei<sup>2</sup>, Qihui Qian<sup>1</sup>, Randy A. Dahlgren<sup>2</sup>, Ming Gao<sup>1\*</sup>, Xuedong Wang<sup>1#</sup>

<sup>1</sup> School of Environmental Science and Engineering, Suzhou University of Science and Technology, Suzhou 215009, China

<sup>2</sup> College of Public Health and Management, Wenzhou Medical University, Wenzhou 325035, China

#Corresponding author: Xuedong Wang, Email:zjuwxd@163.com, Phone: +86-5126809 5950.

Fax: +86-512-6809 5950

\*Co-corresponding author: Ming Gao, Email:gaoming@usts.edu.cn

Submitted to *RSC Advances*

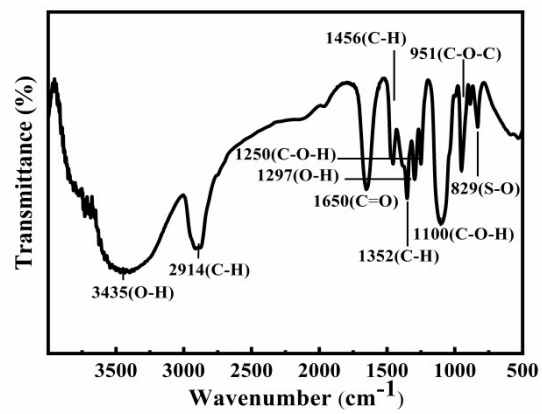
March 05, 2021

**Table S1.** Comparison of SQDs-based “ON-OFF” method with previously reported methods for Cr(VI) detection

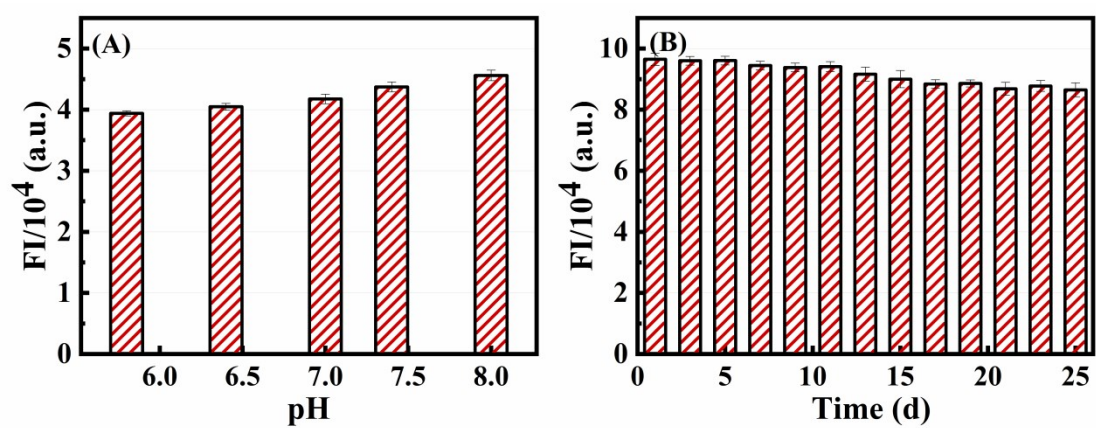
Methods	Linear range ( $\mu\text{M}$ )	Detection limit ( $\mu\text{M}$ )	Ref.
CD fluorescence sensor	2-180	2.10	1
Dual emissive carbon dots	2-300	0.40	2
Cobalt(II)-doped carbon dots	5-125	1.17	3
GQD-modified membranes	1-500	0.19	4
Au-Ag-Pt three material electrodes	2-200	0.90	5
SQD-based “ON-OFF”	5-1500	1.50	This work

**Table S2.** Comparison of SQDs-based “ON-OFF” method with previously reported methods for AA detection

Methods	Linear range ( $\mu\text{M}$ )	Detection limit ( $\mu\text{M}$ )	Ref.
CdTe quantum dots	10-250	1.30	6
AuNCs-PbS quantum dots	3.0-40	1.50	7
P, N-CDs quantum dots	5.0-200	1.35	8
N, S co-doped carbon quantum dots/ $\text{Fe}^{3+}$	10-200	4.96	9
$\text{LaF}_3\text{:Ce}$ , Tb nanoparticles	8-100	2.40	10
Carbon dot nanosensor	30-100	1.20	11
SQD/Cr(VI)-based “ON-OFF-ON”	10-5500	3.00	This work

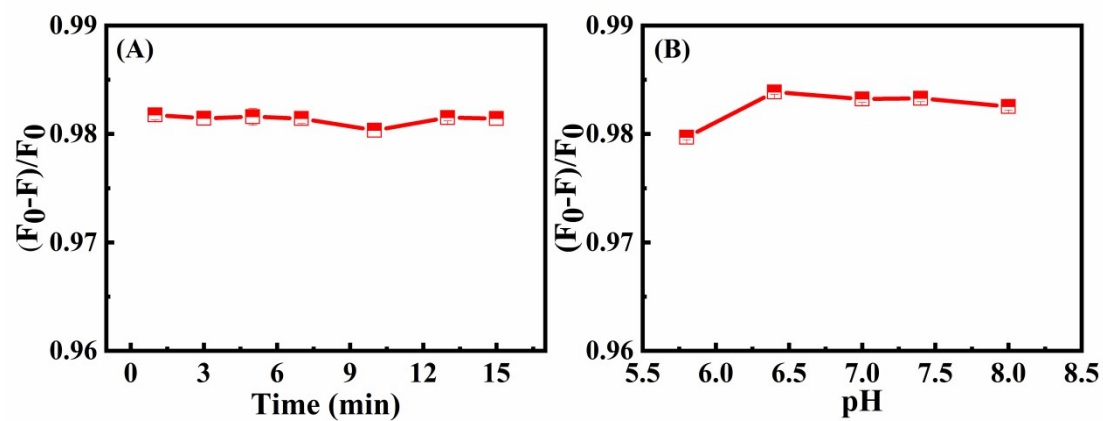


**Fig. S1.** FT-IR of SQDs



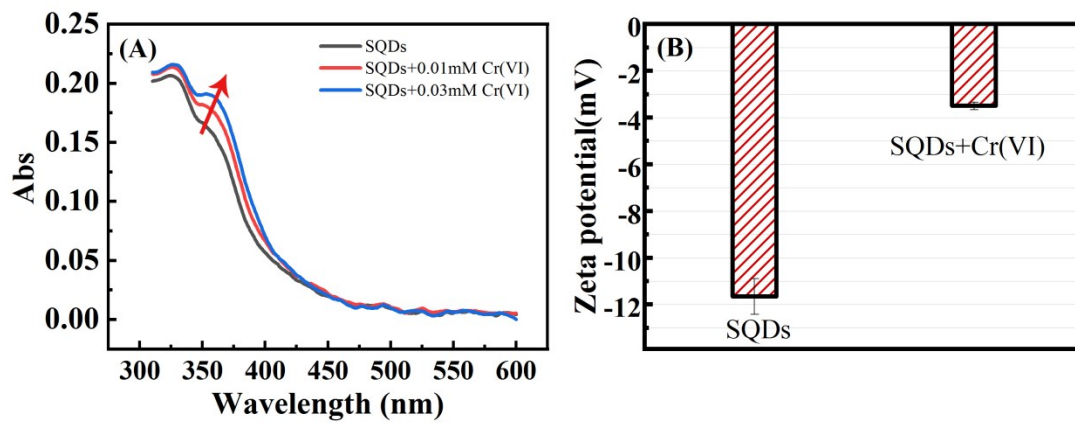
**Fig. S2.** (A) Effects of pH on the FIs of SQDs. (B) FI stability of SQDs tested

**Note:** (1) FI indicates abbreviation for fluorescence intensity. (2) All values were reported as mean  $\pm$ std (n = 3).



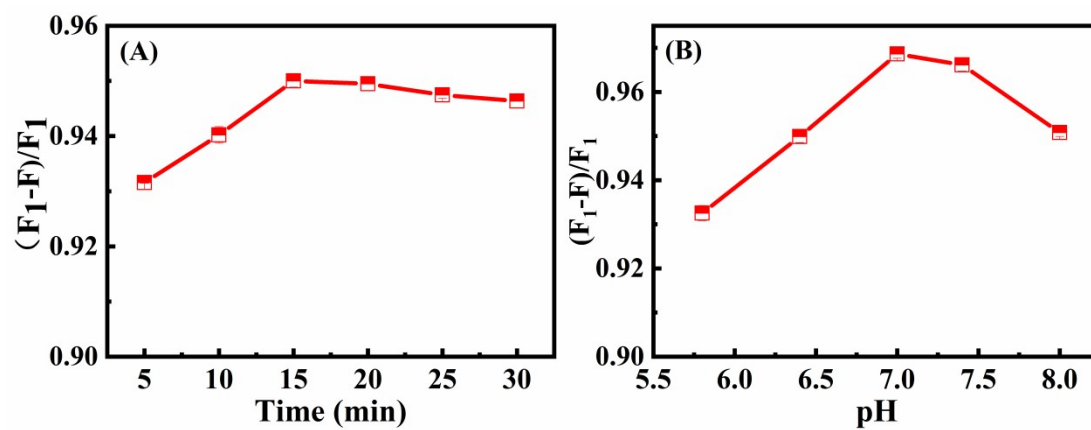
**Fig. S3.** (A) Effects of reaction time on the FIs of the SQDs/Cr(VI) system. (B) Effects of pH on the FIs of SQDs and SQDs/Cr(VI) systems

**Note:** (1) Cr(VI) concentration was 25 mM in the SQDs/Cr(VI) system. (2) All values were reported as mean  $\pm$ std (n = 4).



**Fig. S4.** (A) UV-Vis spectrum of SQDs in the presence of different concentrations Cr(VI); (B)

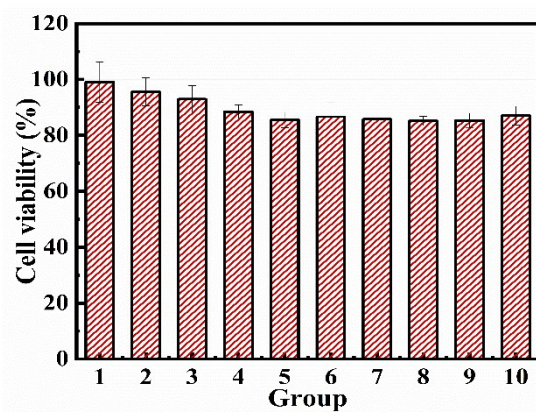
Zeta potential of SQDs and SQDs/Cr(VI) **Note:** Cr(VI) concentrations was 25 mM



**Fig. S5.** (A) Effects of reaction time on the FIs of the SQDs/Cr(VI)/AA system. (B) Effects of pH on the FIs of the SQDs and SQDs/Cr(VI)/AA systems

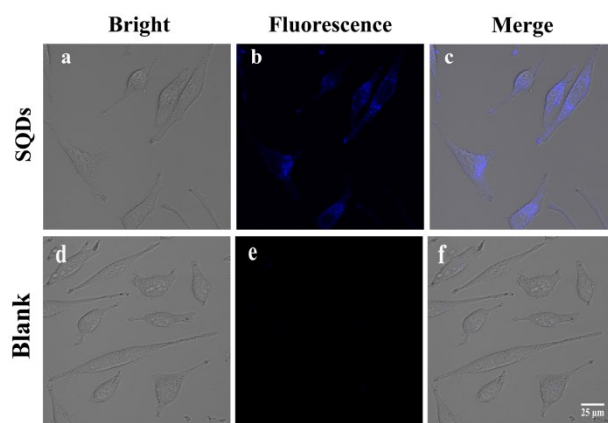
**Note:** (1) Cr(VI) and AA concentrations were 25 and 50 mM, respectively. (2) All values were reported as mean  $\pm$ std (n = 4).





**Fig. S6.** Effects of the SQDs amount on HeLa cell viability

**Notes:** (1) Incubation time of HeLa cells was 24 h after dialysis with fortified volumes of 0, 5, 10, 20, 24, 28, 32, 36, 40 and 50  $\mu\text{L}$  for groups 1-10, respectively, in a total constant volume of 200  $\mu\text{L}$ . (2) All values were reported as mean  $\pm$ std (n = 8).



**Fig. S7.** Fluorescence imaging of HeLa cell with (a-c) and without SQDs (d-f)

## References

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