

Supporting Information

Manipulating time dependent size distribution of sulfur quantum dots and their fluorescent sensing for ascorbic acid

Zitong Wei^{†,a}, Wenyi Lu^{†,a}, Caiwen Pan^a, Jiping Ni^a, Haiyun Zhao^b, Guoyong Huang^{,a}, Chunxia Wang^{*, a}*

^a State Key Laboratory of Heavy Oil Processing, College of New Energy and Materials, China University of Petroleum (Beijing), Beijing 102249, China

^b China Shandong Institute for Food and Drug Control, Jinan, 250101, China

*Correspondence to: E-mail: cxwang@iccas.ac.cn; huanggy@cup.edu.cn.

[†] These two authors contribute equally.

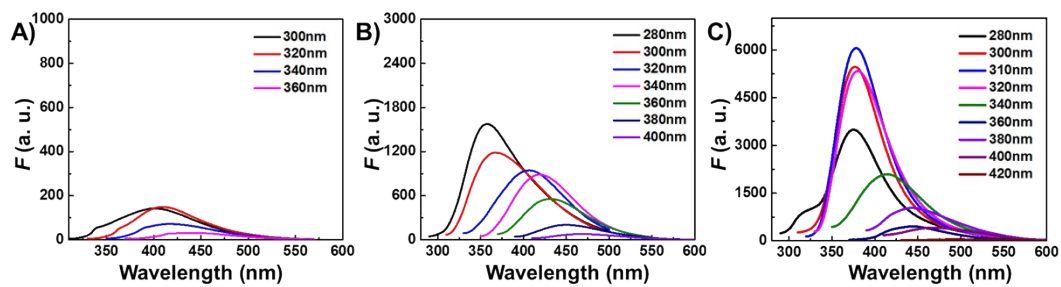


Fig. S1. Photoluminescence spectra of the SQDs prepared from different solvents (A) NaOH, (B) water, (C) ethanol under same conditions (80 mg sulfur powder, 3.0 mL H₂O₂, 1.5 mL PEG). Temperature: 220 °C

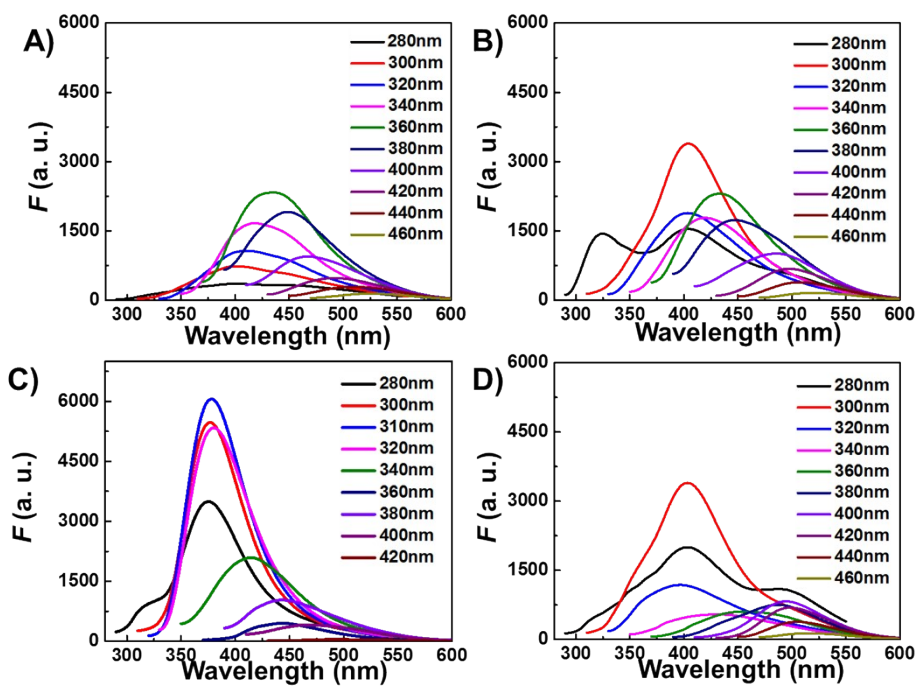


Fig S2. PL spectra of SQDs-36 sample obtained from the reaction using different amount of H_2O_2 . (A) 0 mL H_2O_2 (B) 1.5 mL H_2O_2 (C) 3.0 mL H_2O_2 (D) 5.0 mL H_2O_2 Other condition: 80 mg sulfur powders + 1.5 mL PEG-400 + 30 mL ethanol, temperature: 220 °C

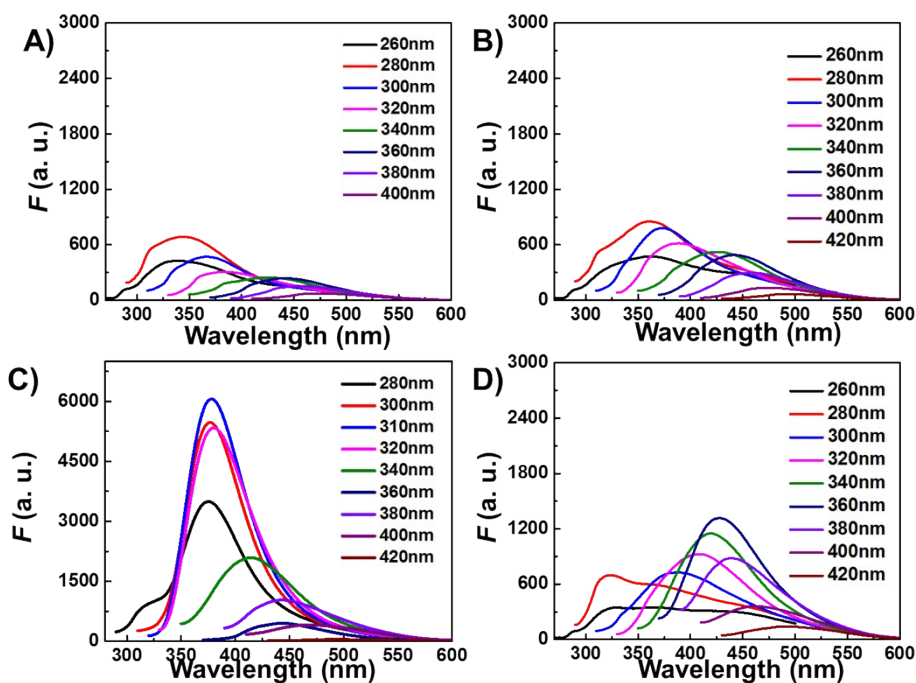


Fig S3. PL spectra of SQDs-36 sample obtained from the reaction using different amount of PEG-400. (A) 0 mL PEG-400 (B) 0.5 mL PEG-400 (C) 1.5 mL PEG-400 (D) 3.0 mL PEG-400. Other condition: 80 mg sulfur powders + 3.0 mL H₂O₂ + 30 mL ethanol, temperature: 220 °C.

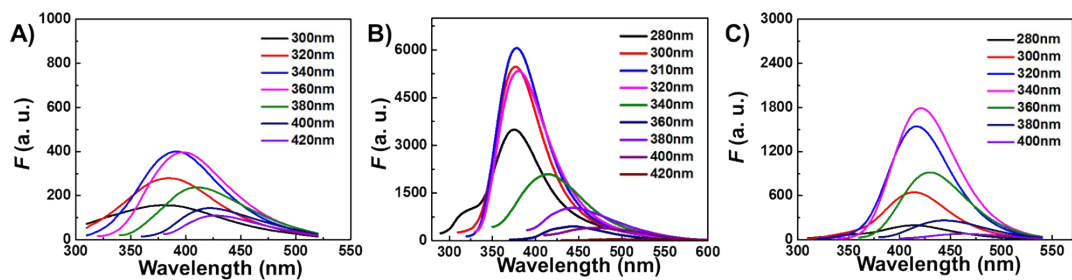


Fig S4. PL spectra of SQDs-36 obtained from the reaction using different amount of sulfur powders. (A) 40 mg sulfur powders (B) 80 mg sulfur powders (C) 120 mg sulfur powders. Other condition: 1.5 mL PEG-400 + 3.0 mL H₂O₂ + 30 mL ethanol, temperature: 220 °C.

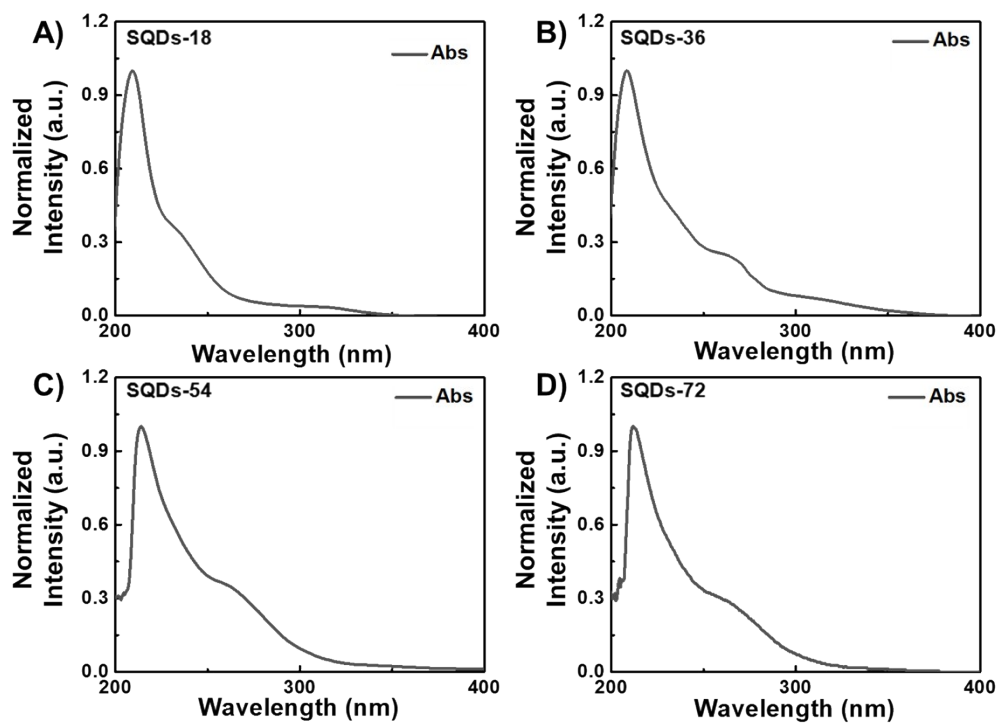


Fig S5. Normalized absorption spectra of (A) SQDs-18, (B) SQDs-36, (C) SQDs-54, (D) SQDs-72.

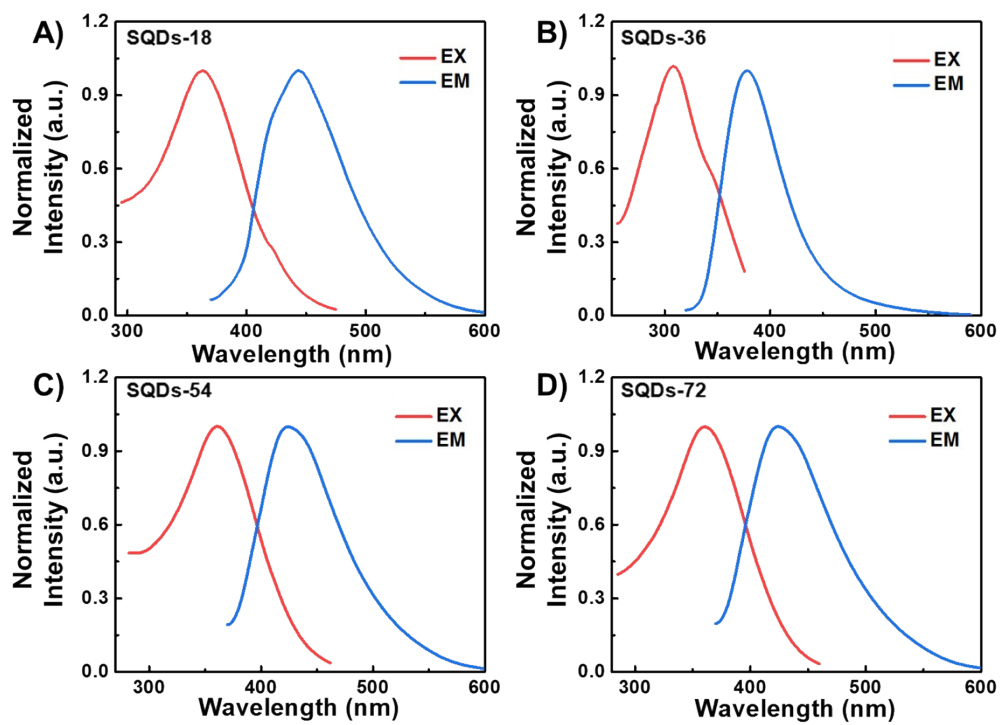


Fig S6. Normalized excitation (Ex., red curve), and emission (Em., blue curve) spectra of (A) SQDs-18, (B) SQDs-36, (C) SQDs-54, (D) SQDs-72.

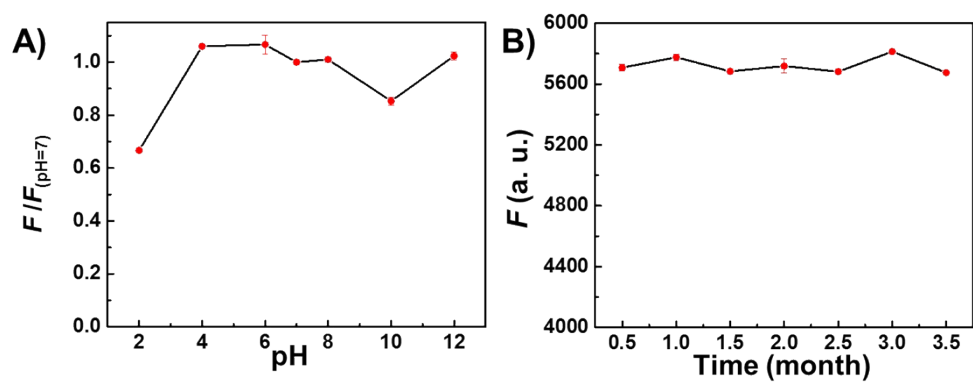


Fig S7. (A) $F/F_{(pH=7)}$ of SQDs-36 when pH switch from 2 to 12. (B) Time dependent fluorescence of SQDs-36.

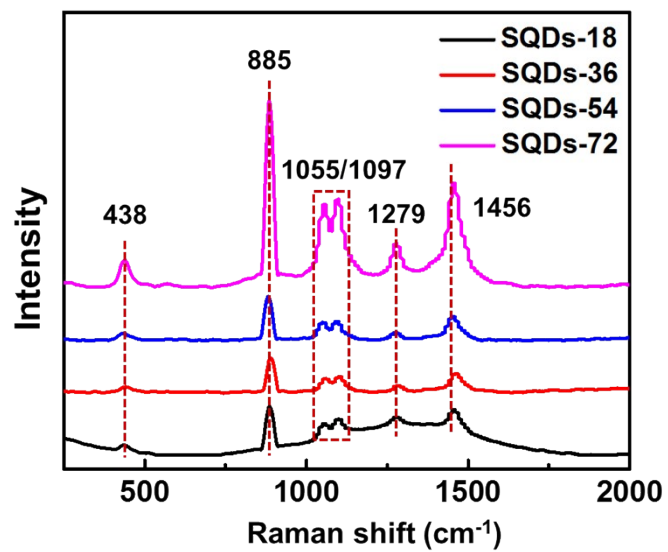


Fig. S8. Raman spectrum of SQDs-18 (black curve), SQDs-36 (red curve), SQDs-54 (blue curve) and SQDs-72 (pink curve).

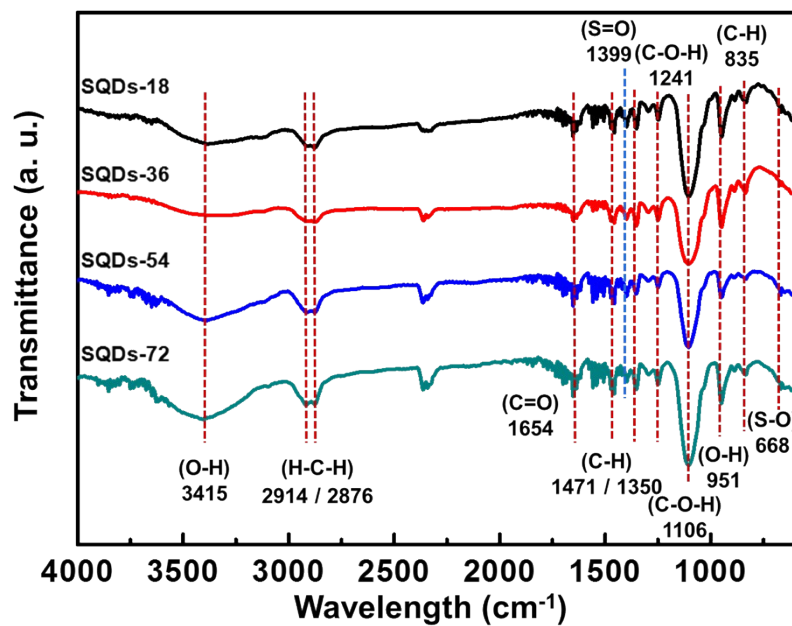


Fig S9. FT-IR of SQDs-18 (black curve), SQDs-36 (red curve), SQDs-54 (blue curve) and SQDs-72 (green curve).

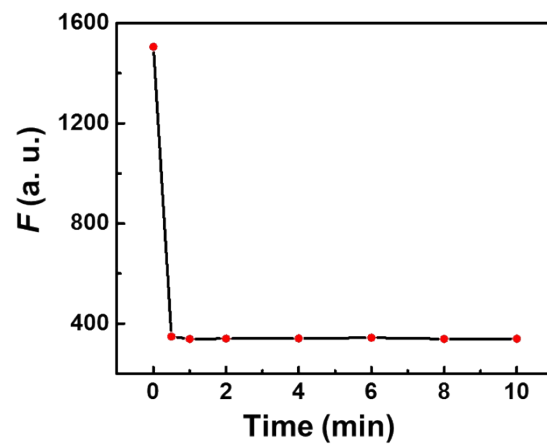


Fig S10. PL stability of SQDs-72 towards CoOOH nanosheets.

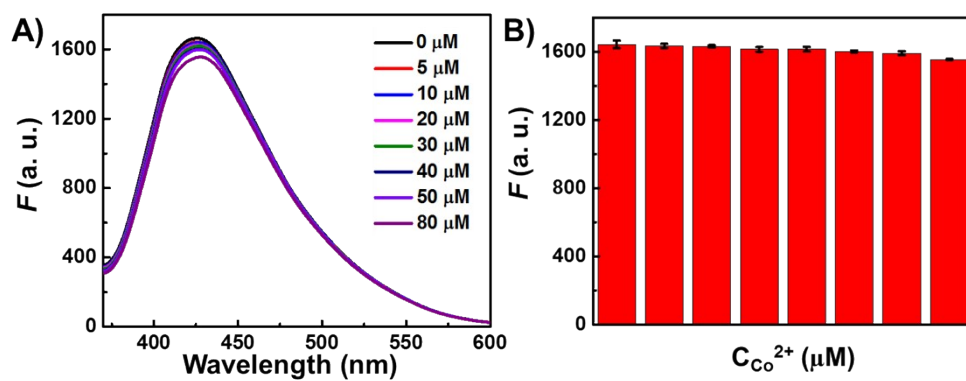


Fig S11. (A) PL property and (B) column of SQDs versus the concentration of CoCl_2 (0, 5, 10, 20, 30, 40, 50, and 80 μM). Excitation: 360 nm.

Table S1. Absorption band of SQDs samples at different reaction times.

Reaction Time	band I	band II	band III
18 h	208 nm	240 nm	318 nm
36 h	209 nm	268 nm	312 nm
54 h	213 nm	265 nm	-
72 h	213 nm	264 nm	-

Table S2. The content of atomic sulphur and oxidized sulphur species of S₂p for different times.

Reaction times (h)	18 h	36 h	54 h	72 h
atomic sulphur	36%	23.3%	21.5%	34.4%
oxidized sulphur species	64%	76.7%	78.5%	65.3%