

# **Cellulose Carbon Quantum Dots Decorated CdS Nanocatalyst for Enhanced Visible-Light Photocatalytic Hydrogen Evolution**

Zijing Wang<sup>1</sup>, Rahil Changotra<sup>1</sup>, Guofa Dong<sup>2</sup>  
Jie Yang<sup>3\*</sup>, Quan Sophia He<sup>1\*</sup>

<sup>1</sup> Department of Engineering, Faculty of Agriculture, Dalhousie University, Truro, NS, B2N 5E3

<sup>2</sup> Fujian Key Laboratory of Functional Marine Sensing Materials, College of Materials and  
Chemical Engineering, Minjiang University, Fuzhou, China

<sup>3</sup> Institute of Oceanography, College of Geography and Oceanography, Minjiang University,  
Fuzhou, China

\* Corresponding authors: Dr. Quan Sophia He, [quan.he@dal.ca](mailto:quan.he@dal.ca); Dr. Jie Yang,  
[jie.yang@mju.edu.cn](mailto:jie.yang@mju.edu.cn)

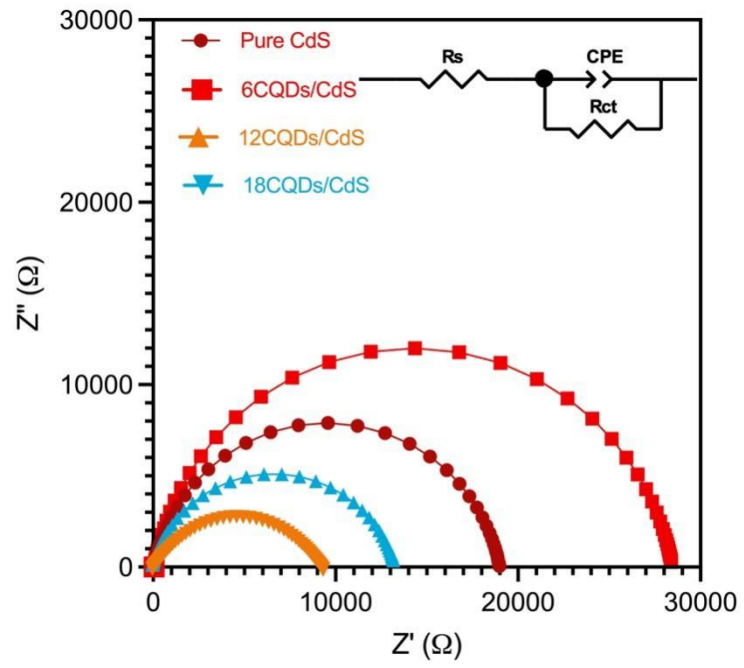
**Table S1.** Comparative data of CdS based photocatalysts for hydrogen generation

Catalysts	Sacrificial agent	HER ( $\mu\text{mol/g/h}$ )	Refs.
Ag <sub>2</sub> S/CdS-pt	0.35 M Na <sub>2</sub> S and 0.25 M Na <sub>2</sub> SO <sub>3</sub>	870	Shen et al., (2010)
C-dot@CdS-6	0.35 M Na <sub>2</sub> S and 0.25 M Na <sub>2</sub> SO <sub>3</sub>	1582	Smrithi, Kottam, Narula, et al., (2022)
NCQDs/CdS	10 mL Latic acid	2306	Xue et al., (2019)
Au-CdS/TiO <sub>2</sub>	0.35 M Na <sub>2</sub> S and 0.25 M Na <sub>2</sub> SO <sub>3</sub>	1970	Fang et al., (2013)
CdS/MoS <sub>2</sub>	10 mL Latic acid	1984	Chen et al., (2015)
CdS/MoP	10 mL Latic acid	1472	Yin et al., (2016)
CdS/In <sub>2</sub> O <sub>3</sub> /Pt	10 mL Latic acid	1032	Pan et al., (2014)
CdS@Nb <sub>2</sub> O <sub>5</sub> /Nb <sub>2</sub> CTx	Latic acid, triethanolamine and glycerol (20 vol%)	2715	Chen et al., (2023)
CdS/Zn-CrLDH	0.35 M Na <sub>2</sub> S and 0.25 M Na <sub>2</sub> SO <sub>3</sub>	1560	Jang Mee Lee et al., (2014)
Cellulose CQDs/CdS	0.35 M Na <sub>2</sub> S and 0.25 M Na <sub>2</sub> SO <sub>3</sub>	2427	This work

Notes: Nb<sub>2</sub>CTx, LDH denote niobium carbide MXene and layered double hydroxide, respectively.

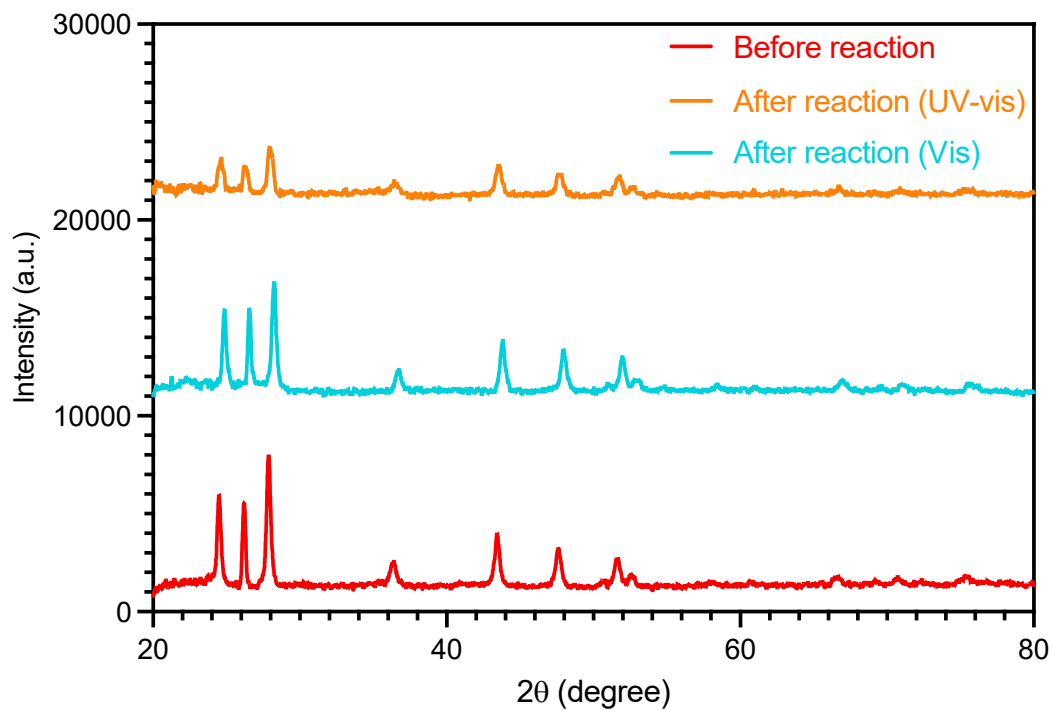
**Table.S2.** Nyquist plots fitting parameters and charge carrier density for CdS and 12CQDs/CdS.

Photoanode	$R_s$ ( $\Omega$ )	$R_{ct}$ ( $K\Omega$ )	CPE ( $F \cdot s^{n-1}$ )
CdS	13.11	17.81	$7.5429 \cdot 10^{-5}$
12CQDs/CdS	12.34	12.65	$2.2516 \cdot 10^{-6}$

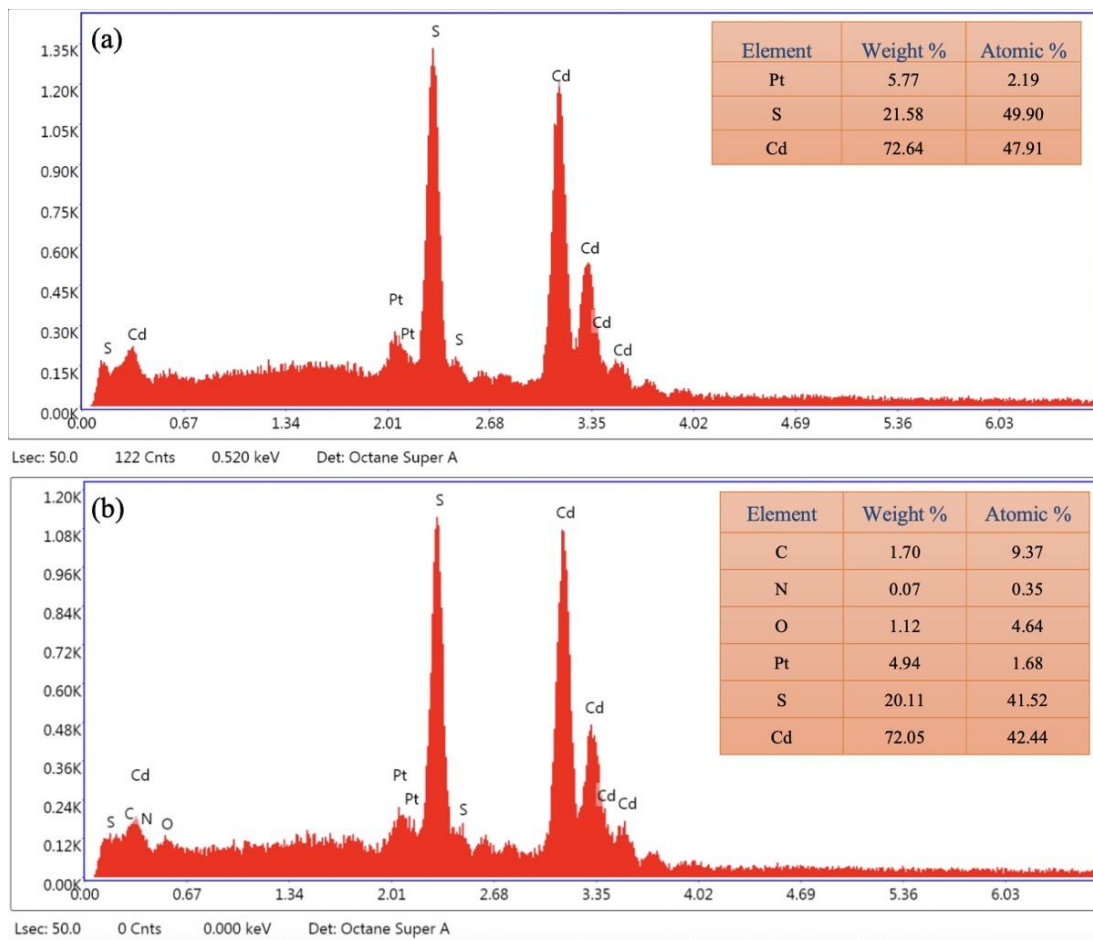


3

**Fig. S3.** Fitted Nyquist plot and corresponding equivalent circuit diagram



**Fig S2.** XRD of 12CQDs/CdS of before reaction, after reaction under vis light irradiation, and after reaction under UV-vis irradiation.  
light irradiation, and after reaction under UV-vis irradiation.



**Fig. S1.** EDS spectra of (a) pure CdS, and (b) 12CQDs/CdS.