Supplementary information

g-C_3N_4@TiO_2 photoanodes for high-efficiency QDSSCs: improved electron transfer and photochemical stability

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Table. S1. Comparisons of present photovoltaic values in this study with other reports of similar Photoanode

Photoanode	*PCE %*	*Jsc* (mA/cm²)	*Voc* (V)	*FF*	Year	Ref
TiO_2 film	6.1	14.8	0.628	0.54	2023	1
TiO_2 nanoparticle/nanorod	4.42	15.48	0.623	0.46	2017	2
TiO_2 film	6.7	22.93	0.559	0.52	2021	3
TiO_2@MWCNT	6.3	18.00	0.63	0.56	2024	4
TiO_2 film	5.7	18.31	0.576	0.54	2023	5

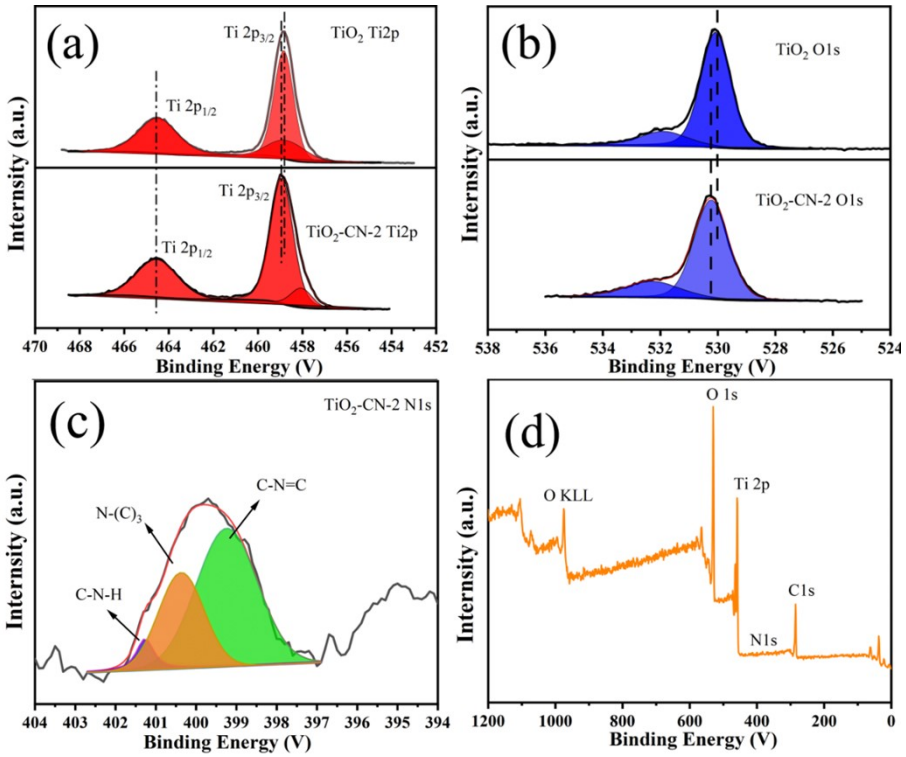

Fig.S1 High-resolution XPS spectra of (a) TiO_2 and TiO_2-CN-2, (b) O 1s of TiO_2 and TiO_2-CN-2, (c) N 1s of TiO_2-CN-2, and (d) high-resolution XPS spectra of TiO_2-CN-2

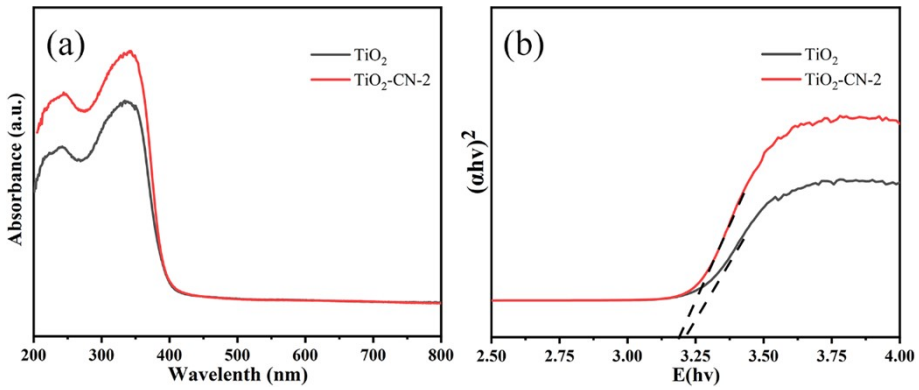

Fig.S2 UV-Vis diagram of (a)TiO_2 and (b)TiO_2-CN-2; Band gap diagram of (b)TiO_2 and (b)TiO_2-CN-2

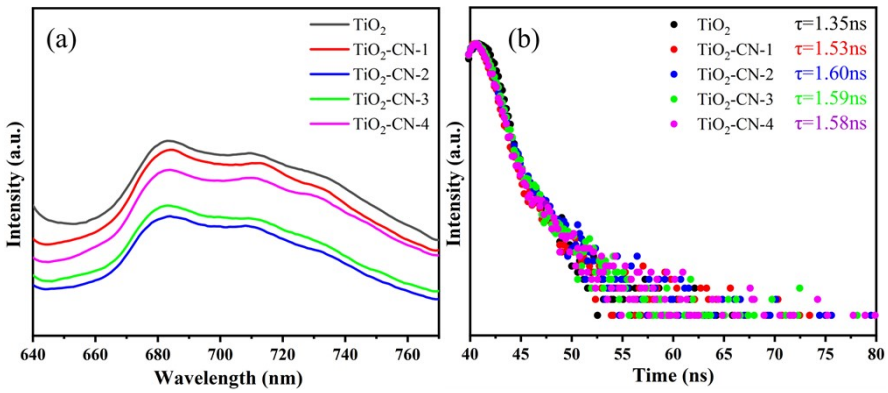

Fig.S3 (a)PL spectrum and (b)Time-resolved PL spectrum of TiO_2, TiO_2-CN-1, TiO_2-CN-2, TiO_2-CN-3 and TiO_2-CN-4

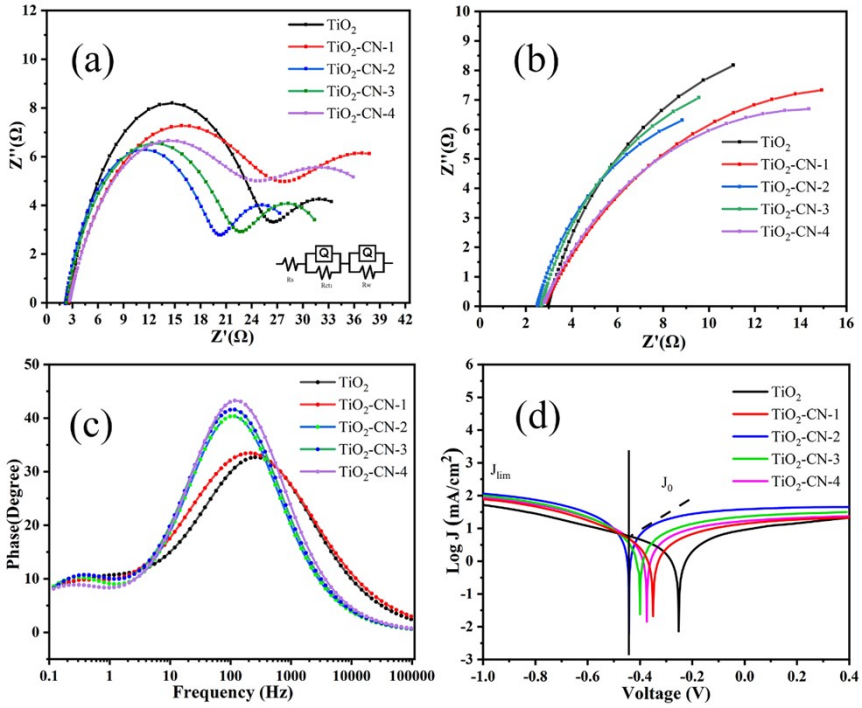

Fig. S4 QDSSCs corresponding to different optical anodes are (a) Nyquist curves, (b) partial amplification of Nyquist curves, (c)Bode phase curves, and (d) Tafel curves

Table.S2 EIS and other performance parameters of QDSSCs corresponding to different optical anodes

Photoanode material	*Rs* (Ω)	*Rct* (Ω)	J_0 (mA/cm^2)	τ_e (ms)
TiO_2	3.1	23.23	1.2	10.4
TiO_2-CN-1	2.9	22.88	3.1	9.2
TiO_2-CN-2	2.5	18.14	5.0	7.2
TiO_2-CN-3	2.7	20.70	3.7	7.5
TiO_2-CN-4	2.8	22.12	3.1	8.1

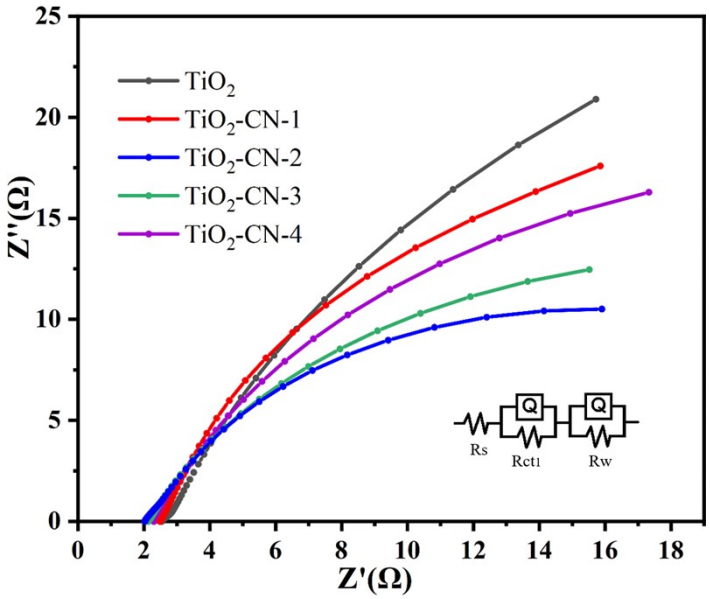

Fig. S5 Nyquist curve of QDSSCs in each group under dark condition

Table.S3 EIS data of QDSSCs in each group under dark condition

Photoanode material	*Rs* (Ω)	*Rct* (Ω)
TiO_2	2.73	46.46
TiO_2-CN-1	2.54	45.68
TiO_2-CN-2	2.06	39.28
TiO_2-CN-3	2.15	42.40
TiO_2-CN-4	2.33	44.31

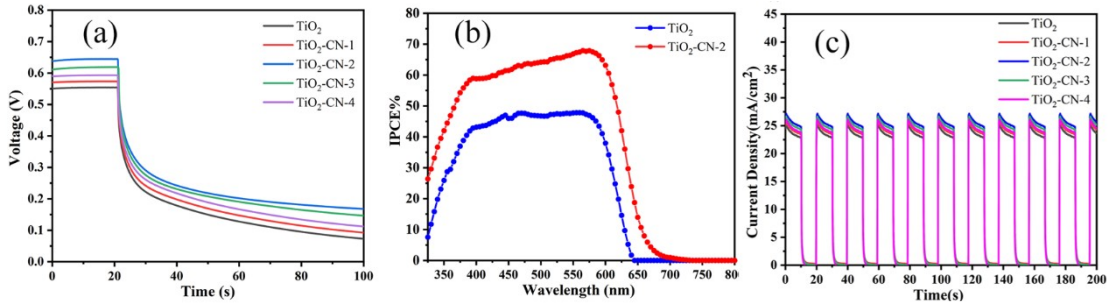

Fig. S6 (a) OCVD curves, (b) IPCE curves, and (c) photocurrent response curves of each group of cells

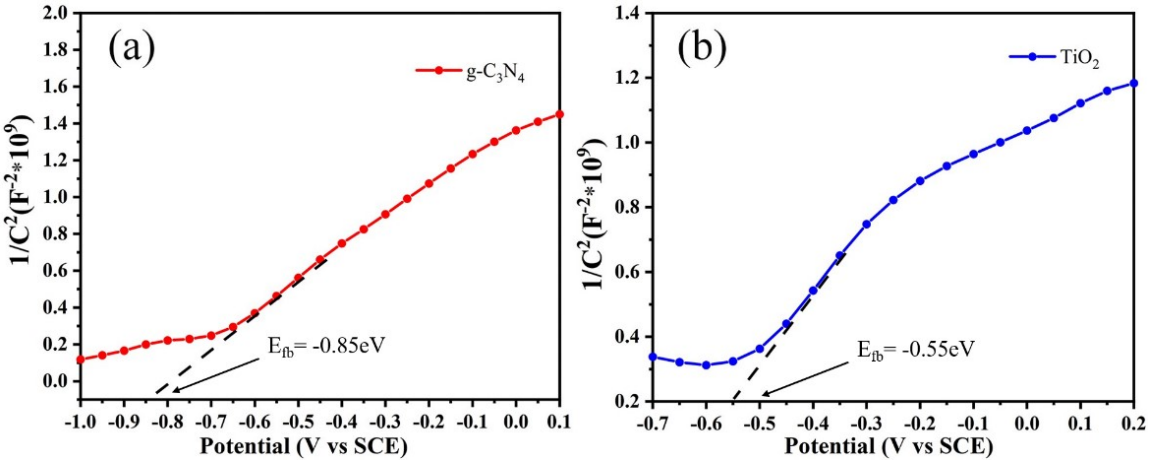

Fig. S7 Mott-Schottky plots of (a) g-C_3N_4 and (b) TiO_2

1 Y. Jiang, Y. Dai, X. Xie, Q. Wang and J. Dai, *ACS Applied Nano Materials*, 2023, **6**, 17572-17580.

2 Q. Gao, X. Zhang, L. Duan, X. Li, X. Li, Y. Yang, Q. Yu and W. Lü, *Journal of Alloys and Compounds*, 2017, **715**, 337-343.

3 S. Liu, R. Fan, Y. Zhao, M. Yu, Y. Fu, L. Li, Q. Li, B. Liang and W. Zhang, *Materials Today Energy*, 2021, **21**, 100798-100804.

4 Y. Jiang, Y. Dai, X. Xie, Q. Wang and J. Dai, *ACS Applied Materials & Interfaces*, 2024, **16**, 12062-12072.

5 B. B. Jin, X. J. Liu, L. C. Dong, X. X. Zhong, M. Y. Liang, J. Gan, M. Chen and F. Guo, *Solar Energy Materials and Solar Cells*, 2023, **255**, 112293-112301.