Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information

Preparation of miscible CdS and homojunction C_3N_4 hybrids for efficient photocatalytic degradation of tetracycline

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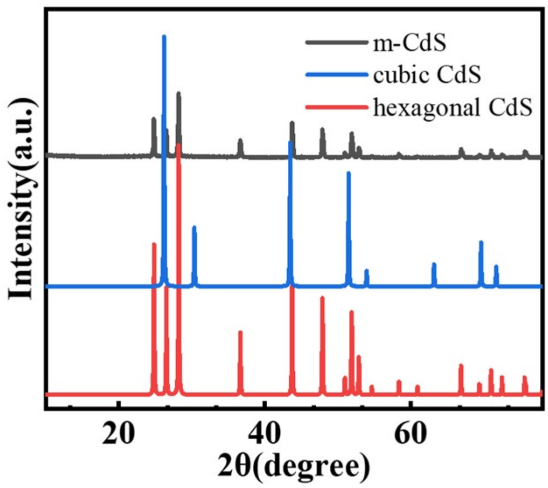

Fig.S1 XRD of m-CdS, cubic CdS, hexagonal CdS

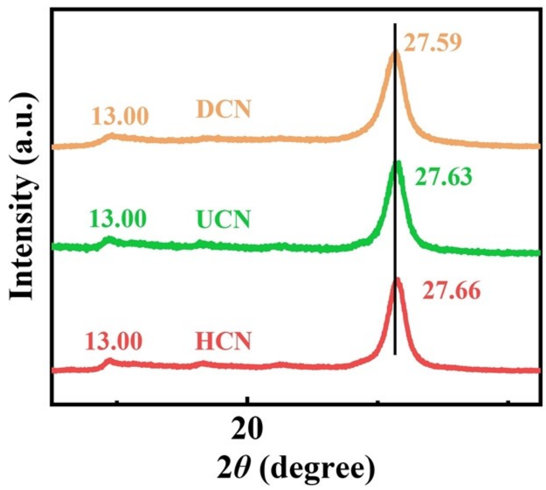

Fig.S2 XRD of DCN, UCN, HCN

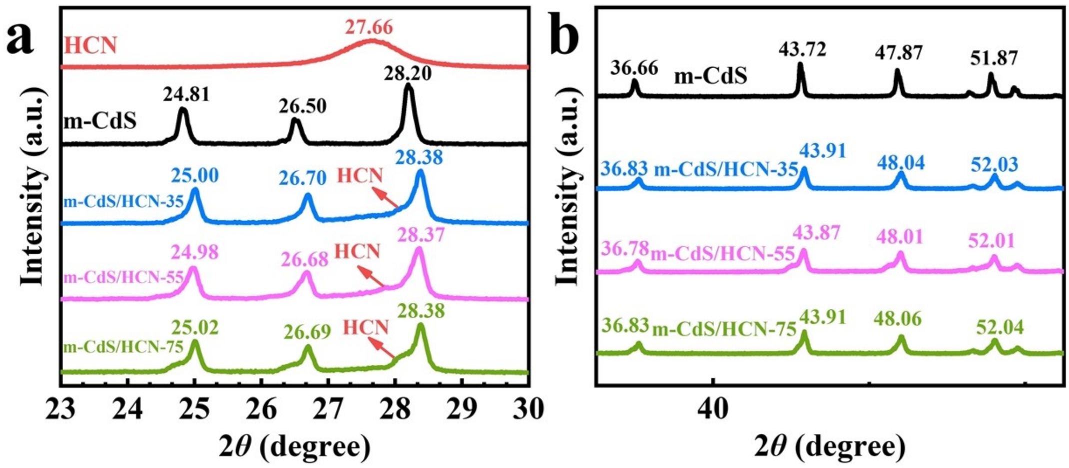

Fig.S3 Enlarged XRD of HCN, m-CdS and m-CdS/HCN samples(a-b)

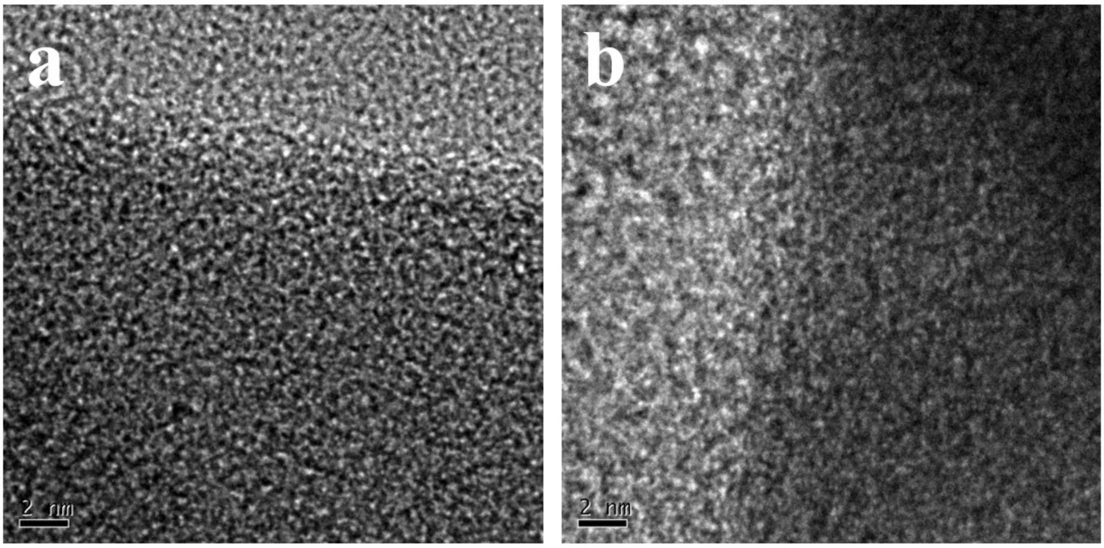

Fig.S4 TEM of HCN(a-b)

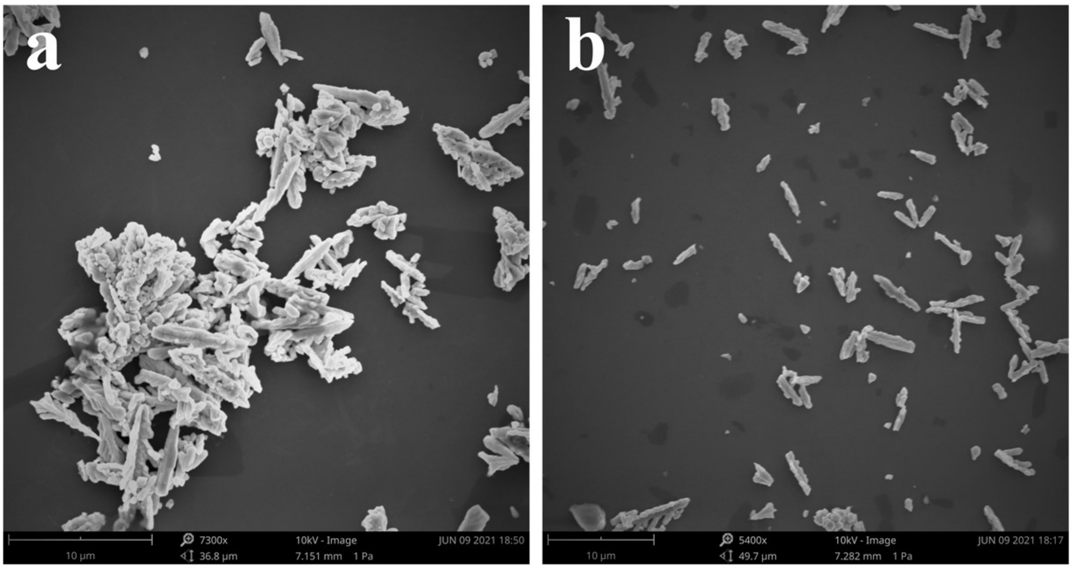

Fig.S5 SEM of (a) bulk m-CdS, (b) cypress leaves-like m-CdS nanoparticles

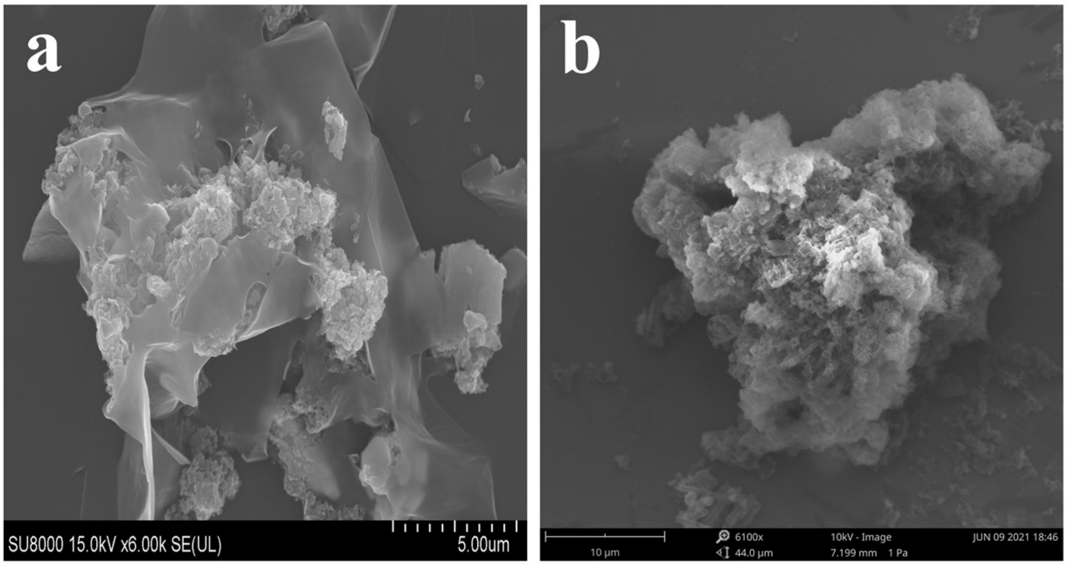

Fig.S6 SEM of (a) bulk HCN, (b) HCN nanosheets

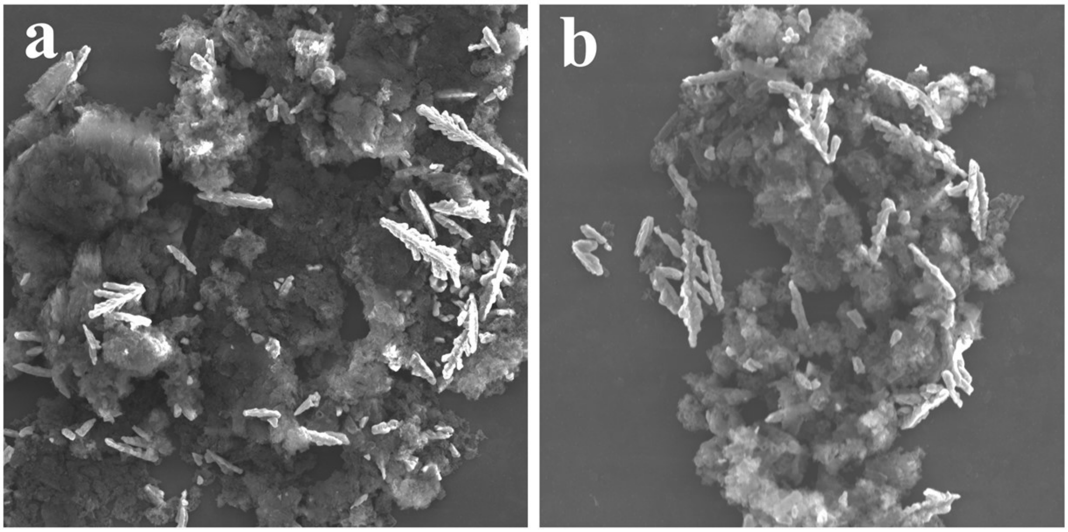

Fig.S7 SEM of m-CdS@HCN-55(a-b)

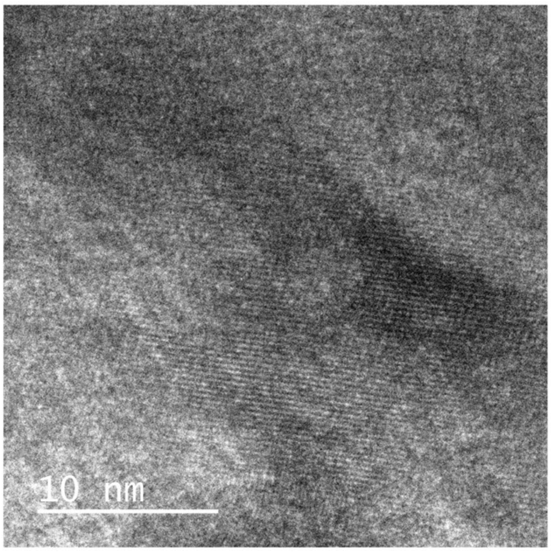

Fig.S8 HRTEM of m-CdS/HCN-55

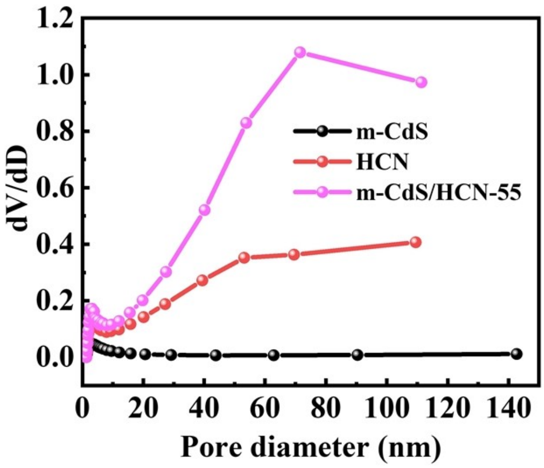

Fig.S9 The pore size distribution of m-CdS, HCN, m-CdS/HCN-55

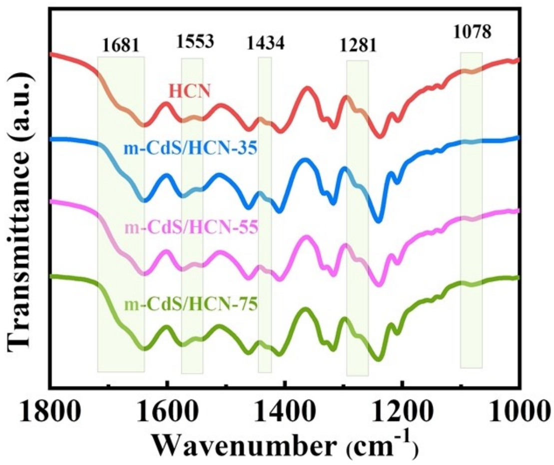

Fig.S10 Enlarged FTIR

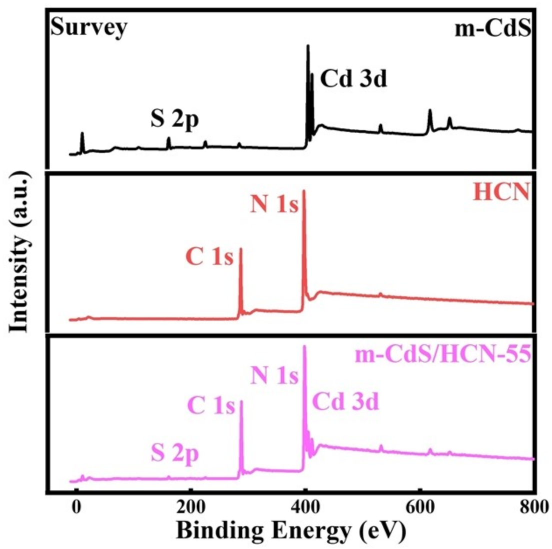

Fig.S11 Survey XPS spectra of m-CdS, HCN, m-CdS/HCN-55

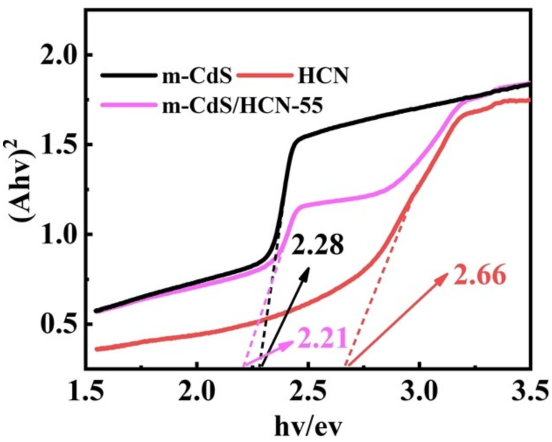

Fig.S12 DRS converted spectra of m-CdS, HCN, m-CdS/HCN-55

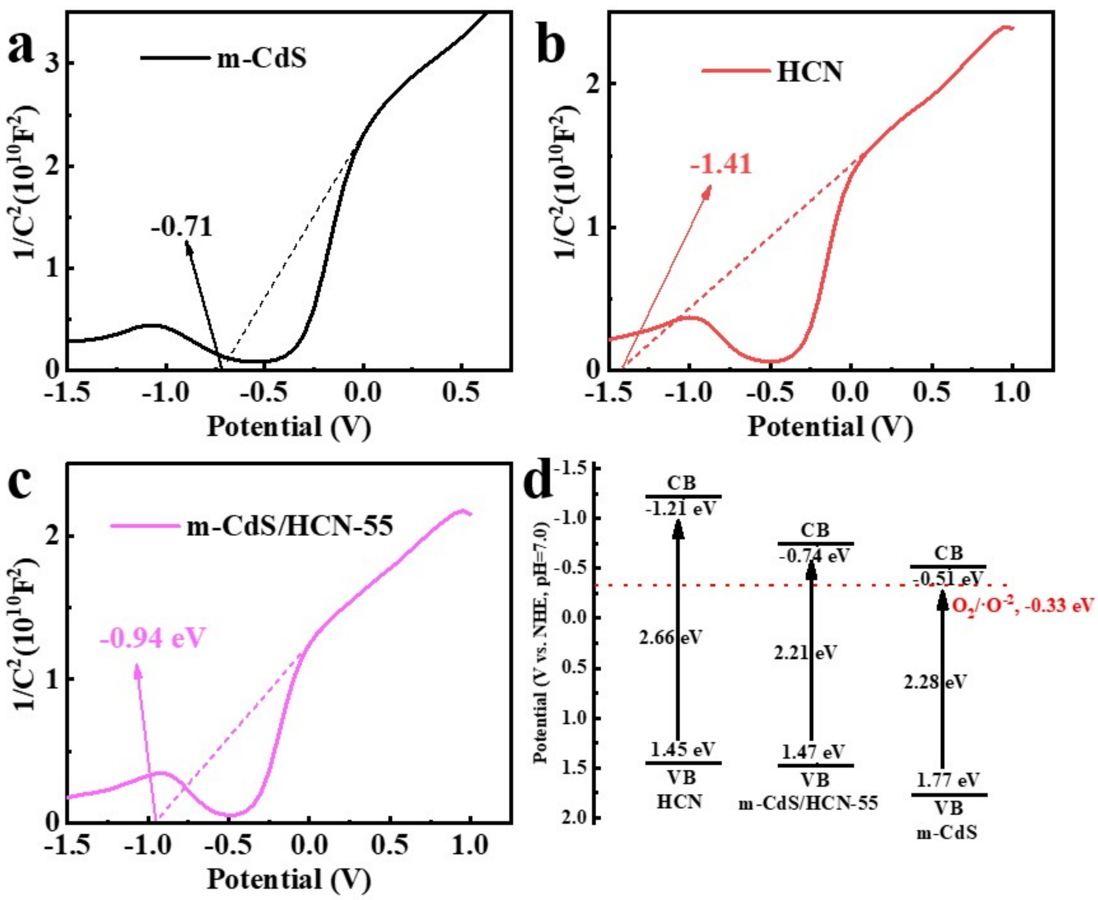

Fig.S13 Mott- Schottky plots of (a) m-CdS, (b) HCN, (c) m-CdS/HCN-55, and (d) band structures of m-CdS, HCN, m-CdS/HCN-55

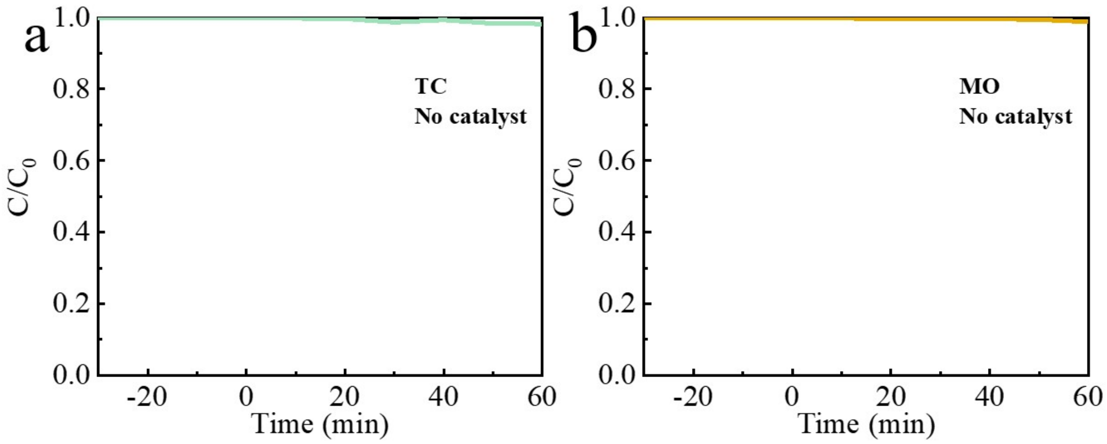

Fig.S14 Blank control experiment of pure TC and MO under light

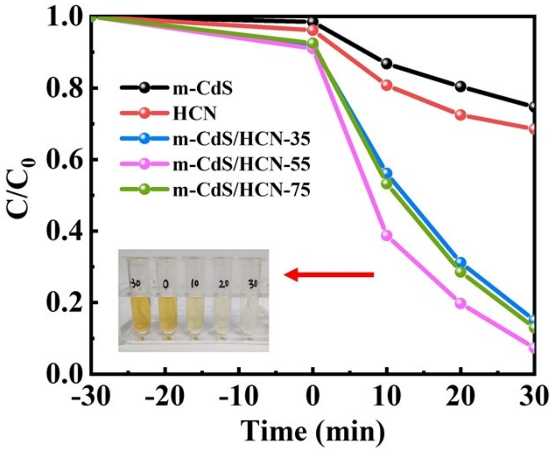

Fig.S15 Photocatalytic MO degradation performance of different catalysts

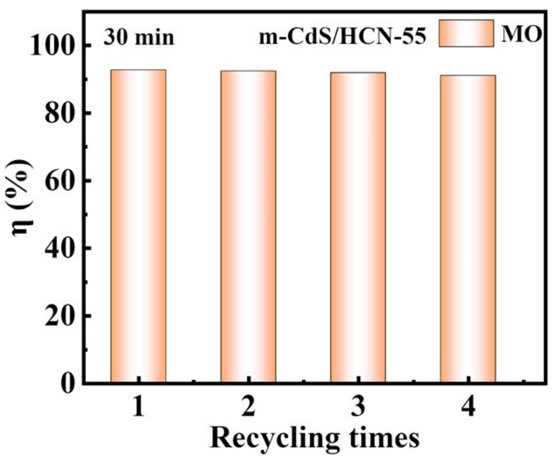

Fig.S16 Four-cycle test of m-CdS/HCN-55 for MO photodegradation

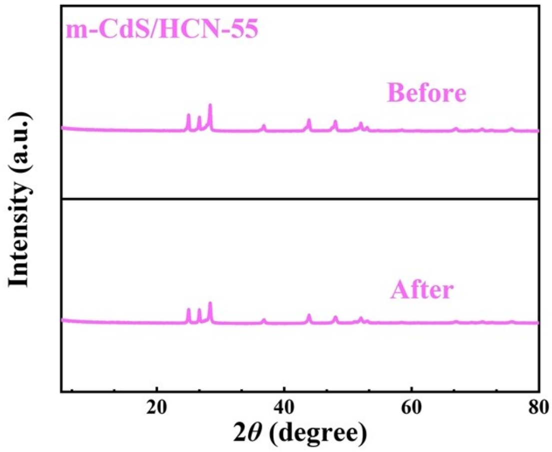

Fig.S17 XRD patterns of m-CdS/HCN-55 before and after TC degradation

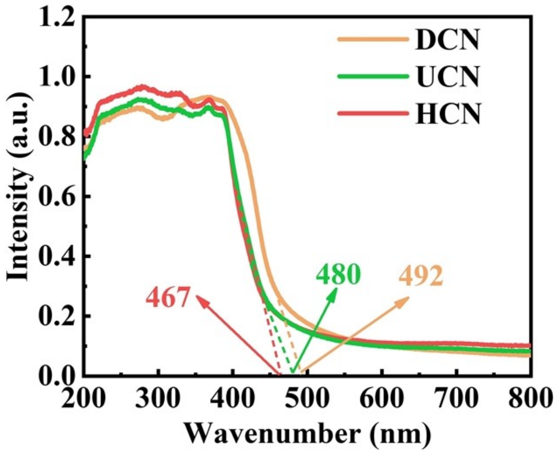

Fig.S18 UV-vis DRS of DCN, UCN, HCN

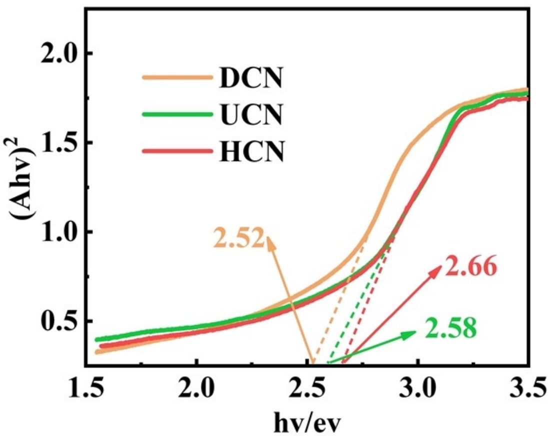

Fig.S19 DRS converted spectra of DCN, UCN, HCN

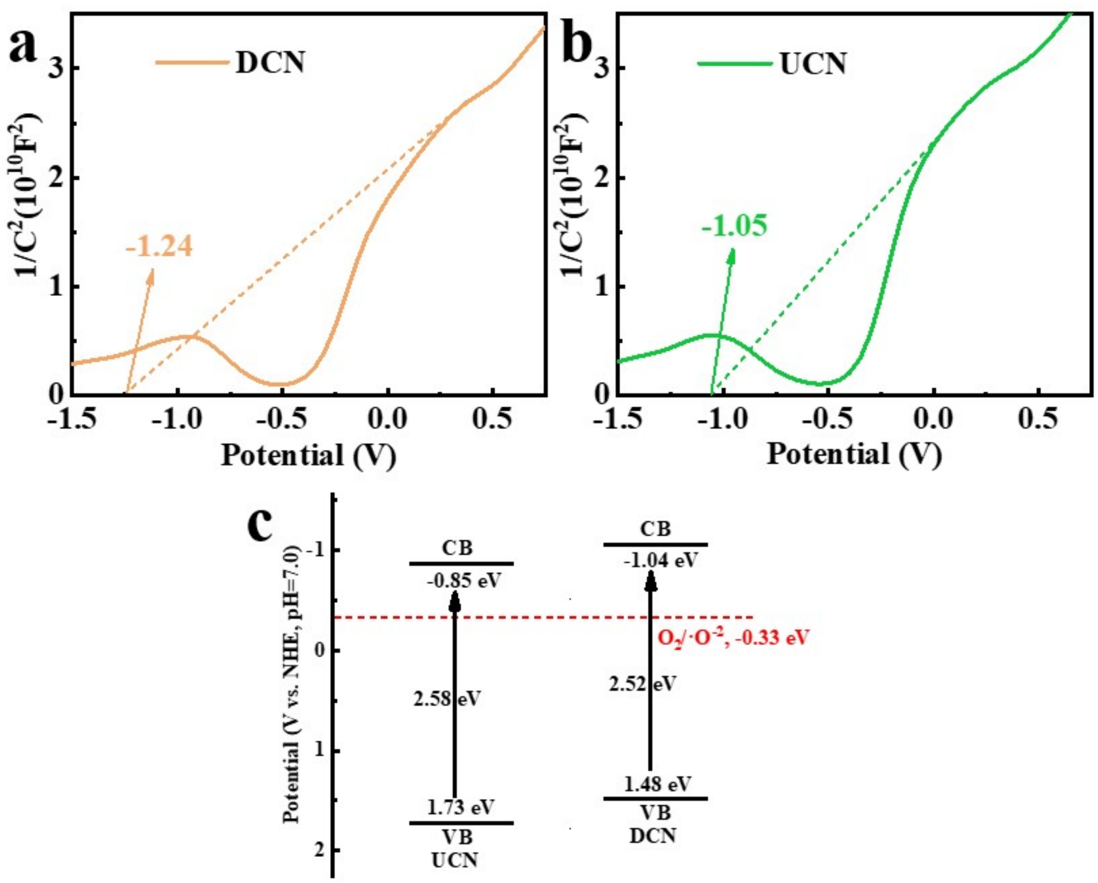

Fig.S20 Mott- Schottky plots of (a) DCN, (b) UCN, and band structures of DCN, UCN

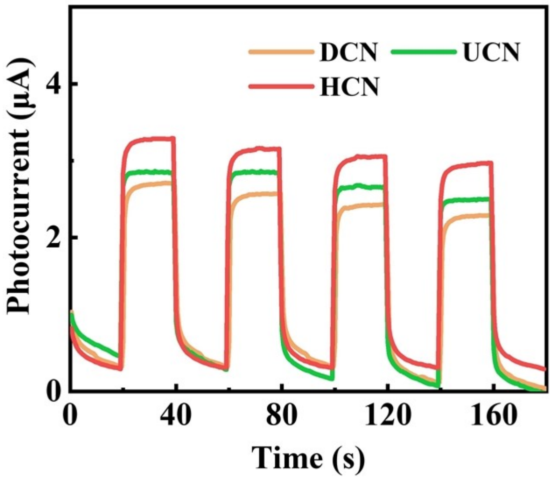

Fig.S21 Transient photocurrent response of DCN, UCN, HCN

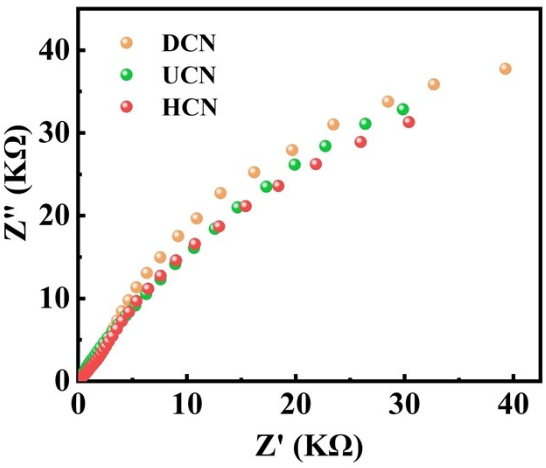

Fig.S22 EIS Nyquist plots of DCN, UCN, HCN

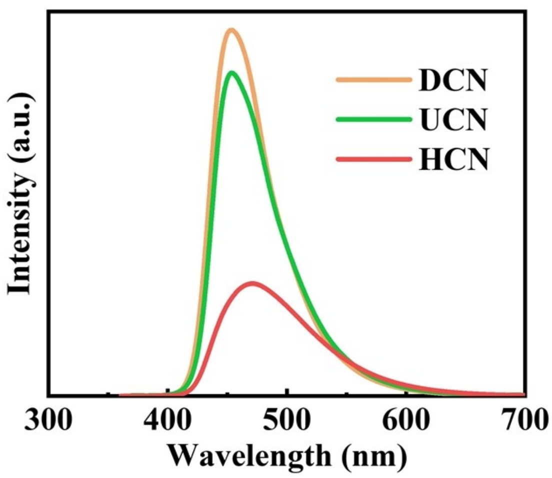

Fig.S23 PL spectra of DCN, UCN, HCN

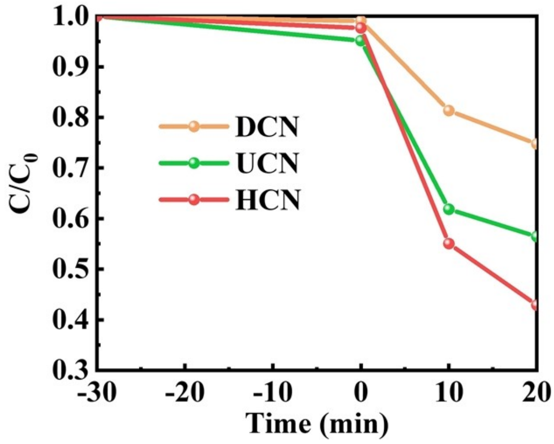

Fig.S24 Photocatalytic performance of DCN, UCN and HCN for TC degradation

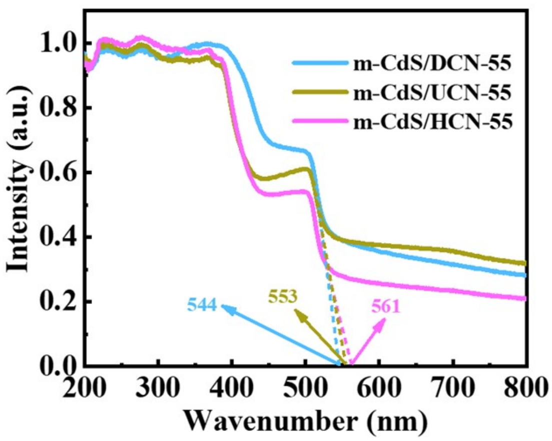

Fig.S25 UV-vis DRS of m-CdS/DCN-55, m-CdS/UCN-55, m-CdS/HCN-55

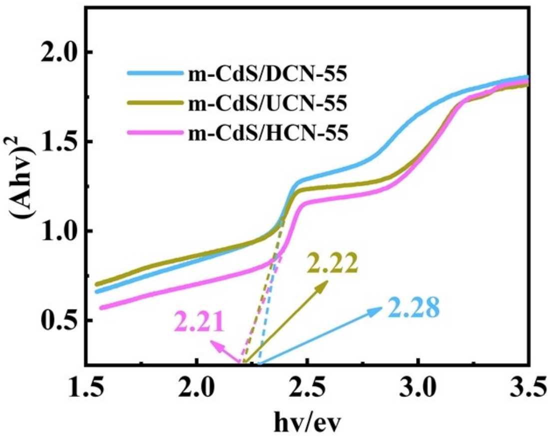

Fig.S26 DRS converted spectra of m-CdS/DCN-55, m-CdS/UCN-55, and m-CdS/HCN-55

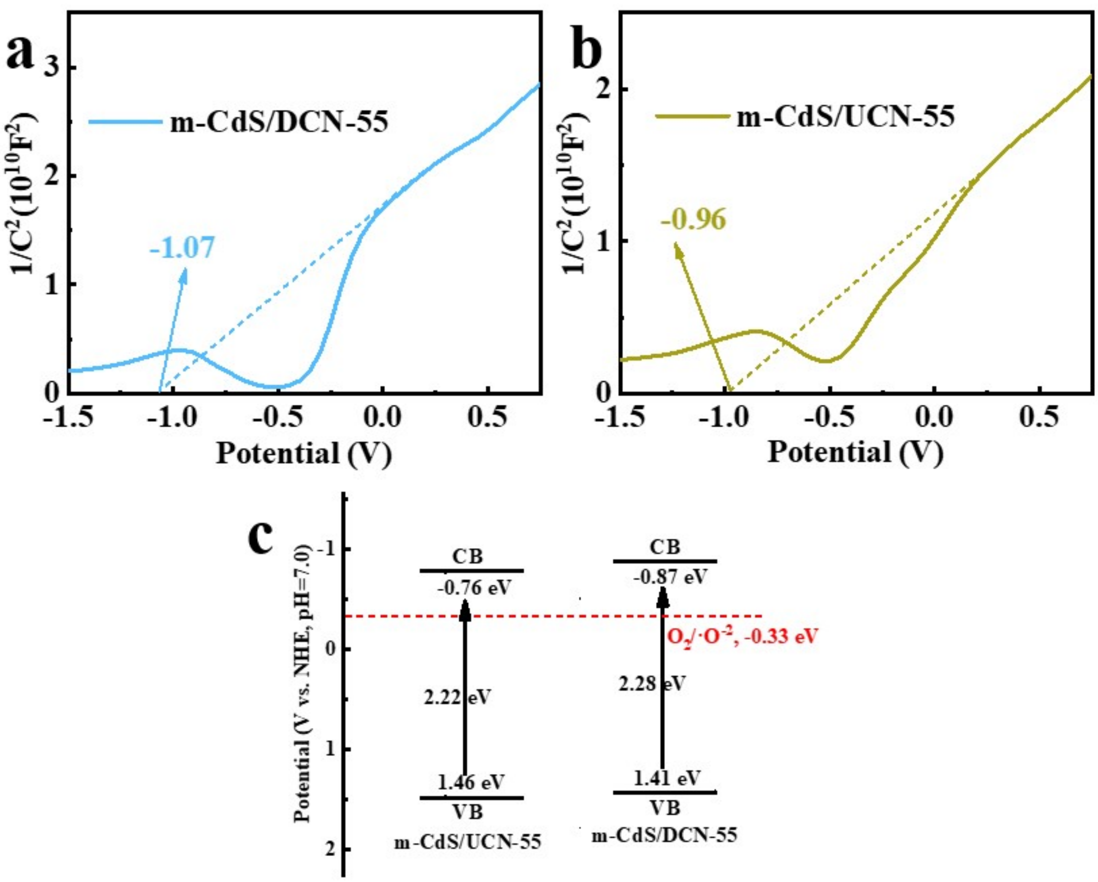

Fig.S27 Mott- Schottky plots of (a) m-CdS/DCN-55, (b) m-CdS/UCN-55, and band structures of m-CdS/DCN-55, m-CdS/UCN-55

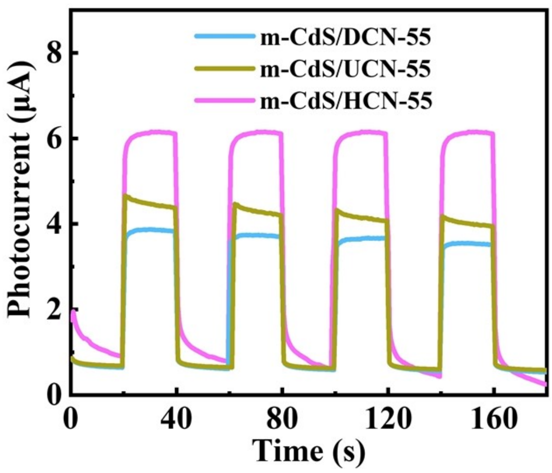

Fig.S28 Transient photocurrent response of m-CdS/DCN-55, m-CdS/UCN-55, m-CdS/HCN-55

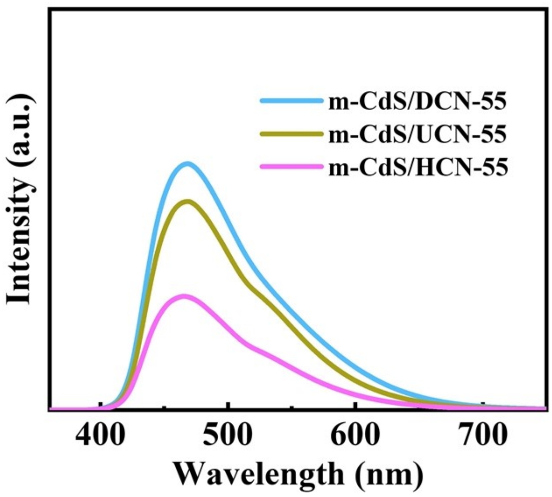

Fig.S29 PL spectra of m-CdS/DCN-55, m-CdS/UCN-55, m-CdS/HCN-55

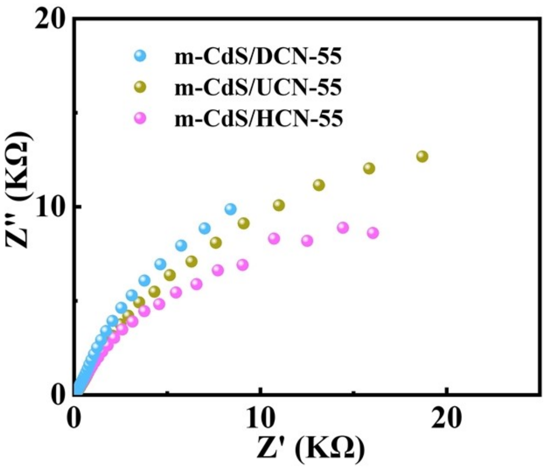

Fig.S30 EIS Nyquist plots of m-CdS/DCN-55, m-CdS/UCN-55, m-CdS/HCN-55

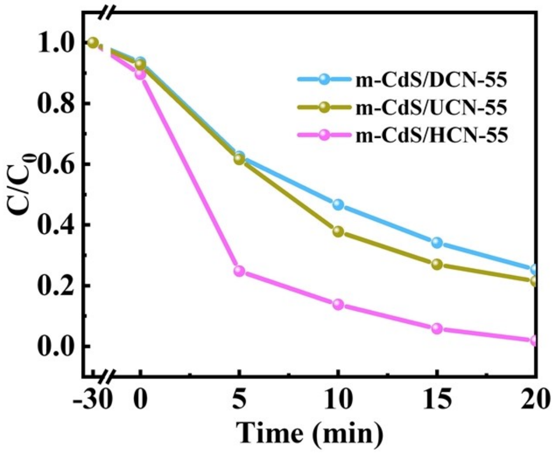

Fig.S31 Photocatalytic performance of m-CdS/DCN-55, m-CdS/UCN-55 and m-CdS/HCN-55 for TC degradation

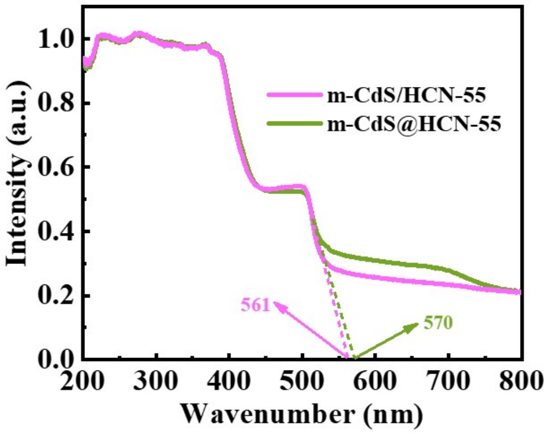

Fig.S32 UV-vis DRS of m-CdS/HCN-55 and m-CdS@HCN-55

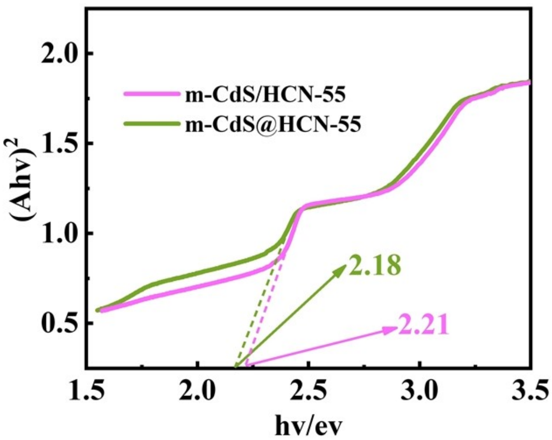

Fig.S33 DRS converted spectra of m-CdS/HCN-55 and m-CdS@HCN-55

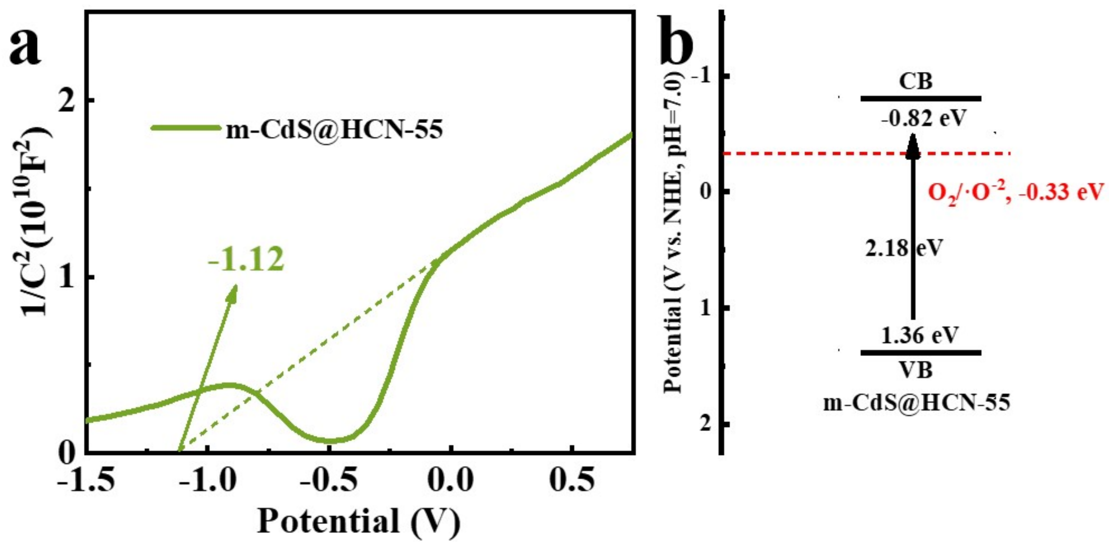

Fig.S34 (a) Mott- Schottky plots and (b) band structure of m-CdS@HCN-55

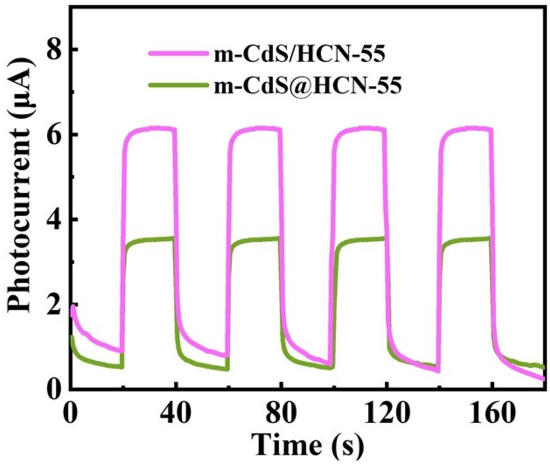

Fig.S35 Transient photocurrent response of m-CdS/HCN-55 and m-CdS@HCN-55

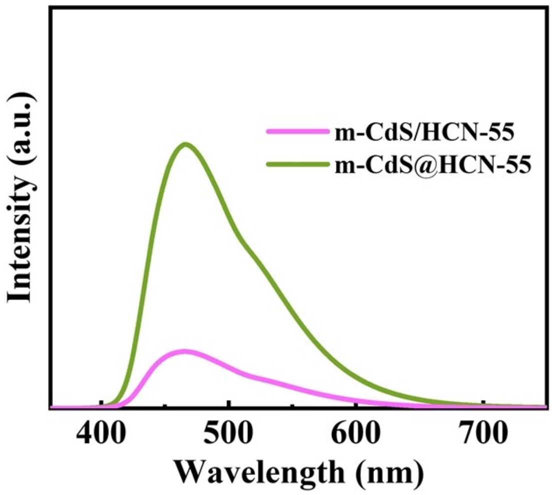

Fig.S36 PL spectra of m-CdS/HCN-55 and m-CdS@HCN-55

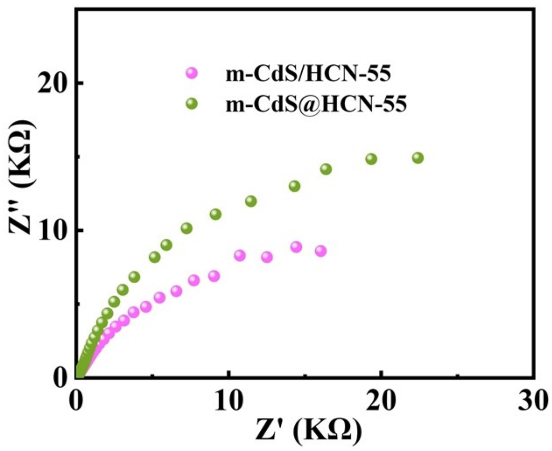

Fig.S37 EIS Nyquist plots of m-CdS/HCN-55 and m-CdS@HCN-55

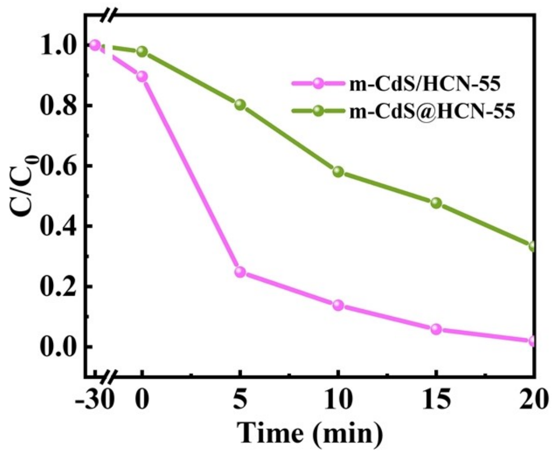

Fig.S38 Photocatalytic performance of m-CdS/HCN-55 and m-CdS@HCN-55 for TC degradation

Tab.S1

Photocatalyst ($g{\cdot}L^{-1}$)	Pollutant ($mg{\cdot}L^{-1}$)	Removal efficiency	Degradation time (min)	Light source	Refs (year)
g-C_3N_4/Ag_2CO_3/graphene oxide (0.6)	Tetracycline (20)	81.6%	60	＞420 nm	[1] (2019)
g-C_3N_4/CdS (0.5)	Tetracycline (50)	69.63%	60	＞300 nm	[2] (2019)
WO_3/g-C_3N_4/Bi_2O_3 (1.0)	Tetracycline (10)	80.2%	60	＞420 nm	[3] (2018)
g-C_3N_4/Au/BiOCl (0.8)	Tetracycline (10)	95%	80	Vis	[4] (2018)
g-C_3N_4/Bi_2WO_6/AgI (0.6)	Tetracycline (20)	91.1%	60	＞420 nm	[5] (2019)
Carbon dots/MoO_3/g-C_3N_4 (0.6)	Tetracycline (20)	88.4%	90	＞400 nm	[6] (2018)
m-CdS/HCN-55 (0.5)	Tetracycline (10)	98.2%	20	＞420 nm	This work

Tab.S2 pore volume of HCN, m-CdS and m-CdS/HCN-55

Samples	HCN	m-CdS	m-CdS/HCN-55
Pore volume ($cm^3 \cdot g^{-1}$)	0.381	0.043	0.757

Tab.S3 The kinetic rate constants of catalysts degradation of TC

Samples	HCN	m-CdS	m-CdS/HCN-35	m-CdS/HCN-55	m-CdS/HCN-75
k/min^{-1}	**0.05675**	**0.0631**	**0.12829**	**0.19195**	**0.12031**

Tab.S4 The kinetic rate constants of catalysts degradation of MO

Samples	**HCN**	**m-CdS**	**m-CdS/HCN-35**	**m-CdS/HCN-55**	**m-CdS/HCN-75**
***k*/min^{-1}**	**0.01255**	**0.00973**	**0.05768**	**0.08194**	**0.06287**

Reference

[1] H.-Y. Liu, C. Liang, C.-G. Niu, D.-W. Huang, Y.-B. Du, H. Guo, L. Zhang, Y.-Y. Yang, G.-M. Zeng, Facile assembly of g-C_3N_4/Ag_2CO_3/graphene oxide with a novel dual Z-scheme system for enhanced photocatalytic pollutant degradation, Applied Surface Science 475 (2019) 421-434.

[2] G. Li, B. Wang, J. Zhang, R. Wang, H. Liu, Rational construction of a direct Z-scheme g-C_3N_4/CdS photocatalyst with enhanced visible light photocatalytic activity and degradation of erythromycin and tetracycline, Applied Surface Science 478 (2019) 1056-1064.

[3] L. Jiang, X. Yuan, G. Zeng, J. Liang, X. Chen, H. Yu, H. Wang, Z. Wu, J. Zhang, T. Xiong, In-situ synthesis of direct solid-state dual Z-scheme WO_3/g-C_3N_4/Bi_2O_3 photocatalyst for the degradation of refractory pollutant, Applied Catalysis B: Environmental 227 (2018) 376-385.

[4] S. Zhao, Y. Zhang, Y. Zhou, J. Fang, Y. Wang, C. Zhang, W. Chen, Fabrication of sandwich-structured g-C_3N_4/Au/BiOCl Z-scheme photocatalyst with enhanced photocatalytic performance under visible light irradiation, Journal of Materials Science 53(8) (2018) 6008-6020.

[5] W. Xue, D. Huang, J. Li, G. Zeng, R. Deng, Y. Yang, S. Chen, Z. Li, X. Gong, B. Li, Assembly of AgI nanoparticles and ultrathin g-C_3N_4 nanosheets codecorated Bi_2WO_6 direct dual Z-scheme photocatalyst: An efficient, sustainable and heterogeneous catalyst with enhanced photocatalytic performance, Chemical Engineering Journal 373 (2019) 1144-1157.

[6] Z. Xie, Y. Feng, F. Wang, D. Chen, Q. Zhang, Y. Zeng, W. Lv, G. Liu, Construction of carbon dots modified MoO_3/g-C_3N_4 Z-scheme photocatalyst with enhanced visible-light photocatalytic activity for the degradation of tetracycline, Applied Catalysis B-Environmental 229 (2018) 96-104.