Supporting Information

Performance and Mechanism Analysis of Photocatalytic Degradation of Tetracycline by SiC/CdS Composites

Sen Qian[a], Fen Qiao[a]*, Lei Zhou[a], Yixian Liu[b],Wenjie Liu[a], Jing Yang[a], Tao Wang[c], Haitao Li[a,b]*

[a] *School of Energy & Power Engineering, Jiangsu University, Zhenjiang, 212013, Jiangsu, P.R. China*

[b] *Institute for Energy Research, Jiangsu University, Zhenjiang, 212013, Jiangsu, P.R. China*

[c]*Key Laboratory of Power Station Energy Transfer Conversion and System, Ministry of Education, North China Electric Power University, 102206, Beijing, P. R.China*

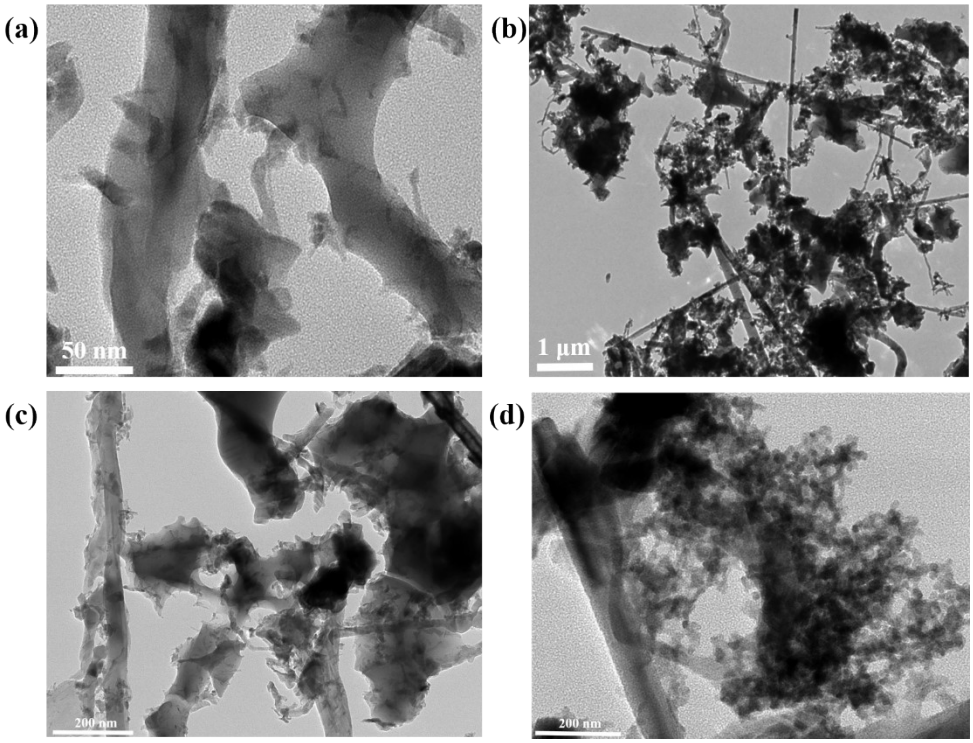

Figure S1. TEM images of SiC/CdS

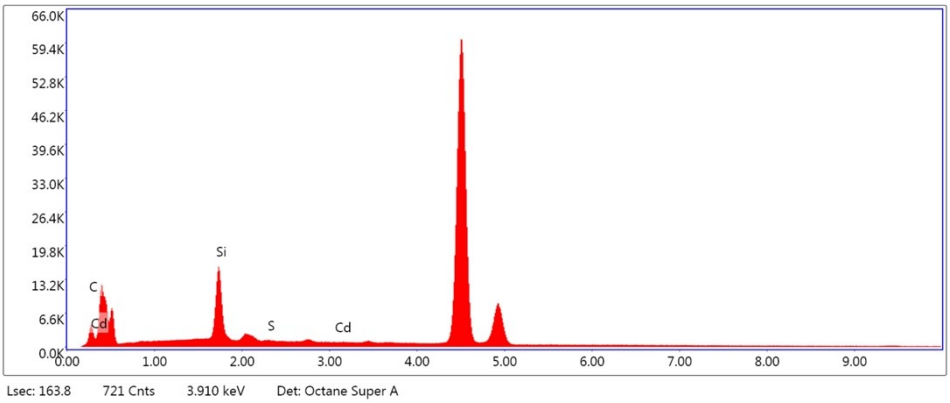

Figure S2. EDS pattern of SiC/CdS composite photocatalyst.

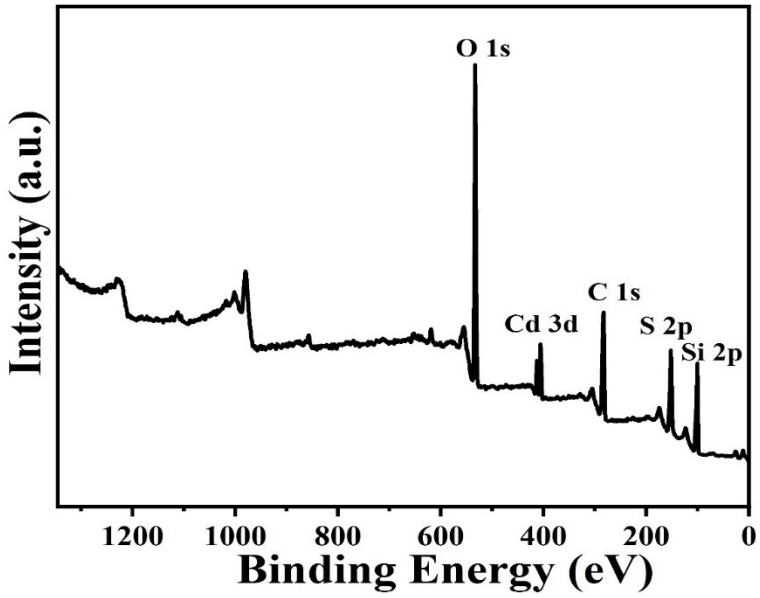

Fig. S3. XPS survey spectrum of SiC/CdS

$$\alpha h\upsilon = A(h\upsilon - Eg)^{n/2} \quad \text{(S1)}$$

Where, α is the absorption coefficient, $h\upsilon$ is the photon energy, and A is a constant. It can be noted that the band gap values of the composite samples decrease with the increasing proportion of CdS.

$$E_{fb} = E_{Ag/AgCl} + 0.059PH + E^{0}_{Ag/AgCl} \quad \text{(S2)}$$

$(vs.Ag/AgCl, PH = 7, E^{0}_{Ag/AgCl} = 0.197\ eV)$

$$-\ln\left(C/C_0\right) = kt \quad \text{(S3)}$$

Where, C_0 and C are the absorbance concentrations of the solution before and after photodegradation, respectively, $k$represents the reaction rate, t represents the reaction time, and k values are obtained by fitting a linear function.

Ab initio simulation

The DFT calculations in this work are carried out by Vienna Ab initio Simulation Package (VASP) [1]. The supercell is too big so only gamma point is calculated in k-space. GGA-PBE[2] method is adopted as exchange-correlation functional and PAW[3, 4] is applied as pseudo-potential. The energy cutoff is 400eV and the atoms are relaxed until the atomic force decreases under 0.01eV•A^{-1}.

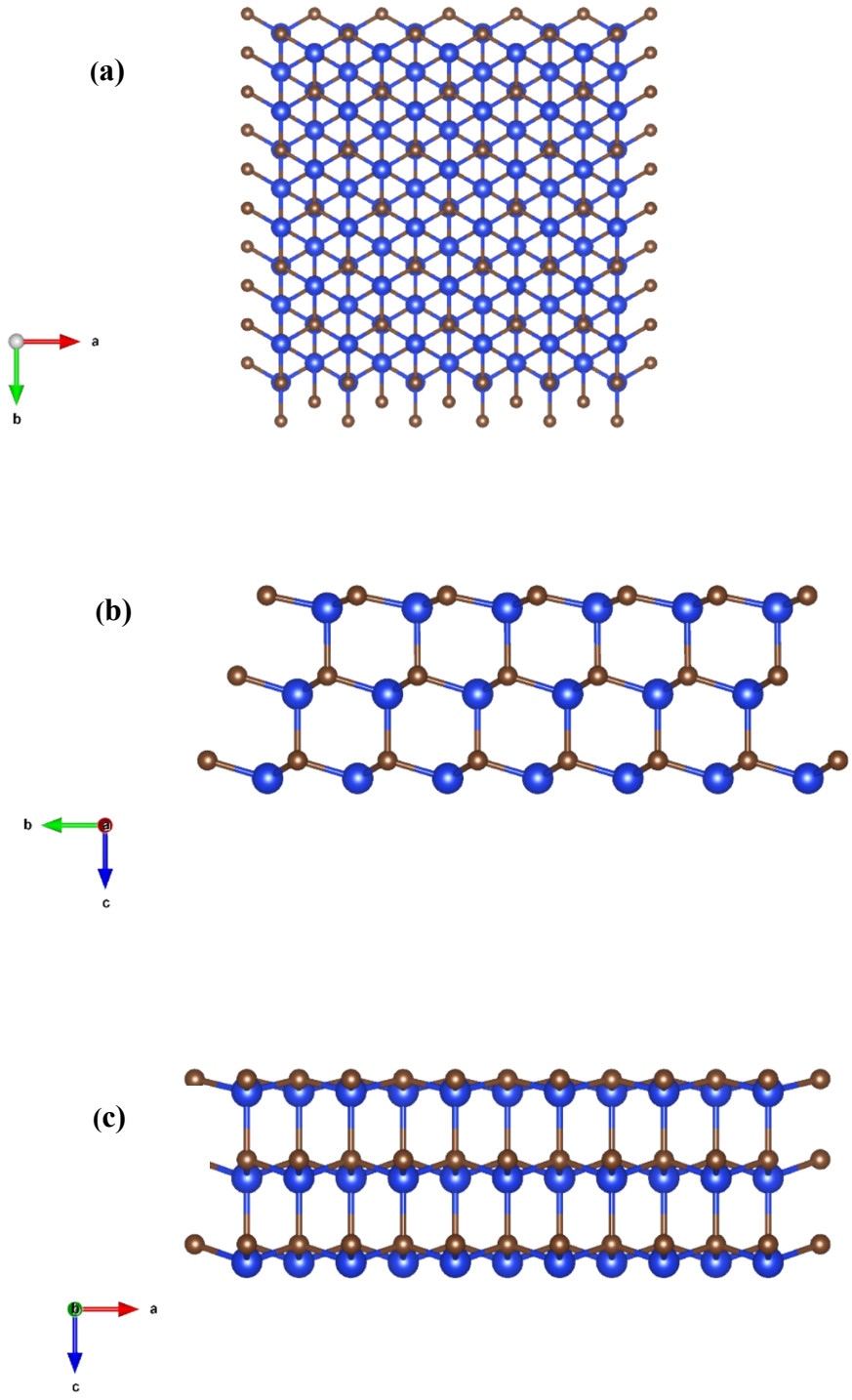

Figure S4. The optimized structures of SiC in the direction of a) a-axis b) b-axis, and c) c-axis.

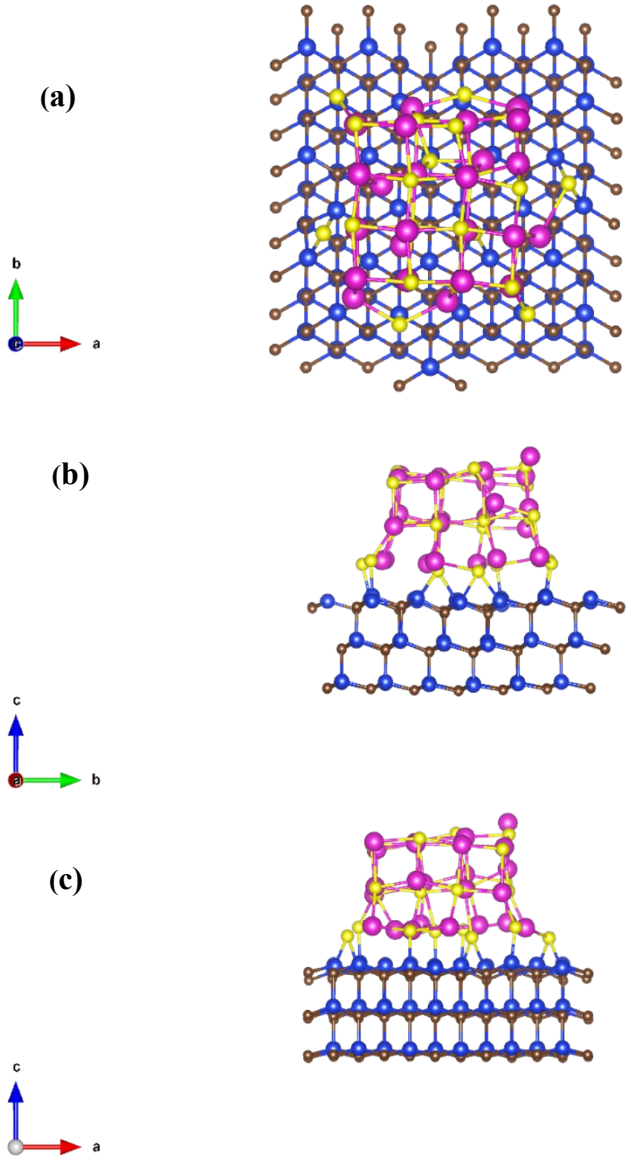

Figure S5. The optimized structures of SiC/CdS in the direction of a) a-axis b) b-axis, and c) c-axis.

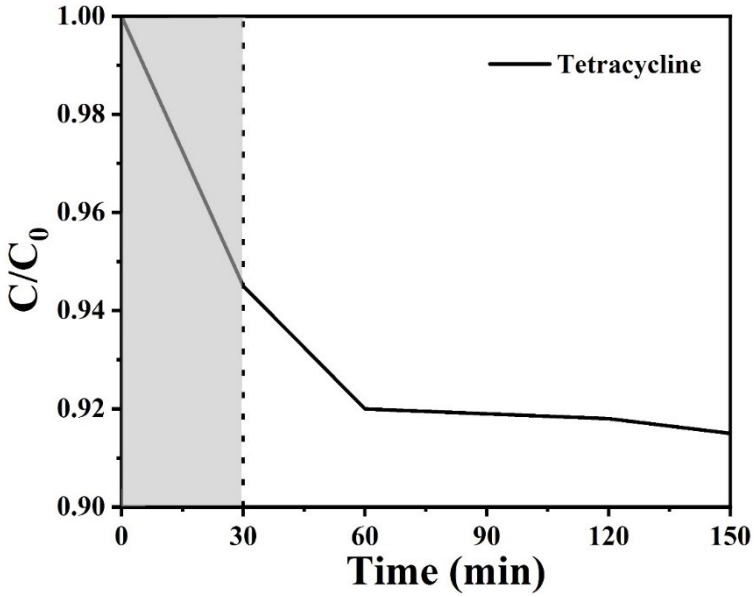

Figure S6. Degradation rate of tetracycline without catalyst.

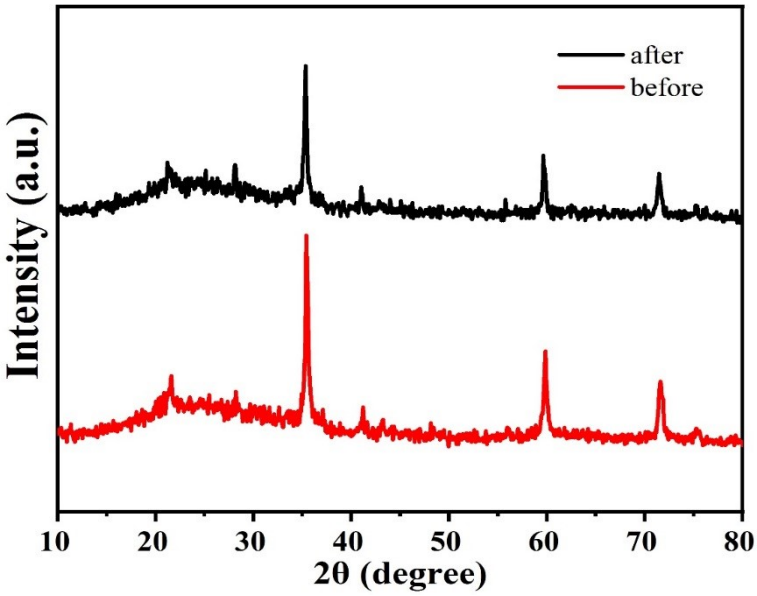

Figure S7. XRD comparison before and after four cycles

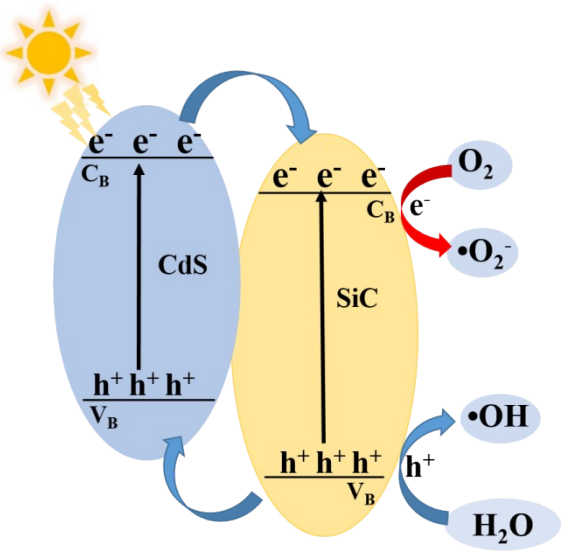

Figure S8. Schematic diagram of the photocatalytic mechanism of SiC/CdS heterojunction.

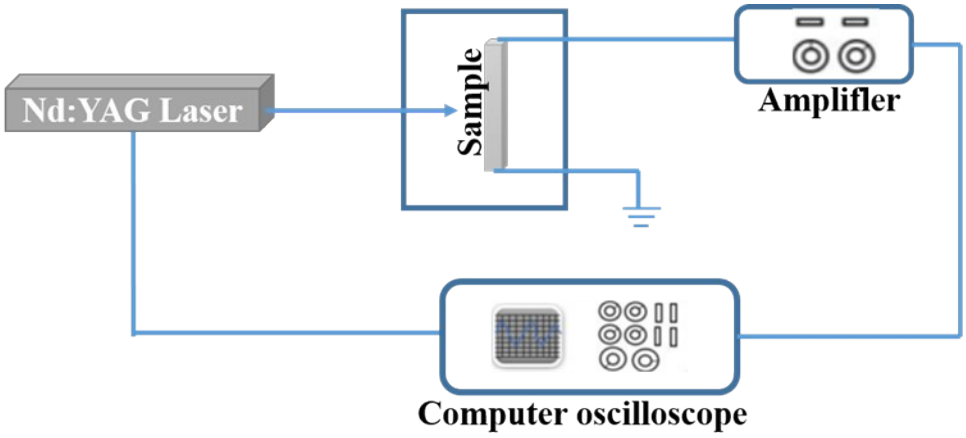

Figure S9 The schematic diagram of the transient photovoltage test system

Table S1. Comparison with other photocatalysts in the literature for the degradation of tetracycline

Photocatalyst	Concentration (mg/L)	Dosage (g/L)	Irradiation time (min)	Light source	Degradation rate (%)	Ref.
Fe/g-C3N4/	20	0.385	80	Xe	88.1	[5]

Kaolinite				500 W		
SnS_2@$ZnLn_2S$4@Kaolinite	40	0.20	60	Xe 300 W	88.23	[6]
CdS/Ti_3C_2	10	0.50	60	Xe 300W	96.3	[7]
Fe based MOF	50	0.50	180	Xe 500 W	52	[8]
WO_3/C_3N_4/NC QDs	20	1.00	30	LED 18 W	96.3	[9]
$Bi_2O_2CO_3$/Ti_3C_2	20	0.50	120	Xe 300 W	31.0	[10]
ZnO/CeO_2@HNTs	20	0.30	60	Xe 300W	87.0	[11]
SiC/CdS-0.5	20	0.33	120	Xe 150 W	78	This word

References

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