Supporting Information

Litchi-like $CdS/CdTiO_3$-TiO_2 composite: synthesis and enhanced photocatalytic performance for crystal violet and hydrogen production

Yixuan Li[a,b], Wenzhi Zhang[a,b*], Li Li[a,b,c*], Chunxiong Yi[b], Haiyuan Lv[a], Qiang Song[a,b]

[a]College of Materials Science and Engineering, Qiqihar University, Qiqihar 161006, PR China

[b]College of Chemistry and Chemical Engineering, Qiqihar University, Qiqihar 161006, PR Chinah

[c]College of Heilongjang Province Key Laboratory of Fine Chemicals, Qiqihar University, Qiqihar 161006, PR China

[*] Corresponding authors at: Qiqihar University, College of Materials Science and Engineering, Wenhuadajie, No. 42, Qiqihar, PR China. Tel.：+86 0452-2738206.

E-mail addresses: qqhrll@163.com, qqhrlili@126.com (L. Li).

Table S1 The crystallite size and lattice parameter of different synthesized products.

sample		Monomer		HCT					40% WCT					
		TiO_2	CdS	5%	20%	30%	40%	50%	160-2	160-4	160-6	100-6	120-6	140-6
Lattice parameter /Å	a	3.78	4.13	4.44	4.27	4.35	4.37	4.35	4.34	3.99	4.09	4.59	3.94	4.81
	c	9.52	6.69	4.75	6.47	10.0	15.0	6.11	5.91	7.08	6.95	4.14	7.88	7.93
d*/nm		13.3	51.2	28.3	41.9	43.6	49.7	28.7	72.3	48.1	64.8	55.8	56.0	62.1

d*: Average crystallite sizes of samples were calculated using the Scherrer equation: $d= K\lambda/ B\cos\theta$(where the K refers to the Scherrer constant; d is the average thickness of the grain perpendicular to the plane direction (nm); B is half-width of the diffraction peak, θ is the diffraction angle; λ is the wavelength of X-rays).

Table S2 Band gaps (Eg) of different proportion of $CdS/CdTiO_3$-TiO_2 and different microwave synthesis conditions of $CdS/CdTiO_3$-TiO_2.

sample	5%	20%	30%	40%	50%	160-1	160-2	160-3	160-4	160-5	100-6	120-6	140-6
HCT	2.16	2.07	2.27	2.23	2.30	-	-	-	-	-	-	-	-
WCT	3.06	2.75	3.01	2.35	2.79	2.18	2.20	2.23	2.25	2.29	2.26	2.21	2.17

Table S3 The average pore, BET and pore volume of different synthesized products.

	sample	D/nm	$S_{BET}/(m^2 \cdot g^{-1})$	$V_{total}/(cm^3 \cdot g^{-1})$
Monomer	TiO_2	18.49	100.2	0.463
	CdS	2.7-5.0	9.2	0.022
HCT	5%	6.77	9.46	0.027
	20%	11.33	40.76	0.116
	30%	10.80	58.11	0.157
	40%	10.80	55.30	0.149
	50%	7.69	75.89	0.146
40% WCT	160-1	23.41	12.49	0.073
	160-2	19.86	23.00	0.114
	160-3	29.46	24.55	0.181
	160-4	20.56	34.72	0.179
	160-5	16.10	41.66	0.168
	160-6	28.48	24.40	0.17
	100-6	11.49	56.29	0.16
	120-6	27.37	20.31	0.139
	140-6	13.41	48.73	0.163

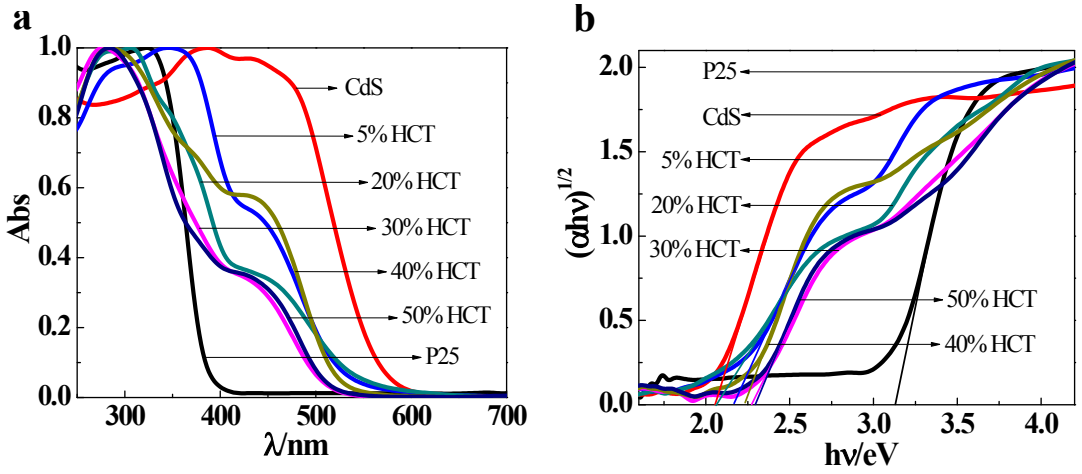


Fig. S1 Different proportion of $CdS/CdTiO_3$-TiO_2 by programmed temperature hydrothermal method synthesis (a) UV–vis/DRS spectra and (b) the plot of transformed Kubelka–Munk function vs. the absorption energy of light.

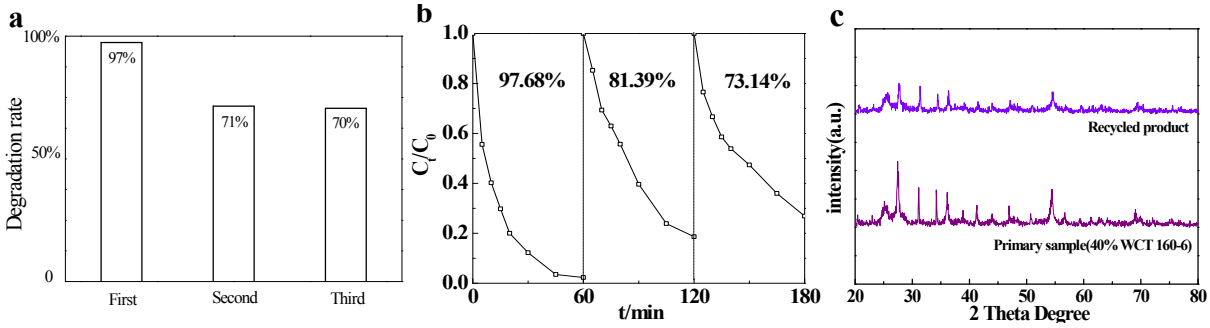


Fig. S2 Recycling experiments of (a) 40% HCT 160-6, (b) 40% WCT 160-6 and (c)XRD patterns of recycled product

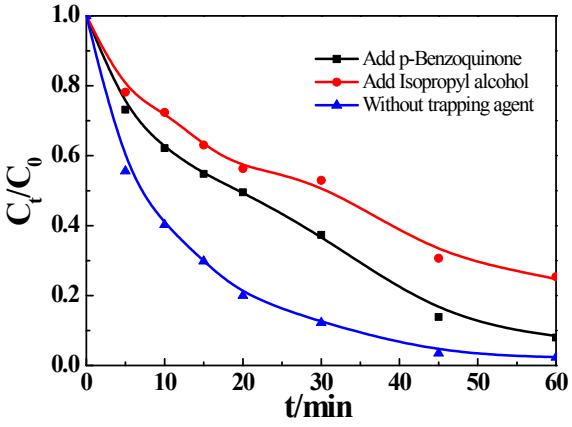
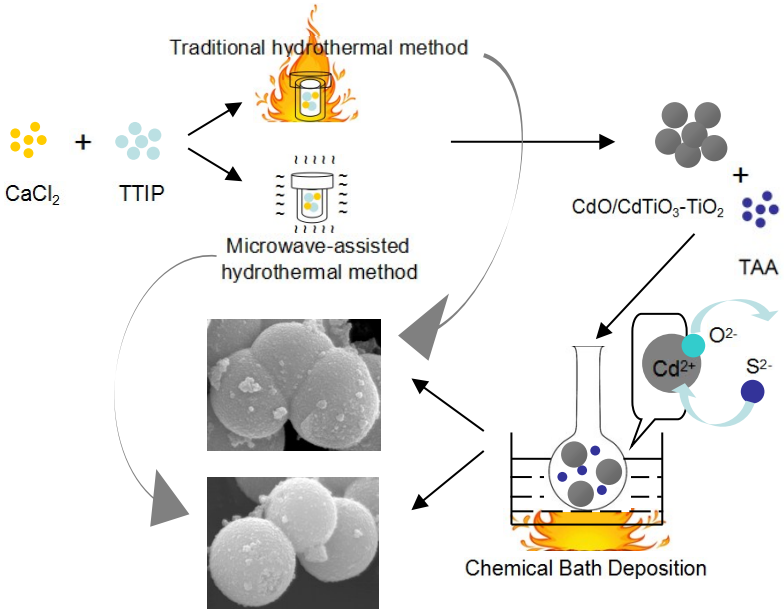


Fig. S3 Trapping experiment results of $CdS/CdTiO_3$-TiO_2.



Scheme S1 The possible formation mechanism of $CdS/CdTiO_3$-TiO_2.