Supporting Information

Enhanced photocatalytic CO_2 conversion of CdS/Co-BDC nanocomposite via Co (II)/Co (III) redox cycling

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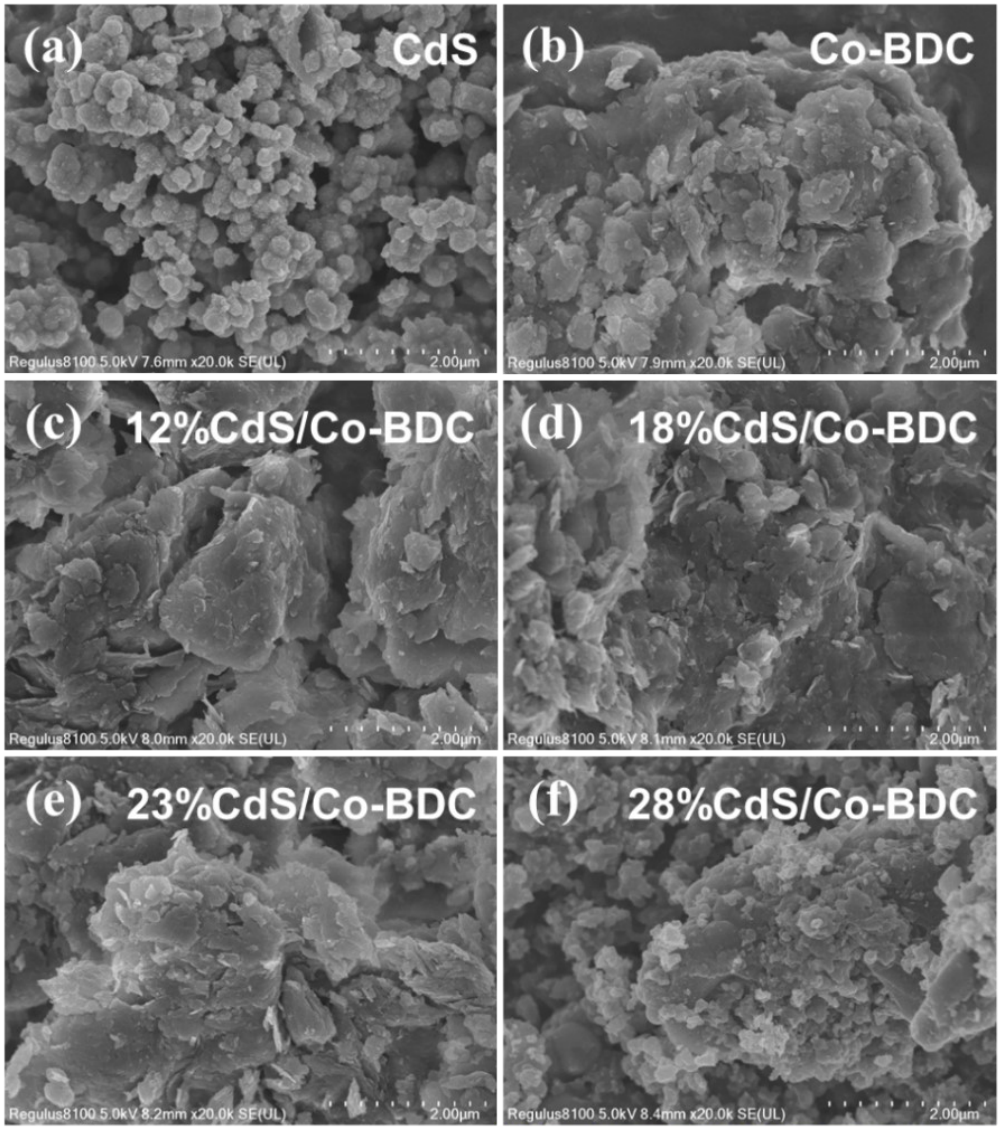
(a) CdS
Regulus8100 5.0kV 7.6mm x20.0k SE(UL)
2.00μm
(b) Co-BDC
Regulus8100 5.0kV 7.9mm x20.0k SE(UL)
2.00μm
(c) 12%CdS/Co-BDC
Regulus8100 5.0kV 8.0mm x20.0k SE(UL)
2.00μm
(d) 18%CdS/Co-BDC
Regulus8100 5.0kV 8.1mm x20.0k SE(UL)
2.00μm
(e) 23%CdS/Co-BDC
Regulus8100 5.0kV 8.2mm x20.0k SE(UL)
2.00μm
(f) 28%CdS/Co-BDC
Regulus8100 5.0kV 8.4mm x20.0k SE(UL)
2.00μm

Fig. S1. SEM images of CdS (a); Co-BDC (b); 12% CdS/Co-BDC (c); 18% CdS/Co-BDC (d); 23% CdS/Co-BDC (e); 28% CdS/Co-BDC(f); 18% CdS/Co-BDC composite (g-j).

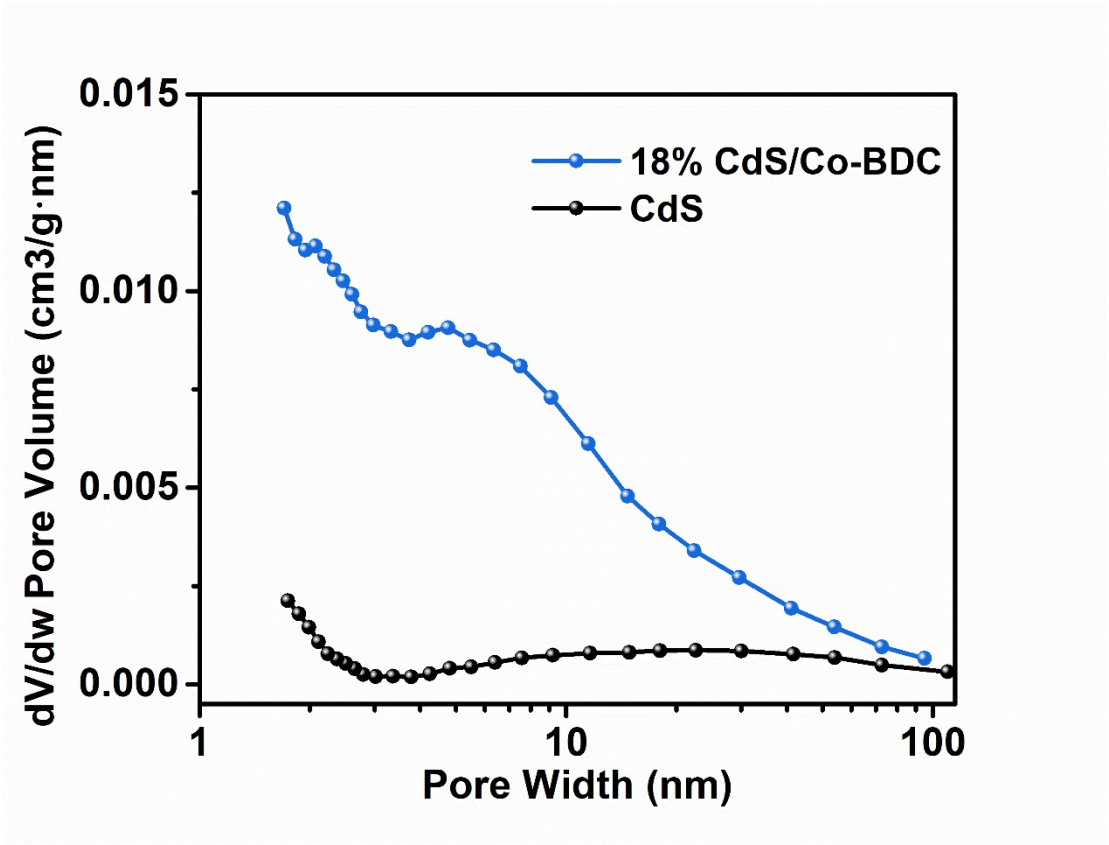

Fig. S2. N_2 The pore size distributions of CdS, Co-BDC and 18% CdS/Co-BDC composite.

Table S1 Specific surface area and pore structure parameters of materials

Sample	S_{BET} ($m^2 \cdot g^{-1}$)	Pore size (nm)	Pore volume ($cm^3 \cdot g^{-1}$)
CdS	17.39	14.71	0.05
18%CdS/Co-BDC	57.42	9.94	0.19

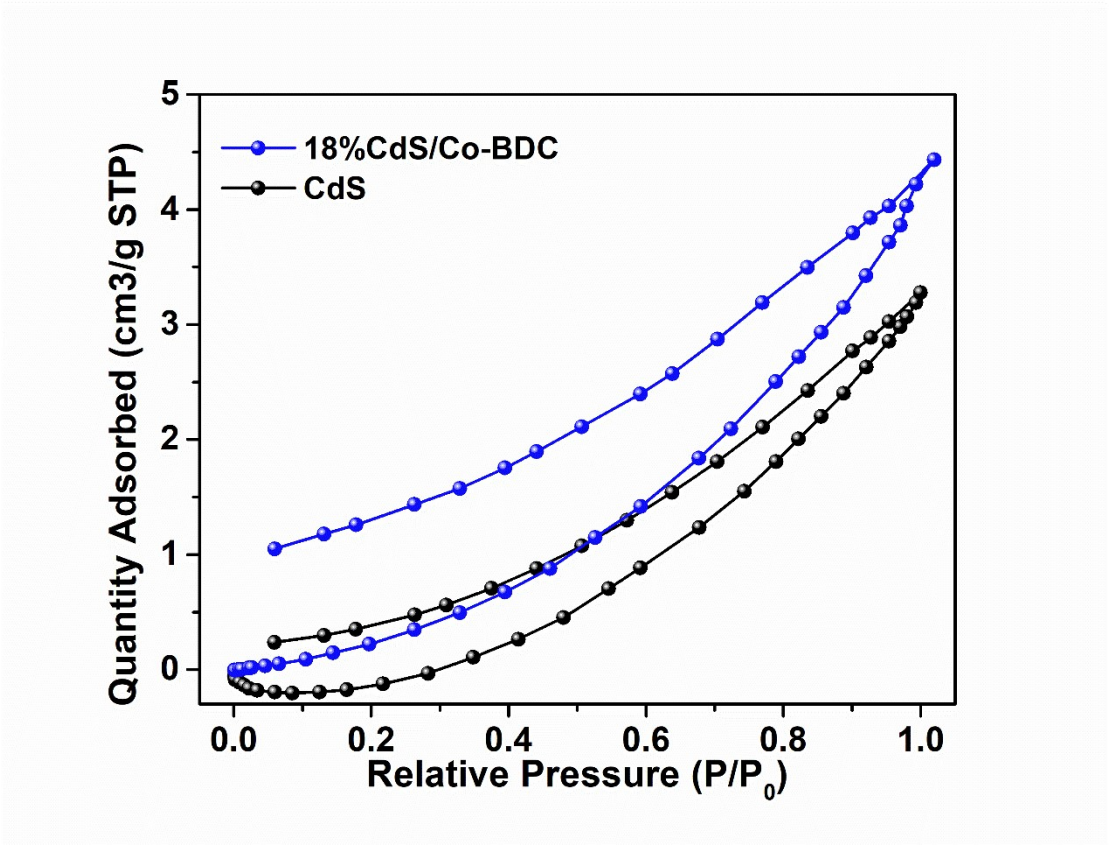

Fig. S3. CO_2 adsorption curve of CdS, Co-BDC and 18% CdS/Co-BDC composite at 298 K.

Table S2 CO_2 adsorption-desorption isotherms of CdS, Co-BDC and 18% CdS/Co-BDC composite

Sample	CO-production ($\mu mol \cdot g^{-1} \cdot h^{-1}$)	CO_2-quantity absorbed ($cm^3 \cdot g^{-1}$)	CO-production/CO_2-quantity absorbed ($\mu mol \cdot cm^{-3} \cdot h^{-1}$)
CdS	2.2	3.28	0.67
18%CdS/Co-BDC	19.6	4.43	4.42

Table S3 The fitted Rct values of Co-BDC, CdS and 18% CdS/Co-BDC composite

Sample	Rp（Ω）
CdS	1006
Co-BDC	1012
18% CdS/Co-BDC	735.5

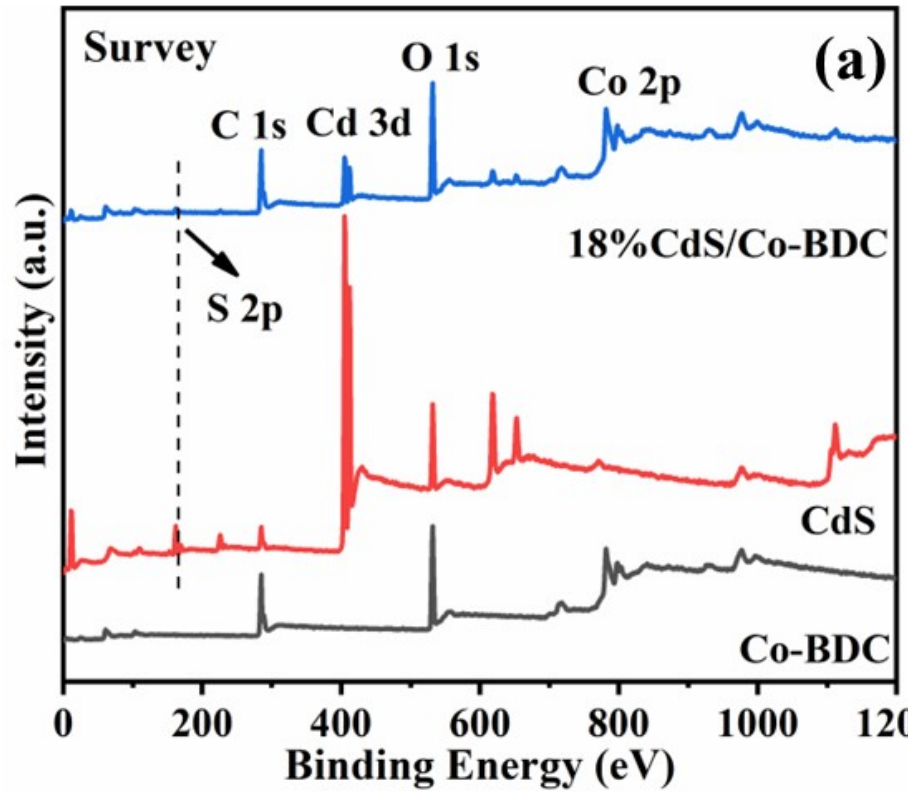

Fig. S4. XPS spectra of survey scan of CdS, Co-BDC and 18% CdS/Co-BDC.

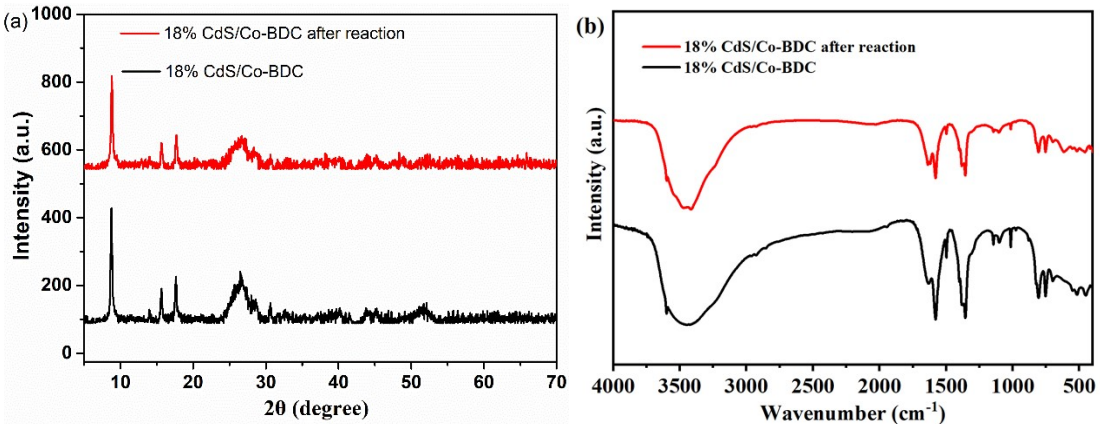

Fig. S5 XRD and FT-IR pattern of fresh and used 18%CdS/Co-BDC nanocomposites.

Fig. S5 **XRD and FT-IR pattern of fresh and used 25-Bi_2O_2Se/BiOCl nanocomposites.**

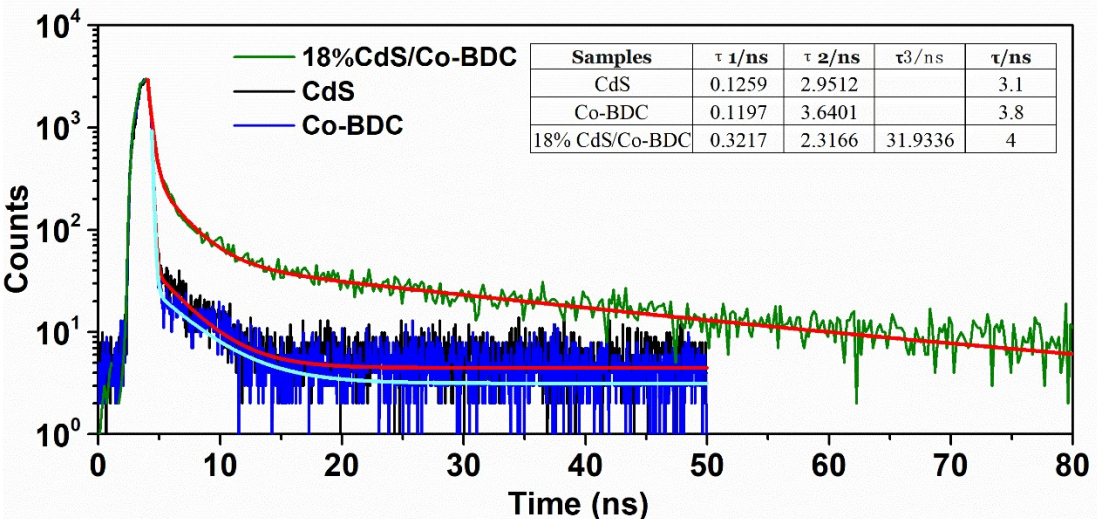

Fig. S6. Time-resolved PL spectra of bare CdS, Co-BDC and 18% CdS/Co-BDC.

Table S4. Analyses of the time-resolved transient PL decay spectra of the samples.

Samples	τ1/ns	B1	τ2/ns	B2	τ3/ns	B3	τ/ns
CdS	0.1259	1278.42	2.9512	38.49			3.13
Co-BDC	0.1197	1349.10	3.6401	23.40			3.86
18% CdS/Co-BDC	0.3217	4703.53	2.3166	354.08	31.9336	0.98	4.0