Electronic Supplementary Information:

Mechanistic Insights into Photoinduced Charge Carriers Dynamics of BiOBr/CdS Nanosheet Heterojunctions for Photovoltaic Application

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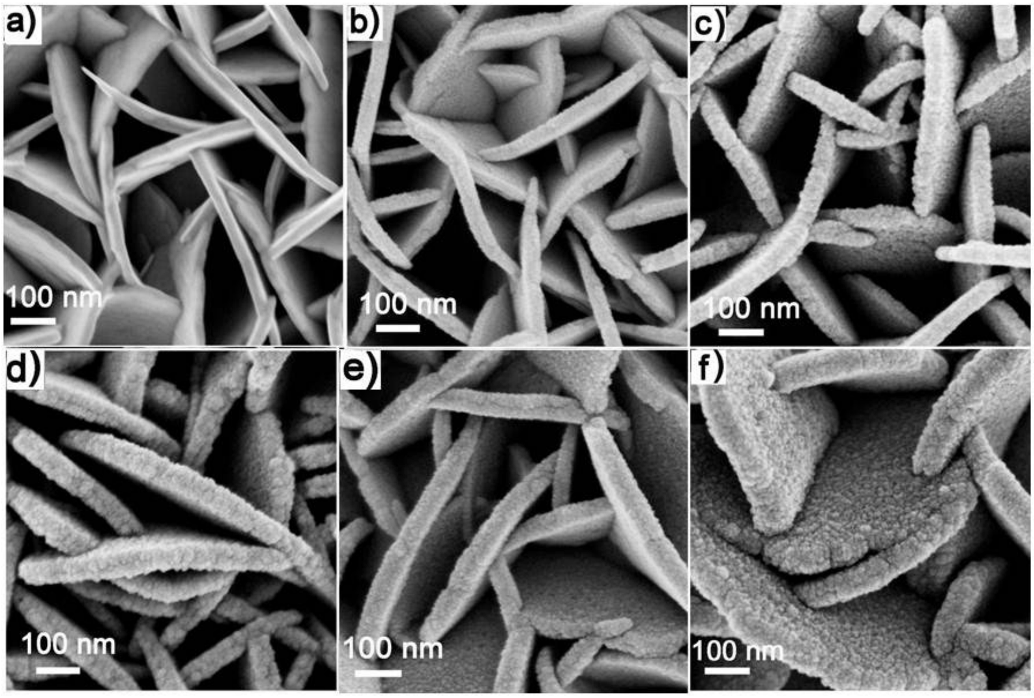

Fig. S1. SEM images of pure BiOBr film (a), BiOBr/CdS-5 (b), BiOBr/CdS-10 (c), BiOBr/CdS-15 (d), BiOBr/CdS-20 (e) and BiOBr/CdS-30 heterojunction nanosheet array films (f).

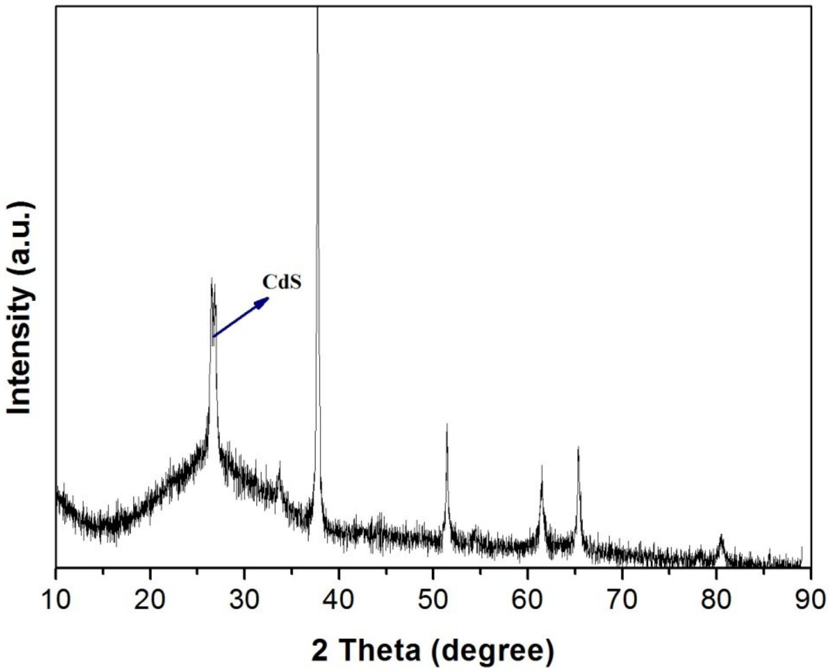

Fig. S2. XRD pattern of CdS film.

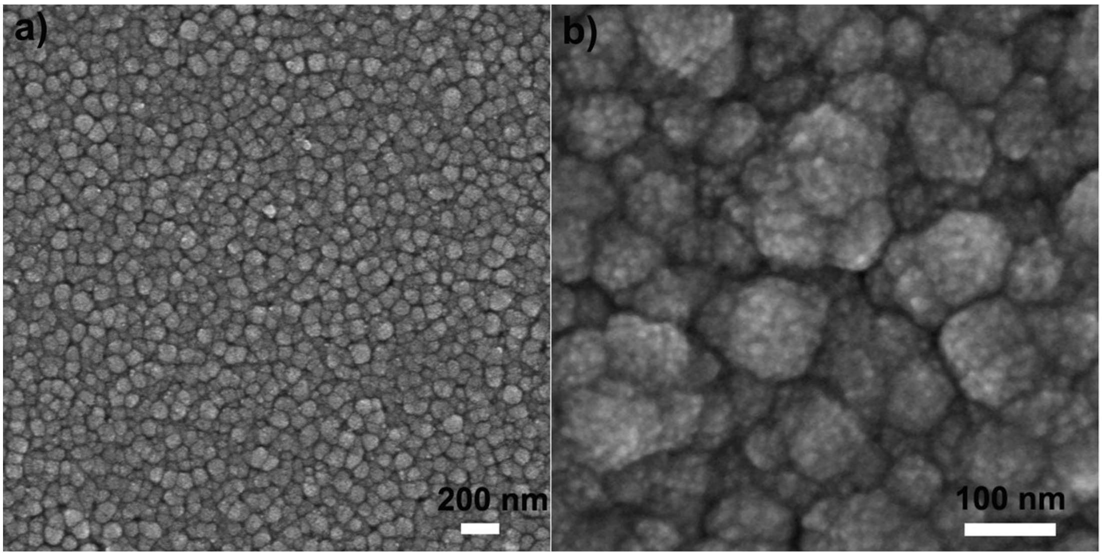

Fig. S3. The SEM images of the pure CdS film.

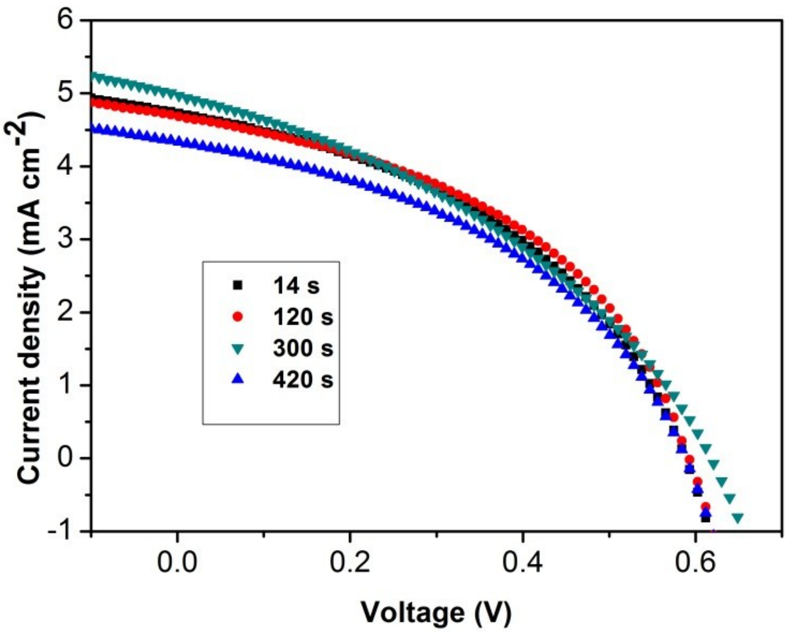

Fig. S4. The I-V curves of BiOBr/CdS-20 photochemical cells under different irradiation time.

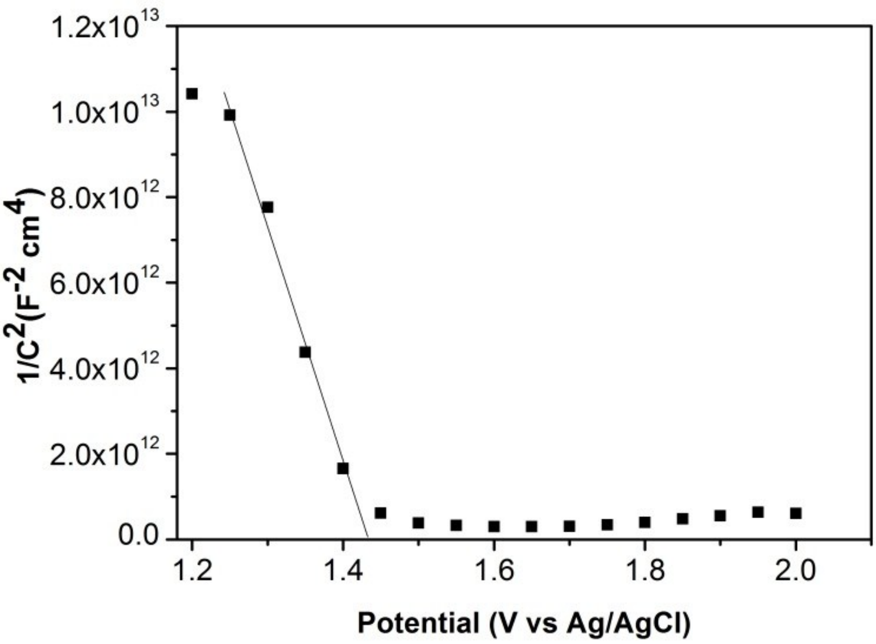

Fig. S5. The Mott−Schottky curve of BiOBr film.

The Mott−Schottky plot of BiOBr film was recorded by electrochemical workstation (CHI 760e, Shanghai). A three electrode single compartment immersed in 0.5 M Na_2SO_4 solution was used for capacitance analysis. The BiOBr film was used as a working electrode while Ag/AgCl and platinum were used as reference and counter electrodes, respectively. According to the Mott−Schottky equation, a linear relationship of $1/C^2$ versus applied potential can be obtained, and the negative and positive slopes correspond to p- and n-type conductivities, respectively. The result shows that the as-prepared BiOBr film was a p-type semiconductor.

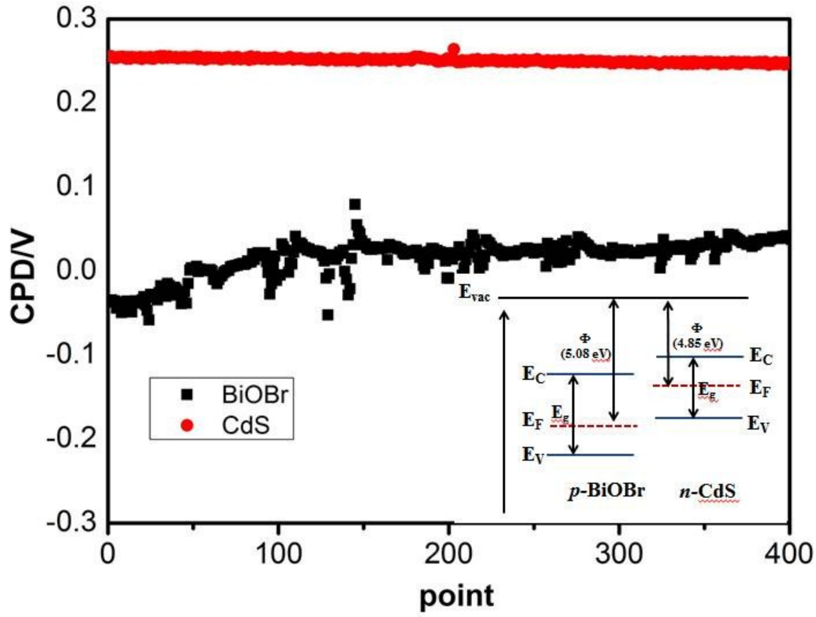

Fig. S6. Contact potential differences (CPDs) of p-type BiOBr and n-type CdS film. Inset show the schematic diagram of valence band, conduction band and Fermi level of BiOBr and CdS.

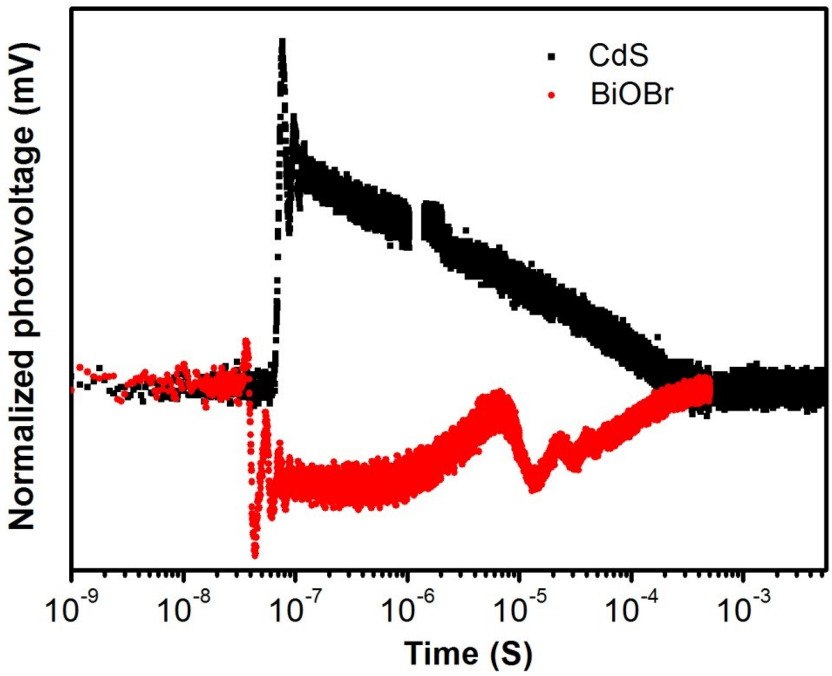

Fig. S7. The transient photovoltage of pure BiOBr and pure CdS films front side illumination. The wavelength and power of the laser are 355 nm and 350 ns.

Table S1 Effect of irradiation time on the stability of BiOBr/CdS-20 based solar cell.

Irradiation Time (s)	V_{oc} **(V)**	I_{sc} **(mA cm^{-2})**	***FF***	η **(%)**
14	0.59	4.74	0.44	1.23
120	0.59	4.70	0.45	1.25
300	0.61	4.98	0.39	1.18
420	0.59	4.36	0.44	1.13

Table S2. Parameters of the as-prepared Pure BiOBr Film Measured by Hall Effect.

Summary		
ID		
Type	van der Pauw	
Thickness [nm]	400	
Hall factor	1	
Dimension Lp [mm]	10	
Max voltage [V]	20	
Max current [mA]	20	
Gate bias voltage [V]	0	
Final results		
		Mean value
μH	Hall mobility [m²/V·s]	**1.221879987**
	Carrier type	**P**
n	Carrier concentration [1/m³]	**1.27538E+23**
nsheet	Sheet carrier concentration [1/m²]	**5.10152E+16**
RH	Hall coefficient [m³/C]	**4.89384E-05**
RHsheet	Sheet Hall coefficient [m²/C]	**122.345976**
ρ	Resistivity [Ω·m]	**4.00517E-05**
ρsheet	Sheet resistivity [Ω/□]	**100.1292903**
VH	Hall voltage [V]	**1.22346E-06**