

Supporting Information

for

Facile synthesis of a ZnO–BiOI p–n nano-heterojunction with excellent visible-light photocatalytic activity

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Additional experimental information

Table S1: Comparison of ZnO/TiO₂-BiOI composites prepared by different methods

Samples	Synthetic method	Testing method	Test result	Ref.
ZnO-BiOI nanoheterojunction	Solution method followed by calcination.	Photocatalytic degradation of RhB solution under 300 W Xe lamp with a 420 nm cutoff filter.	99.3% of RhB was degraded after 100 min irradiation.	This report
TiO₂-BiOI heterostructure	Soft chemical method	Photocatalytic degradation of MO solution under 500 W halogen-tungsten lamp with a 420 nm cutoff filter.	95% of MO was degraded after 2h irradiation.	[1]
ZnO-BiOI heterostructure	Chemical bath method	Photocatalytic degradation of MO solution under 500W halogen-tungsten lamp with a 420 nm cutoff filter.	78% of MO was degraded after 4h irradiation.	[2]
BiOBr-BiOI/ZnO nanowires heterostructure	Spine-coating	Photocurrent under the 300 W Xe lamp with a 420 nm filter.	4.8 mA/cm ²	[3]
BiOI nanoplate- ZnO nanorod p-n heterojunction	Electrodeposition followed by solvolthermal process	Photoelectrocatalytic degradation of CR under 300 W Xe lamp with a 420 nm filter.	93.66% of CR was degraded after 2 h irradiation.	[4]
ZnO embedded into BiOI hybrid nanoflakes	Solvolthermal method followed by precipitation-deposition in combination with calcination.	Photodegradation of RhB under the irradiation of 300 W Xe lamp with a 420 nm filter.	37.2% of the RhB was degraded after 5 min irradiation.	[5]
BiOI loaded ZnO nanorods composites	Solvolthermal method followed by precipitation-deposition	Photodegradation of phenol under the irradiation of 500 W Xe lamp without filter.	99.9% of phenol was degraded after 2 h irradiation.	[6]

Table S2: The average crystal size estimated by Scherrer formula and the specific surface area of selected samples.

Samples	Crystal size(nm)	Specific surface area (cm ² /g)
B-1	-	5.23
B-2	31.25	-
B-3	14.8165	-
B-4	14.2949	20.83
B-5	12.5145	-
B-6	-	16

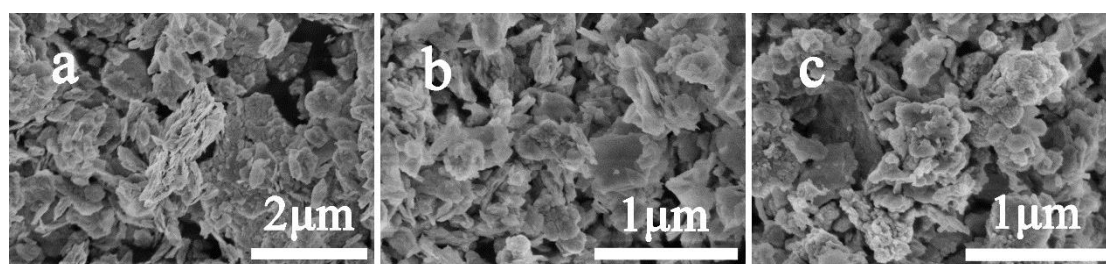


Figure S1: SEM image of a. B-2 (Bi/Zn=1/1), b. B-3 (Bi/Zn=1:2) and c. B-5 (Bi/Zn=1/4). From figure S1 a and b, it is obviously seen that the thickness and size of the particles from B-2 and B-3 samples diminish with the increase of the concentration of ZnO. When the Bi/Zn molar ratio reaches to 1/4, the assembled ZnO nano particles displace of the plate-like BiOI as the major shape of the B-5 sample.

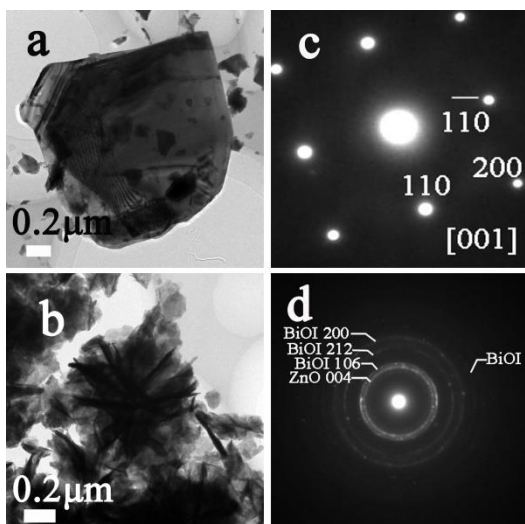


Figure S2: The TEM images: a. pure BiOI, b. B-3 sample and their SAED patterns: c. pure BiOI, d. B-3 sample. The morphology of the samples highly agree with the results of the SEM images. The crystallinity natures of B-1 and B-3 are each revealed by figure S2 c and d, which represent single and poly crystal feature respectively.

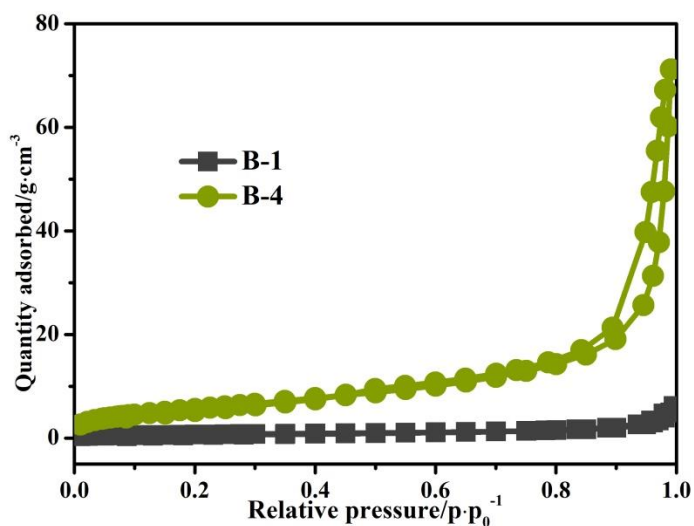


Figure S3: N₂ adsorption-desorption isotherms of pure BiOI and B-4 sample with Bi/Zn molar ratio=1/3. The B-4's shape corresponds to a type IV isotherm, with a loop shape of H3, demonstrating the pores in B-4 are mainly made up of slit-like cracks.

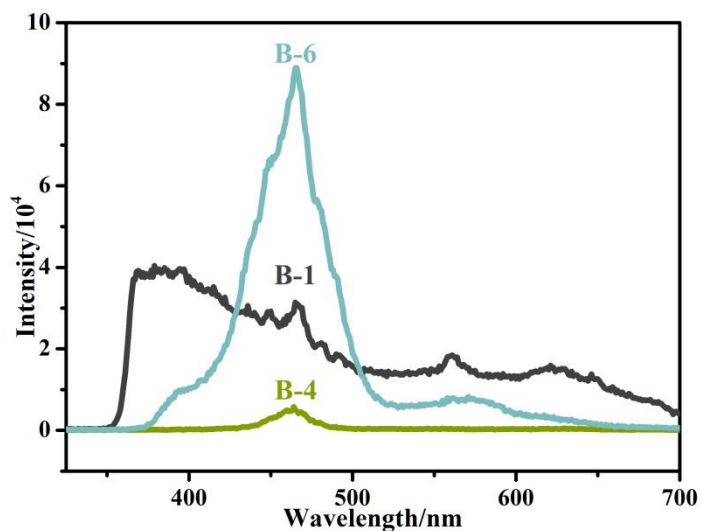


Figure S4: Photoluminescence spectra of B-1, B-4 and B-6 samples. The PL spectrum of B-4 has the lowest intensity comparing with the pure BiOI (B-1) and ZnO(B-6), illustrating the highest photo-induced charge separation efficiency.

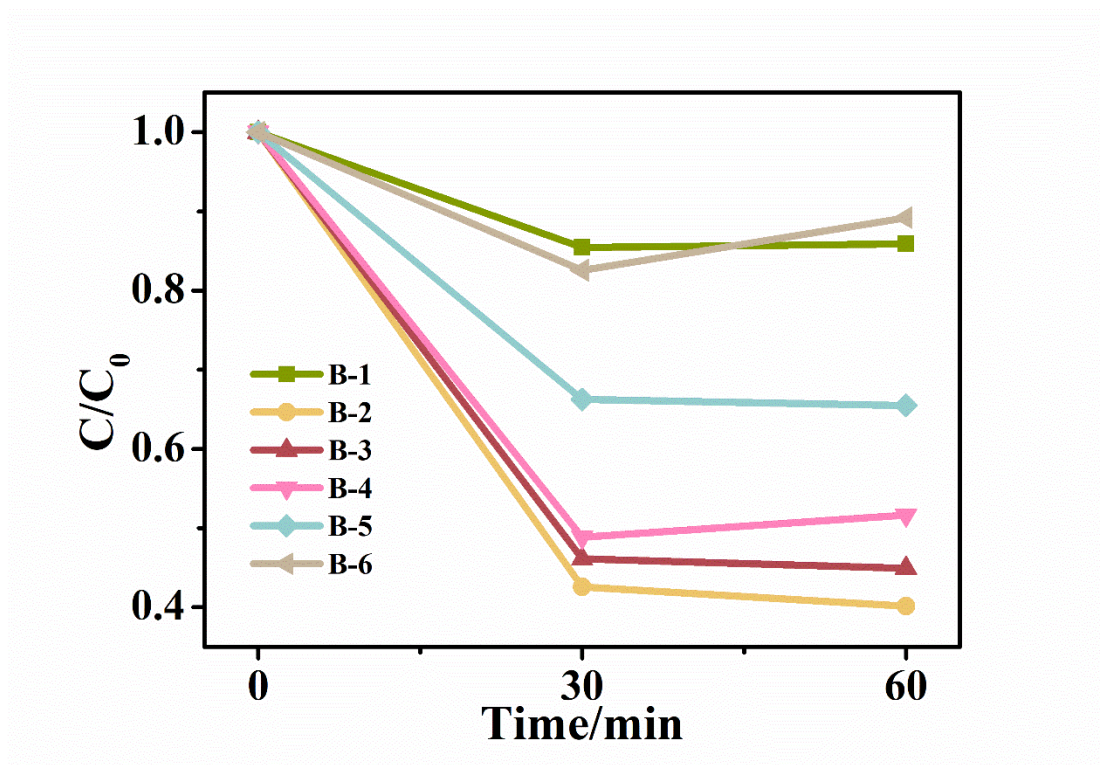


Figure S5: Adsorption-desorption equilibrium of different samples in the dark.

References

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