

Supporting Information

Pd/BiOBr tetragonal platelets with controllable facets by the decoration of La dopant enabling highly efficient photocatalytic activity

Xin Chen^a, Kailian Zhang,^a Yanming Yang,^c Kai Yang,^{a*} Qizhe Fan,^{b*} Changlin Yu,^{b*} Weiya Huang,^a Wenxin Dai^d

a, School of Chemistry and Chemical Engineering, Jiangxi University of Science and Technology, Ganzhou 341000, Jiangxi, China

b, School of Chemical Engineering, Key Laboratory of Petrochemical Pollution Process and Control, Guangdong Province, Guangdong University of Petrochemical Technology, Maoming 525000, Guangdong, China

c, Ganzhou Intelligent Industry Innovation Research Institute, Ganzhou 341000, Jiangxi, China

d, Research Institute of Photocatalysis, State Key Laboratory of Photocatalysis on Energy and Environment, Fuzhou University, Fuzhou, 350002, China

1. *Corresponding author: Kai Yang, Ph. D. Associate Professor

Tel/Fax: +86-797-8312334

E-mail: 19979706763@126.com

2. *Corresponding author: Qizhe Fan, Ph. D

Tel/Fax: ++86-668-2982253

E-mail: lyfx210@126.com

3. *Corresponding author: Changlin Yu, Ph. D. Professor

Tel/Fax: +86-668-2982253

E-mail: yuchanglinjx@163.com

XRD

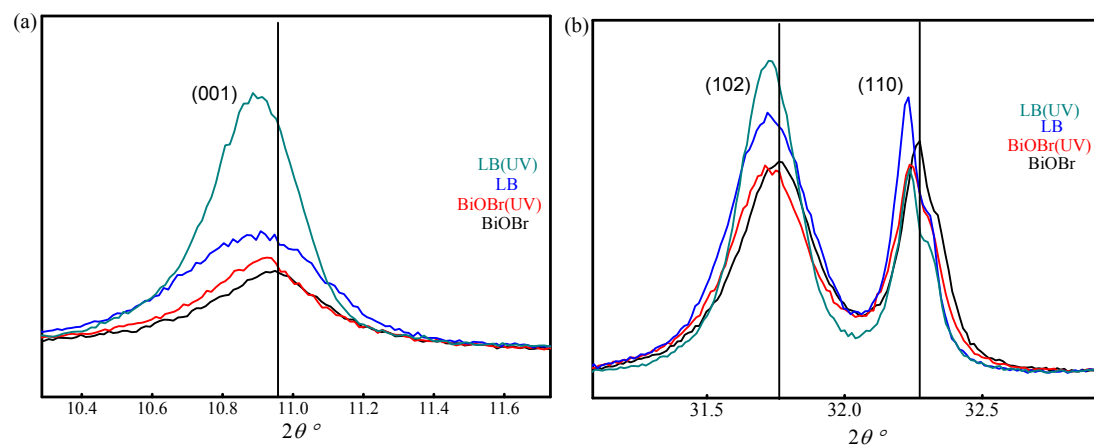


Fig. S1 Enlarge the pattern of BiOBr, LB, BiOBr(UV), and LB (UV) (a) the peak at 10.90° corresponding (001) facet (b) at 31.72° and 32.27° corresponding (102) and (110) facets, respectively.

SEM

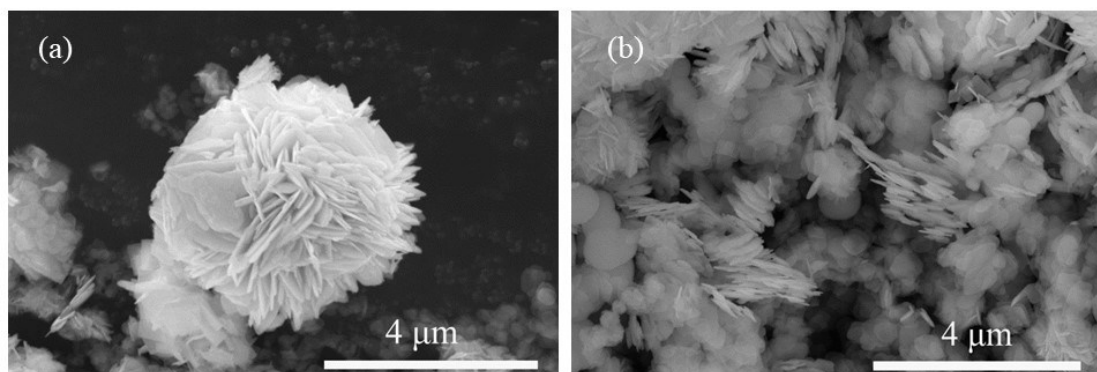


Fig. S2 The morphology of (a)BiOBr and (b) LB.

TEM

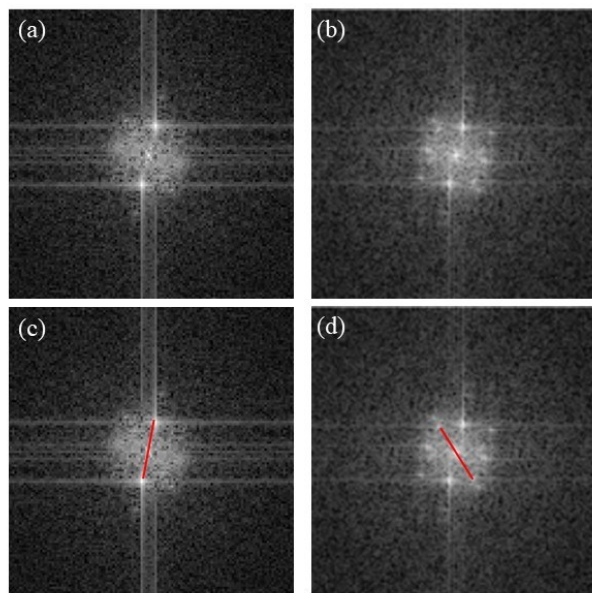


Fig. S3 (a,b) Unmodified FFT images (c) FFT image with (110) planes (d) FFT image with (102) planes.

$$\cos \varphi = \frac{\frac{h_1 h_2 + k_1 k_2}{a^2} + \frac{l_1 l_2}{c^2}}{\sqrt{\left(\frac{h_1^2 + k_1^2}{a^2} + \frac{l_1^2}{c^2}\right) \left(\frac{h_2^2 + k_2^2}{a^2} + \frac{l_2^2}{c^2}\right)}}$$

SF(1)

Elemental mapping images

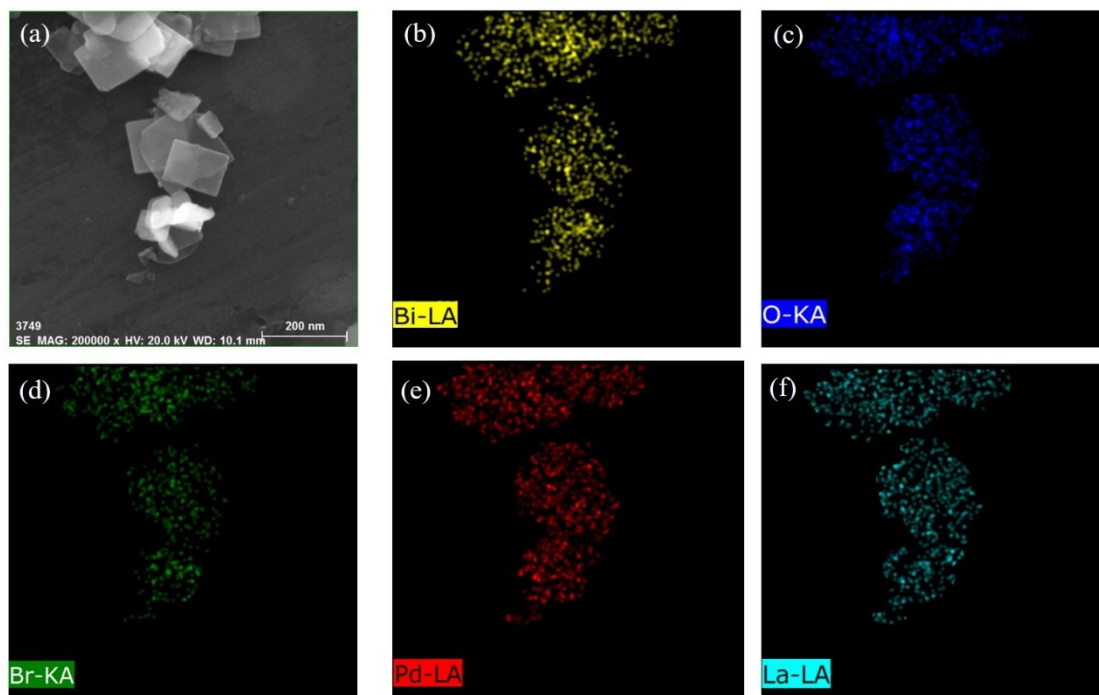


Fig. S4 The elemental mapping images of 4%PLB. (a-f) the element mapping of 4%PLB (a) SEM image (b) Bi, (c) O, (d) Br, (e) Pd, (f) La and elements.

UV-vis DRS

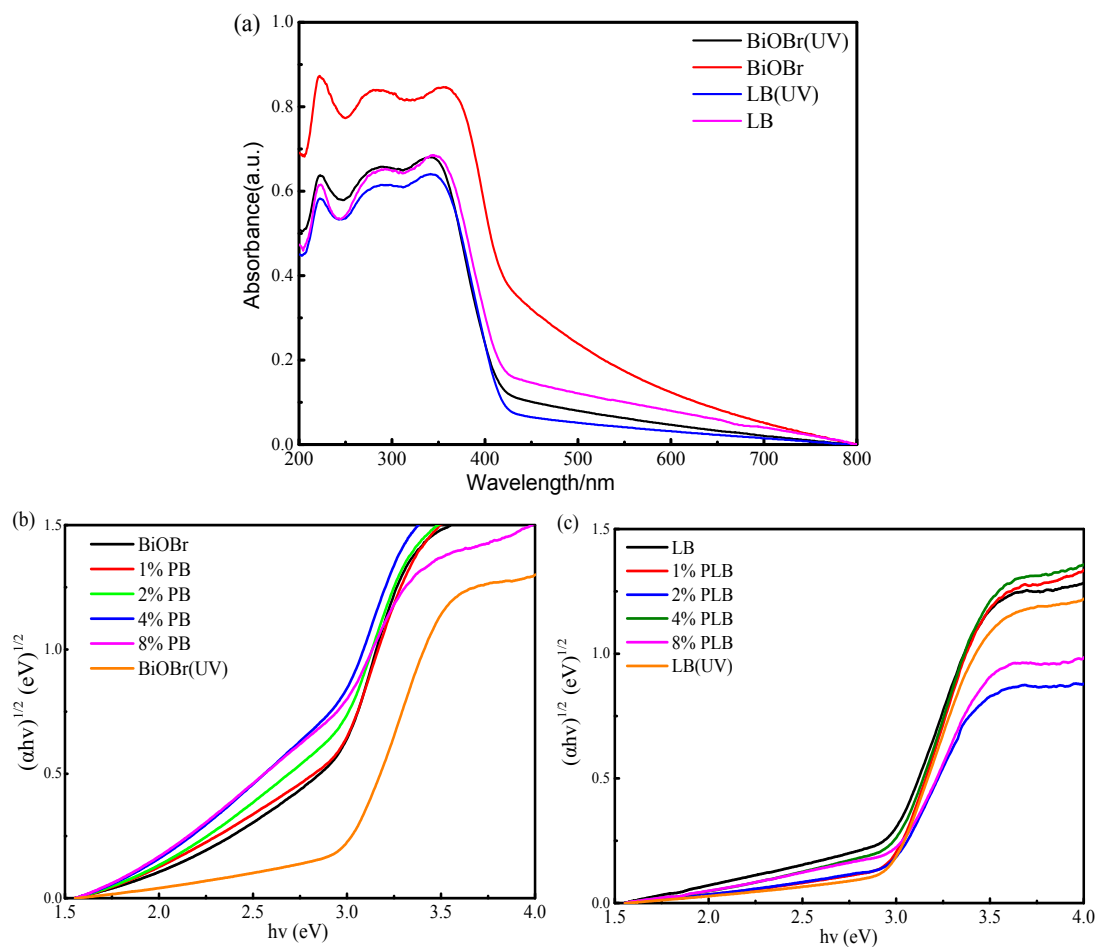


Fig. S5 (a) UV-vis DRS spectra of BiOBr, LB, BiOBr(UV), LB(UV) and the Tauc plots of (b) x%PB (c) x%PLB as the range from 1.5-4.0 eV.

Photocatalytic activity test

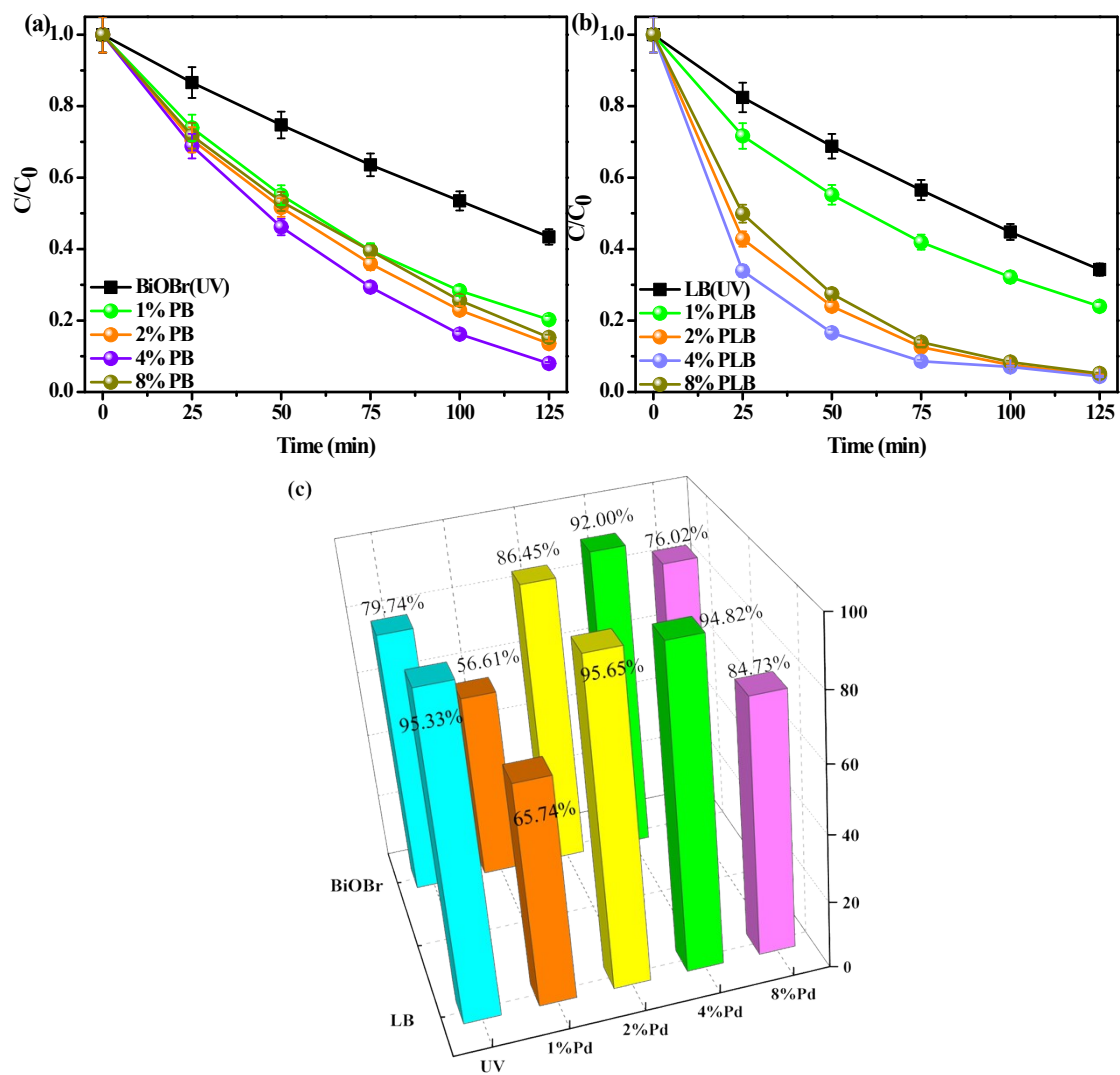


Fig. S6 The degradation curves of the samples under UV light irradiation (a) BiOBr(UV) and x%PB (b) LB(UV) and x%PLB (c) The degradation ratio of the samples (UV means only with irradiation of UV light but not deposited Pd).

Table S1 The basic parameters of tetragonal BiOBr in PDF card (ICDD-01-085-0862)

Miller Index	d	2 θ /°	I/%
001	8.11000	10.901	40.6
002	4.05500	21.901	5.7
101	3.52934	25.213	25.3
102	2.81838	31.723	100
110	2.77186	32.270	47.9
003	2.70333	33.111	3.2
111	2.62289	34.157	2.8
112	2.28832	39.342	9
103	2.22545	40.502	0.5
004	2.02750	44.658	5
200	1.96000	46.284	19
113	1.93532	46.909	7.5
201	1.90515	47.698	2.8
104	1.80088	50.648	10
202	1.76467	51.763	1.9
211	1.71350	53.429	5.4
114	1.63645	56.161	11.9
005	1.62200	56.707	0.4
212	1.60914	57.201	28.9
203	1.58681	58.083	2.3
105	1.49876	61.856	2.3
213	1.47087	63.162	0.2
204	1.40919	66.272	5
220	1.38593	67.532	4.8
221	1.36612	68.646	0.7
006	1.35167	69.485	1.6
214	1.32610	71.024	5.7
222	1.31145	71.941	0.6
301	1.29003	73.328	0.9
106	1.27783	74.144	1.7
205	1.24960	76.113	0.1
302	1.24369	76.540	5
310	1.23961	76.838	5.7
223	1.23330	77.303	0.9
311	1.22538	77.897	0.5
116	1.21491	78.697	3.3
215	1.19057	80.632	1.8
312	1.18546	81.052	1.3
303	1.17645	81.804	0.1
007	1.15857	83.345	0.2
224	1.14416	84.636	2.1

313	1.12680	86.254	1.6
206	1.11272	87.620	2.8
304	1.09833	89.069	1.3

Table S2 Bandgap energy of the samples

Samples	E_g/eV	Samples	E_g/eV
LB	2.87	BiOBr	2.79
LB(UV)	2.90	BiOBr(UV)	2.93
1%PLB	2.92	1%PB	2.73
2% PLB	2.91	2%PB	2.64
4% PLB	2.91	4%PB	2.67
8% PLB	2.90	8%PB	2.55

Table S3 The flat band potential of the samples

Samples	Flat band potential/eV
BiOBr(UV)	-0.45
LB(UV)	-0.39
4%PB	-0.62
4%PLB	-0.65