

## Electronic Supporting Information (ESI)

### Mild synthesis of {001} facets predominated Bi<sub>2</sub>O<sub>2</sub>CO<sub>3</sub> clusters with outstanding simulated sunlight photocatalytic activities

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Table S1 The samples prepared at variable temperatures and  $\text{Na}_2\text{CO}_3$  dosages.

Sample	1	2	3	4	5	6	7	8	9	10	11
Temperature ( $^{\circ}\text{C}$ )	60	60	60	60	60	60	RT	40	80	100	140
$\text{Na}_2\text{CO}_3$ dosage (mmol)	0.5	1.0	2.0	4.0	6.0	10.0	6.0	6.0	6.0	6.0	6.0

Table S2. The relationship of carbonate dosage with medium pH and product phase.

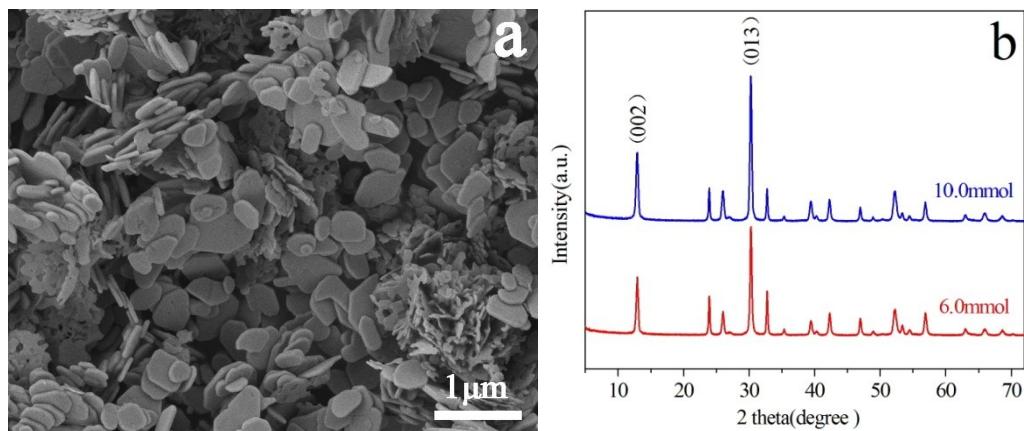
dosage		0.5	1.0	2.0	4.0	6.0
$(\text{NH}_4)_2\text{CO}_3$	pH	1.44	2.68	5.82	7.75	8.90
	Phase	BON	BON	BOC	BOC	BOC
$\text{Li}_2\text{CO}_3$	pH	1.52	2.84	6.17	7.94	9.21
	Phase	BON	BON	BOC	BOC	BOC
$\text{Na}_2\text{CO}_3$	pH	1.56	3.08	6.42	8.13	9.45
	Phase	BON	BON+BOC	BOC	BOC	BOC
$\text{K}_2\text{CO}_3$	pH	1.54	3.13	6.49	8.22	9.59
	Phase	BON	BON+BOC	BOC	BOC	BOC

Table S3. The intensity ratio of (002)/(113) with different carbonate and dosage

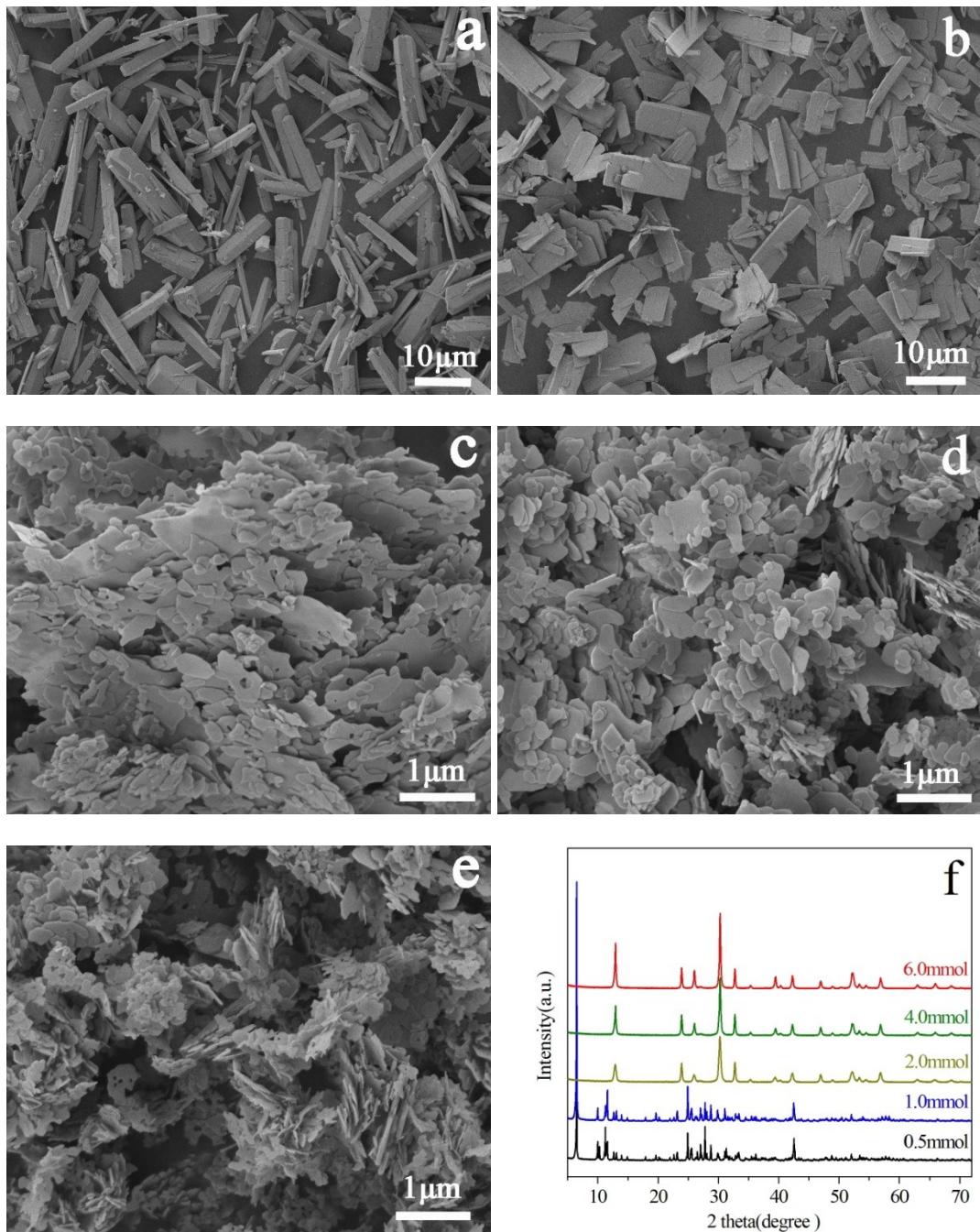
carbonate	$\text{Na}_2\text{CO}_3$	$\text{K}_2\text{CO}_3$	$\text{Li}_2\text{CO}_3$	$(\text{NH}_4)_2\text{CO}_3$
<b>2.0mmol</b>	0.38	0.35	0.42	0.39
<b>4.0mmol</b>	0.51	0.50	0.48	0.52
<b>6.0mmol</b>	0.54	0.55	0.51	0.61

Table S4 Adsorption of 10 mg BOC samples to  $10^{-5}$  M RhB solution

Time(min)	30	60	90	120
<b>BOC-40°C</b>	4.6%	7.7%	10.5%	10.7%
<b>BOC-60°C</b>	4.5%	8.3%	11.4%	11.5%
<b>BOC-140°C</b>	4.3%	6.4%	8.1%	8.4%

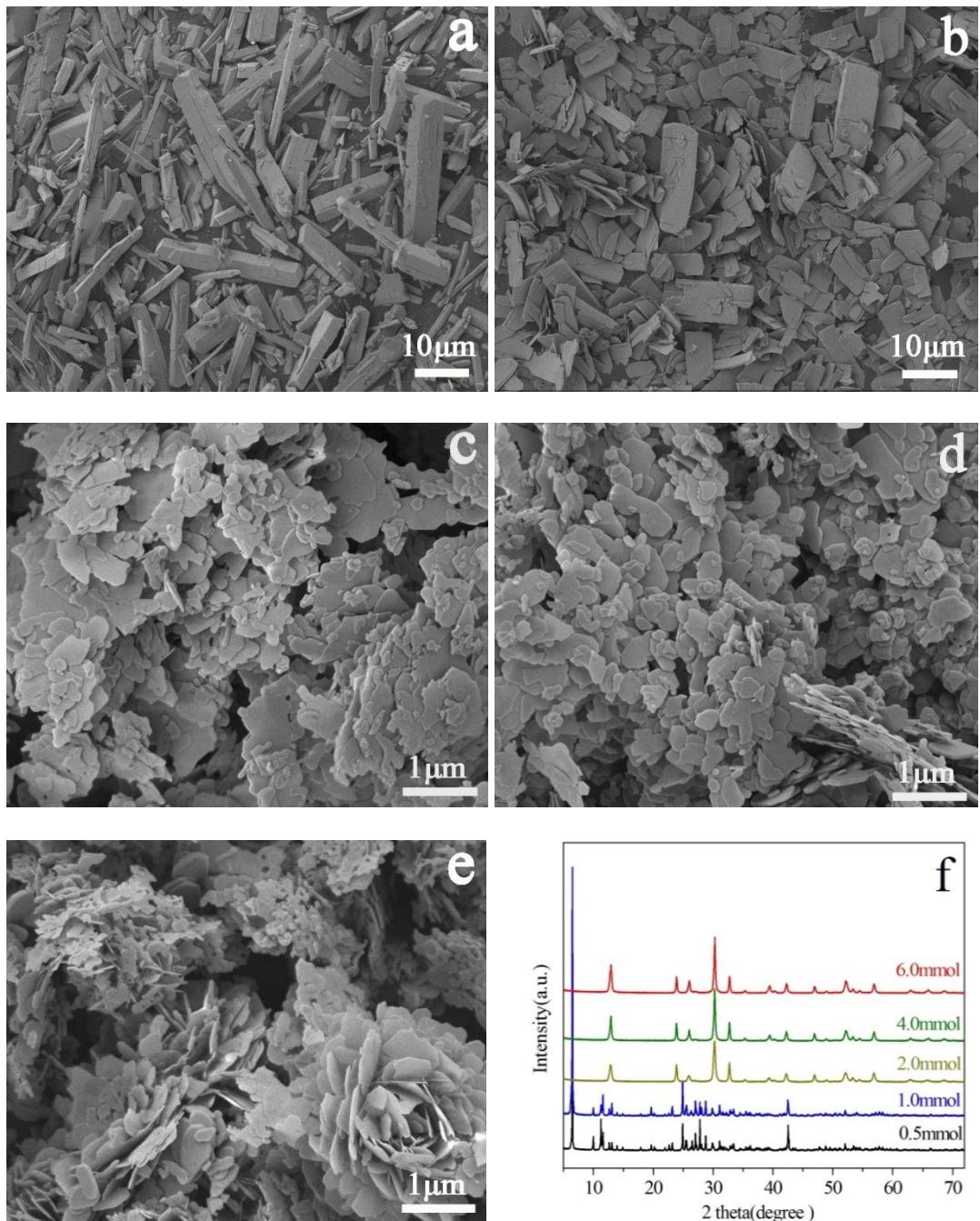


**Figure S1** (a) SEM image of BOC prepared with 10.0 mmol of  $\text{Na}_2\text{CO}_3$ , (b) XRD patterns of BOC samples with  $\text{Na}_2\text{CO}_3$  dosage of 10.0 and 6.0 mmol, respectively.

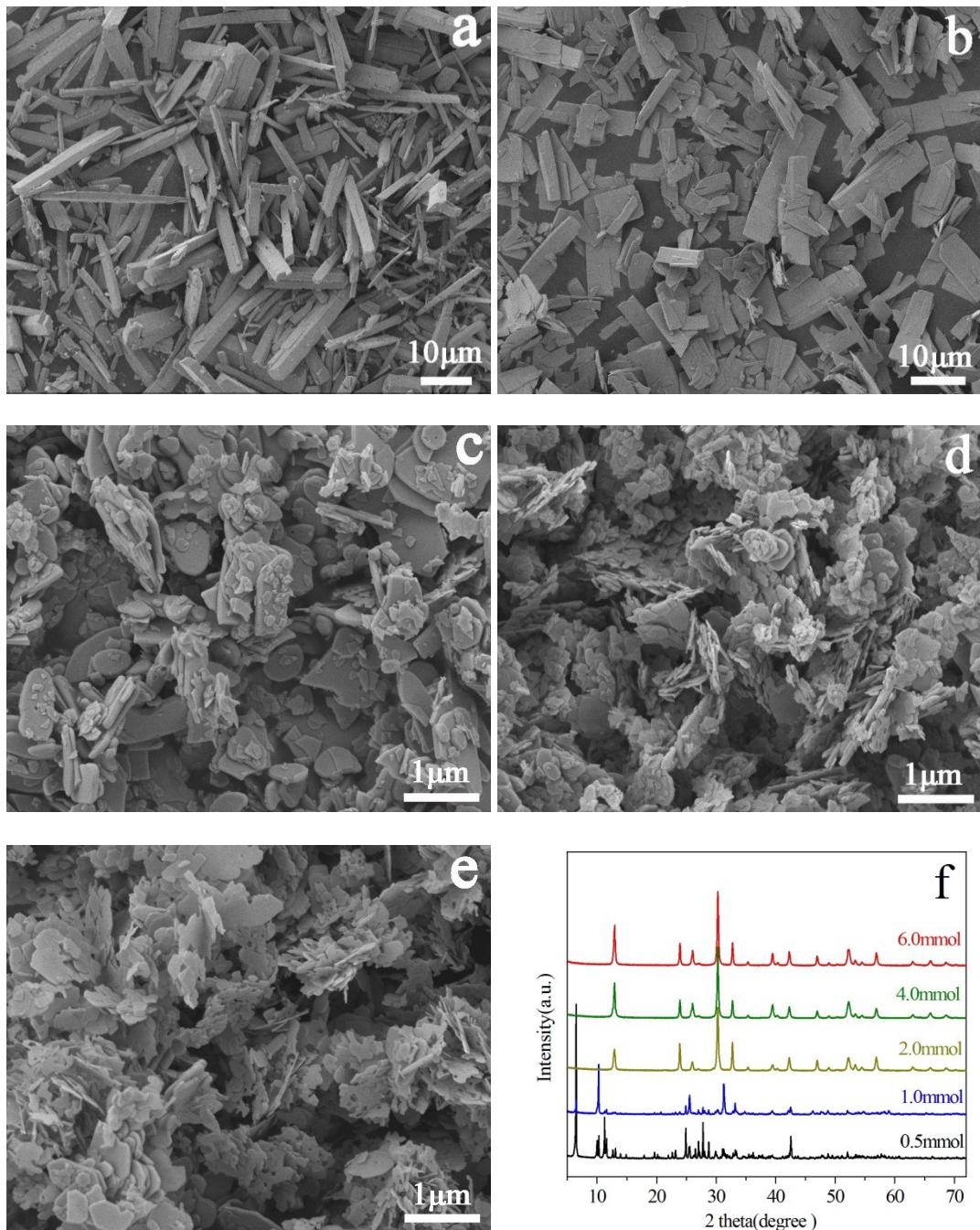


**Figure S2** SEM images and XRD patterns of the (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub> dosage series samples:

(a) 0.5 mmol, (b) 1.0 mmol, (c) 2.0 mmol, (d) 4.0 mmol, (e) 6.0 mmol, and (f) corresponding XRD patterns.



**Figure S3** SEM images and XRD patterns of the  $\text{Li}_2\text{CO}_3$  dosage series samples: (a) 0.5 mmol, (b) 1.0 mmol, (c) 2.0 mmol, (d) 4.0 mmol, (e) 6.0mmol, and (f) corresponding XRD patterns.



**Figure S4** SEM images and XRD patterns of the  $\text{K}_2\text{CO}_3$  dosage series samples: (a) 0.5 mmol, (b) 1.0 mmol, (c) 2.0 mmol, (d) 4.0 mmol, (e) 6.0 mmol, and (f) corresponding XRD patterns.

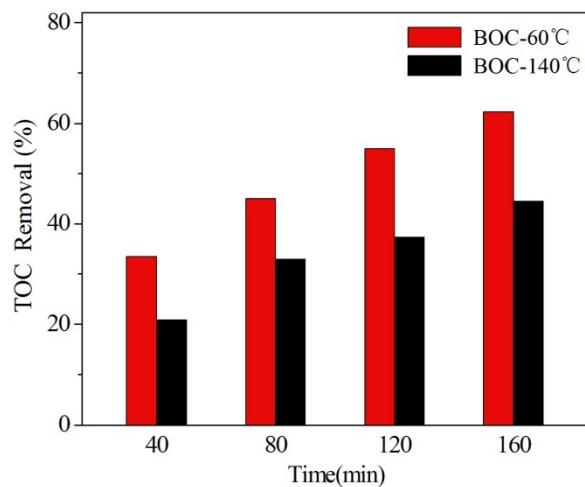


Figure S5 TOC analyses of RhB solutions at different irradiation time over BOC-60°C and BOC-140°C, respectively.

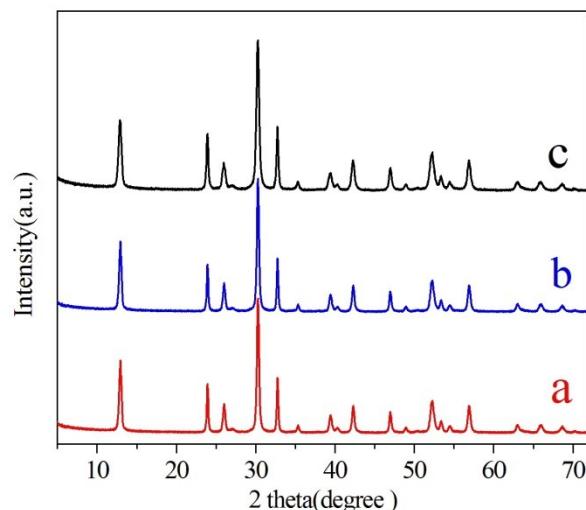


Figure S6 XRD patterns of the as-synthesized BOC samples: (a) fresh, (b) after 3 recycle runs and (c) after 5 recycle runs.

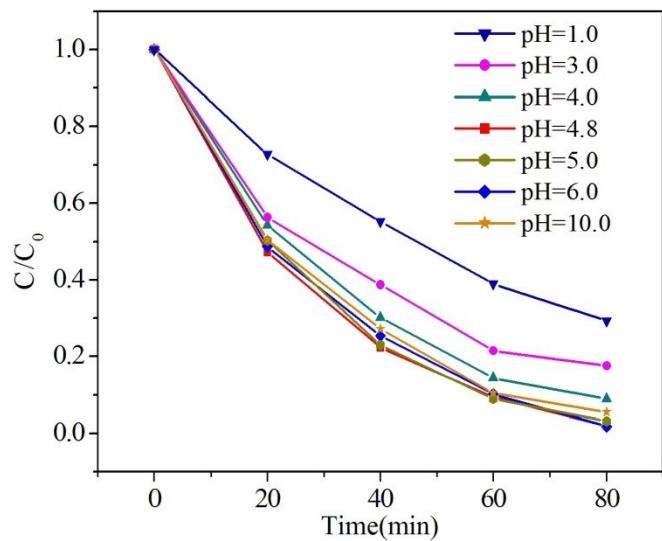


Figure S7 The degradation of RhB/BOC systems with different reaction pH values.