

Supporting material for

Fully understanding photochemistry properties of $\text{Bi}_2\text{O}_2(\text{CO}_3)_{1-x}\text{S}_x$ nanosheets

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The supporting material contains 10 Figures and 1 Table

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Table S1

Table S1 The experimental preparation of the samples

| Sample | Bi(NO ₃) ₃ (mmol) | CO(NH ₂) ₂ (mmol) | Sulfoarea:Bi (mole ratio) | pH value | Temperature (°C) | Reaction time (h) |
|--------|---|---|------------------------------|-------------|---------------------|----------------------|
| U1 | 0.2 | 0.2 | 0:1 | 9 | 120 | 24 |
| U2 | 0.2 | 0.2 | 0.33:1 | 9 | 120 | 24 |
| U3 | 0.2 | 0.2 | 0.5:1 | 9 | 120 | 24 |
| U4 | 0.2 | 0.2 | 1:1 | 9 | 120 | 24 |
| U5 | 0.2 | 0.2 | 1.5/1 | 9 | 120 | 24 |

Figure S1

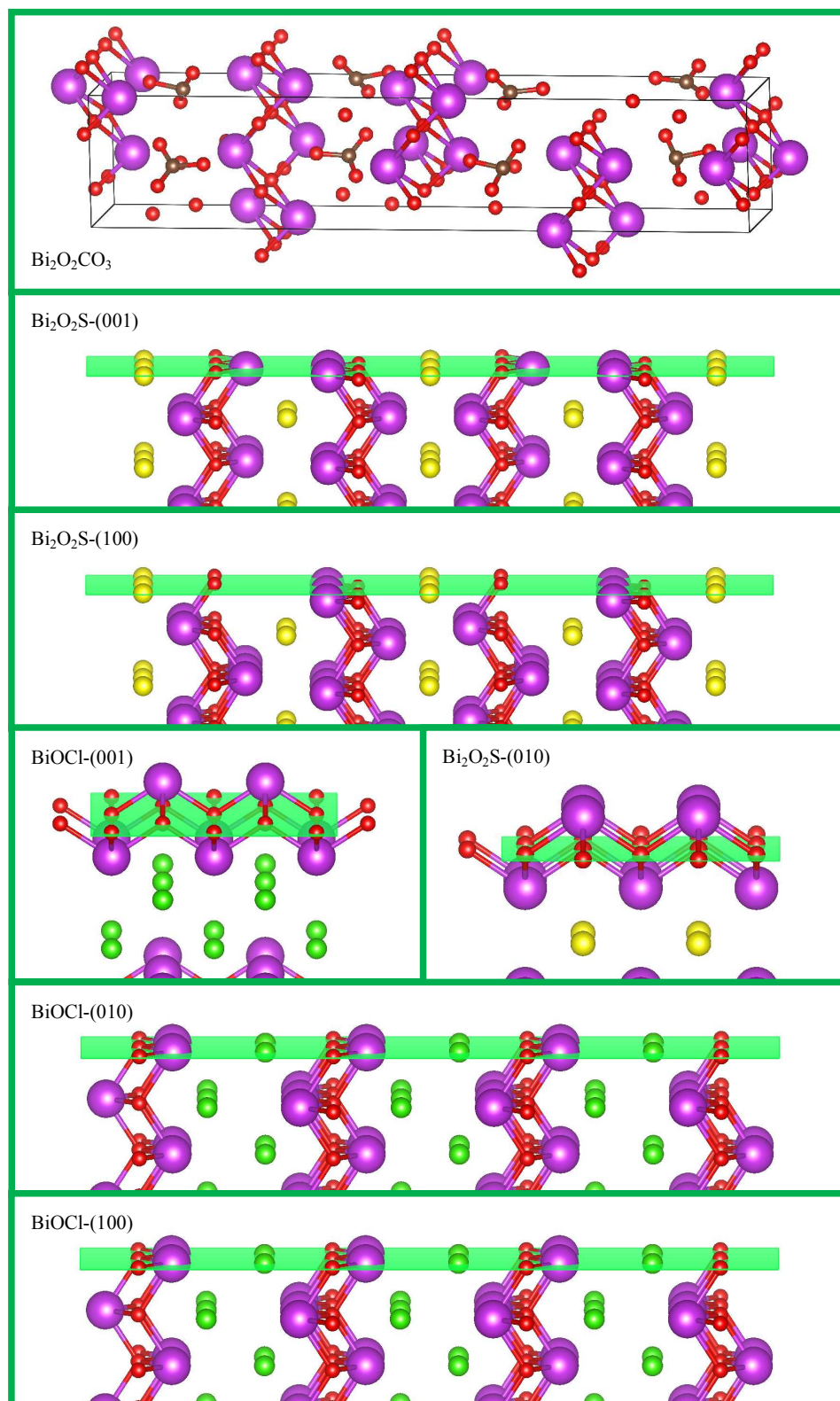


Figure S1 Atomic and geometric structures of $\text{Bi}_2\text{O}_2\text{CO}_3$ and different facets for $\text{Bi}_2\text{O}_2\text{S}$ and BiOCl

Figure S2

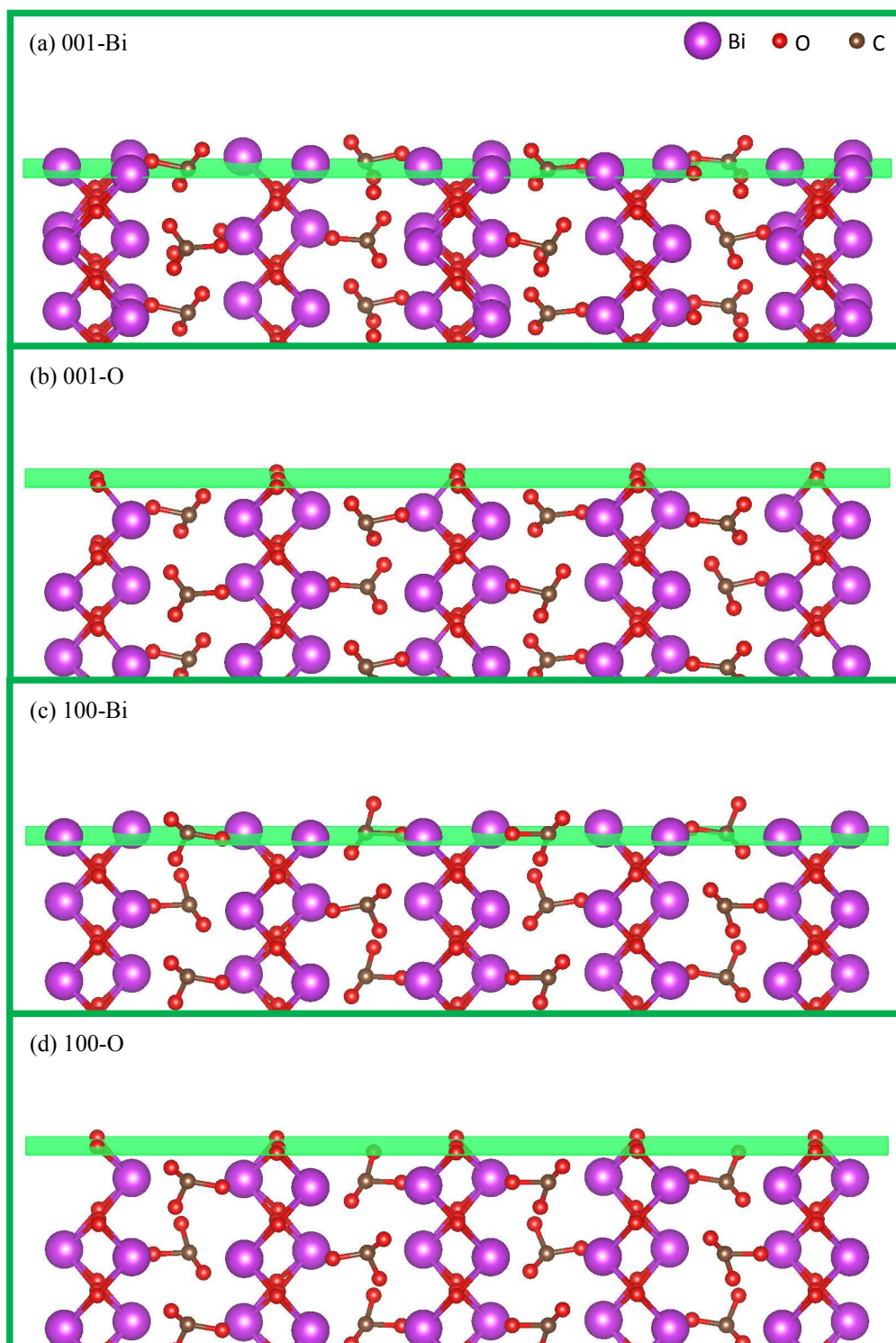


Figure S2 Atomic and geometric structures of (001) and (100) facets of $\text{Bi}_2\text{O}_2\text{CO}_3$: (a) 001-Bi, terminated with Bi; (b) 001-O, terminated with O; (c) 100-Bi, terminated with Bi; (d) 100-O, terminated with O

Figure S3

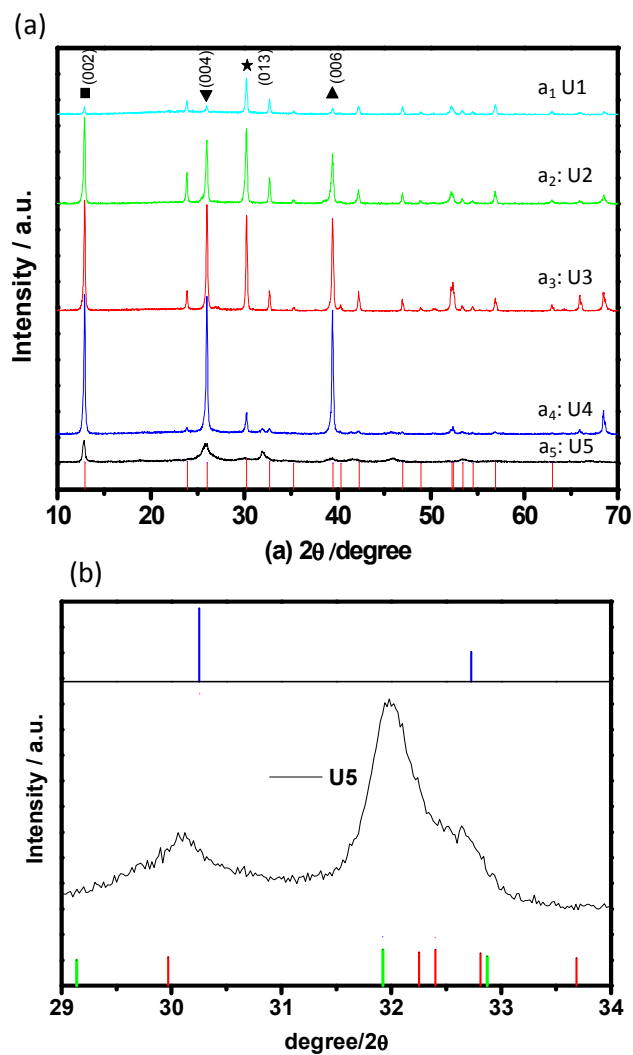


Figure S3 (a) XRD patterns of the U1-U5 samples in the 2θ range of 10-70°: The (002), (004), (013) and (006) peaks of $\text{Bi}_2\text{O}_2\text{CO}_3$ (JCPDS no. 41-1488) are marked by ■, ▼, ★ and ▲, respectively; (b) XRD patterns of the U5 sample in the 2θ range of 23-35.5°: Blue, yellow and red patterns represent the standard $\text{Bi}_2\text{O}_2\text{CO}_3$ (JCPDS no. 41-1488), $\text{Bi}_2\text{O}_{2.7}$ (JCPDS no. 75-0993) and $\text{Bi}_2\text{O}_2\text{S}$ (JCPDS no. 75-0717), respectively

Figure S4

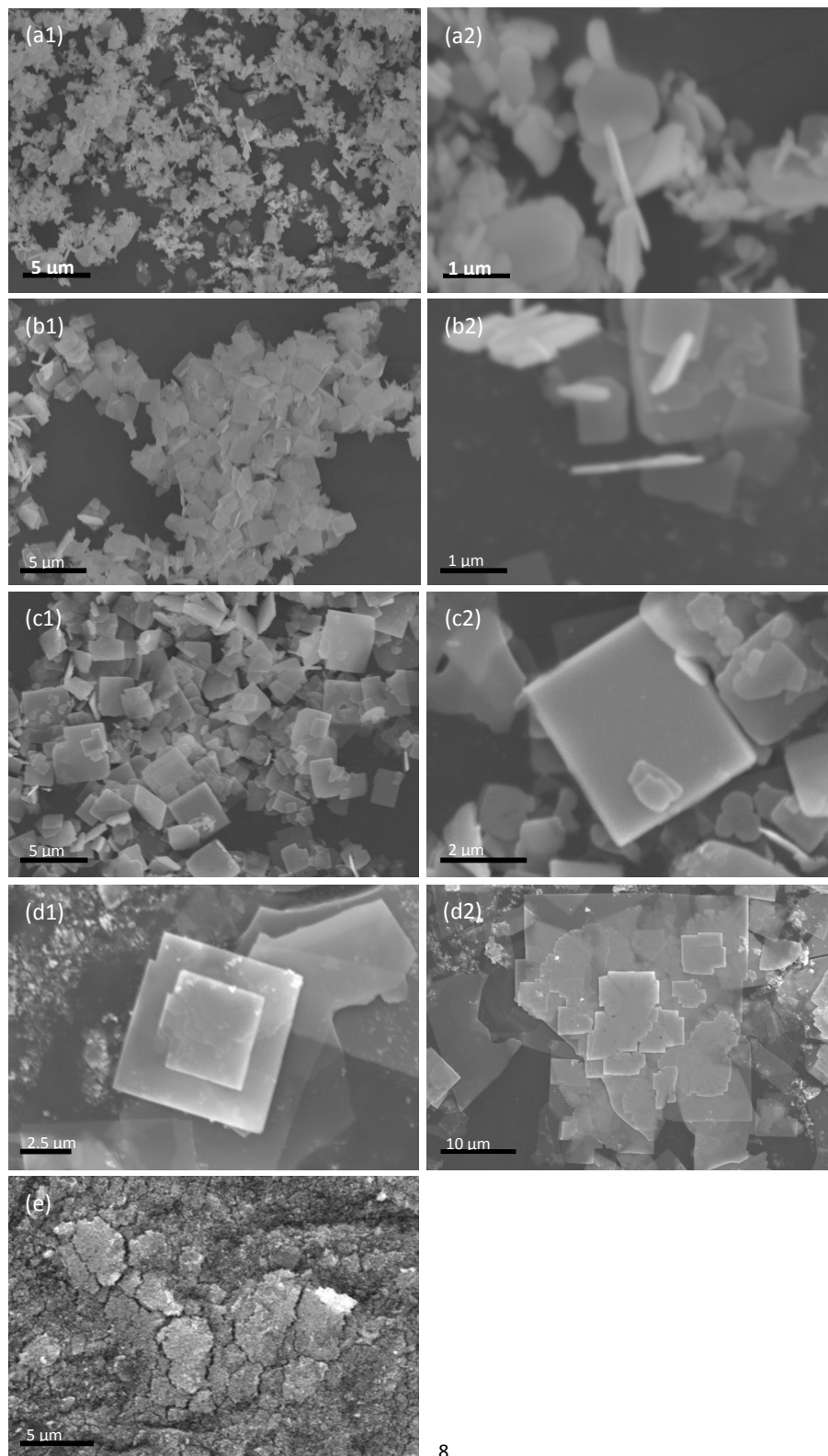


Figure S4 SEM micrographs of the samples: (a1, a2), U2; (b1, b2), U3; (c1, c2) U4; (d) U5

Figure S5

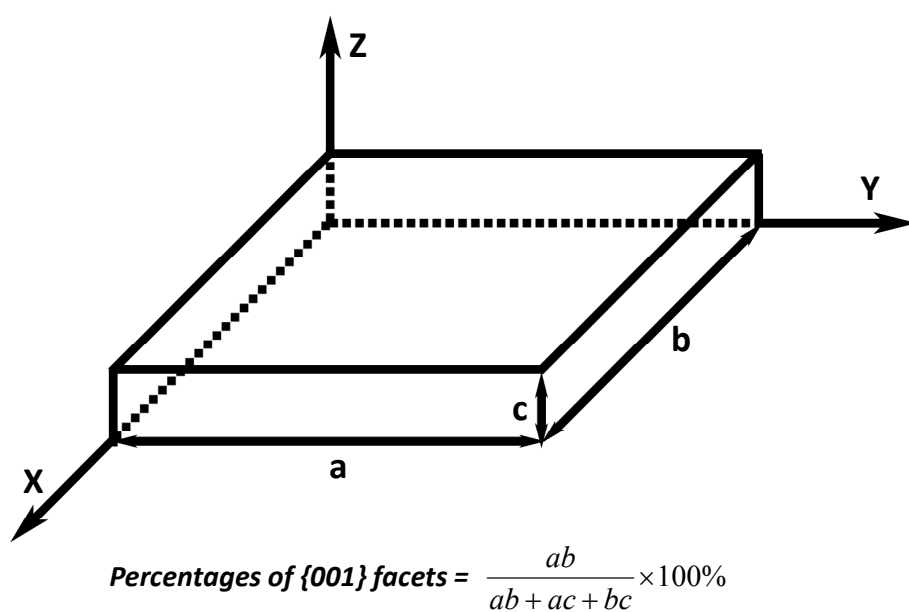


Figure S5 Geometric diagram of $\text{Bi}_2\text{O}_2\text{CO}_3$ nanosheets and the formula for calculating the {001} facet

Figure S6

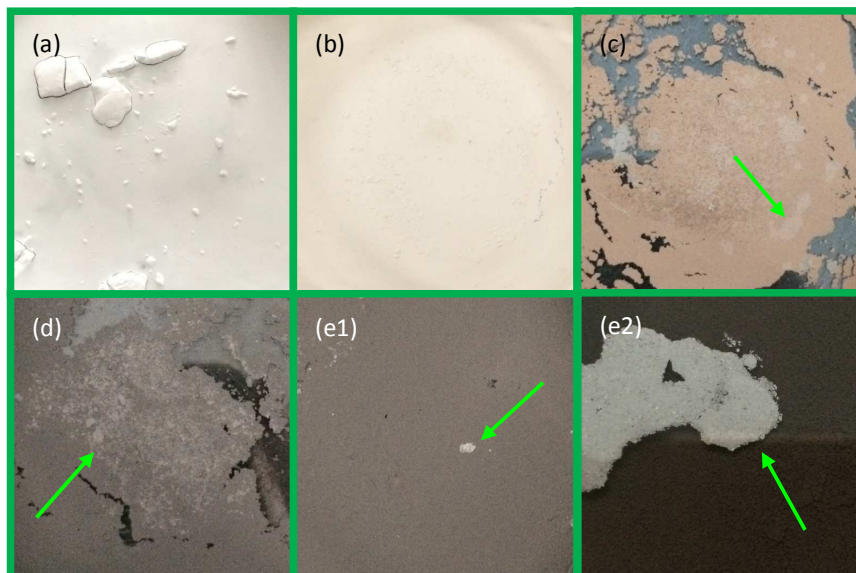


Figure S6 Photographs of the U1-U5 samples: (a) U1; (b) U2; (c) U; (d) U3; (d) U4; (e1, e2) U5: (e1) and (e2), after and before being dried, respectively

Figure S7

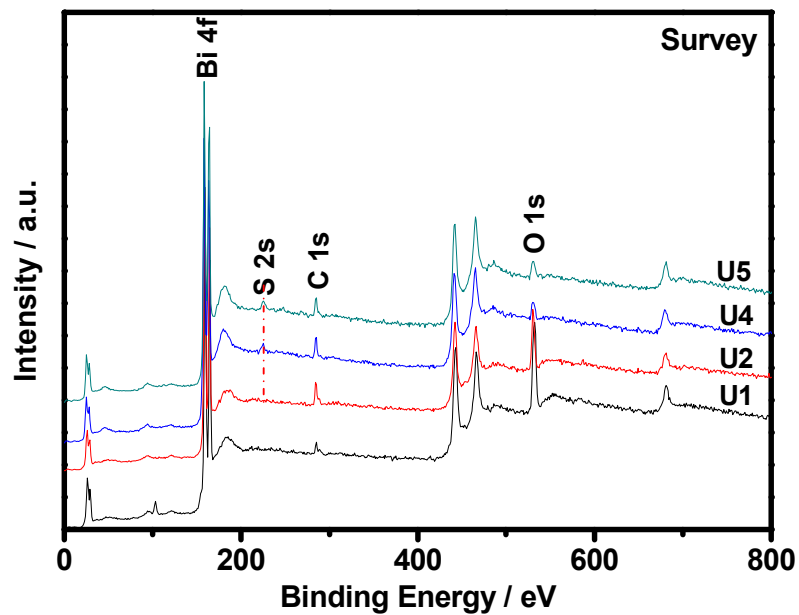


Figure S7 XPS survey spectra of the U1, U2, U4 and U5 samples

Figure S8

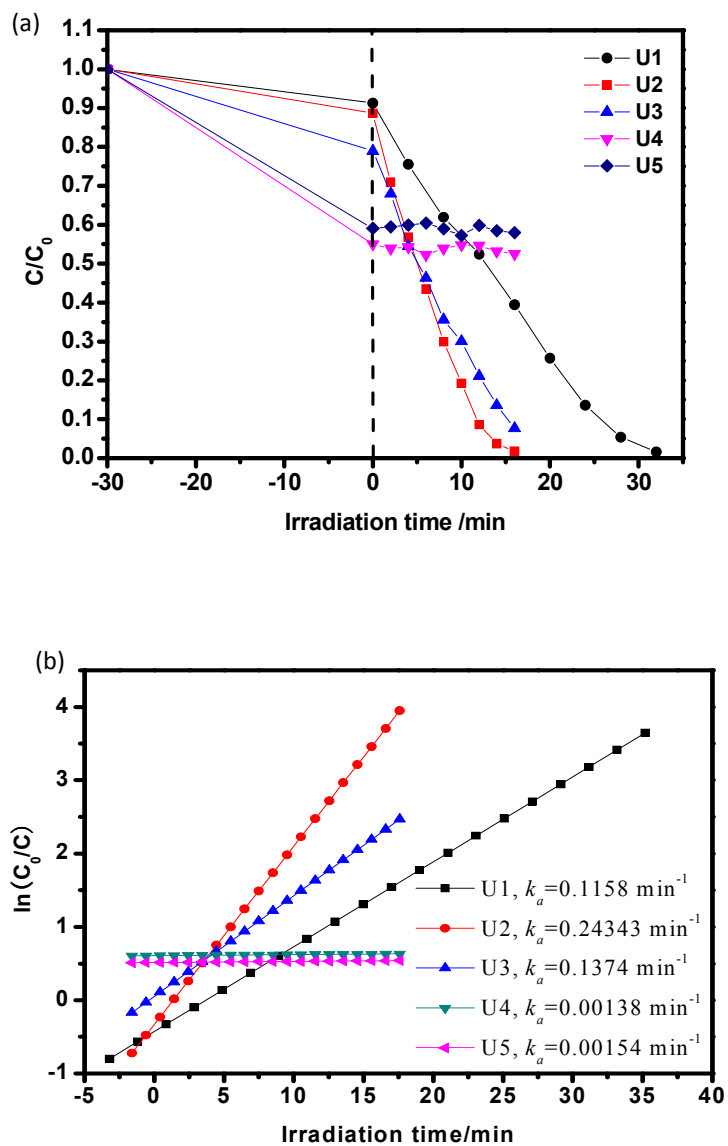


Figure S8 (a) Degradation curves of RhB over the U1-U5 samples under ultraviolet light irradiation ($\lambda \leq 400$ nm); (b) Apparent reaction kinetic curves of RhB degradation

Figure S9

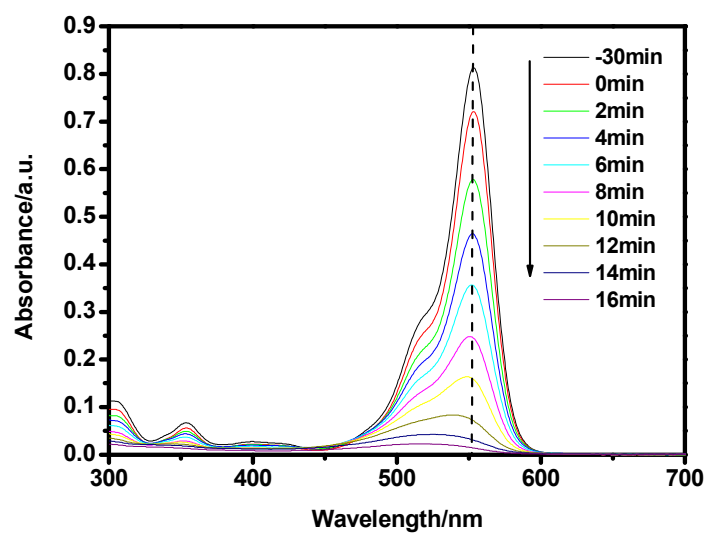


Figure S9 UV-Vis spectra of RhB aqueous solution as a function of irradiation time over the U2 sample

Figure S10

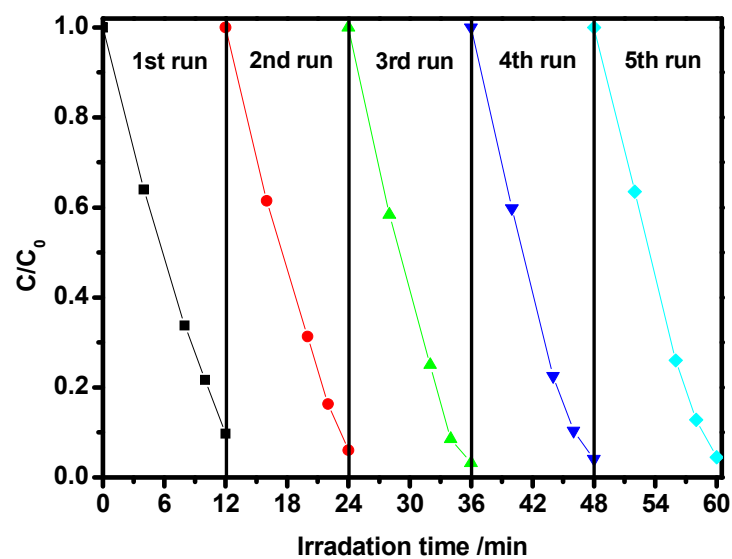


Figure S10 Cycle curves of the U2 sample for the degradation of RhB under ultraviolet light irradiation ($\lambda \leq 400$ nm)