Supporting Information

A novel visible-light-driven ternary Ag@Ag_2O/BiOCl Z-scheme photocatalyst with enhanced removal efficiency of RhB

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Contents

1. Enlarged details of XRD patterns of as-prepared samples

The enlarged XRD patterns of the corresponding diffraction peaks for Ag and Ag_2O are displayed in Fig. S1. Obviously, a weak wide diffraction peak (2θ) at 38.2 ° corresponding to (111) plane of Ag can be found in the Ag/BiOCl and Ag@Ag_2O/BiOCl samples (Fig. S1A), indicating that certain amount of Ag nanoparticles were obtained after photoreduction process. Meanwhile, the characteristic diffraction peaks at 33.0 ° (Fig. S1B) in Ag@Ag_2O/BiOCl composite can be well attributed (111) plane of Ag_2O.

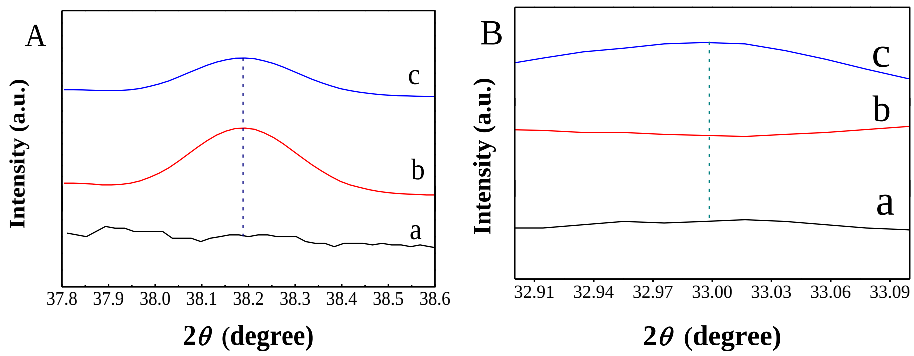

Fig. S1 Enlarged details of corresponding diffraction peaks for Ag (A) and Ag_2O (B): BiOCl (a), Ag/BiOCl (b) and Ag@Ag_2O/BiOCl (c).

2. TOC removal rates of the as-prepared photocatalysts toward RhB

Fig. S2 displays the TOC removal rates of the as-prepared photocatalysts toward RhB. It is obvious that Ag@Ag_2O/BiOCl exhibits a mineralization rate of 50.1% which is much higher than that of BiOCl (3.0%), Ag_2O (18.9%) and Ag/BiOCl (16.6%). The above results indicate that the as-prepared Ag@Ag_2O/BiOCl sample has an obvious superiority in mineralization of RhB than any other counterparts.

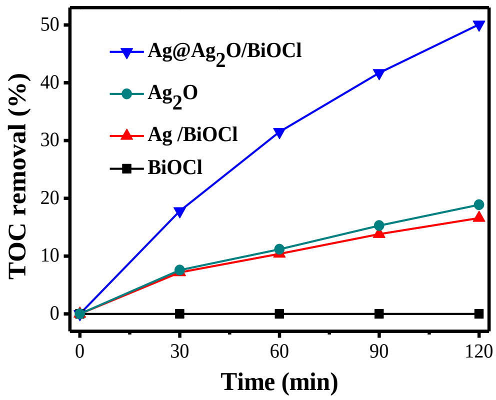

Fig. S2 TOC removal plots of RhB solution over different photocatalysts.

3. XPS of Ag@Ag_2O/BiOCl composite before and after the recycle degradation experiments.

To estimate the stability of Ag@Ag_2O/BiOCl composite, XPS spectra of the Ag@Ag2O/BiOCl composite before and after the recycle degradation were compared in this work. As shown in Fig. S3, the chemical state of all component elements remains unchanged, indicating that Ag@Ag_2O/BiOCl composite can be deemed stable.

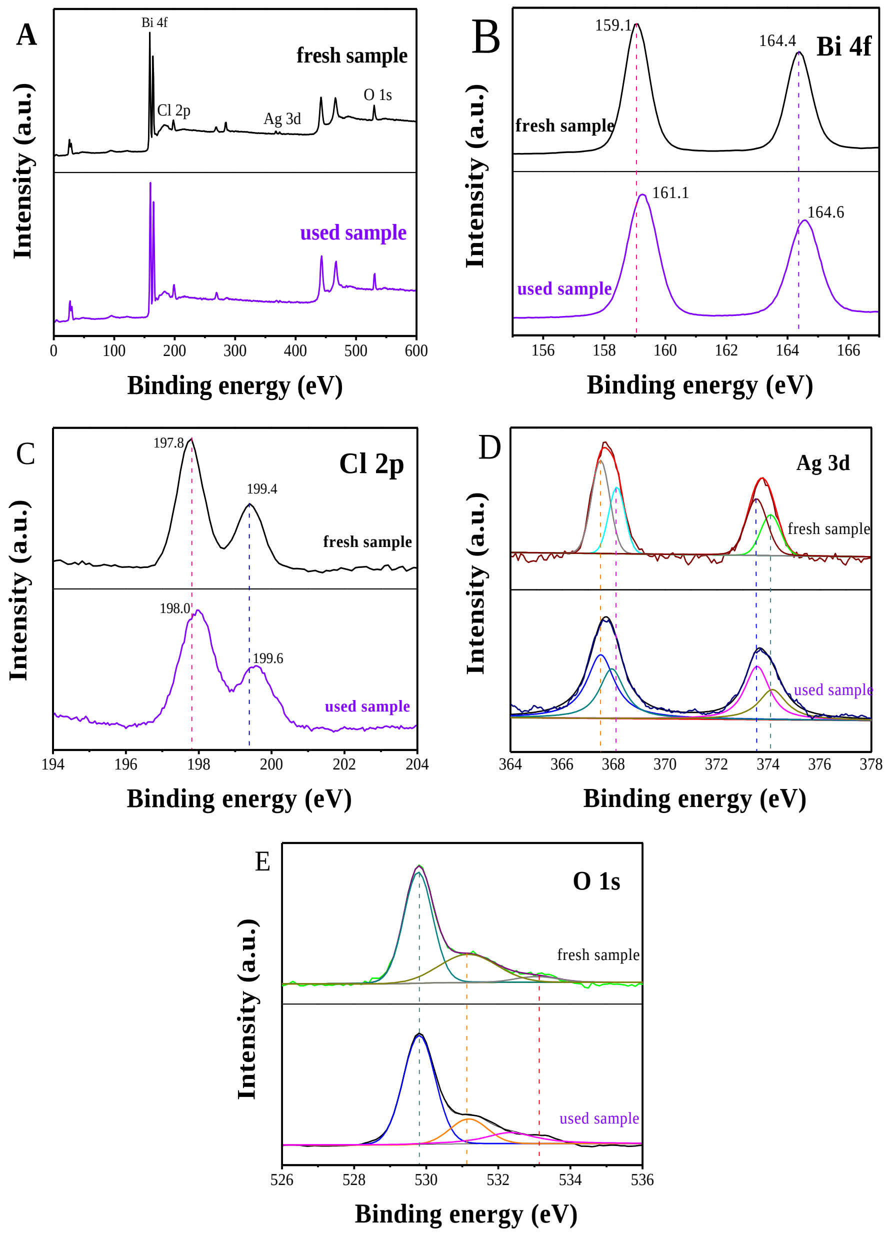

Fig. S3 XPS spectra of Ag@Ag_2O/BiOCl composite before and after the photodegradation process: (A) survey, (B) Bi 4f, (C) Cl 2p, (D) Ag 3d and (E) O 1s.

4. Comparison of photodegradation performance for $Ag/Ag_2O/BiOCl$ composite with similar catalysts.

Table S1 shows the results of photocatalytic degradation for $Ag/Ag_2O/BiOCl$ composite with similar catalysts. As exhibited, there are some differences in photodegradation performance. It may be caused by the following reasons: (1) the differences in light source, power of the light source and irradiation time (2) the difference in the mass ratio of pollutants and catalysts (3) the difference in structure and morphology caused by preparation procedure. Compared with other counterparts, the power of the light source in this work is relatively low, as a result, the 91.2% degradation rate of $Ag/Ag_2O/BiOCl$ composite toward RhB shows relatively good photocatalytic activity.

Table S1 Comparison of photodegradation performance for $Ag/Ag_2O/BiOCl$ composite with similar catalysts.

Name	Light source	Pollutant	Catalyst dosage	Mass ratio of pollutants to catalysts	Degradation efficiency	Ref.
Ag/AgCl/BiOCl	Xe lamp (500W)	RhB (50 mL, 10 mg/L)	20 mg	1/40	120 min, 77.9%	1
$BiVO_4$/Au@CdS	Xe lamp (300W)	RhB (50 mL, 5 mg/L)	30 mg	1/120	80 min, 68%	2
$Ag/AgCl/Bi_2WO_6$	Halogen lamp	RhB (100 mL, 10 mg/L)	50 mg	1/50	45 min, 100%	3
Ag/AgCl/BiOCl	Xe lamp (300W)	X-3B (100 mL, 40 mg/L)	100 mg	1/25	60 min, 55%	4
Ag_2O-Ag/$BiVO_4$	Xe lamp (350W)	MO (10 mL, 20 mg/L)	50 mg	1/250	-	5
Ag@Ag_2O/BiOCl	Xe lamp (150W)	RhB (100 mL, 10 mg/L)	100 mg	1/100	120 min, 91.2%	This work

References

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