Supplementary Materials for

Enhanced photocatalytic performance of Ag-BiOBr nanosheets under LED with different wavelengths

Shuqing Wang,[a] Guodong Shen,[*abc] Yijun Yao[a] and Runjun Sun[a]

[a] *School of Textile Science and Engineering, Xi'an Polytechnic University, Xi'an, 710048, China. E-mail: shenguodong@xpu.edu.cn*

[b] *Key Laboratory of Auxiliary Chemistry and Technology for Chemical Industry, Ministry of Education, Shaanxi University of Science and Technology, Xi'an, 710021, China*

[c] *Shaanxi Collaborative Innovation Center of Industrial Auxiliary Chemistry and Technology, Shaanxi University of Science and Technology, Xi'an 710021, China*

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The crystal structure of as-prepared BiOBr and *x*Ag-(1-*x*)BiOBr (*x* = 0.01, 0.02, 0.03, 0.04, 0.05, 0.06) sheets was characterized by X-ray diffractometry (XRD, XRD-6000, Shimadzu) with Cu Ka radiation. The micromorphology of samples was observed by field emission scanning electron microscopy (FE-SEM, Quanta 450-FEG+X-MAX50, FEI) and transmission electron microscopy (TEM, JEM-2010F, JEOL). The chemical states and characterize the spectral absorption characteristics of BiOBr and Ag-BiOBr were characterized by X-ray photoelectron spectroscopy (XPS, VG Multilab 2000, Thermo) and Ultraviolet-visible spectrophotometer (UV-Vis DRS, Lambda 950, PerkinElmer), respectively. The content of metallic elements (Ag and Bi) were detected by the inductively coupled plasma optical emission spectroscopy (ICP, ICP-OES 5800, Agilent) with a plsama flow of 12.0 L/min and a nebulizer flow of 0.70L/min.

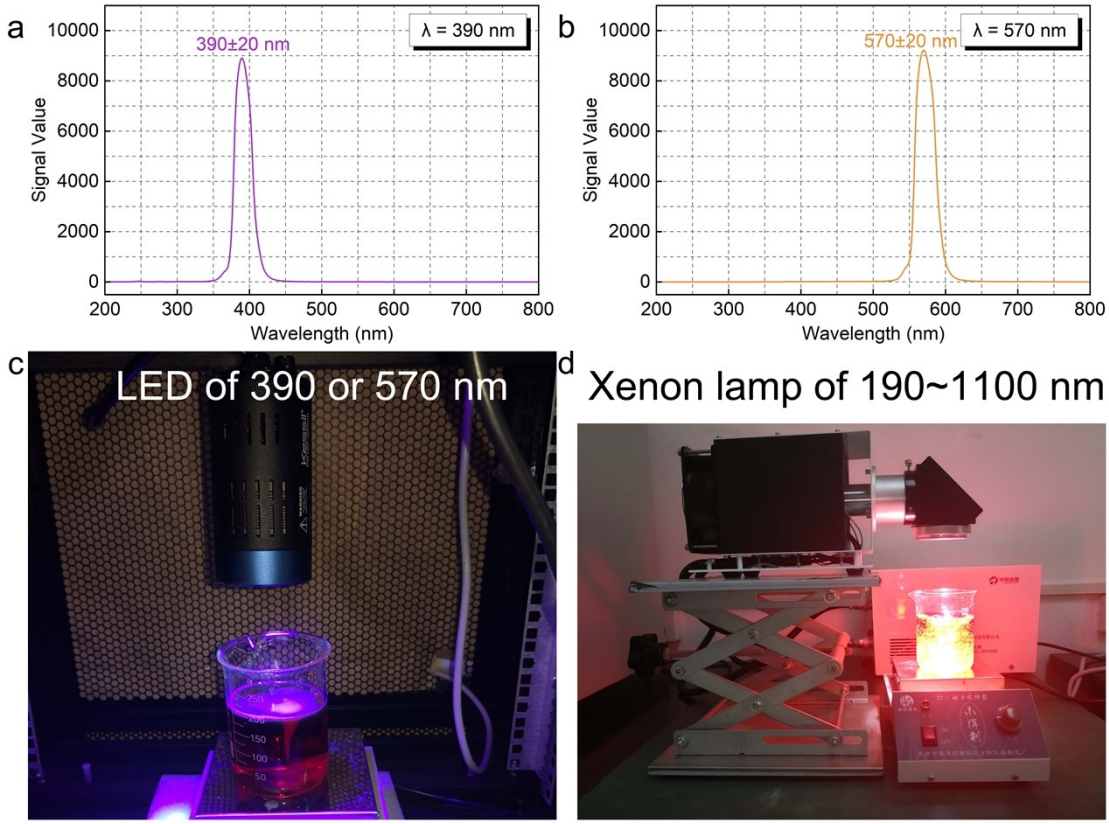

Fig. S1 The spectral characteristics of LED with a wavelength of (a) 390 nm and (a) 570 nm, the photographs of photocatalytic degradation of Rhodamine B dye under (c) LED and (d) xenon lamp.

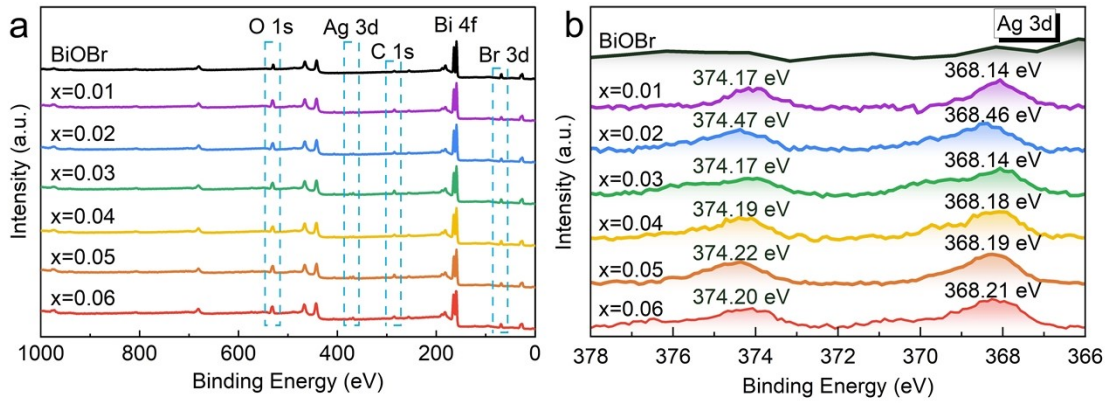

Fig. S2 XPS spectra of the as-prepared BiOBr and *x*Ag-(1-*x*)BiOBr samples: (a) survey spectrum, (b) Ag 3d.

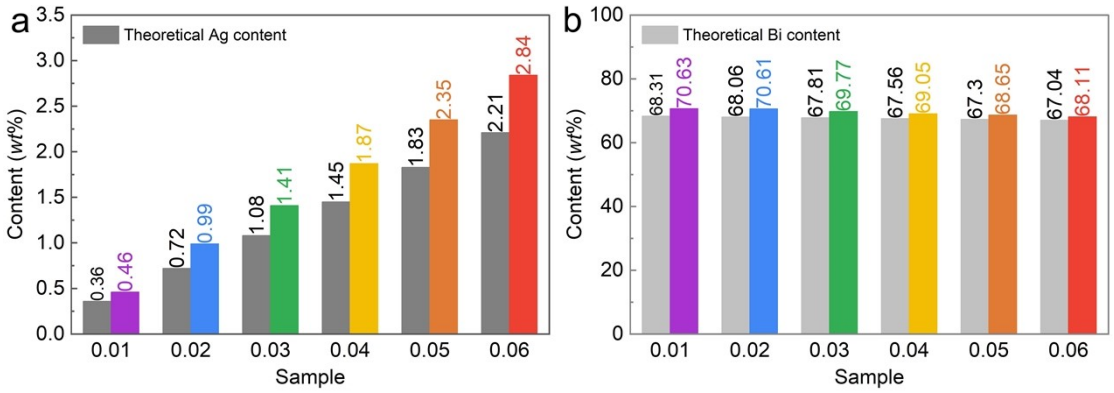

Fig. S3 The theoretical content and ICP detected contents of Ag (a) and Bi (b) in *x*Ag-(1-*x*)BiOBr samples.

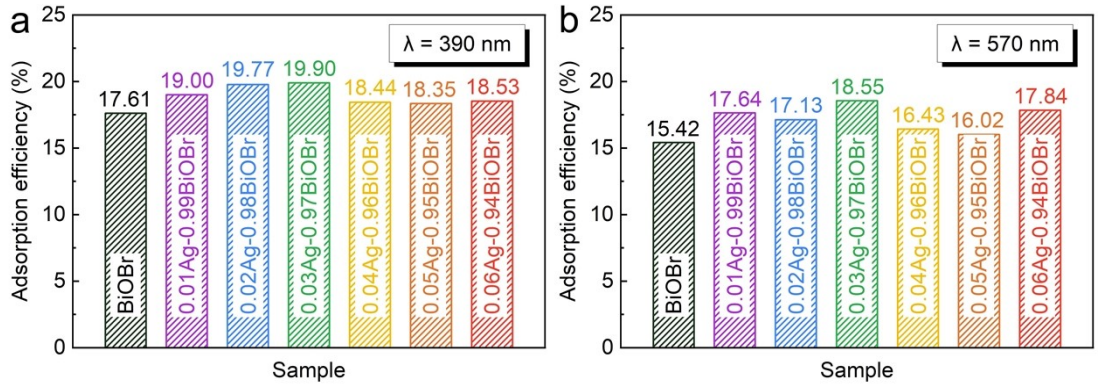

Fig. S4 The adsorption efficiency comparison of BiOBr and *x*Ag-(1-*x*)BiOBr samples under LED irradiation with different wavelength:(a) 390 nm, (b) 570 nm.

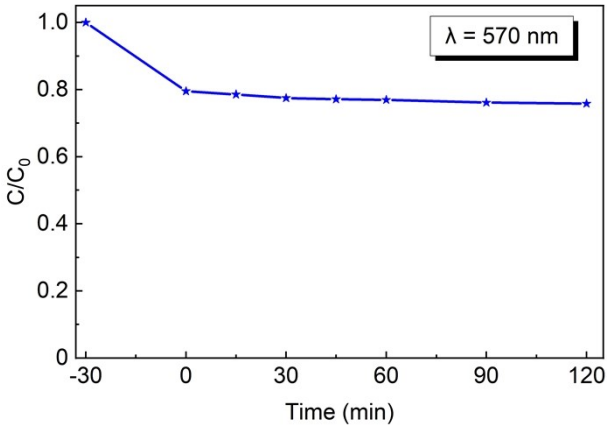

Fig. S5 Degradation performance of Ag nanoparticles under LED irradiation of 570 nm.

Table S1 The atomic percentage of target detection elements of BiOBr and *x*Ag-(1-*x*)BiOBr samples calculated by XPS testing.

Sample	Ag/atomic%	Bi/atomic %	O/atomic %	Br/atomic %	C/atomic %
BiOBr	0	19.77	31.49	22.45	26.29
0.01Ag-0.99BiOBr	0.35	15.36	42.23	9.45	32.61
0.02Ag-0.98BiOBr	0.87	14.58	43.03	10.53	30.99
0.03Ag-0.97BiOBr	0.96	16.16	39.06	15.01	28.81
0.04Ag-0.96BiOBr	1.37	13.24	39.72	10.83	34.83
0.05Ag-0.95BiOBr	1.54	15.34	41.36	12.79	28.96
0.06Ag-0.94BiOBr	1.72	12.89	35.51	11.61	38.27

Table S2 The specific surface area of BiOBr and *x*Ag-(1-*x*)BiOBr samples.

Sample	Specific surface area/$m^2 \cdot g^{-1}$
BiOBr	21.6753
0.01A-0.99BiOBr	28.3246
0.02A-0.98BiOBr	28.6842
0.03A-0.97BiOBr	32.5546
0.04A-0.96BiOBr	26.2457
0.05A-0.95BiOBr	25.4843
0.06A-0.94BiOBr	24.3158