

Supporting Information

Synergy of Oxygen Vacancies and Bi nanoparticles on BiOBr nanosheets for Enhanced Photocatalytic H₂O₂ Production

Li Feng, Hanping Fu, Tianxiang Zhang, Qing Zhang, Shufen Ren, Jianyun Cheng, Qingshuang Liang*, Xiufeng Xiao*

Fujian Provincial Key Laboratory of Advanced Materials Oriented Chemical Engineering, College of Chemistry and Material Science, Fujian Normal University, Fuzhou, Fujian 350007, China

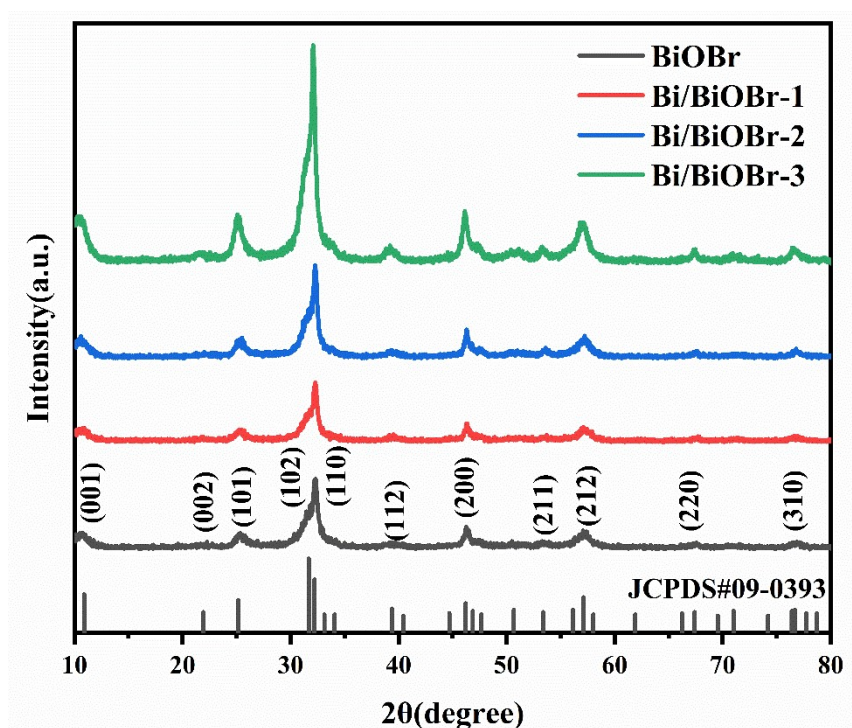


Fig. S1 XRD pattern of different samples.

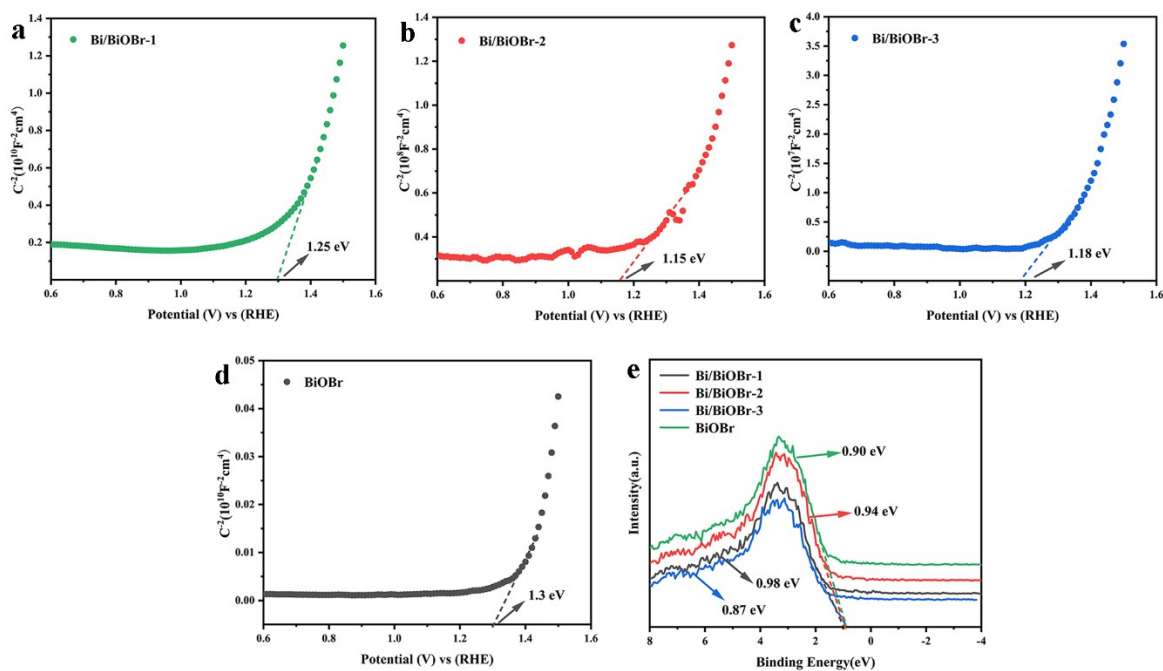


Fig. S2 (a-d) Mott-Schottky plot and (e) VB-XPS spectra of different samples.

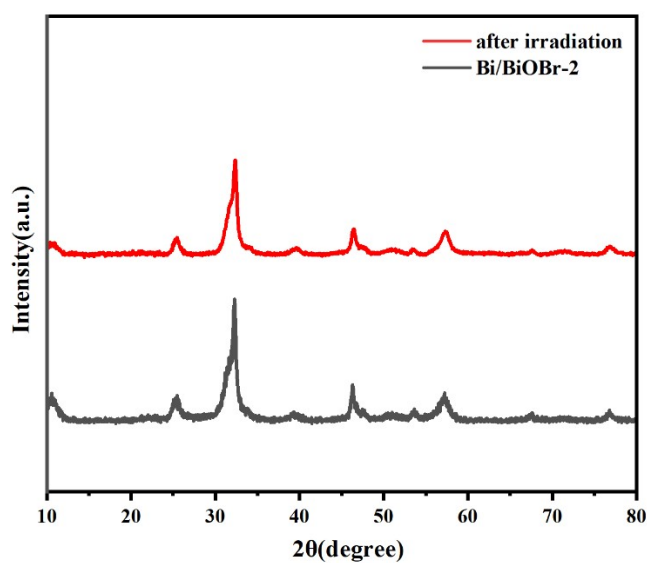


Fig. S3 XRD of fresh and reused Bi/BiOBr-2.

The main procedure of the cycling experiments was the same as in the photocatalytic H_2O_2 production experiments. At the end of each cycle, in order to reduce the possible loss of photocatalyst, the obtained suspension solution was centrifuged, washed once with water and redispersed directly in 40 mL of aqueous solution containing 5% formic acid. The next cycle of the stability test was then started.

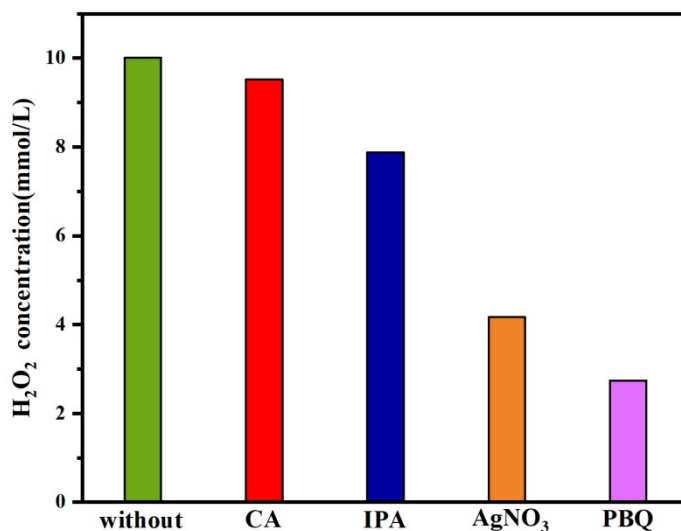


Fig. S4 Effects of various scavengers on photocatalytic H₂O₂ production by Bi/BiOBr-2.

Table. S1 Comparison of photocatalytic H₂O₂ production with Different Catalysts

| Catalysts | Dosage (mg) | energy | Reaction solution | H ₂ O ₂ production $\mu\text{mol/h}$ |
|--|-------------|--------------------------|---------------------------------|--|
| C-P-CN ¹ | 50 | 300 W Xenon lamp | EtOH/water solution | 166 |
| MIL-125-PDI ² | 5 | 500 W Xenon lamp | CH ₃ CN/ solution | 240 |
| g-C ₃ N ₄ ³ | 20 | 2 KW Xe arc lamp >420 nm | alcohol/water solution | 13.3 |
| Au/TiO ₂ ⁴ | 200 | UV | 8 mL EtOH | 50 |
| BiOCl ⁵ | 50 | 150 W Ultrasonic cleaner | water | 28 |
| Bi/BiOCl ⁶ | 50 | 300 W Xe lamp | HCOOH/water solution | 5400 |
| Bi/BPNs/P-BiOCl ⁷ | 50 | 300W xenon lamp | 10% volume isopropanol solution | 4920 |

| | | | | |
|---|-----------|---|--|-------------|
| Pt/Bi ₂ WO ₆ ⁸ | 65 | 150 W Xe arc lamp >400 nm | phenol/water solution | 5 |
| CoWO ₄ /Bi ₂ WO ₆ ⁹ | 50 | 300 W Xenon lamp with a 420 nm cut-off filter | Water (adjusting the pH with HClO ₄) | <50 |
| Au/BiVO ₄ ¹⁰ | 50 | Xe arc lamp >420 nm | EtOH/water solution | 257 |
| xrGO-BiVO ₄ ¹¹ | 8 | Newport solar simulator with an AM 1.5 air filter | Water (PH=3) | <175 |
| This work | 50 | 300 W Xe lamp | HCOOH/water solution | 5045 |

Reference

1. W. Wei, L. Zou, J. Li, F. Hou, Z. Sheng, Y. Li, Z. Guo and A. Wei, *Journal of Colloid and Interface Science*, 2023, **636**, 537-548.
2. X. Chen, Y. Kondo, S. Li, Y. Kuwahara, K. Mori, D. Zhang, C. Louis and H. Yamashita, *Journal of Materials Chemistry A*, 2021, **9**, 26371-26380.
3. Y. Shiraishi, S. Kanazawa, Y. Sugano, D. Tsukamoto, H. Sakamoto, S. Ichikawa and T. Hirai, *ACS Catalysis*, 2014, **4**, 774-780.
4. M. Teranishi, S.-i. Naya and H. Tada, *The Journal of Physical Chemistry C*, 2016, **120**, 1083-1088.
5. D. Shao, L. Zhang, S. Sun and W. Wang, *ChemSusChem*, 2018, **11**, 527-531.
6. L. Liu, H. Fu, Y. Zeng, L. Feng, T. Zhang, Q. Liang and X. Xiao, *New Journal of Chemistry*, 2022, **46**, 22419-22426.
7. H. Ma, Y. Wang, Z. Zhang, J. Liu, Y. Yu, S. Zuo and B. Li, *Chemosphere*, 2023, **330**.
8. J. Sheng, X. Li and Y. Xu, *ACS Catalysis*, 2014, **4**, 732-737.
9. J. Wang, L. Yang and L. Zhang, *Chemical Engineering Journal*, 2021, **420**.
10. H. Hirakawa, S. Shiota, Y. Shiraishi, H. Sakamoto, S. Ichikawa and T. Hirai, *ACS Catalysis*, 2016, **6**, 4976-4982.
11. N. Dhabarde, O. Carrillo-Ceja, S. Tian, G. Xiong, K. Raja and V. R. Subramanian, *The Journal of Physical Chemistry C*, 2021, **125**, 23669-23679.