Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Efficient Solar-Driven Conversion of Nitrogen to Ammonia in Pure Water via Hydrogenated Bismuth Oxybromide

Yuanqing Bi, Yu Wang, Xiaoli Dong*, Nan Zheng, Hongchao Ma, Xiufang Zhang

School of Light Industry and Chemical Engineering, Dalian Polytechnic University, #1 Qinggongyuan, Dalian 116034, P R China. E-mail: dongxiaoli65@163.com

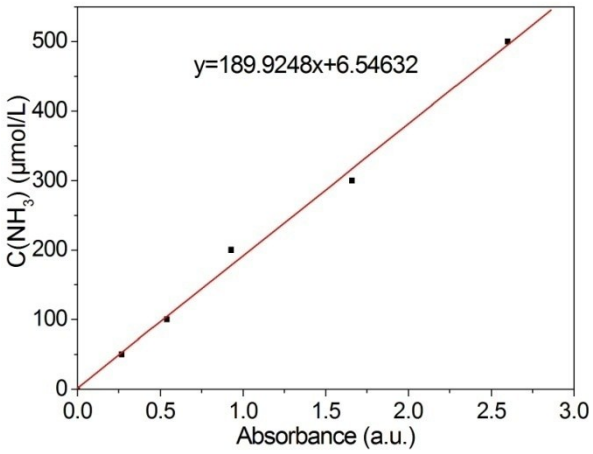

Fig. S1 The standard curve of NH_3 with Nessler's regent.

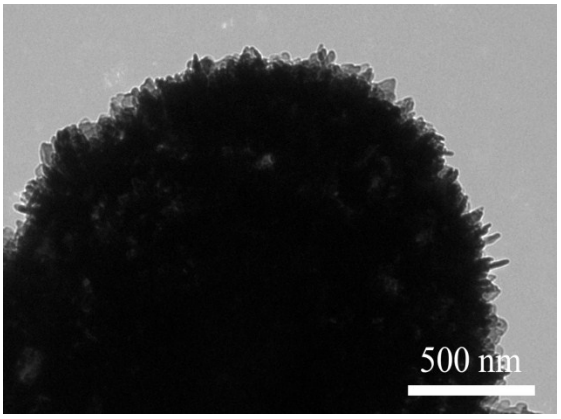

Fig. S2 TEM image of H-BiOBr.

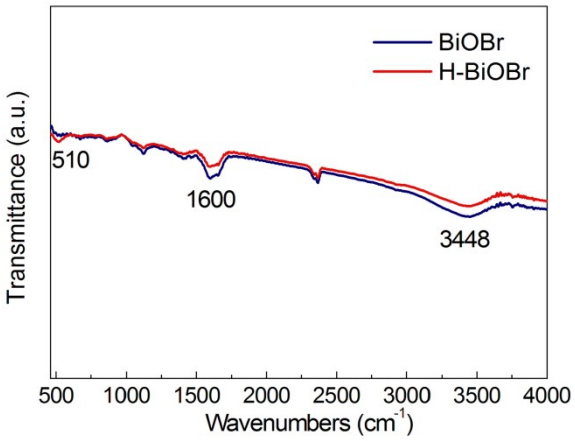

Fig. S3 FT-IR spectra of the as-prepared BiOBr and H-BiOBr.

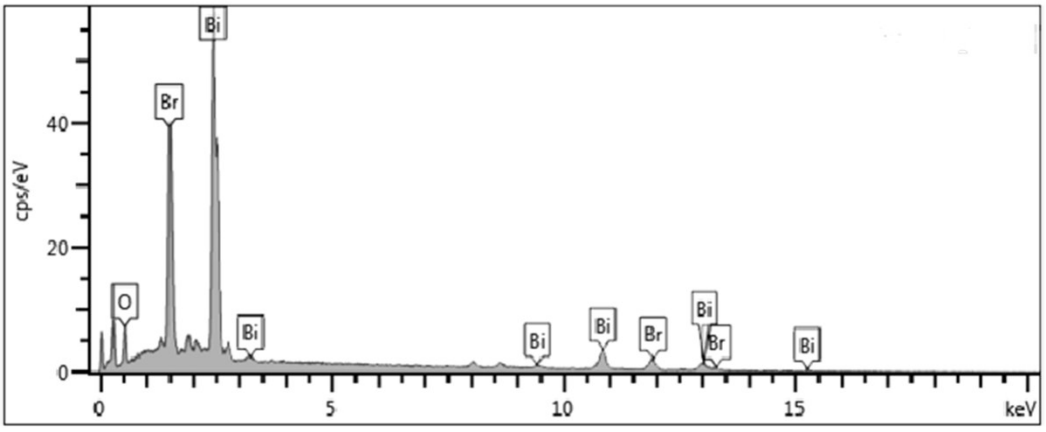

Fig. S4 EDS spectra of H-BiOBr.

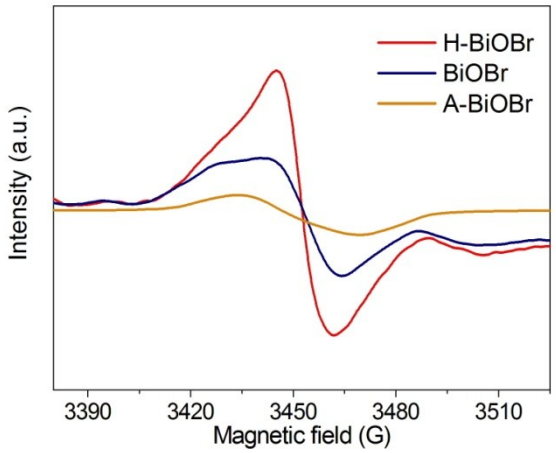

Fig. S5 The ESR spectra for different samples.

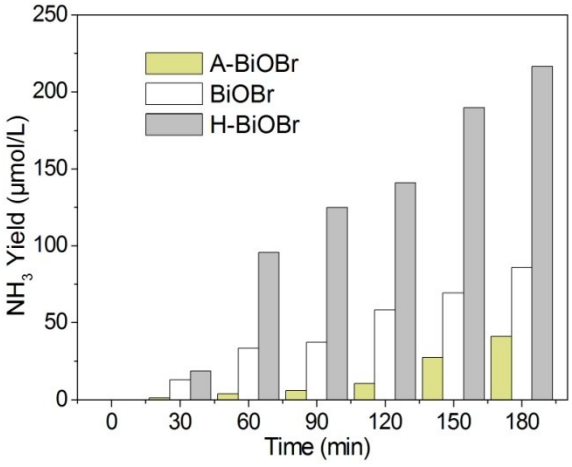

Fig. S6 Photocatalytic nitrogen fixation performance with different OVs concentrations.

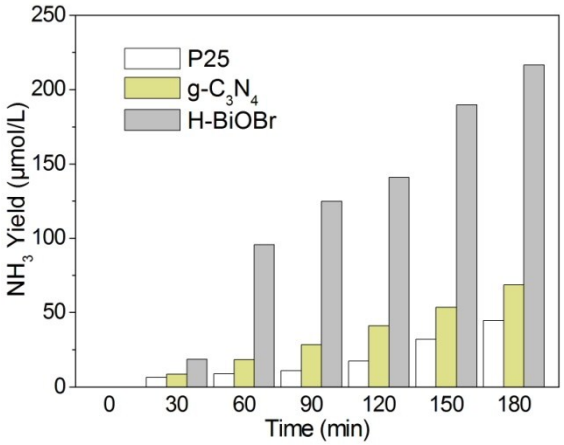

Fig. S7 The comparison of photocatalytic nitrogen fixation properties of different photocatalysts.

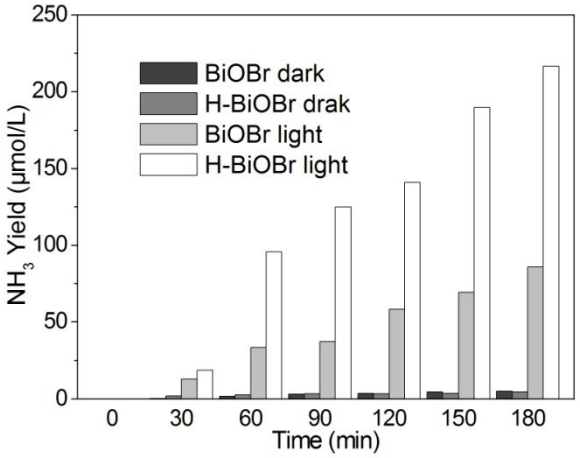

Fig. S8 The dark nitrogen fixation experiment of two samples.

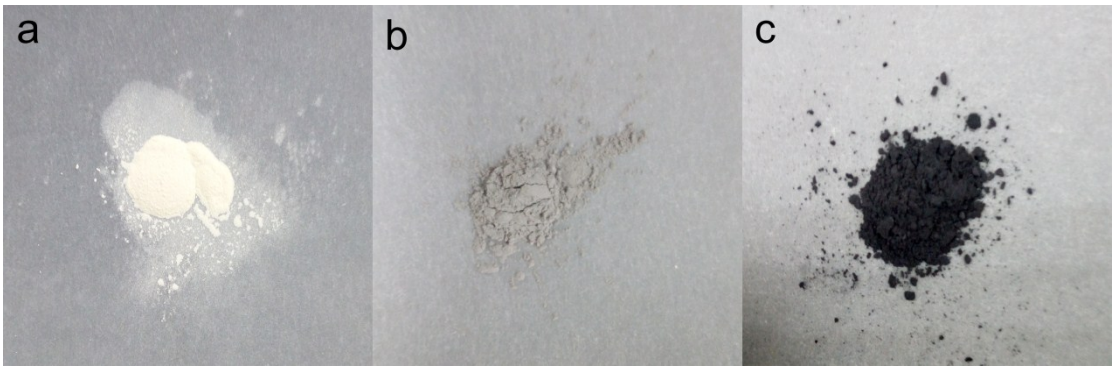

Fig. S9 The sample of BiOBr calcined with hydrogen at different temperature, 100℃ (a), 200℃ (b), 300℃ (c).

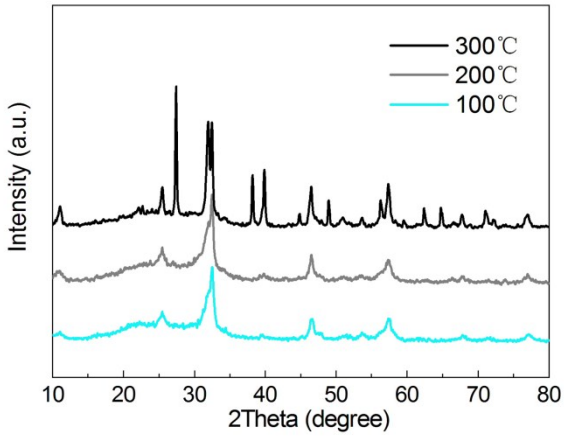

Fig. S10 XRD patterns of BiOBr calcined with hydrogen at different temperature.

Table. S1 The corresponding element information of EDS measurement.

Element	Line Type	Apparent Concentration	k Ratio	Wt%	Wt% Sigma	Atomic %	Standard Label	Factory Standard	Standard Calibration Date
O	K series	3.64	0.01226	7.19	0.28	41.92	SiO2	Yes	
Br	L series	15.66	0.14027	23.11	0.28	26.98	KBr	Yes	
Bi	M series	52.43	0.52430	69.70	0.36	31.11	Bi	Yes	
Total:				100.00		100.00			

Table. S2 The BET surface area and Average pore Diameter of two samples

	BET surface area ($m^2 g^{-1}$)	Average pore Diameter (nm)
BiOBr	31.6	10.248
H-BiOBr	26.56	22.0904

Table. S3 The performance of photocatalytic nitrogen fixation for different photocatalysts under various reaction conditions.

Catalyst	Reaction medium	Scavenger	Light Source	NH_3generation rate (g^{-1})	AQE	Refs
H-BiOBr	H_2O 25℃	No	300 W Xenon lamp (Full Spectrum)	360.8μmol/h	2.11% (λ = 380 nm)	This work
CuCr-LDH nanosheet	H_2O 25℃	No	300 W Xenon lamp (λ>420 nm)	280μmol/h	0.22% (λ = 380 nm)	[1]
g-C_3N_4 of nitrogen vacaancy	H_2O	20% Methanol	300 W Xenon lamp (λ>420 nm)	160μmol/h	No	[2]
(010) facets of BiOCl	H_2O 25℃	25% Methanol	500 W Xenon lamp (Full Spectrum)	92.4μmol/h	2.15 % (λ = 254 nm)	[3]
(001) faces of Bi_5O_7I	H_2O 25℃	20% Methanol	300 W Xenon lamp (280-800 nm)	11.15μmol/h	2.55 % (λ = 365 nm)	[4]
Iron titanate	H_2O	Ethanol	High pressure Hg lamp (λ> 320 nm)	11.3μmol/h	No	[5]
TiO_2 oxygen vacancy	H_2O 40℃	No	100 W high pressure Hg lamp (Full Spectrum)	2.08μmol/h	0.35 % (λ = 350 nm)	[6]

Notes and references

1 Y. Zhao, Y. Zhao, G. I. N. Waterhouse, L. Zheng, X. Cao, F. Teng, L.-Z. Wu, C.-H. Tung, D. O'Hare and T. Zhang, *Adv. Mater.*, 2017, **29**, 1703828.

2 G. Dong, W. Ho and C. Wang, *J. Mater. Chem. A*, 2015, **3**, 23435-23441.

3 H. Li, J. Shang, J. Shi, K. Zhao, L. Zhang, *Nanoscale*, 2016, **8**, 1986-1993.

4 Y. Bai, L. Ye, T. Chen, L. Wang, X. Shi, X. Zhang and D. Chen, *ACS Appl. Mater. Inter.*, 2016, **8**, 27661-27668.

5 O. Rusina, A. Eremenko, G. Frank, H.P. Strunk, H. Kisch, *Angew. Chem. Int. Ed.*, 2001, **40**, 3993-3995.

6 H. Hirakawa, M. Hashimoto, Y. Shiraishi, T. Hirai, *J. Am. Chem. Soc.*, 2017, **139**, 10929-10936.