

Defective WO₃-Mediated Photocatalytic Oxidation of Aromatic Alcohols: Achieving Product Versatility with Bromine Radicals and Water

S1. Methods and materials

All experimental drugs and reagents were obtained commercially from various chemical companies, and the chemicals were used without further purification.

The products was recorded by GC-2014C (Shimadzu, Japan) with HP-5 column and FID detector. The analysis of products by GC-MS (Agilent 8860-5977C). blue LED light (450nm, 30W, Shenzhen Boya Technology Co., Ltd., China) as illumination source.

S2. Photocatalytic experiment

In a typical photocatalytic reaction system, 4-methoxybenzyl alcohol (0.5 mmol), KBr (20 mol%), H₂O (100 μ L), MeCN (8 mL), and catalyst (20 mg) were charged into a 10 mL Schlenk tube. The mixture was irradiated under a 450 nm blue LED lamp (30 W) with magnetic stirring for the desired reaction durations. After completion, the precipitate was filtered off, and 1.5 mL of the remaining solution was collected for analysis. The conversion rate and product yields were determined using gas chromatography (Shimadzu GC-2014) using biphenyl as an internal standard. the post-reaction gas was determined using gas chromatography (Agilent GC). The products were identified by GC-MS.

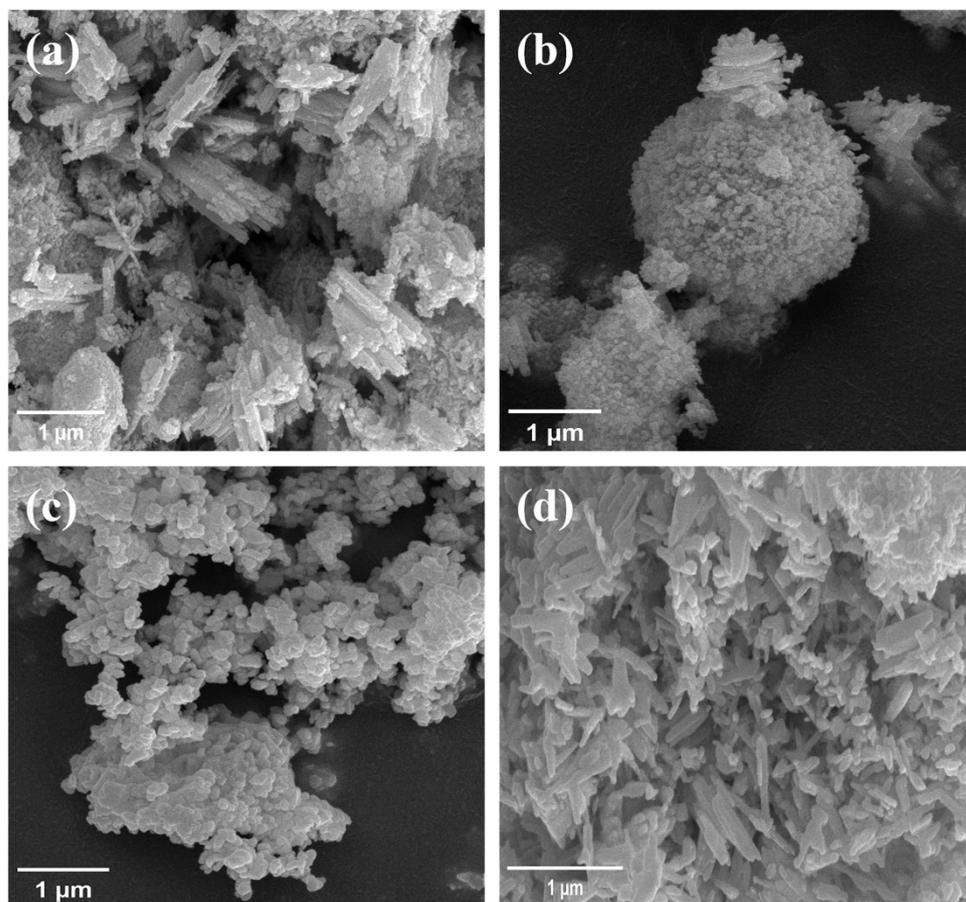


Fig.S1. (a) SEM image of W1. (b) SEM image of W2. (c) SEM image of W3. (d) SEM

image of CW.

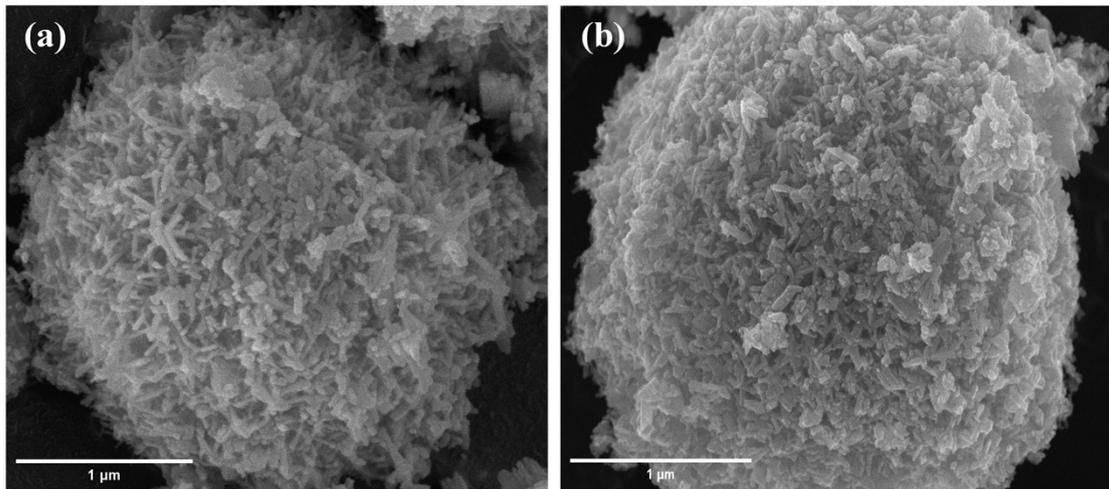


Fig.S2. (a) SEM image of W4. (b) SEM image of W4 after five cycles.

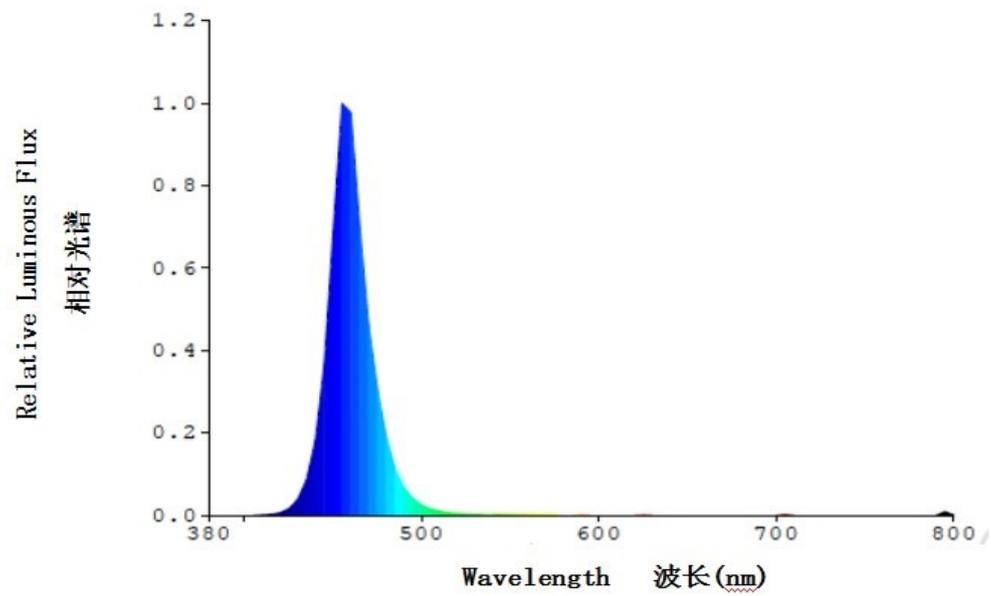


Fig. S3. Images of the light source emission spectrum (provided by the dealer)

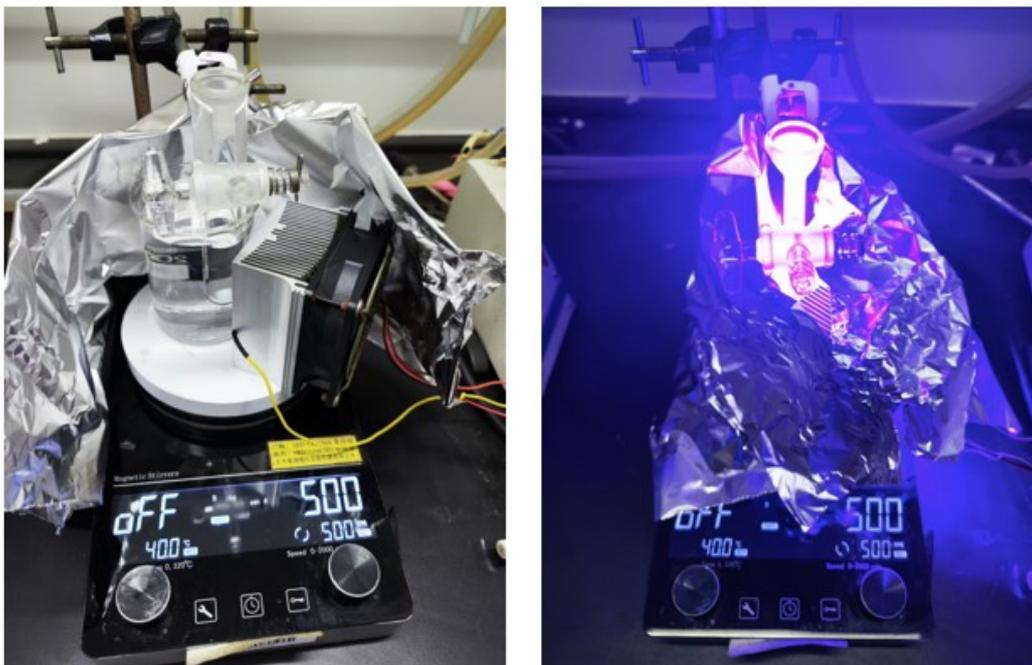


Fig. S4. Images of the reaction generator.

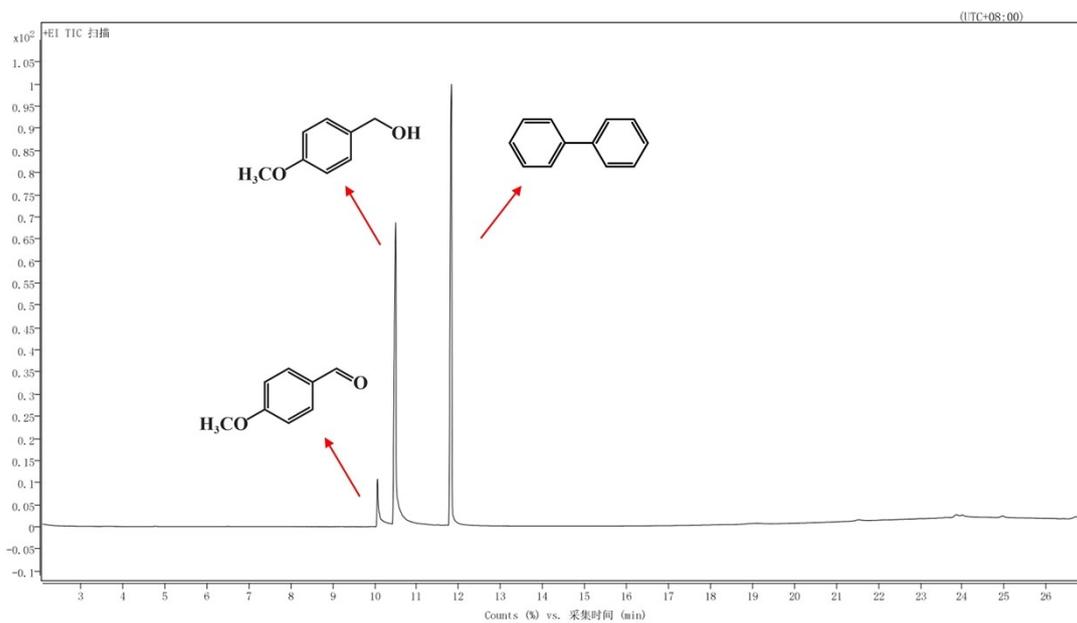


Fig. S5. GCMS of the 10 mins reaction (biphenyl as internal standard).

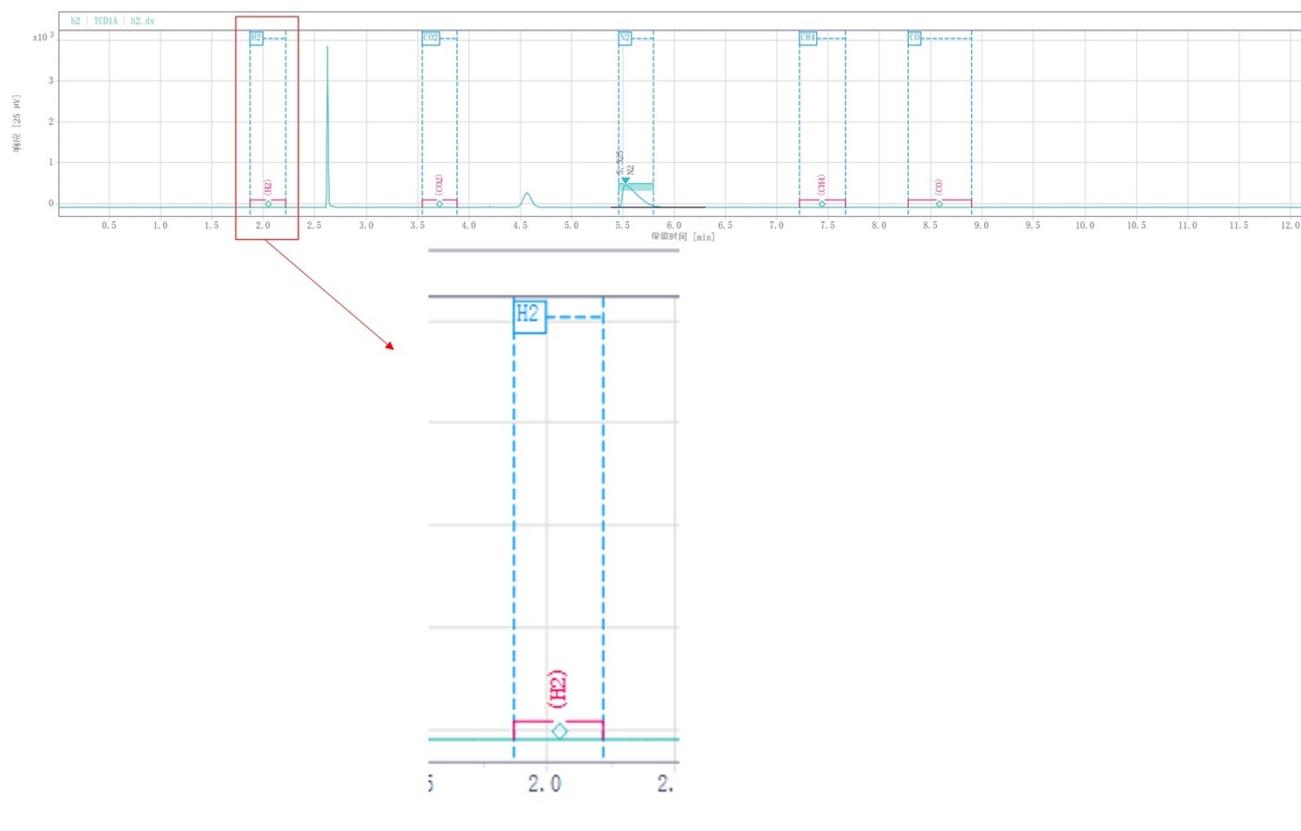


Fig. S6. GC analysis of the post-reaction gas. Reaction conditions: W4 (20 mg), alcohols (0.5 mmol), KBr (20 mol%), H₂O (100 μ L), MeCN (8 mL), air atmosphere and room temperature, blue LED lamp (450 nm, 30 W) for 4 h.

Table S1. The BET surface area, pore volume, and pore size of the samples.

Sample	S_{BET} (m^2/g)	Pore · Volume (cm^3/g)	Pore · Size (nm)
a	34.7200	0.199845	23.2430
b	33.6211	0.170919	21.9606

a: Unreacted W4, b: W4 after the first reaction cycle.

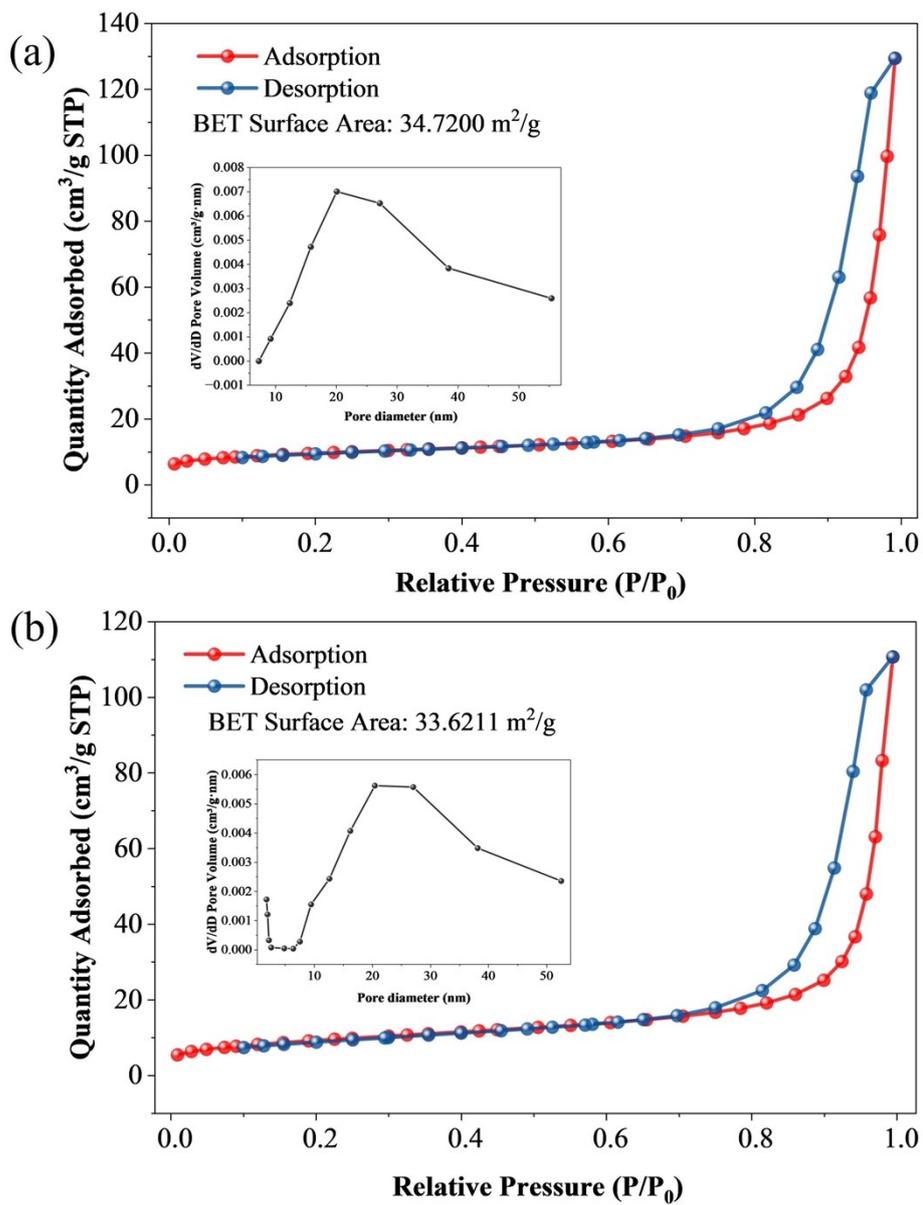


Fig. S7. (a) Adsorption-desorption isotherms and BJH desorption pore size distribution of sample a; (b) Adsorption-desorption isotherms and BJH desorption pore size distribution of sample b.