

1. Determination of Cr(VI) concentration using the DPC method

The concentration of Cr(VI) was measured colorimetrically at $\lambda_{\max} = 540 \text{ nm}$ by the standard diphenylcarbazide (DPC) method. In detail, the filtered sample 1 mL was injected into a 50 mL volumetric flask and diluted to scale with water. Subsequently, 0.5 mL of sulfuric acid, phosphoric acid solution (acid/water volume ratio 1:1) and 2 mL of freshly prepared DPC solution were successively added to the mixture. After vortexing the mixture for about 1 min, it was allowed to stand for another 10 min in order to ensure full color development. Using the distilled water as reference, the absorbance of the colored Cr(VI)-DPC complex solution was then measured at $\lambda_{\max} = 540 \text{ nm}$.

Preparation of DPC solution: 100 mg of DPC was dissolved in 50 mL mixed solution of acetone and water (Volume ratio 1:1) in a 50 mL volumetric flask, shaken well and stored it in a brown reagent bottle.

2. Characterization data

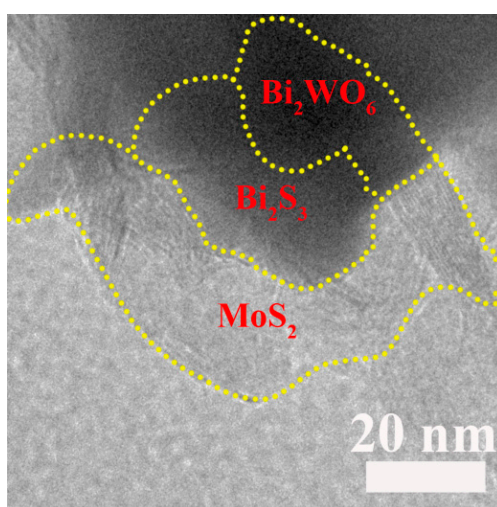


Figure S1. High-magnification TEM image of BBM-3.

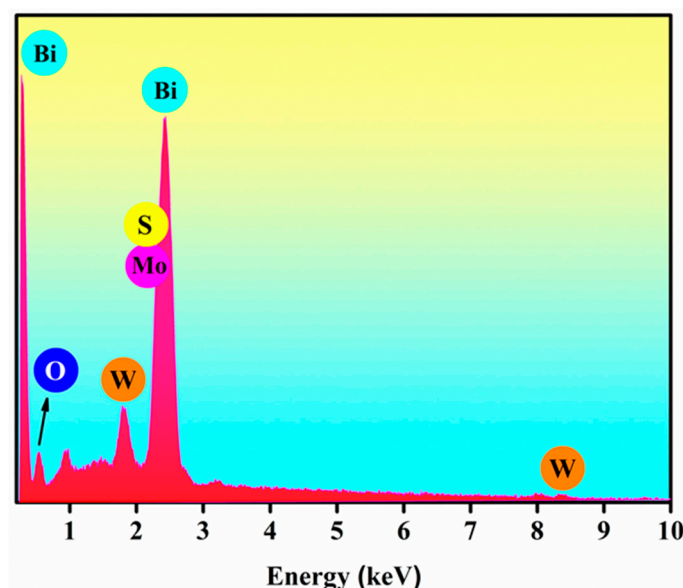


Figure S2. EDS analysis of the BBM-3.

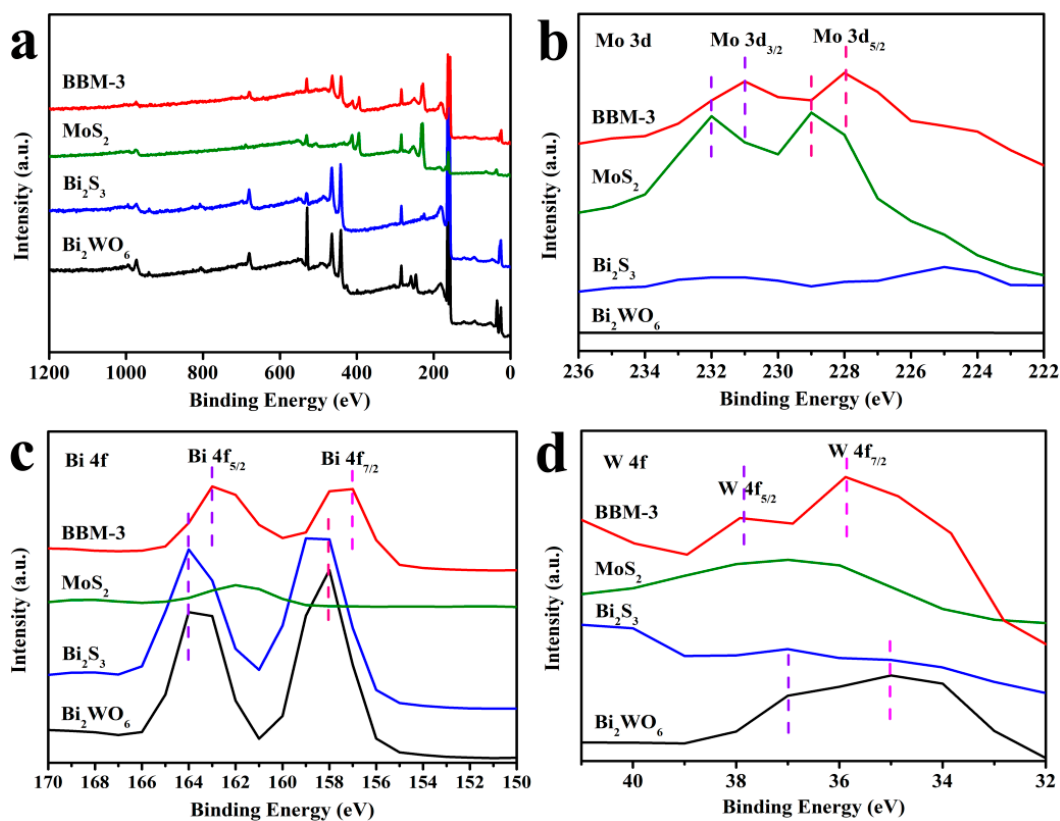


Figure S3. XPS spectra of Bi_2WO_6 , Bi_2S_3 , MoS_2 , and BBM-3: (a) survey, (b) Mo 3d, (c) Bi 4f, and (d) W 4f.

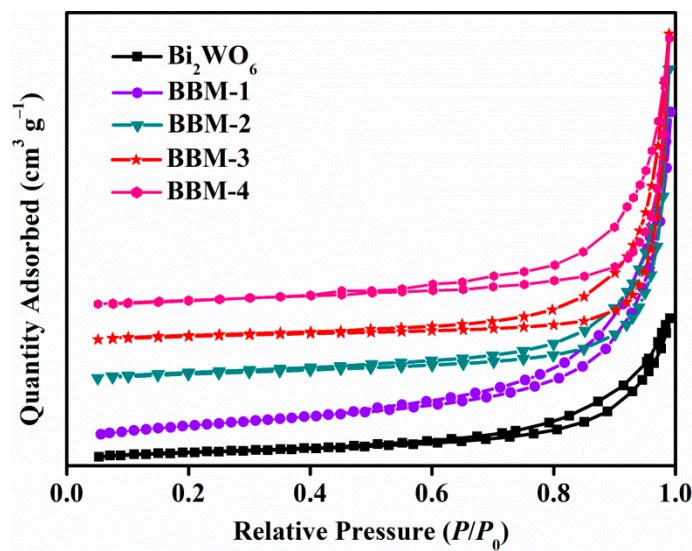


Figure S4. N_2 adsorption-desorption isotherms of the Bi_2WO_6 , BBM-1, BBM-2, BBM-3, and BBM-4.

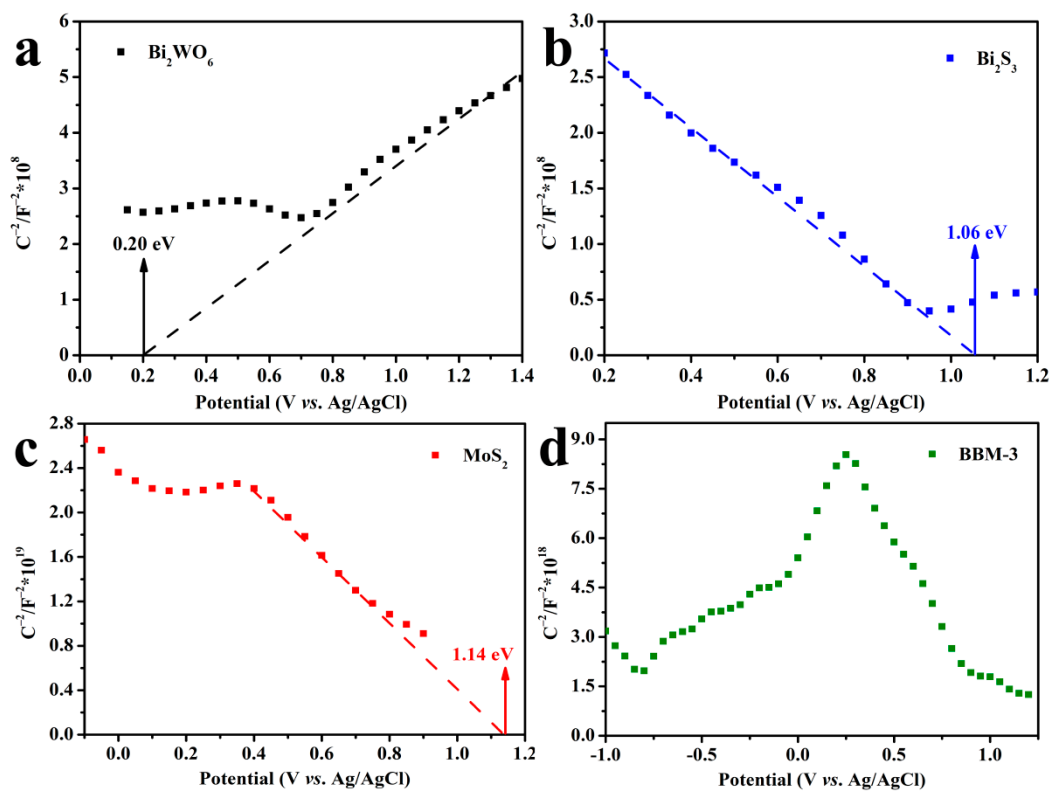


Figure S5. The Mott-Schottky curves of (a) Bi_2WO_6 , (b) Bi_2S_3 , (c) MoS_2 , and (d) BBM-3.

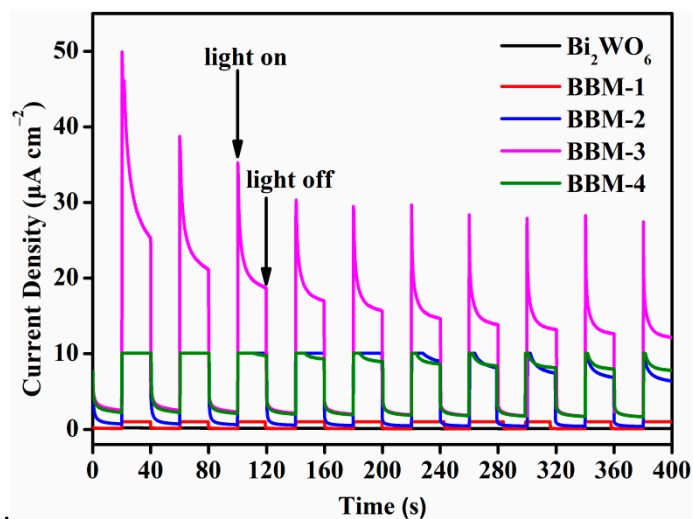


Figure S6. Photocurrent responses of Bi_2WO_6 , BBM-1, BBM-2, BBM-3, and BBM-4.

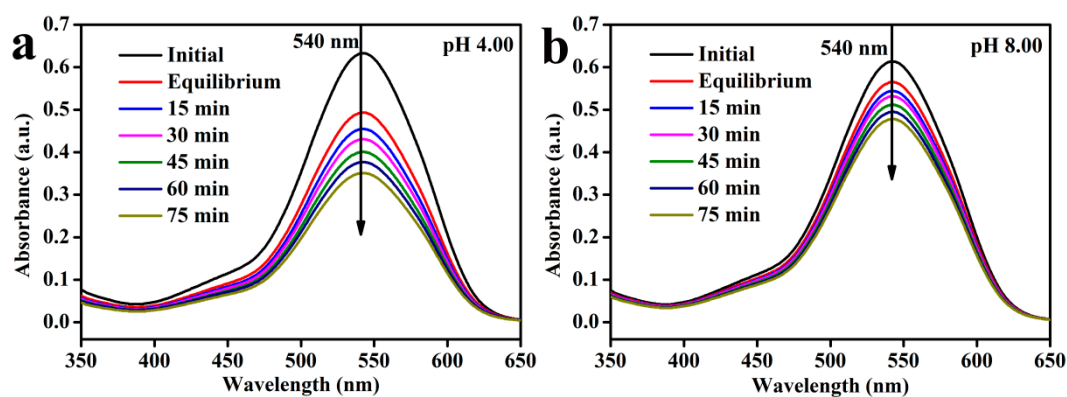


Figure S7. The UV-vis absorption spectra of Cr(VI) solution over the BBM-3 at (a) pH 4.00, and (b) pH 8.00.

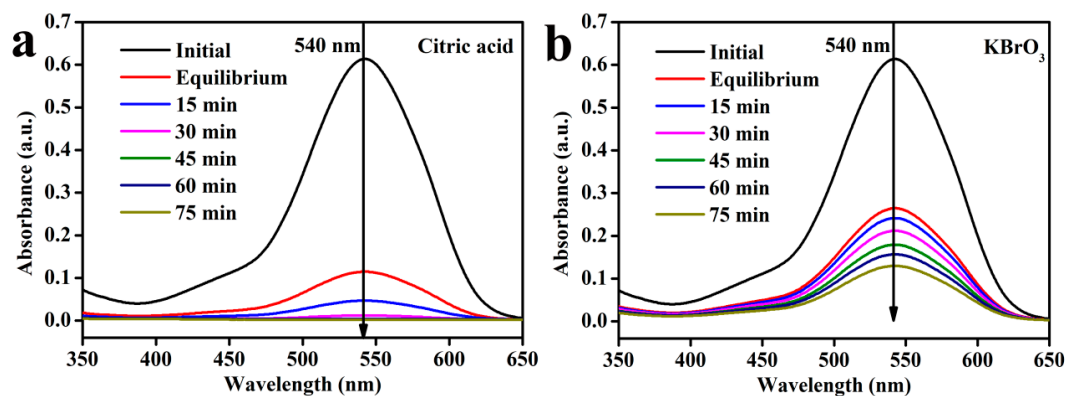


Figure S8. The UV-vis absorption spectra of Cr(VI) solution over the BBM-3 in the presence of (a) hole scavenger (citric acid) and (b) electron scavenger (KBrO_3).

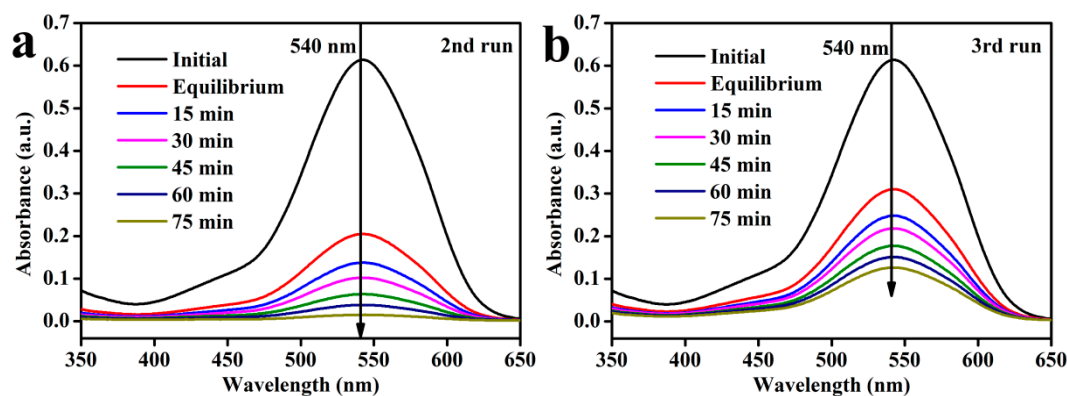


Figure S9. The UV-vis absorption spectra of Cr(VI) solution over the BBM-3 in the cycle experiments: (a) 2nd run and (b) 3rd run.