

## SUPPLEMENTARY INFORMATION

### A novel solvent-free strategy for the synthesis of bismuth oxyhalides

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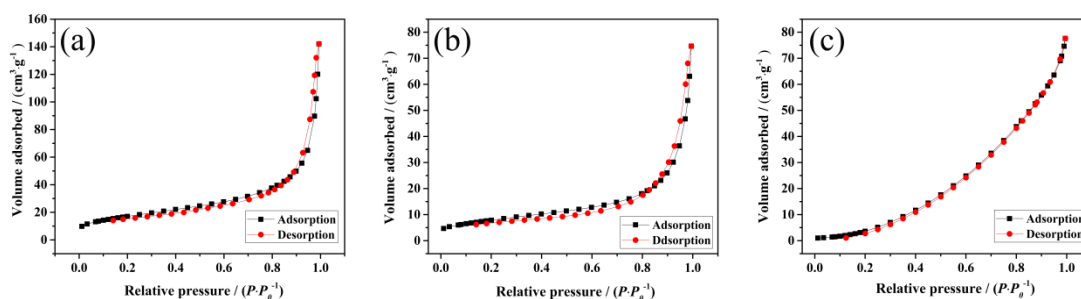


Figure S1. Nitrogen adsorption-desorption isotherm of bismuth oxyhalides (a: BiOCl, b: BiOBr, c: BiOI).

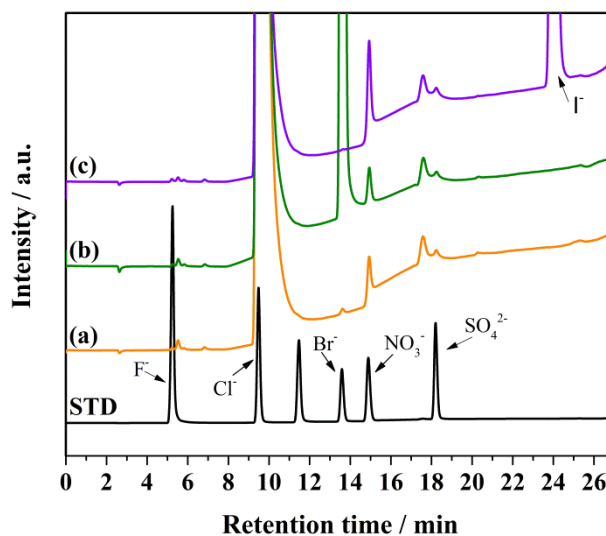


Figure S2. Ion chromatograms of bismuth oxyhalides (a: BiOCl, b: BiOBr, c: BiOI) dissolved in hydrochloric acid.

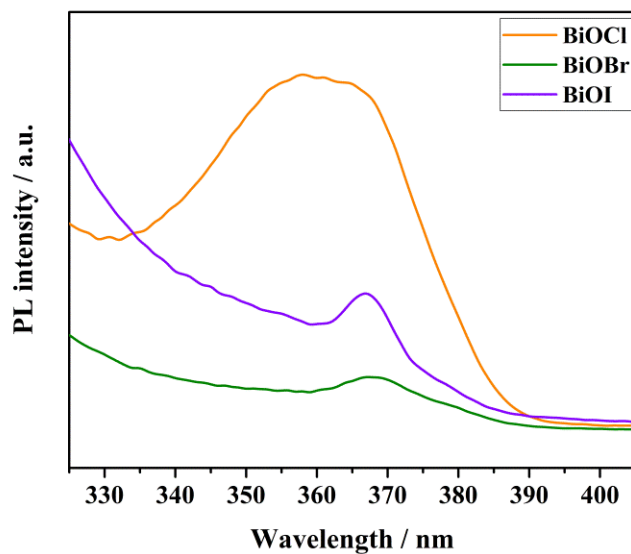


Figure S3 PL spectra of BiOX synthesized by grinding method.

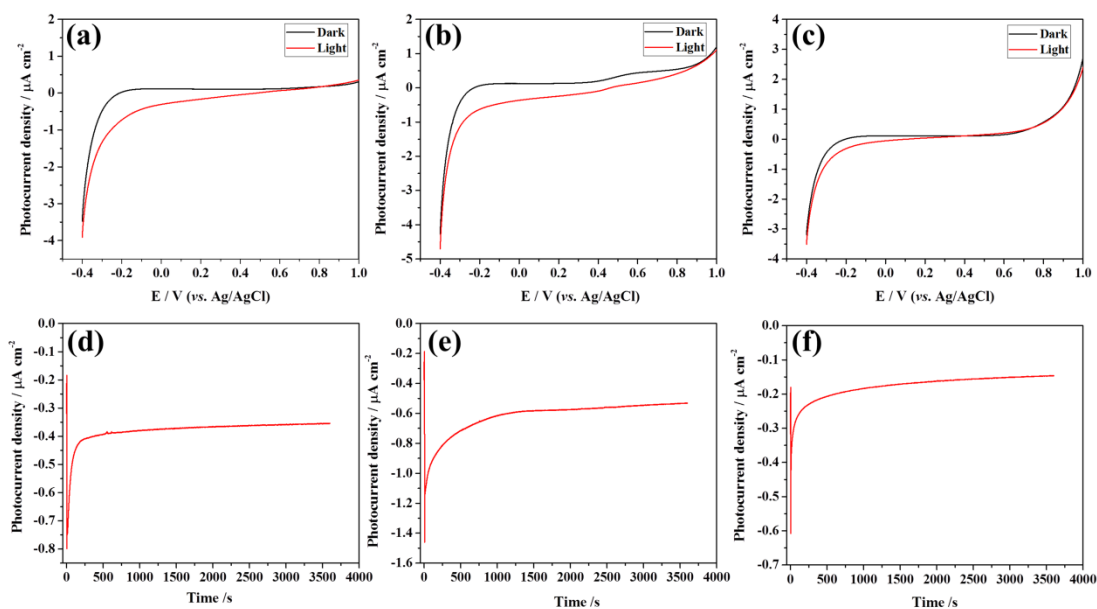


Figure S4 The current–voltage behavior of (a)BiOCl, (b) BiOBr, and (c) BiOI dip-coating film under  $100 \text{ mW cm}^{-2}$  illumination in  $0.1 \text{ M Na}_2\text{SO}_4$  electrolyte, respectively. The stability of (d)BiOCl, (e) BiOBr, and (f) BiOI dip-coating film at an applied voltage of  $-0.2 \text{ V vs. Ag/AgCl}$  after 1 hour.

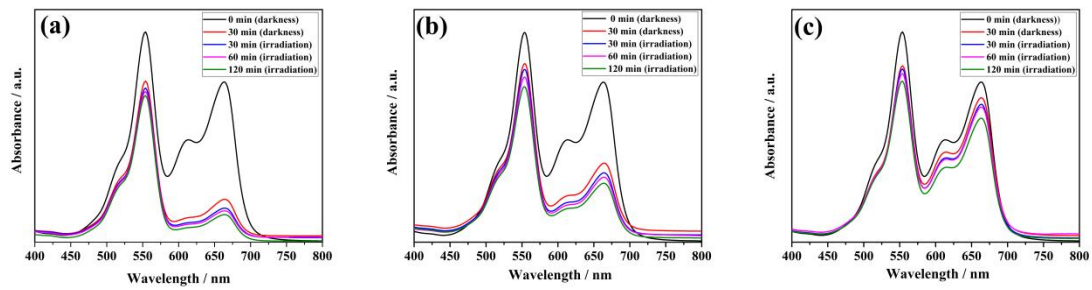


Figure S5 Photodecomposition coupled adsorption of MB and RhB mixture with (a) BiOCl, (b) BiOBr, and (c) BiOI under simulated sunlight irradiation.