

## Supporting information

### Tunable and Sustainable Photocatalytic Activity of Photochromic Y- WO<sub>3</sub> under Visible Light Irradiation

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#### Experimental part

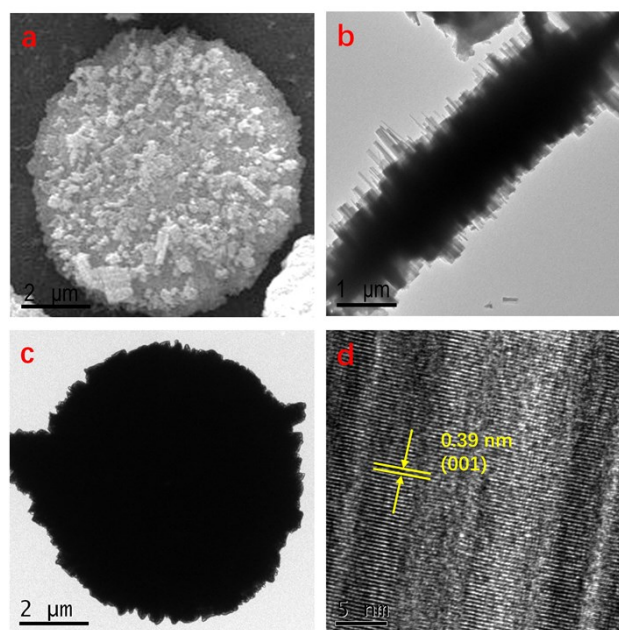


Fig. S1. SEM and TEM images of B-WO<sub>3</sub>; SEM (a); TEM (b, c); HRTEM (d).

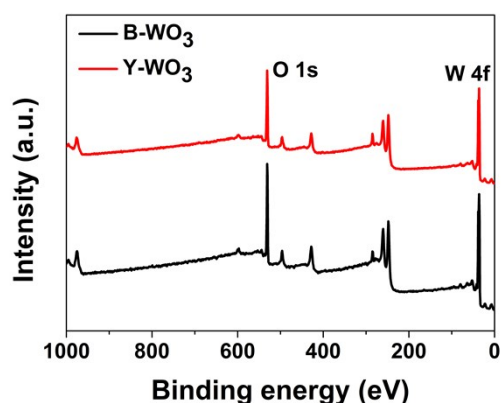


Fig. S2. Full XPS spectra of the as-synthesized samples.

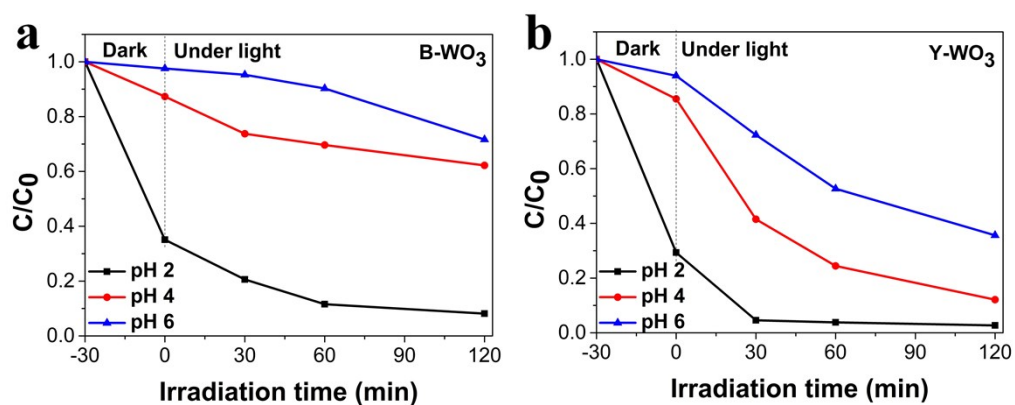


Fig. S3. Photodegradation activities of RhB under different pH values.

Taking the suitable adsorption-desorption equilibrium and high photocatalytic activity into consideration, the appropriate pH of 4 was adopted.

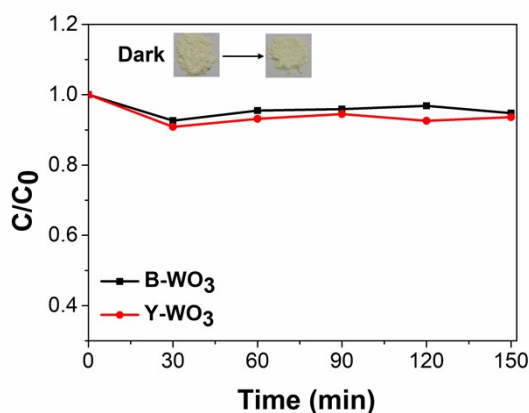


Fig. S4. The adsorption-desorption equilibrium of TCH in dark with the inserts for the color of Y-WO<sub>3</sub>.

When Y-WO<sub>3</sub> and B-WO<sub>3</sub> are both catalyzed under dark conditions for 150 min, the catalytic rates

of Y-WO<sub>3</sub> and B-WO<sub>3</sub> are almost at the same level and there is no obvious degradation and coloration of Y-WO<sub>3</sub>, indicating no transition from W<sup>6+</sup> to W<sup>5+</sup> under dark conditions.