

**Electronic supplementary information**

**A facile synthesis of ZnO decorated with AgBr nanoparticles and  
enhanced photocatalytic properties**

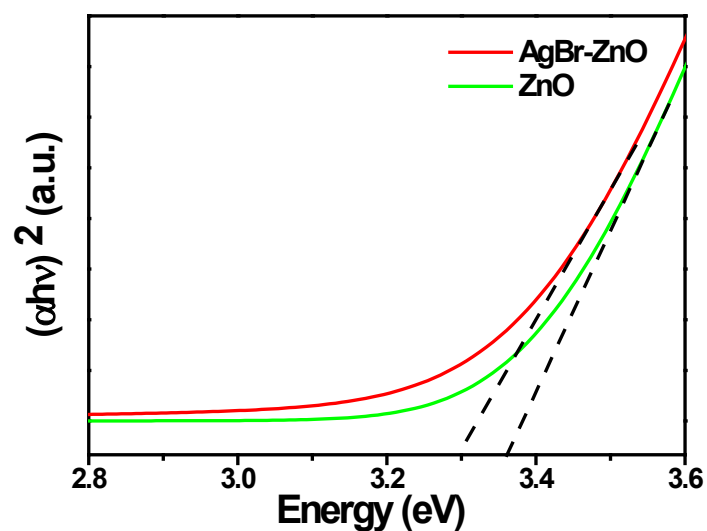
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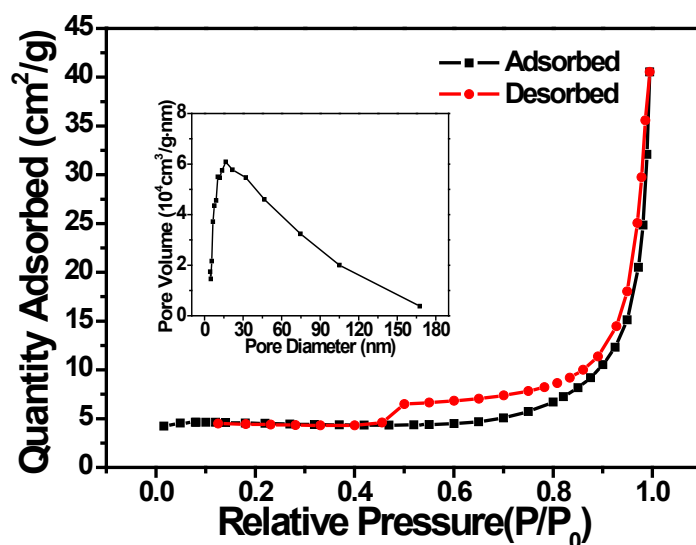
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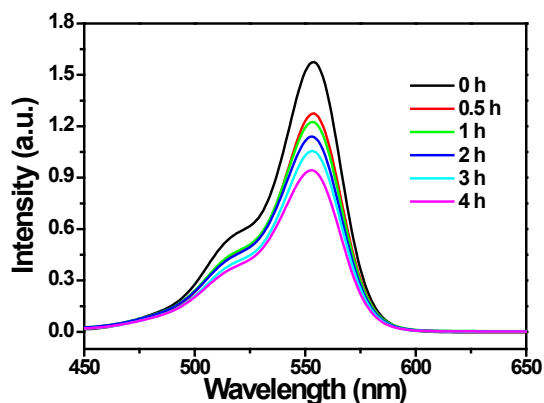
**Figure S1** The band gap of pure ZnO and AgBr-ZnO nanocomposites.

It is well-known that the relationship between the absorption coefficient ( $\alpha$ ) near the absorption edge and the excitation energy ( $h\nu$ ) follows the equation:  $(\alpha h\nu)^2 = A(h\nu - E_g)$ , where  $A$  is a parameter that relates to the effective mass associated with valence and conduction bands, and  $E_g$  is the band gap, which is one of the most important electronic parameters for semiconductor nanomaterials. The band gap of ZnO and AgBr-ZnO nanocomposites are found to be 3.37 eV and 3.29 eV, respectively.



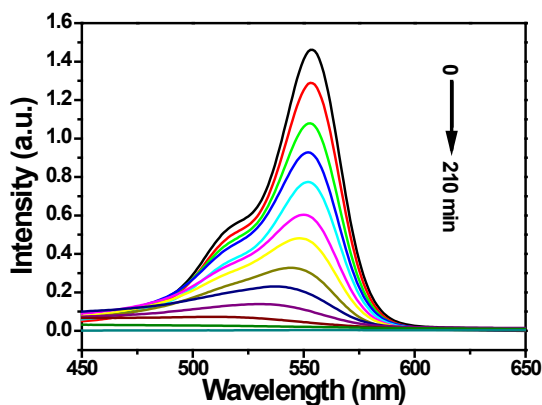
**Figure S2** N<sub>2</sub> adsorption-desorption isotherm of AgBr-ZnO nanocomposites. Inset: pore-size distribution.

The Brunauer-Emmett-Teller (BET) Nitrogen adsorption and desorption isotherms analysis in Fig. S2 shows the specific surface area and porosity of as-synthesized AgBr-ZnO nanocomposites. BET surface area of AgBr-ZnO nanocomposites is 11.54 m<sup>2</sup> g<sup>-1</sup>. The hysteresis loop is observed in the range of 0.45-1.0 P/P<sub>0</sub>, which is corresponding to type IV. The insert shows the pore-size distribution of the sample, the diameter of the pores is about 16.3 nm by using the Barrett-Joyner-Halenda (BJH) method, which may be the pores caused by the packed nanostructures.



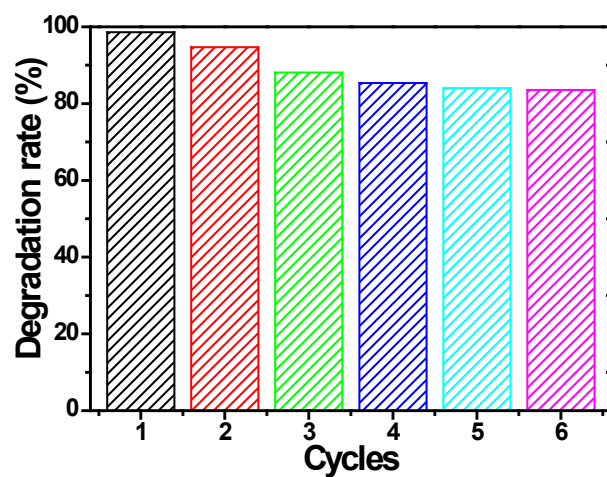
**Fig. S3** Degradation spectra of RhB by using AgBr-ZnO catalyst in the dark.

Fig. S3 shows curve of the degradation of RhB under AgBr-ZnO catalyst in the dark for 4 hours under vigorously stirring. The absorbance of RhB declined to a certain degree, which might be caused by the adsorption of the catalyst in the first 30 min, while in the following 30 min, the absorption peaks from red line to green line at 553 nm declined just a little, which shows that the as-synthesized AgBr-ZnO nanocomposites had poor catalytic activity in the dark.



**Fig. S4** Degradation spectra of RhB by using pure ZnO catalyst under UV light with a filter ( $\lambda=365$  nm).

As a reference, pure ZnO was also used as a catalyst for the degradation of RhB under UV light with a filter ( $\lambda=365$  nm). It almost cost 210 min, thus is far more than that of AgBr-ZnO (27 min).



**Fig. S5** Cycling runs of AgBr-ZnO nanocomposites for the degradation of RhB under UV irradiation with a filter ( $\lambda=365$  nm).

The degradation efficiency of AgBr-ZnO is slightly decreased after each cycle, after six recycling runs, the degradations of RhB by AgBr-ZnO photocatalyst remained at 85% after six recycling.