Supporting Information

Synthesis of novel TiO2/BiOCl@HHSS composites and its photocatalytic activity enhancement under simulated sunlight†

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Synthesis of BiOCl

The BiOCl were prepared by a solvothermal method using absolute ethanol as the solvent. 1.13 g NaCl was dissolved in water and the solution was added into 80 mL absolute ethanol. After stirring for 30 minutes, 9.31g Bi $(NO_3)_3.5H_2O$ dissolved in acetic acid (10 mL) was added to the mixture in drops under vigorous stirring. After adjusting the PH of the mixture to 6-7 with ammonia, the mixture was transferred into a Teflon-lined autoclave and heated at 373K for 24h. The samples was separated by filtration, washed with deionized water and ethanol several times, and dried at 333K.

Synthesis of TiO_2/BiOCl

In a typical process to synthesize TiO_2/BiOCl (molar ratio of 1:1) nanocomposite photocatalyst, 20 mL octane and 0.5 mL deionized water were added into 80 mL absolute ethanol. After decentralized operation, 2.1 mL TBOT was added into above solution drop by drop, then 0.34 g NaCl was dissolved in water and the solution was added to the mixture. After stirring for 30 minutes, 2.8 g Bi $(NO_3)_3.5H_2O$ dissolved in acetic acid (10 mL) and the solution were added to the mixture. Under vigorous stirring, ammonia was introduced to the resultant solution until the pH value reached 6-7. Then the mixture was transferred into a Teflon-lined autoclave and maintained at 373 K for 24 h. The product was separated by filtration, washed with deionized water and absolute ethanol several times, dried at 333 K, and calcined at 673 K for 3 h.

Synthesis of TiO_2@HHSS

To prepare TiO_2/HHSS, 1g HHSS was first dissolved in 80 mL absolute ethanol. After complete dissolution, 20 mL octane was added under vigorous stirring. Subsequently, 0.5 mL deionized water was added into it. After a series of decentralized operations 1.7 mL TBOT (the loading amount of TiO_2 was set to 40 wt%) was added in drops. Then the mixture was transferred into a Teflon-lined autoclave, followed by heating and maintaining at 373 K for 24 h. The resulting precipitates were washed with deionized water and ethanol thoroughly to remove residual ions and dried at 333 K for 6 h. The as-synthesized TiO_2@HHSS was obtained and calcined at 673 K for 3 h for further characterization.

Synthesis of BiOCl@HHSS

The BiOCl@HHSS photocatalyst (the loading amount of BiOCl was set to 40 wt %) was prepared as

follows: 20 mL octane was added into a mixture of 1g HHSS and 80 mL absolute ethanol. The resulting mixture was stirred for 2h at room temperature.Then 0.15 g NaCl was dissolved in water and the solution was added to the solution with stirring for another 30 min, 1.25 g $Bi(NO_3)_3.5H_2O$ was dissolved in acetic acid (10 mL) and the solution was added to the mixture. After stirring for 1 h, the PH of the mixture was adjusted to 6-7 with ammonia.Then the mixture was transferred into a Teflon-lined autoclave and this autoclave was kept at 373 K for 24 h and then cooled to room temperature naturally. The resulting white solid powder was collected by filtration and washed with deionized water several times to remove residual ions. The final product was dried at 333 K for 6 h. The as-synthesized solid product was collected and calcined at 673 K for 3 h to get obtain the target crystal.

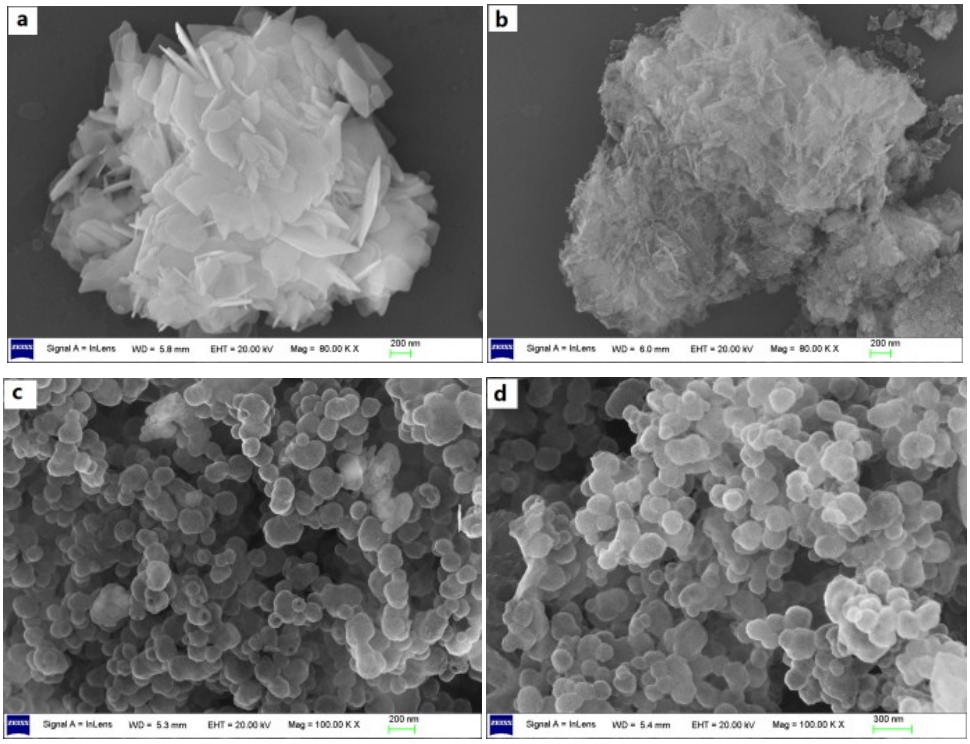

Fig. S1 SEM images of (a)BiOCl, (b)$BiOCl/TiO_2$, (c) BiOCl@HHSS and (d) TiO_2@HHSS.

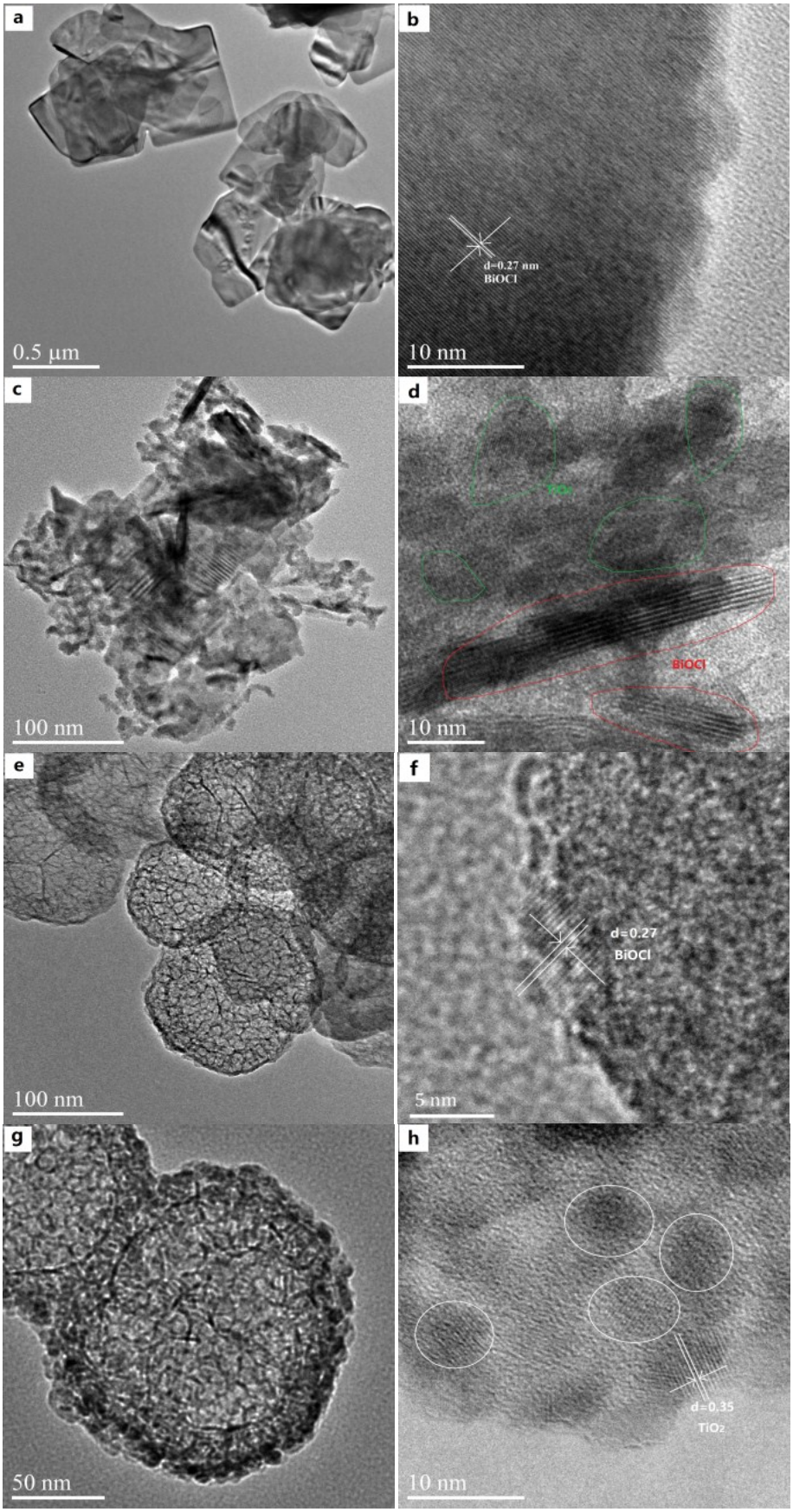

Fig. S2 TEM and HRTEM images of (a and b) BiOCl, (c and d) BiOCl/TiO_2, (e and f) BiOCl@HHSS and(g and h) TiO_2@HHSS.