Supporting Information

An Efficient Dye-sensitized BiOCl Photocatalyst for Air and Water Purification under Visible Light Irradiation

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Photocatalysts characterizations

The sample structure was determined by X-ray diffraction (XRD, Rigacu D/Max-2000, monochromatic CuKa radiation), field emission scanning electron microscopy (FESEM, HITACHI S4800), high-resonance transmission electron microscopy (HRTEM) and selective area electronic diffraction (SAED) collected on a JEOL JEM2100, and N_2 adsorption-desorption (Quantachrome NOVA 4000e, at 77 K). The optical properties were determined by UV-visible diffuse reflectance spectrum (Cary 500, Varian) and photoluminescence spectrum (PLS, Varian

Cary-Eclipse 500). Liquid chromatography-mass spectrometry (HPLC -MS, Angilent 1200) was used to detection the residual 4-CP concentration. Based on the adsorption branches of N_2 sorption isotherms, the Brunauer–Emmett–Teller (BET) method was used to calculate the specific surface area (S_{BET}). The electron paramagnetic resonance (EPR) spectra were recorded at 100 K using a Bruker EMX-8/2.7 EPR spectrometer.

NO oxidation experimental process

The photocatalytic NO oxidation in gas phase was carried out at ambient temperature in a continuous flow reactor with volume of 4.5 L (10 × 30 × 15 cm). During visible light driven photocatalysis, 2*150 W tungsten halogen lamps (General Electric) located vertically above the reactor by cutting the lights with wavelength shorter than 420 using an ultraviolet filter. For UV lights driven photocatalysis, 8*6w 365 nm UV lamps located vertically above the reactor was used as light source, as shown in Scheme 1. In each run of experiments, an air gas flow containing 500 ppb NO was allowed to pass through 0.20 g photocatalyst with different amount of dye RhB at the rate of 4.0 L/min. RhB adsorbed BiOCl samples were prepared by coating an aqueous RhB suspension of BiOCl samples onto glass dishes with a diameter of 15.0 cm. The dishes containing the RhB-BiOCl samples were pretreated at 70 ^{o}C until a complete removal of water in the suspension and then cooled to room temperature. Then the dishes were transferred into the NO oxidation reactor. NO gas was selected as the target pollutant for the photocatalytic degradation at ambient temperature. The NO gas was acquired from compressed gas cylinder at a concentration of 48 ppm NO (N_2 balance, BOC gas) with traceable National Institute of Stands and Technology (NIST) standard. The initial concentration of NO was diluted to about 500 ppb by the air stream supplied by a zero air generator (Thermo Environmental Inc. Model 111). The desired humidity level of the NO flow was controlled at 70% (2100 ppmv) by passing the zero air streams through a humidification chamber. The gas streams were pre-mixed completely by a gas blender and the flow rate was controlled at 4 L.min^{-1} by a mass flow controller. After reaching adsorption-desorption equilibrium on the photocatalyst, the lamp was turned on to start the photocatalysis reaction. The

concentration of NO was continuously measured by using a chemiluminescence NO analyzer (Thermo Environmental Instruments Inc. Model 42i). The NO removal rate (%) was calculated based on the following equation: NO removal rate (%) = (C_0 - C)/C_0 × 100%, where C_0 and C refer to the NO concentration determined before and after reaction.

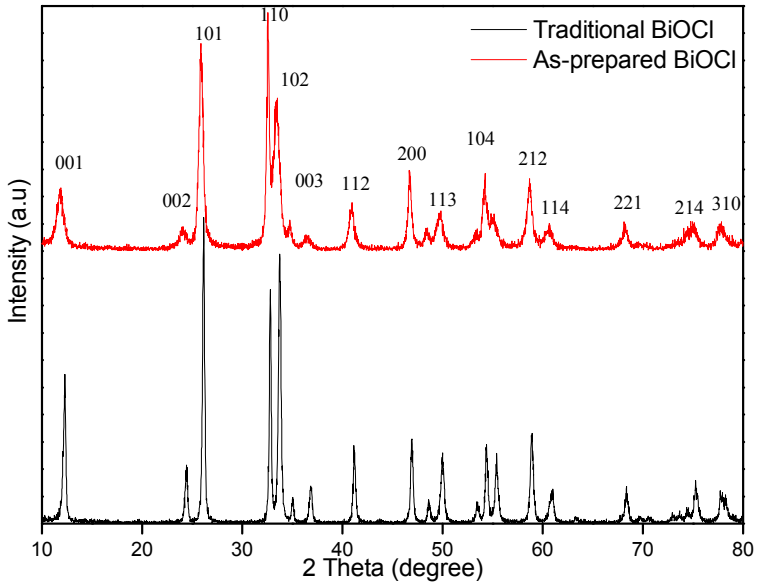

Figure S1. XRD patterns of the as-prepared BiOCl and the traditional BiOCl samples

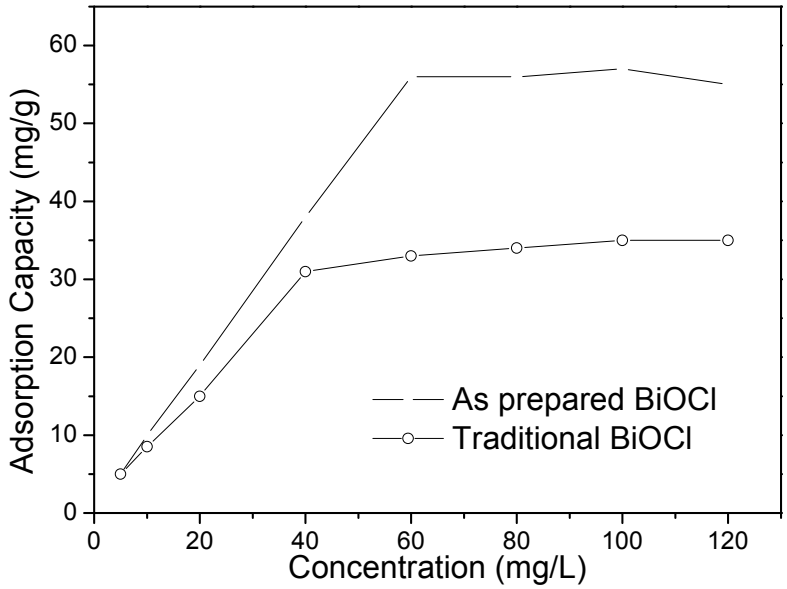

Figure S2. Adsorption isotherms of RhB on the as prepared BiOCl sample (-■-) and traditional BiOCl sample (-○-).

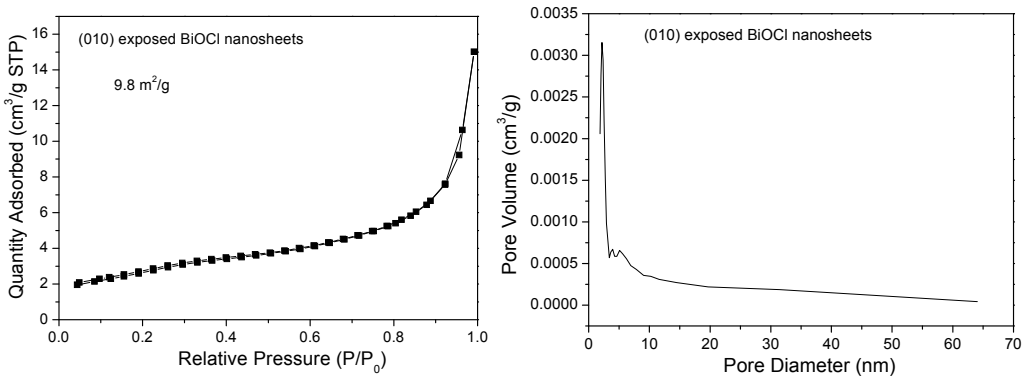

Figure S3. N_2 adsorption-desorption isotherms and pore size distribution curves inset

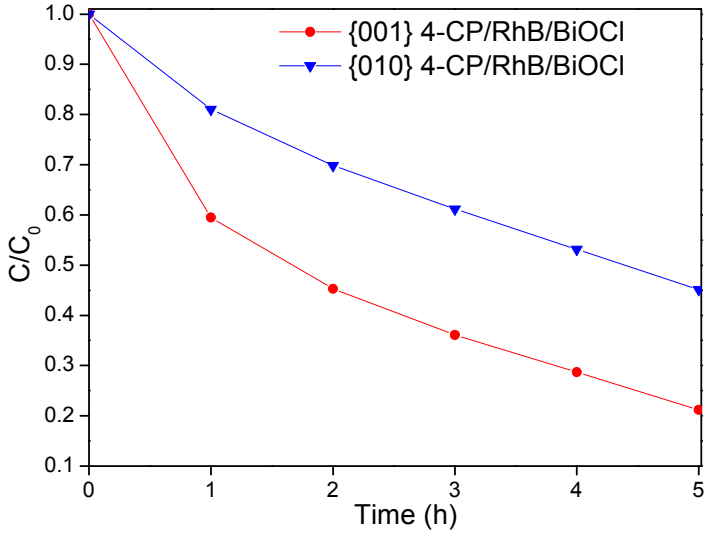

Figure S4. The comparison of synergistic photocatalytic decomposition 4-CP in the presence of {001}/{010} facets exposed BiOCl. (RhB: 100 mg/L, 4-CP: 50 mg/L)

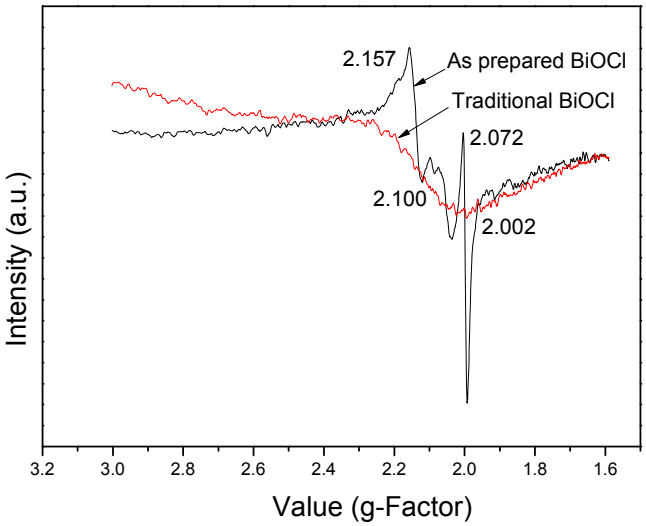

Figure S5. EPR spectra of the as-prepared and traditional BiOCl samples.