Supplementary data for

A New Photocatalyst BiOCl/BiOI Composites with Highly Enhanced Visible Light Photocatalytic Performances†

Tian bao Li, Gang Chen*, Chao Zhou, Zao yu Shen, Ren cheng Jin, Jing xue Sun

Department of Chemistry, Harbin Institute of Technology, 92 West Dazhi Street

Harbin, 150001, P R. China

Analysis of hydroxyl radicals: The formation of hydroxyl radicals (·OH) on the surface of 20% BiOCl/BiOI and 70%BiOCl/BiOI was detected by PL using terephthalic acid as a probe molecule. 350 W high-Pressure mercury lamp and 300 W Xe lamp were used as the light source. Terephthalic acid readily reacts with ·OH to produce a highly fluorescent product, 2-hydroxyterephthalic acid. This technique has been used in radiation chemistry, sonochemistry, and biochemistry for the detection of ·OH generated in water. The method relies on the PL signal at 425 nm arising from the hydroxylation of terephthalic acid with ·OH generated at the water/catalyst interface. The PL intensity of 2-hydroxyterephthalic acid is proportional to the amount of ·OH radicals produced in water. The method is rapid, sensitive, and specific, and needs only a simple standard PL instrumentation. The experimental procedures were similar to those used in the measurement of photocatalytic activity except that the aqueous solution of RhB was replaced by an aqueous solution of 5×10^{-4} M terephthalic acid and 2×10^{-3} M NaOH. The UV irradiation or visible light irradiation was continuous and sampling was performed at given time intervals for analysis. The solution was analyzed after filtration on a Perkin Elmer LS55 fluorescence spectrophotometer. The product of the terephthalic acid hydroxylation, 2-hydroxyterephthalic acid, gave a peak at a wavelength of about 425 nm by excitation with a wavelength of 315 nm. The intensity of the 425 nm PL peak increased with increasing irradiation.

Fig. S1

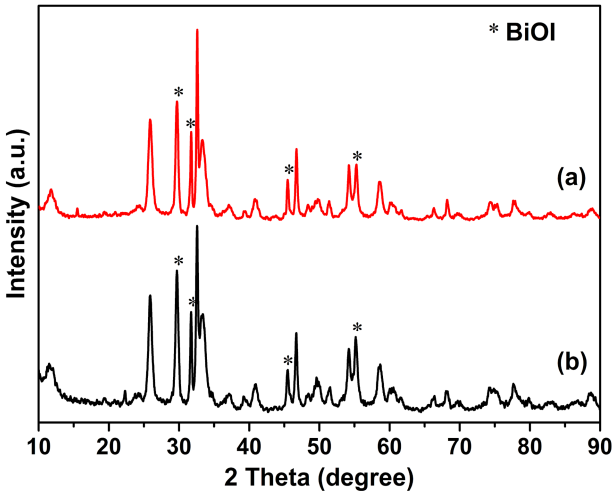

Fig. S1 XRD patterns of 70%BiOCl/BiOI: (a) before reaction; (b) after reaction.

Fig. S2

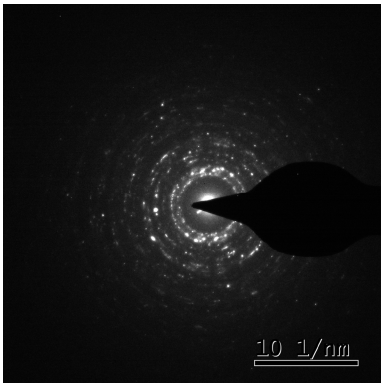

Fig. S2 Selected area electron diffraction pattern of the 70%BiOCl/BiOI composite.

Fig. S3

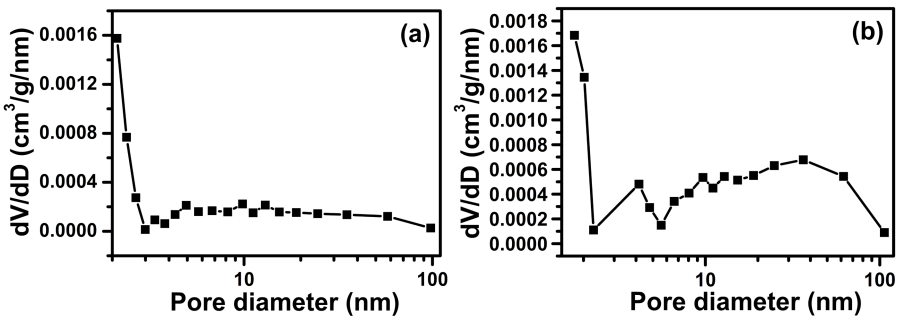

Fig. S3 The corresponding pore-size distributions of: (a) BiOI and (b) BiOCl.

Fig. S4

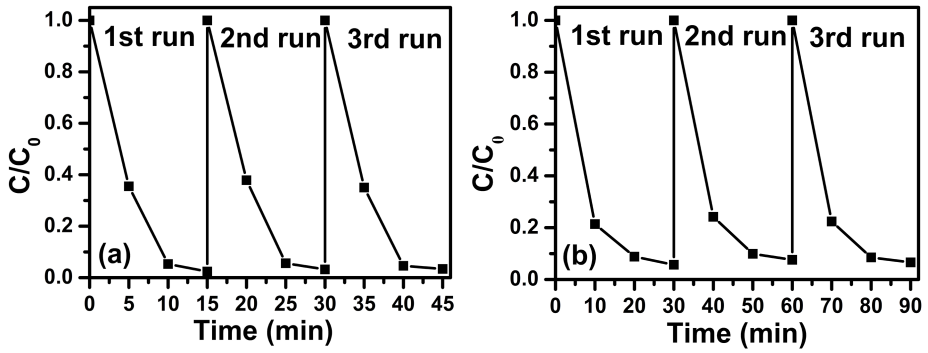

Fig. S4 Cycling runs in photocatalytic degradation of (a) RhB; (b) MO in the presence of the 70% BiOCl/BiOI and 20% BiOCl/BiOI composite under visible-light irradiation, respectively.

Fig. S5

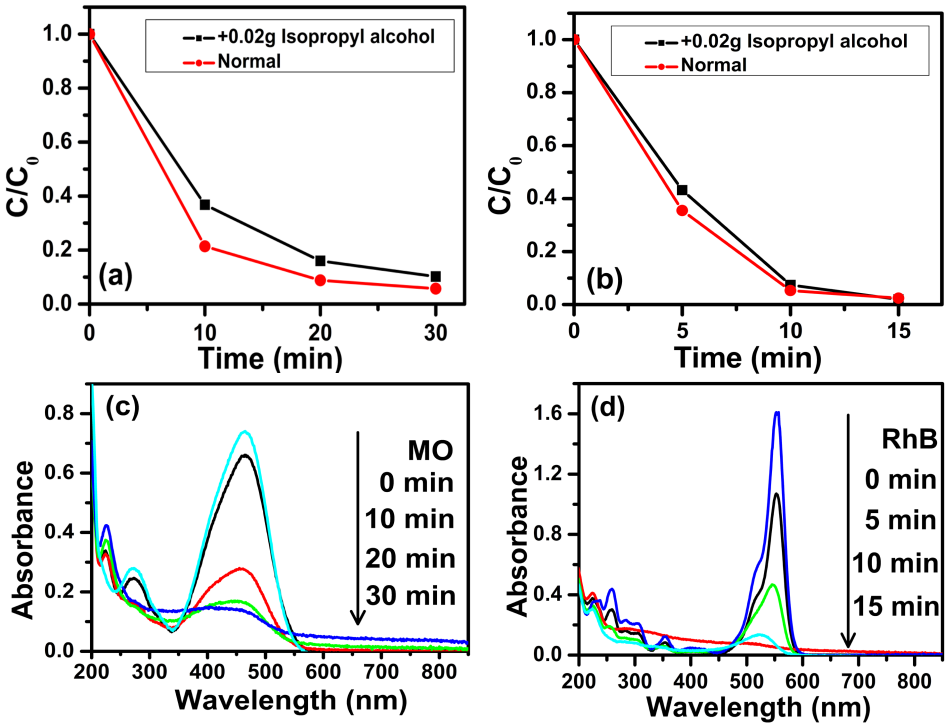

Fig. S5 Effect of isopropyl alcohol addictive for (a) 20%BiOCl/BiOI on decomposing MO; (b) 70%BiOCl/BiOI on decomposing RhB. (c) UV spectral changes of MO as a function of irradiation time over 20%BiOCl/BiOI by adding isopropyl alcohol; (d) UV spectral changes of RhB as a function of irradiation time over 70%BiOCl/BiOI by adding isopropyl alcohol.

Fig. S6

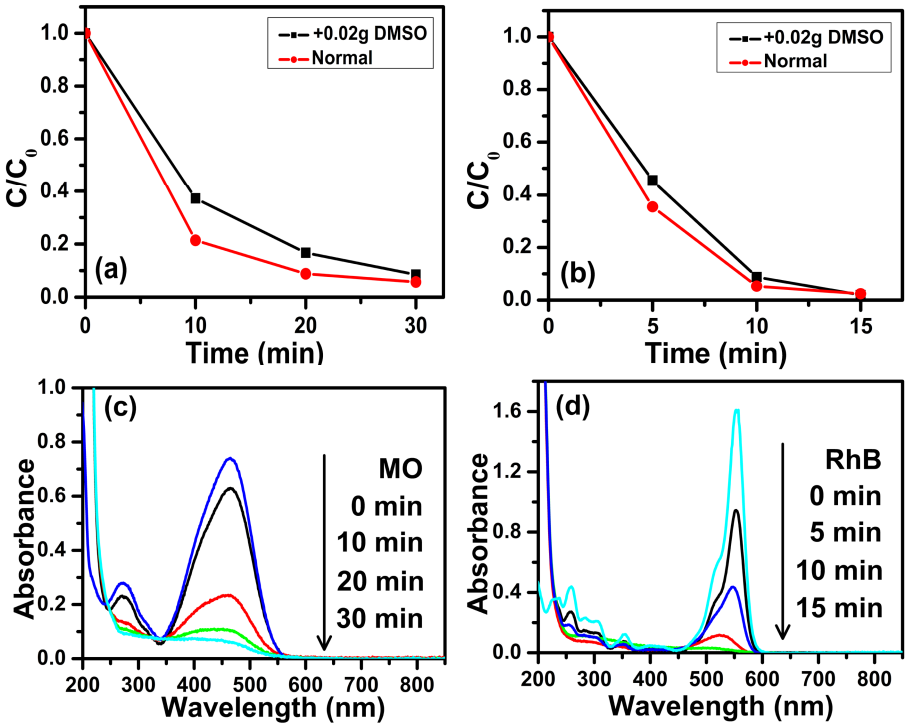

Fig. S6 Effect of DMSO addictive for (a) 20%BiOCl/BiOI on decomposing MO; (b) 70%BiOCl/BiOI on decomposing RhB. (c) UV spectral changes of MO as a function of irradiation time over 20%BiOCl/BiOI by adding DMSO; (d) UV spectral changes of RhB as a function of irradiation time over 70%BiOCl/BiOI by adding DMSO.