Supporting information for

One-step co-precipitation synthesis of novel BiOCl/CeO_2 composites with enhanced photodegradation of rhodamine B

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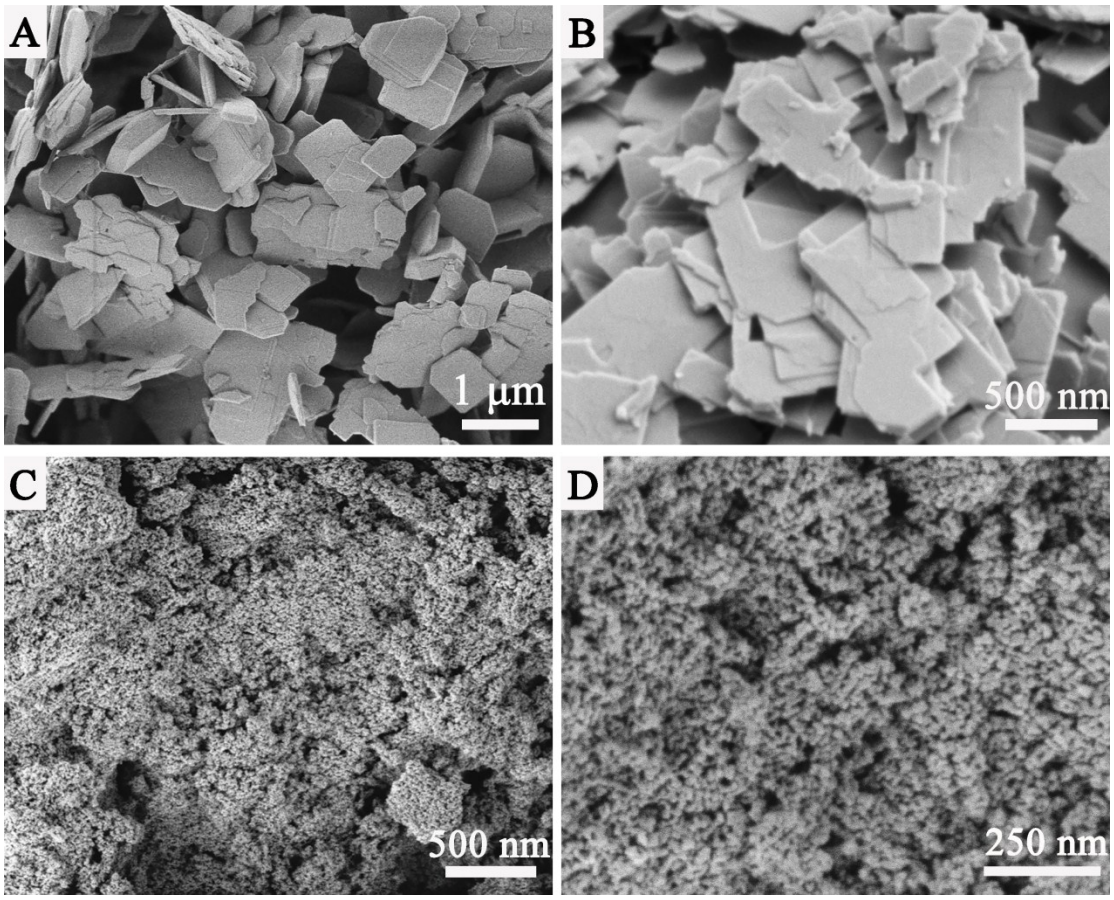

Fig. S1 SEM images of BiOCl (A, B) and CeO_2 (C, D).

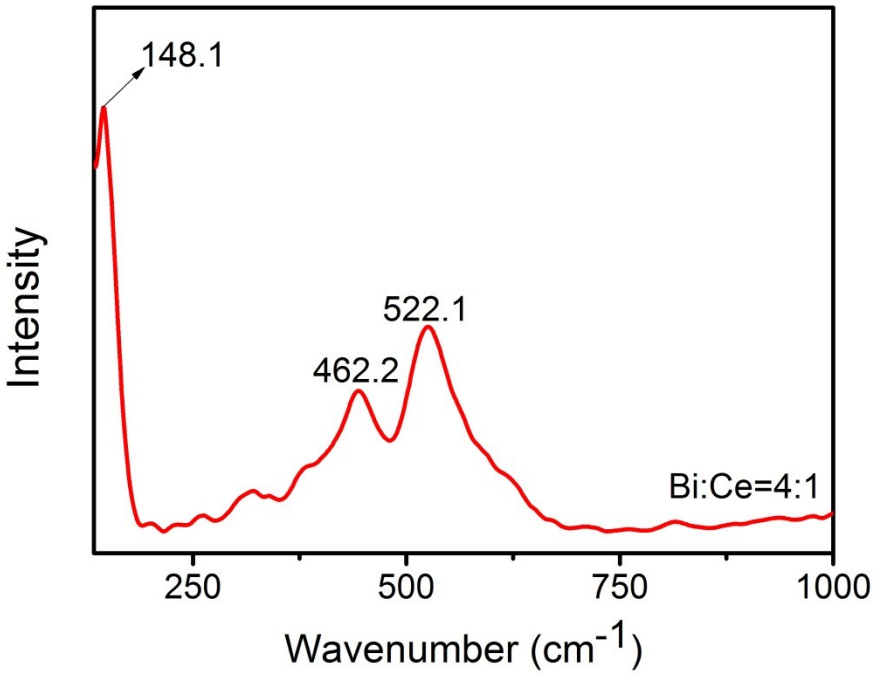

Fig. S2 Raman spectrum of Bi:Ce=4:1 composites.

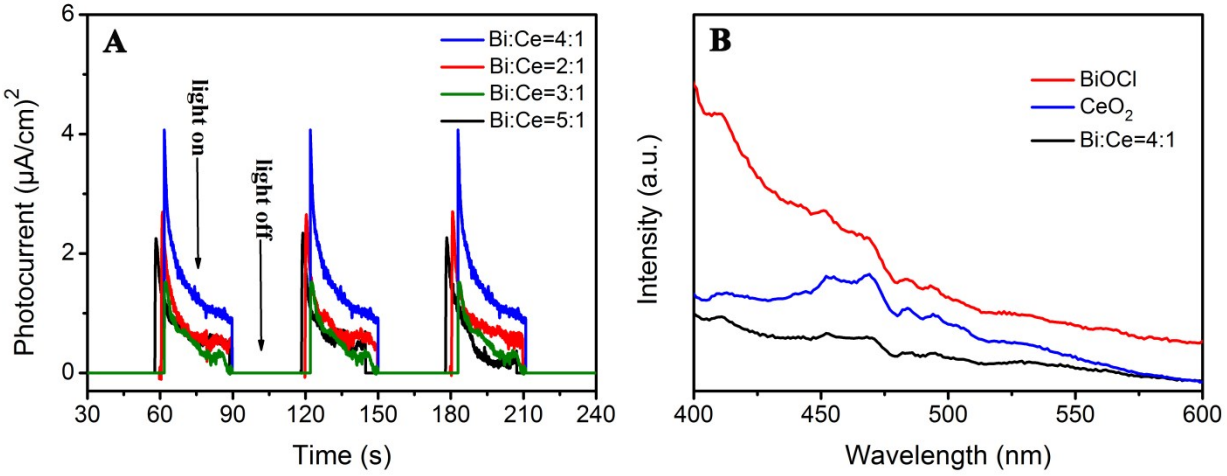

Fig. S3 The transient photocurrent responses (A) of Bi:Ce=2:1, Bi:Ce=3:1, Bi:Ce=4:1 and Bi:Ce=5:1 and PL spectra (B) of BiOCl, CeO_2 and Bi:Ce:4:1.

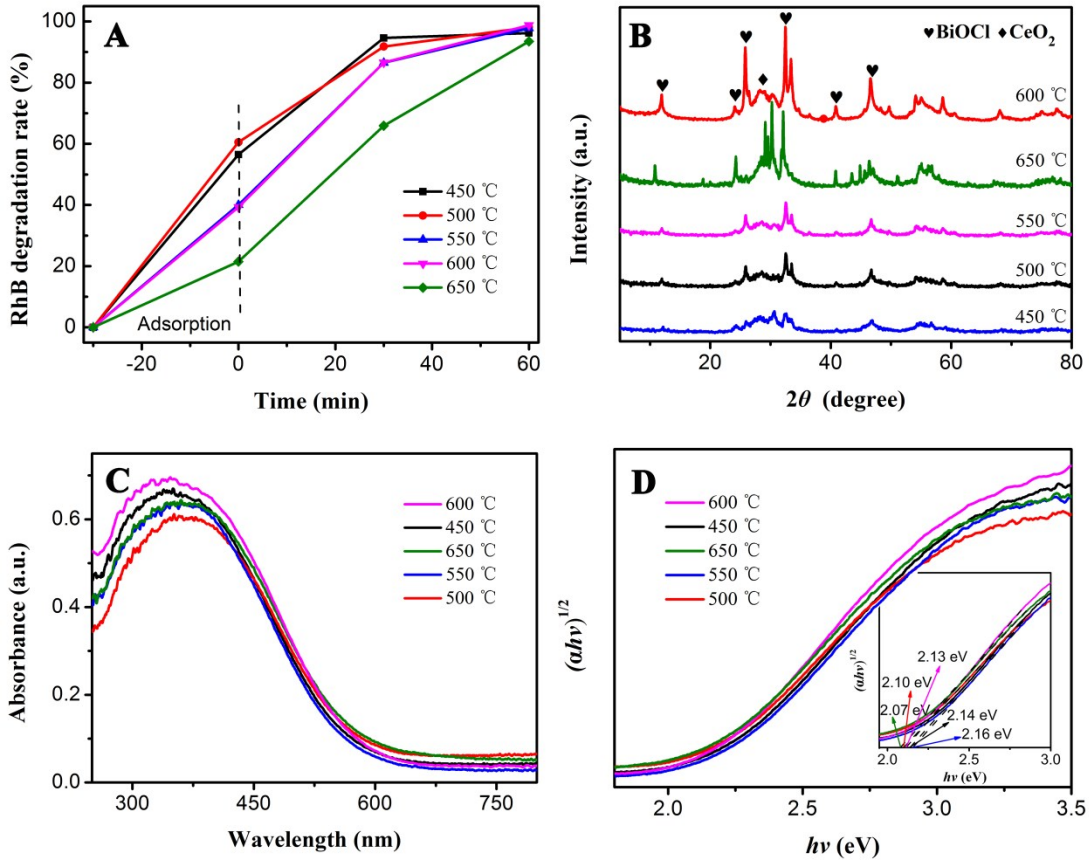

Fig. S4 RhB degradation efficiency (A), XRD patterns (B), UV-vis absorption spectra (C) and the plotting of $(\alpha hv)^{1/2}$ *vs.* hv (D) of Bi/Ce = 4:1 synthesized at different calcination temperatures.

The X-ray diffraction patterns of all the above-prepared samples showed the changes in the phase structure from Bi/Ce=4:1 composites under different calcination temperature (Fig. S4B). When the annealing temperature is 450 °C, 500 °C and 550 °C, the intensity of Bi:Ce=4:1 is lower than 600 °C and 650 °C and the main diffraction peaks is not obvious, indicating the temperature can impact the crystalline structure and the structure of the complexes. As shown in Fig. S4B, the diffraction of 600 °C fits well with the diffraction peaks of BiOCl. Compared with the diffraction peaks of 600 °C, some diffraction peaks of BiOCl in the 650 °C disappear and shifted, which further illustrates high temperature would destroy the crystalline structure. These

results indicate that inappropriate temperature breaks down the structure of the complexes and the calcination at 600 °C is the best calcination condition.

Fig. S4C shows the UV-vis absorption spectra of Bi/Ce = 4:1 synthesized at different calcination temperatures. All as-obtained samples have similar absorption wavelength and band gap, which show a strong absorbance at wavelengths less than 410 nm. It can be seen from Fig. S4C, the composites with Bi/Ce=4:1 obtained at calcination temperature of 600 °C exhibit a strong absorbance. As shown in Fig. S4D, The band gap energy values of Bi/Ce=4:1 composites obtained at calcination temperature of 600 °C, 450 °C, 650 °C, 550 °C and 500 °C are 2.13 eV, 2.14 eV, 2.07 eV, 2.16 eV and 2.10 eV, respectively.