Enhanced photocatalytic activity of B$_{12}$-based catalyst co-photosensitized by TiO$_2$ and Ru(II) towards dechlorination

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Experimental

Preparation of B$_{12}$-TiO$_2$

[(CN)(H$_2$O)Cob(III)7COOH]Cl (2.5 mg, 2.4×10$^{-3}$ mmol) was added to 5 mL methanol dispersion of mesoporous anatase TiO$_2$ microspheres (30 mg) and the mixture was stirred at room temperature for 4 h. Then the hybrid B$_{12}$-TiO$_2$ was obtained after centrifugation and washed with methanol for three times.

The Co content of B$_{12}$-TiO$_2$ was $6.9 \times 10^{-5}$ mol·g$^{-1}$, which was determined through detecting the absorbance change of the characteristic peak of [(CN)(H$_2$O)Cob(III)7COOH]Cl at 523 nm in the supernatant by UV-vis spectra.

Preparation of Ru(II)-TiO$_2$

Ru(dcb)(bpy)$_2$(PF$_6$)$_2$ (5 mg, 5.8 mmol) was added to 5 mL methanol dispersion of mesoporous anatase TiO$_2$ microspheres (30 mg) and the mixture was stirred at room temperature for 4 h. Then the hybrid Ru(II)-TiO$_2$ was obtained after centrifugation and washed with methanol for three times.

The Ru content of Ru(II)-TiO$_2$ was $1.75 \times 10^{-4}$ mol·g$^{-1}$, which was determined through detecting the absorbance change of the characteristic peak of Ru(dcb)(bpy)$_2$(PF$_6$)$_2$ at 480 nm in the supernatant by UV-vis spectra.
Fig. S1 Structures of ([CN](H_2O)Cob(III)7C_1ester]Cl and Ru(bpy)_3Cl_2.

![Fig. S1](image1.png)

Fig. S2 UV-vis spectra of Cob(III)7C_1ester (a) and Ru(bpy)_3Cl_2 (b) in methanol.

![Fig. S2](image2.png)

Fig. S3 Photographs of B_{12}-TiO_2 (a) and Ru(II)-TiO_2 (b).

![Fig. S3](image3.png)

Fig. S4 SEM images of titanium glycolate (a), B_{12}-TiO_2 (b) and Ru(II)-TiO_2 (c).

![Fig. S4](image4.png)
Fig. S5 Diffuse reflectance UV-vis spectra of TiO$_2$ (a), B$_{12}$-TiO$_2$ (b) and Ru(II)-TiO$_2$ (c).