

# Supporting Information for:

## Facile synthesis of composite $g\text{-C}_3\text{N}_4/\text{WO}_3$ : A novel nontoxic photocatalyst with excellent catalytic activity under visible light

### *Experimental Section*

#### **Catalysts Preparation**

Melamine ( $\text{C}_3\text{H}_6\text{N}_6$ ), ethanol, glucose and polyvinyl alcohol were purchased from Sinopharm Chemical Reagent Corp, P. R. China;  $\text{WCl}_6$  was purchased from Aladdin Chemical Reagent Corp, P. R. China. All of reagents were reagent grade and used without further purification.

Synthesis of  $\text{WO}_3$  was performed according to method reported by Xi et al.

#### **Synthesis of PVA@GCP**

1.5 g glucose was added to 50 ml water under stirring. Then, 0.5 g polyvinyl alcohol (PVA) was added to the mixed solution. This serosity was transferred to an autoclave, and maintained at 180 °C for 24 h. After the autoclaves were cool down to room temperature, and the product was washed with absolute ethanol for a given period of time. Then, one portion was dried at 70 °C for 4 h. The PVA@GCP was obtained.

#### **Synthesis of $\text{WO}_3$**

1.5 g as prepared PVA@GCP and 2.0 g  $\text{WCl}_6$  were added to 60 ml absolute ethyl alcohol, the as-prepared mixture was sealed and placed at ice bath with stirring for 12 h. After that, the ethyl alcohol residual was removed by centrifugation, and the products were dried in a vacuum. At last, the dried products were heated from room temperature to 450 °C with 420 minutes, and kept at 450 °C for 1 h. After cooling down to room temperature, the PVA@GCP was removed, and the  $\text{WO}_3$  was obtained.

#### **Synthesis of polymeric $g\text{-C}_3\text{N}_4$**

2g melamine was put into a crucible and heated them in a tubular furnace. Before heating, we put nitrogen gas into the tube furnace for five minutes to discharge air. Then, heated the crucible to 550 °C and kept at this temperature for 2 h with the heating rate of 2 °C per minute, while maintaining the flow of nitrogen.

#### **Synthesis of 50% $g\text{-C}_3\text{N}_4/\text{WO}_3$**

Amounts of polymeric  $g\text{-C}_3\text{N}_4$  were added into ethanol. In order to keep the  $\text{C}_3\text{N}_4$  disperse well, we put the mixture in an ultrasonic bath for 30 min. Then, the same amount of  $\text{WO}_3$  was put into the mixture and stirred in a stink cupboard for 24h until

the ethanol was evaporated completely. Finally, the product was dried at 80 °C for 2h. The obtained product was calcined at 100 °C, 200 °C, 300, 400 °C and 450 °C, the final products were named as CNWO-100, CNWO-200, CNWO-300, CNWO-400 and CNWO-450 respectively.

### **Synthesis of 50% *g*-C<sub>3</sub>N<sub>4</sub>/Bi<sub>2</sub>WO<sub>6</sub>**

Melamine was heated to 520 °C for 2 h at a heating rate of 10 °C per minute. Further heating treatment was performed at 520 °C for deammoniation, so the *g*-C<sub>3</sub>N<sub>4</sub> was obtained.

For Bi<sub>2</sub>WO<sub>6</sub>, we chose Na<sub>2</sub>WO<sub>4</sub> and Bi(NO<sub>3</sub>)<sub>3</sub> as raw material, which were mixed in a 1:2 molar ratio. After hydrothermal treatment at 170 °C for 2 h, the final products were calcined at 300 °C in air for 1 h.

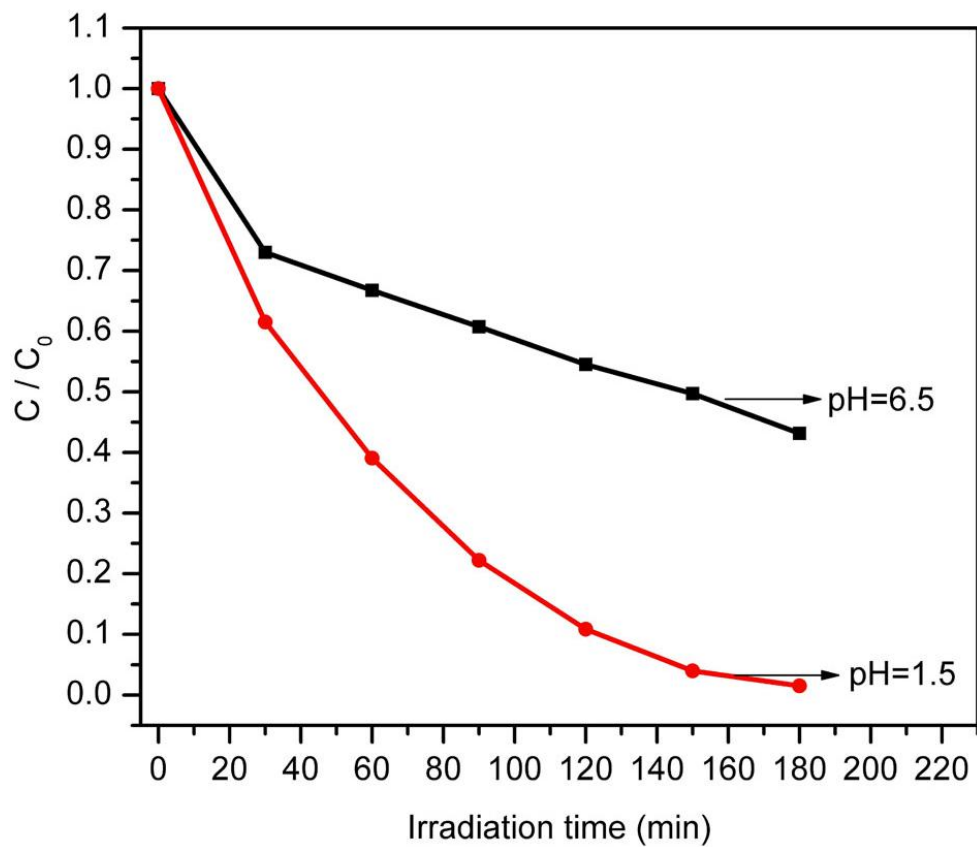
50% *g*-C<sub>3</sub>N<sub>4</sub>/Bi<sub>2</sub>WO<sub>6</sub> were synthesized by ground *g*-C<sub>3</sub>N<sub>4</sub> and Bi<sub>2</sub>WO<sub>6</sub> together, the resultant products were calcined at 300 °C for 1 h.

### **Sample characterization**

The crystal structure of the samples was investigated using a Rigaku MinFlexII benchtop X-ray diffractometry (XRD) with Cu-Kα irradiation. The morphology of the as-prepared pure *g*-C<sub>3</sub>N<sub>4</sub>, WO<sub>3</sub> and *g*-C<sub>3</sub>N<sub>4</sub>/WO<sub>3</sub> composite were characterized by transmission electron microscope (TEM) using a Tecnai G2 F20. The BET specific surface area of the samples was characterized from the nitrogen absorption data measured at liquid nitrogen temperature on a Micromeritics ASAP 2000 Surface Area. Before N<sub>2</sub>-sorption analysis, the sample was pretreated in N<sub>2</sub> at 120 °C for 1 h. UV-vis diffuse reflection spectroscopy (DRS) of the catalysts was characterized by Varian Cary-500 spectrophotometer. The Fourier transform infrared spectroscopy (FT-IR) were recorded on a Perkin-Elmer IR spectrometer using a KBr pellet technique. Photoluminescence (PL) spectra of the samples was carried out at room temperature by a Varian Cary Eclipse Fluorescence Spectrometer.

### **Photocatalytic characterization of the samples**

Photocatalytic activities of the samples were measured by methyl orange (MO) degradation as a probe reaction in an aqueous solution under visible light irradiation at room temperature. 100 mg of samples were dispersed in MO aqueous solution (100 mL, 10 ppm). Before the photocatalytic reaction, MO aqueous solution should be magnetically stirred with the catalyst in dark for 5 h to establish an adsorption and desorption balance. The pH value of the solution was around 6.5. We employed a 300 W Xe lamp equipped with a 420 nm cutoff filter to remove the UV-light to obtain the visible light irradiation. The absorbency of the irradiated MO was characterized by UV-vis spectrophotometer.



**Fig. S1** Photocatalytic performance of CNWO-400 under pH=6.5 and 1.5.