Supporting Information

Synthesis of $BiErWO_6$ photocatalyst

The $BiErWO_6$ photocatalyst was synthesized through a hydrothermal process. All chemicals used were analytic grade reagents without further purification. In a typical process, 1 mmol of $Bi(NO_3)_3 \cdot 5H_2O$ and 1mmol of $Er(NO_3)_3 \cdot 6H_2O$ were dissolved in 10 mL of 4 M nitric acid to form a clear solution. Meanwhile, 1mmol of $Na_2WO_4 \cdot 2H_2O$ was dissolved in 20 mL of deionized water under constant stirring. A pink precipitate was formed when these two solutions were mixed together. The pH values of the suspensions were adjusted to 4, 7 and 10 by adding NaOH solution (4 M) when necessary. After being stirred for 2 h, the suspension was transferred into a 50 mL Teflon-lined stainless steel autoclave up to 80% of the total volume. The autoclave was heated at 180 °C for 24 h, and then cooled to room temperature naturally. The resulting products were separated by filtration, washed with deionized water and absolute alcohol for several times, and then dried at 60 °C for 12 h.

Characterization

The phase and composition of the as-prepared samples were measured by X-ray diffraction (XRD) studies using an X-ray diffractometer with Cu Kα radiation under 40 kV and 100 mA and with the 2θ ranging from 10° to 70° (Rigaku, Japan). The morphologies and microstructures of the samples were investigated by the Scanning Electron Microscope (SEM) (JEOL JSM-6700F). The UV absorption spectra were recorded on a PE Lambda 900 UV-vis spectrophotometer in the wavelength range of 240-2500 nm using $BaSO_4$ as reference.

Photocatalytic test

Photocatalytic activities of the $BiErWO_6$ photocatalysts were evaluated by monitoring photo-degradation of rhodamine B (RhB) under infrared light irradiation.

A 100 W infrared lamp (λ>700 nm) was used as the light source. The experiments were performed at room temperature as follows: 100 mg of the photocatalysts were dispersed in a 100 mL solution of RhB (10^{-5} mol/L). Before illumination, the suspensions were magnetically stirred in the dark overnight to ensure adsorption/desorption equilibrium of RhB with the photocatalyst powders, and then exposed to light irradiation. At given time intervals, 3 mL suspension was sampled and centrifuged to remove the photocatalysts. After that, the supernatant was taken out to measure the absorption spectral change of RhB through a UV–vis spectrophotometer (Hitachi U–3010) to monitor the photo–degradation rate. The concentration change of rhodamine B was determined by monitoring the optical intensity of absorption spectra at 552 nm.