

Fig. S1 The temporal UV-vis absorption spectra during the photocatalytic degradation of RhB.



Fig. S2 The temporal UV-vis absorption spectra during the PersP degradation of RhB.



Fig. S3 The decay of total organic carbon (TOC) concentration as the PersP reaction time.



Fig. S4 The PersP effect of the black peony-like BiOCl sample.



Fig. S5 The reaction rate constants calculated from the slopes of the degradation curve. The Insert, The degradation curve of Phenol in solution (20 mg/L, 50 mL) by 20mg white and black peony-like BiOCl samples under visible light respectively.



Fig. S6 The temporal UV-vis absorption spectra during the photocatalytic degradation of Phenol



Fig. S7 The degradation curve of phenol in solution (20 mg/L, 50 mL) by 20mg white and black peony-like BiOCl samples in dark.

Particular attention: 20 mg white (blue line) and black (red line) peony-like BiOCl samples were firstly irradiated by a visible light source (500 W xenon lamp,  $\lambda \ge$  420 nm) for 5 h and then were put into the phenol solutions (20 mg/L, 50 mL) in a completely dark room. For the references, the parallel experiments without visible light irradiation had been conducted as well.



Fig. S8 The temporal UV-vis absorption spectra during the PersP degradation of phenol.



Fig. S9 The temporal UV-vis absorption spectra during the full-time degradation of RhB.