Supporting Information

Experimental details:

The morphology of the fabricated samples was observed by field emission scanning electron microscopy (FE-SEM, JSM-7000F, Japan). Linear sweep voltammetry and chronoamperonmetry were performed to investigate electrochemical responses using a 3-electrode configuration with Pt (counter electrode) and Ag/AgCl (reference electrode) in 1 M sulfuric acid solution (electrolyte), and these techniques were used at a scan rate of 10 mV/s. The samples used photoanode (working electrode) were illuminated under 100 mW/cm^2 of light irradiance with a xenon lamp based solar simulator (PECCELL, Yokohama, Japan, PEC-L01:100mW/cm^2). The power of the xenon lamp was 150 W and the light intensity of the solar simulator was calibrated prior to each sample measurement using a silicon reference cell (Fraunhofer ISE, Certificate No. C-ISE269).

The photo-decomposition reaction was carried out in 20ml of 2×10^{-3} mM rhodamine B (Rh B) aqueous solution (20ml) using the same threeelectrode system, with samples (working electrode), Pt (counter electrode) and Ag/AgCl (reference electrode) under 0.8V of applied bias and 100 mW/cm^2 of light irradiance from a xenon lamp based solar simulator. The photocatalytic degradation was measured as the time-dependant absorption changes in 550nm UV spectra with a UV-2401 PC, Shimadzu (UV/visible spectrophotometer). The concentration changes were estimated by using a calibration equation with the absorbance data measured from UV/visible spectrophotometer. The equation was obtained by measuring the absorptions of several Rh B solutions with different concentrations and plotting the concentration versus absorption curve

Mesoporous WO_3 inverse opal nanostructured films were prepared by using a polystyrene (PS) colloidal array as a skeleton-forming template and then filling the template with a colloidal complex precursor via spin-casting. The PS template was fabricated on transparent conducting glass substrates (F-doped SnO_2 coated glass, FTO).[1] Monodispersed PS (with a diameter of 1000nm) colloidal suspension was synthesized and self-assembled on the substrate as described previously.[2-3] To obtain the precursor solution composed of peroxi-tungstic acid and organic additive, 0.9 g of tungsten powder (W, Acros, 99.9%) was dissolved in 10 ml of hydrogen peroxide (30% H_2O_2, Junsei), which was subsequently combined with 25ml of 2-propanol (IPA, Junsei), used as an organic solvent to improve stability. IPA has the ability to slow down the condensation of tungstic acid in the precursor solution[4] and can make complexes with tungsten oxoanions.[5] After stirring the solution for 6 hr, different amounts of PEG 300 (Poly ethylene glycol) 300, Aldrich) was added to the solution to alter the morphology of the WO_3 inverse opal structure.

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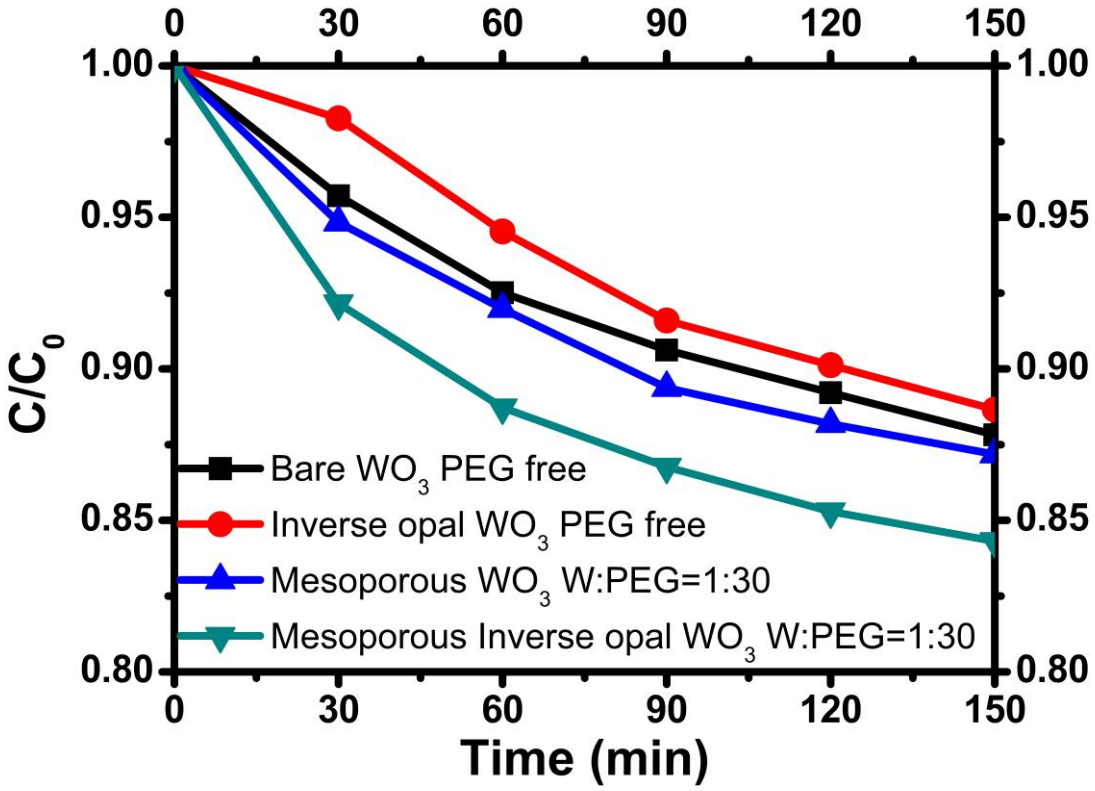

Change in concentration, C/C_0, at 525 nm as a function of the irradiation time during photocatalysis of rhodamine B in aqueous solution.