Nanoheterostructures on TiO_2 Nanobelts Achieved by Acid Hydrothermal Method with Enhanced Photocatalytic and Gas Sensitive Performance

Weijia Zhou, Guojun Du, Peiguang Hu, Dongzhou Wang, Hong Liu, Jiyang Wang, Robert I Boughton, Duo Liu and Huaidong Jiang

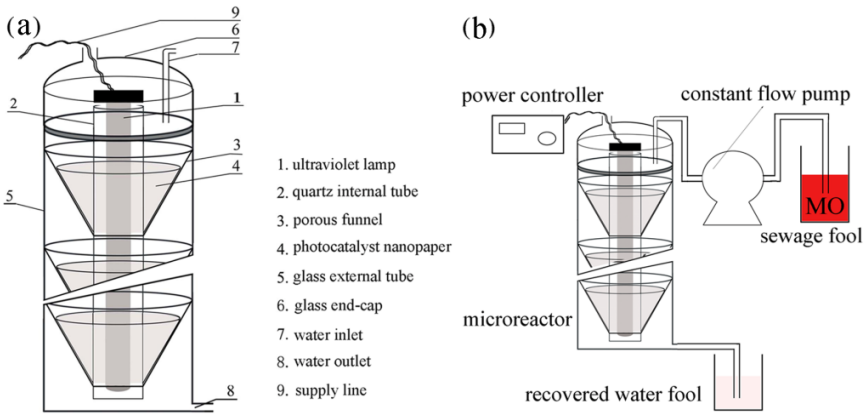

Figure S1. Experimental set up used in the liquid-phase degradation of methyl orange (MO) solution with a 36 W UV lamp (UVA, Philips, the main wavelength is 355 nm) as the UV light resource: (a) photocatalytic microreactor and (b) continuous-flow microreactor. The device consists of built-in UV lamp (1), quartz tube (2), porous glass funnel (3), anti-UV glass tube (5) and cap (6). UV lamp (1) is vertically placed in the inner quartz tube (2) of the reactor. A power cord (9) exits from the top side of the cover. Quartz tube cap covers on the outside of UV lamp for protection from corrosion of liquid or air pollution, and quartz glass does not block the UV radiation. Porous funnels (3) set on the outside of the quartz tube (2), which can be requested according to different requirements. The angle between porous funnel wall and the quartz tube is 30 degrees, which makes the catalyst papers fully accept UV irradiation. The session numbers of

porous funnel and pore volume and diameter of funnel walls can be changed as required to control the filtration rate. Here, the height of a single funnel is 5 cm, and the volume is 100 cm^3. Porous TiO_2 nanobelt-based filter papers (4) placed on the inner wall of the funnels. The MO aqueous solution (25 mg/L) is pumped with a flow rate of 20 mL/min into the upper inlet (7) of the photocatalytic reactor by a cross-flow pump. UV light radiates through the quartz tube to the TiO_2 nanopapers, and simultaneously MO aqueous solution flows through the TiO_2 nanopapers, leading to the photocatalytic degradation reaction. The degradation produces are discharged from the water outlet (8) of the photocatalytic reactor.

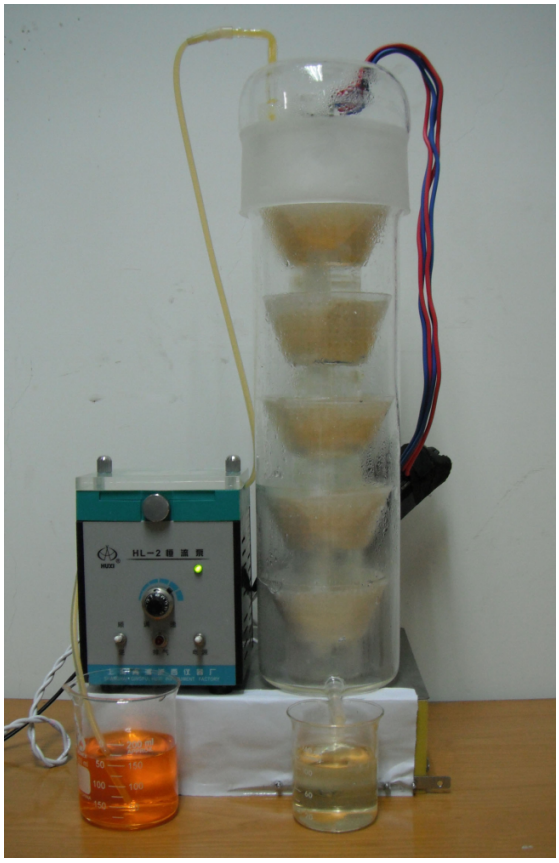

Figure S2. The simple practical reaction equipment used in the liquid-phase degradation of MO solution irradiated with a 36 W UVA lamp.

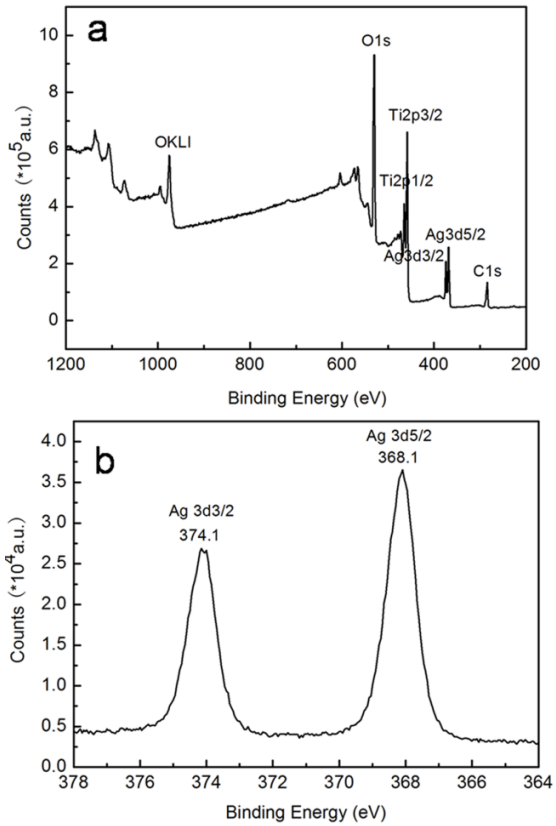

Figure S3. (a) Survey scan XPS spectrum of Ag/TiO_2-P/TiO_2-B heterostructures; (b) detail scan of Ag showing the binding energy of Ag 3d5/2 and 3d3/2.