Supporting Information

Large–Scale, Ultrathin, and {001} Facets Exposed TiO_2 Nanosheet Superstructures and Their Applications in Photocatalysis

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Experimental Section

Synthesis of TiO_2 nanosheet superstructures: In a typical procedure, 2 mL of tetrabutyl titanate and 0.8 ml of hydrofluoric acid (30% *m*/*m*) was dissolved in 25 mL of n–propanol, and the obtained white suspension was magnetically stirred for 2 h , and then transferred to a teflon–lined stainless–steel autoclave and heated at 180 °C for 20 h with a heating rate of 2 °C/min. The autoclave was cool down naturally and a white precipitate was collected, washed, and dried in air.

Photocatalytic Property Test: The photocatalytic activities of the TiO2 nanosheet superstructures were evaluated by degradation of Rhodamine B (RhB) in an aqueous solution under visible light from a 300W Xe lamp (HSX-F300, NBeT, full acr). The photocatalyst (50 mg) was poured into 100 mL RhB aqueous solution (10 mg/L) in a Pyrex reactor at room temperature under air. Before light was turned on, the suspension was continuously stirred for 30 min in dark to ensure the establishment of an adsorption–desorption equilibrium. The concentration of RhB during the degradation was monitored by colorimetry using a UV-vis spectrometer (Shimadzu UV-3600).

Characterization: XRD patterns of the products were recorded on a Bruker D8 Focus diffractometer by using CuKα radiation (λ = 1.54178 Å). Scanning electron microscopy (SEM) images and EDS spectrums were obtained on a Hitachi S–4800. Transmission electron microscopy (TEM) and high–resolution TEM (HRTEM) characterizations were performed with a Tecnai G F30 operated at 300 kV. BET measurements were carried out in Micromeritics Tristar 3020. UV–Vis–NIR absorption spectra were recorded with a Shimadzu UV-3600. Raman spectra were obtained from Renishaw in VIA.

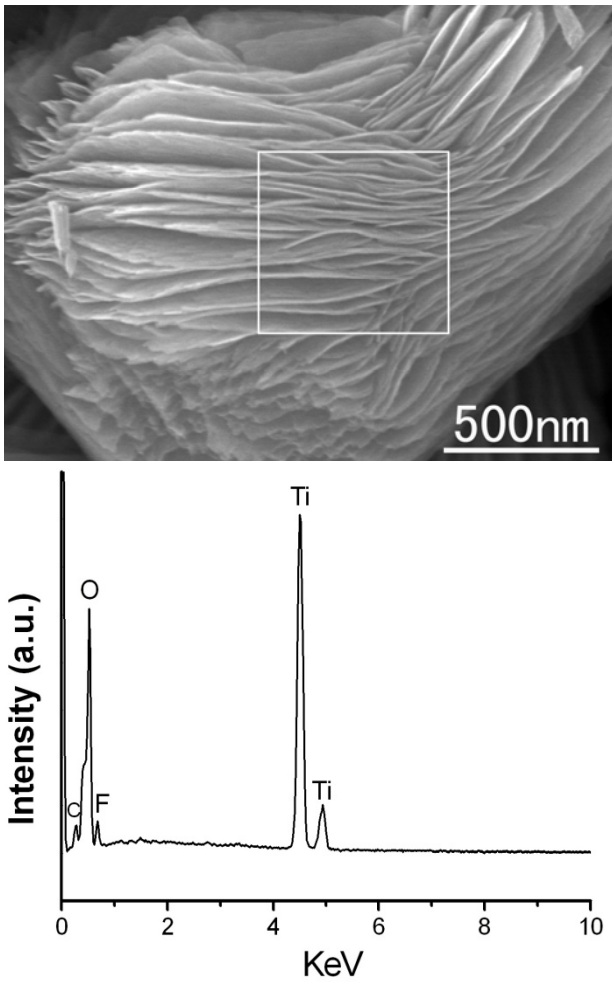

Figure S1. EDS spectrum of the as-synthesized large-scale, ultrathin, and (001) facets exposed anatase TiO_2 nanosheet superstructures.

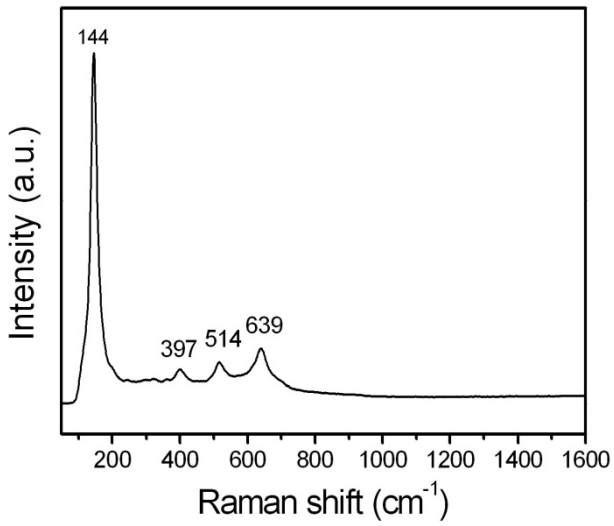

Figure S2. A typical Raman spectrum of the as-synthesized anatase TiO_2 nanosheet superstructures.

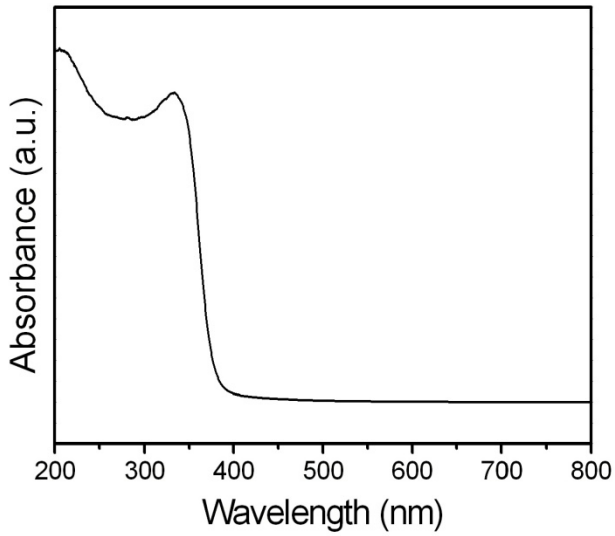

Figure S3. A typical UV-vis absorption spectrum of the anatase TiO_2 nanosheet superstructures.

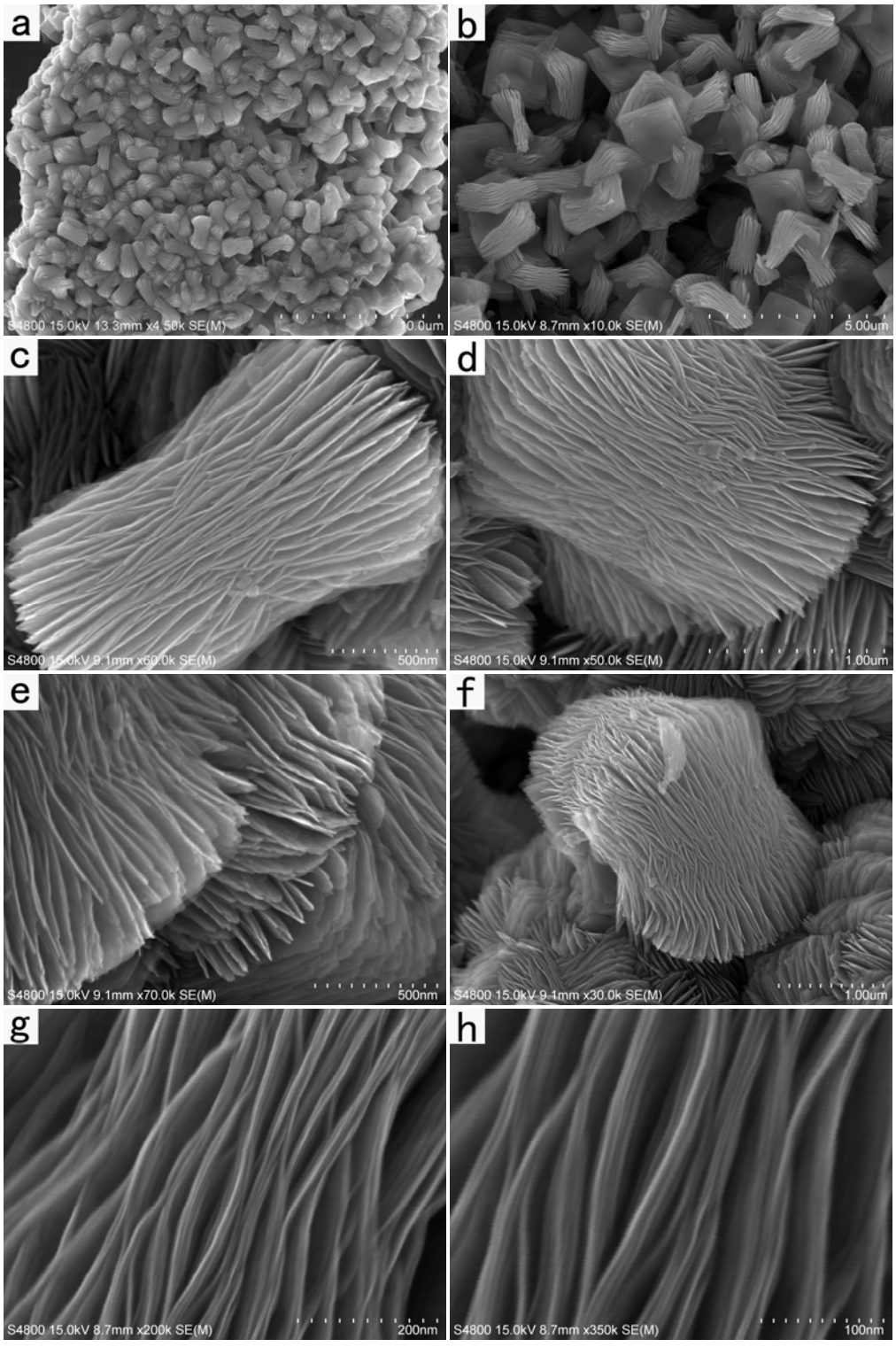

Figure S4. FESEM images of the TiO_2 nanosheet superstructures with different magnifications.

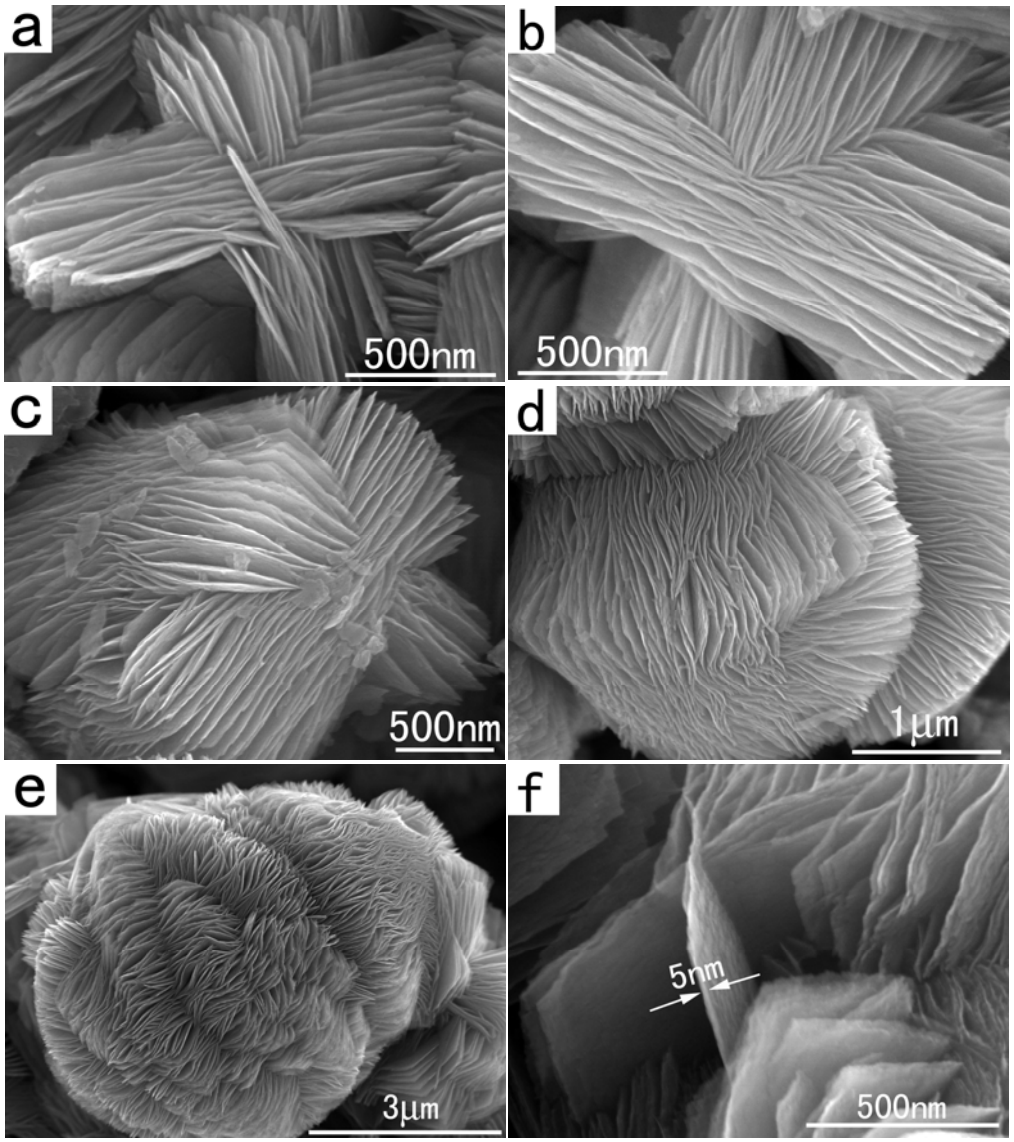

Figure S5. FESEM images of the more complex TiO_2 nanosheet superstructures obtained by extending reaction time: (a) 25 h, (b) 32 h, (c) 40 h, (d) 46 h, (e,f) 52 h.

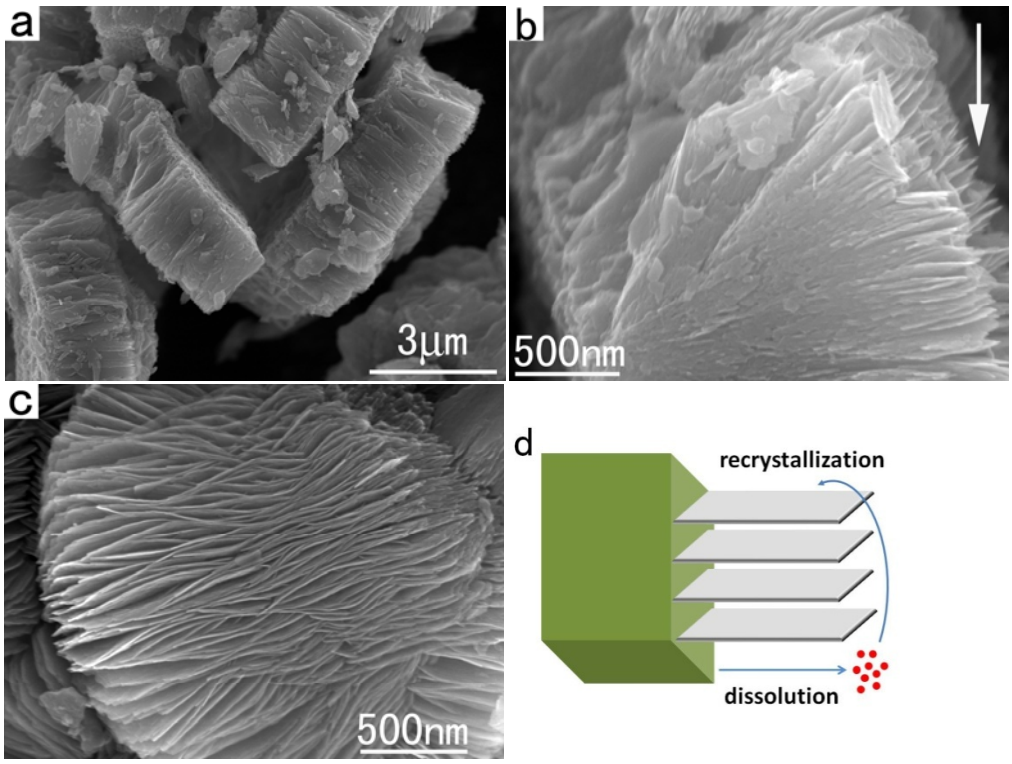

Figure 6. FESEM images of the samples recorded in different reaction times: a) 2 h, b) 8 h, and c) 18 h. d) Schematic illustration of the formation and shape evolution of the ultrathin TiO_2 nanosheet superstructures.

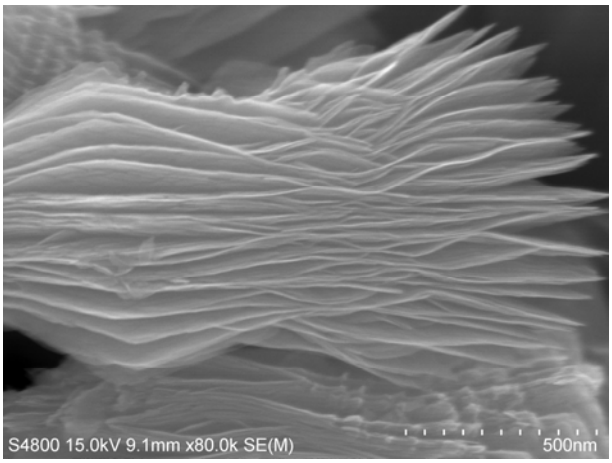

Figure S7. The SEM image of the sample after photocatalytic reaction.

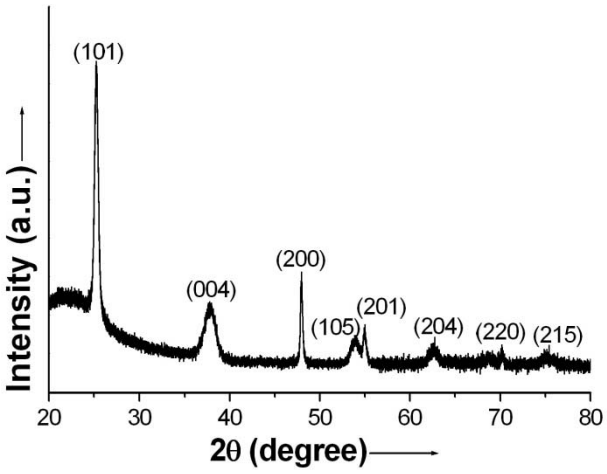

Figure S8. The XRD pattern of the sample after photocatalytic reaction.