

## Supplementary Information

### Anatase TiO<sub>2</sub> Single Crystals with Exposed {001} and {110} Facets: Facile Synthesis and Enhanced Photocatalysis

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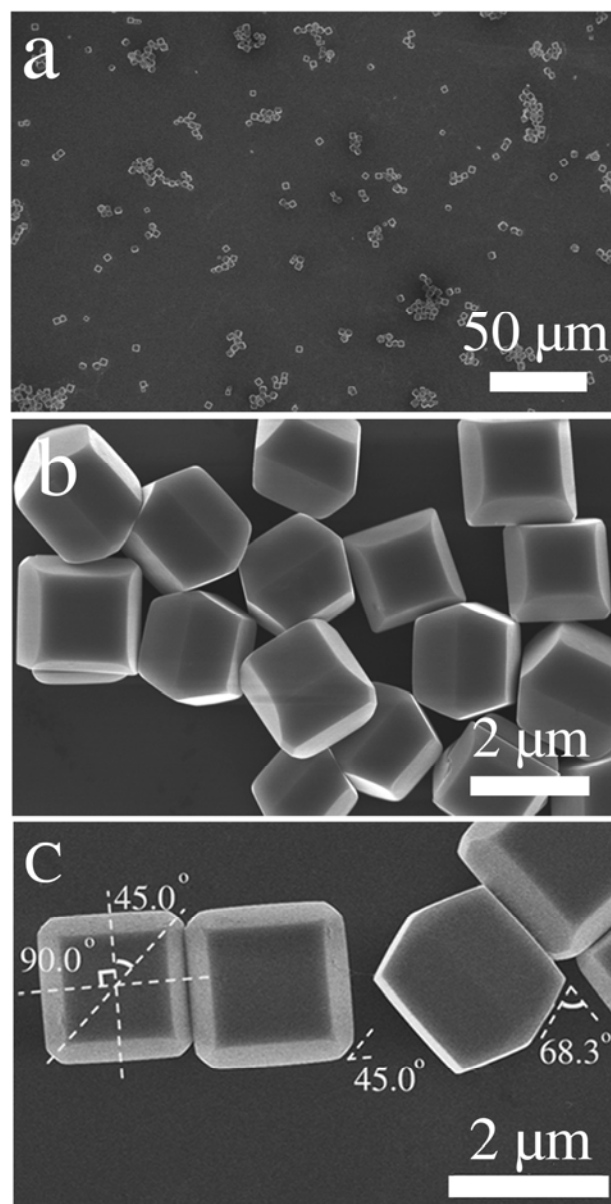
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#### Characterisation and photocatalytic activity measurement

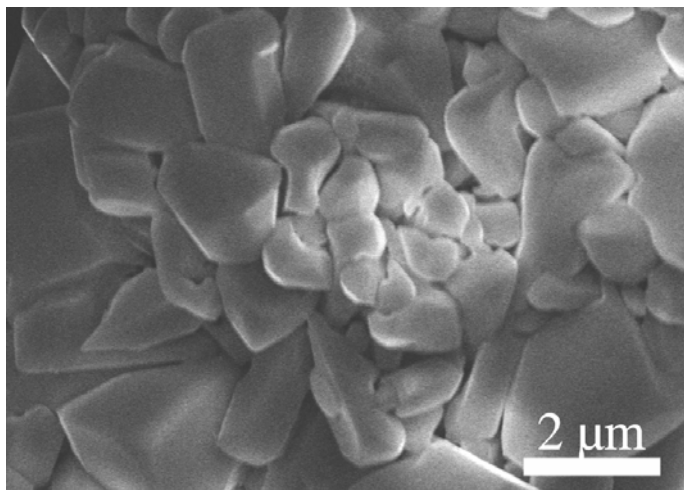
The shape and crystal structure of the resulting anatase TiO<sub>2</sub> single crystals were investigated by X-ray spectroscopy (XRD, Bruker D8 Advanced Diffractometer, Cu K $\alpha$  radiation,  $\lambda=1.54056$  Å, 40 kV), field-emission scanning electron microscopy (FE-SEM, Hitachi S-4800), and transmission electron microscopy and selected area electron diffraction (TEM/SAED, FEI F-20, 200 kV).

Photocatalytic activity of the resulting anatase TiO<sub>2</sub> single crystals was evaluated in terms of the decolorization of methylene blue (MB) dye under ultraviolet (UV) irradiation. Before applying these crystals in photocatalytic reaction, the fluorinated surfaces were first cleaned with a heat treatment at 600 °C for 2 h, without altering the morphology (see Figure 3 in the Supporting Information). After that, 0.01 g single anatase crystals were dispersed into 20 ml of aqueous solution containing 0.01 M NaOH and 10 ppm MB [H. G. Yang, G. Liu, S. Z. Qiao, C. H. Sun, Y. G. Jin, S. C. Smith, J. Zou, H. M. Cheng, and G. Q. Lu, *J. Am. Chem. Soc.* 2009, **131**, 4078.]. Before exposure to UV light irradiation, the suspension was stirred in the dark for 1h to reach a complete adsorption-desorption equilibrium. Then the solution was

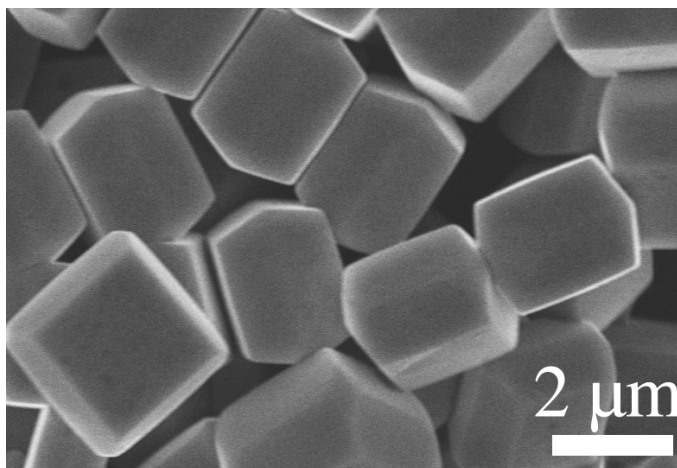
irradiated with  $\sim 0.5$  mW/cm<sup>2</sup> UV light (with a wavelength peak at 365 nm) under continuous stirring. With a given irradiation time interval, some specimens (2 ml) were taken from the dispersion and were centrifuged (4000 rpm). The clear upper solution was subjected to an UV-Vis spectrophotometer (Shanghai Spectrum Instruments Co., Ltd., WFJ721E). The concentration of MB was determined from the absorbance at the wavelength of 665 nm. For comparison, the same procedure was also done for the TiO<sub>2</sub> product without addition of H<sub>2</sub>O<sub>2</sub>.



**Figure S1.** FE-SEM images of the TiO<sub>2</sub> single crystals.



**Figure S2.** FE-SEM image of the TiO<sub>2</sub> product without addition of H<sub>2</sub>O<sub>2</sub>.



**Figure S3.** FE-SEM image of the TiO<sub>2</sub> single crystals after heating at 600 °C for 2 h.