

## Electronic Supplementary Information

### Synthesis of tapered tetragonal nanorods of anatase TiO<sub>2</sub> with enhanced photocatalytic activity via a sol-hydrothermal process mediated by H<sub>2</sub>O<sub>2</sub> and NH<sub>3</sub>

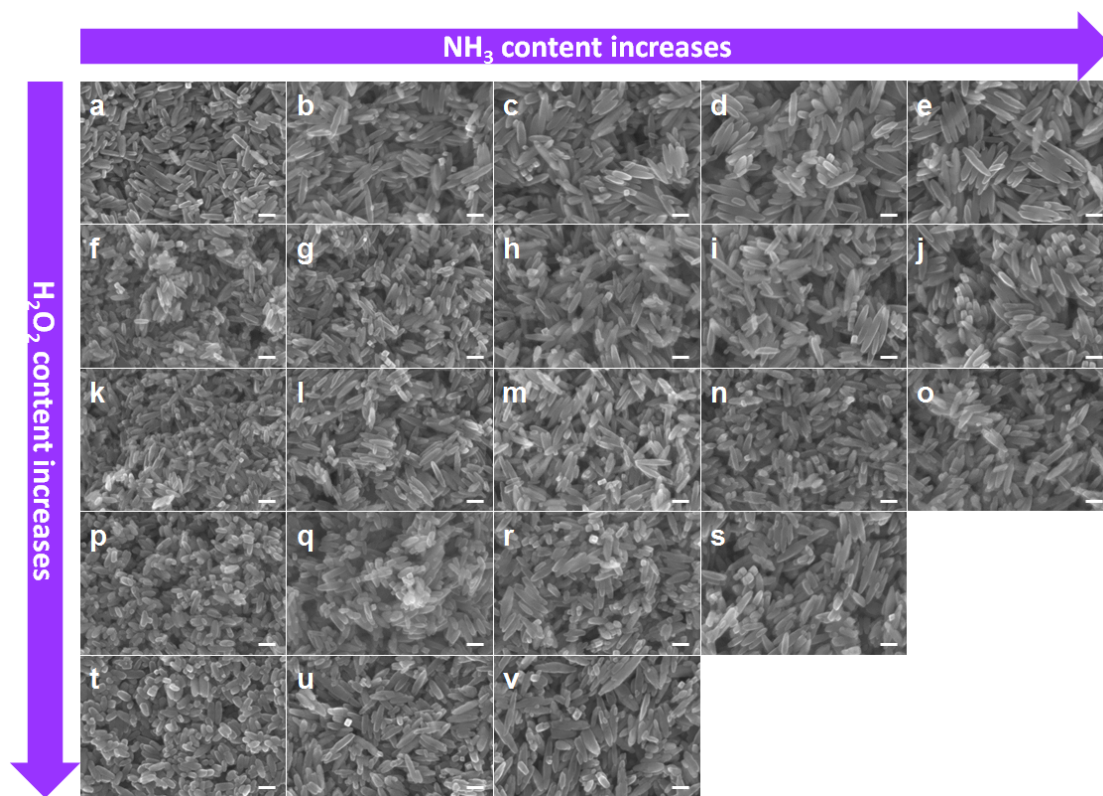
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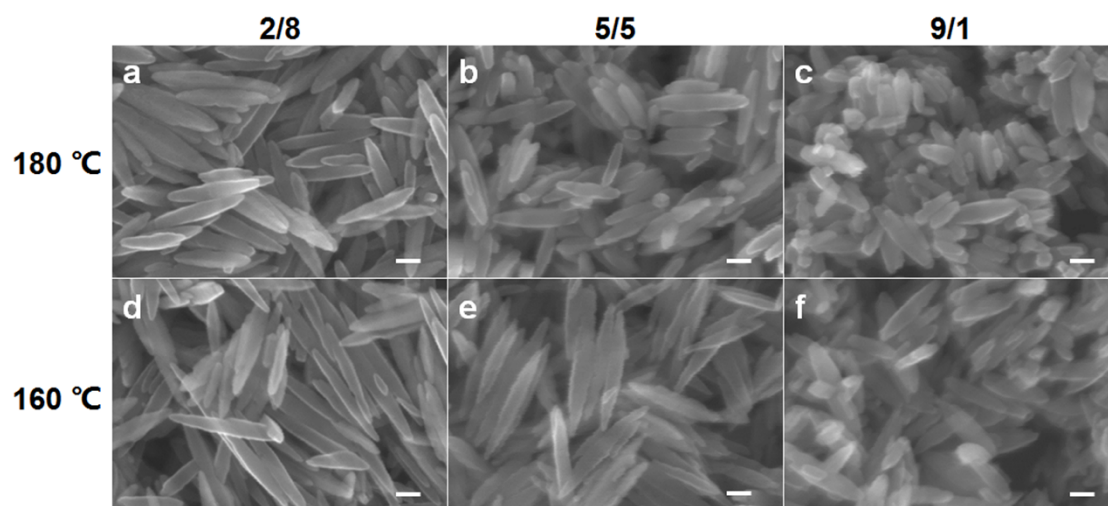
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**Table S1** Summary of experiments carried out to investigate the effects of the volume of H<sub>2</sub>O<sub>2</sub> and NH<sub>3</sub>. All these experiments were performed with 20 mg of Ti powder under 200 °C for 24 h.

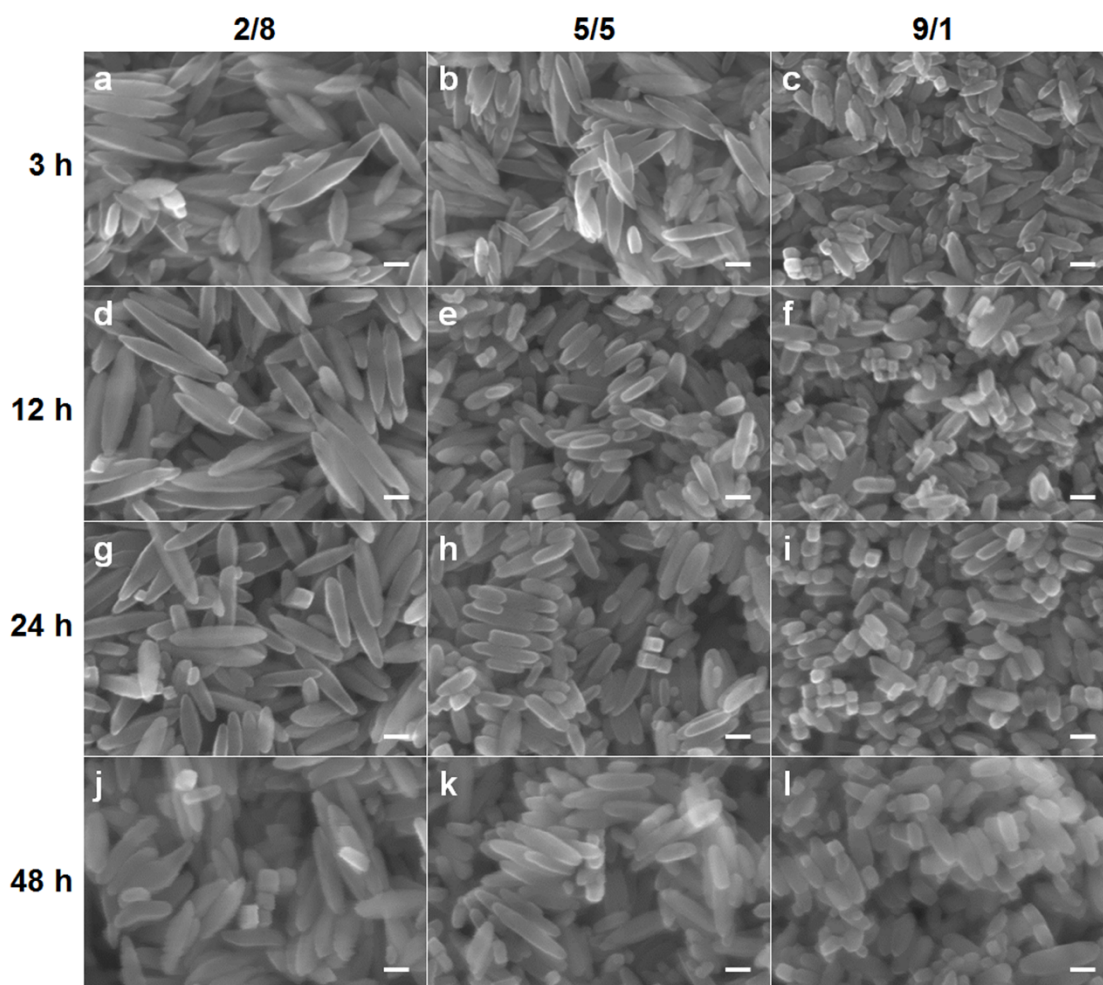
H <sub>2</sub> O <sub>2</sub> /mL	NH <sub>3</sub> /mL	H <sub>2</sub> O/mL	Entry
	1	12	a
	3	10	b
2	5	8	c
	7	6	d
	8	5	e
	1	11	f
	3	9	g
3	5	7	h
	7	5	i
	9	3	j
	1	9	k
	3	7	l
5	5	5	m
	7	3	n
	9	1	o
	1	7	p
7	3	5	q
	5	3	r
	7	1	s
	1	5	t
9	3	3	u
	5	1	v



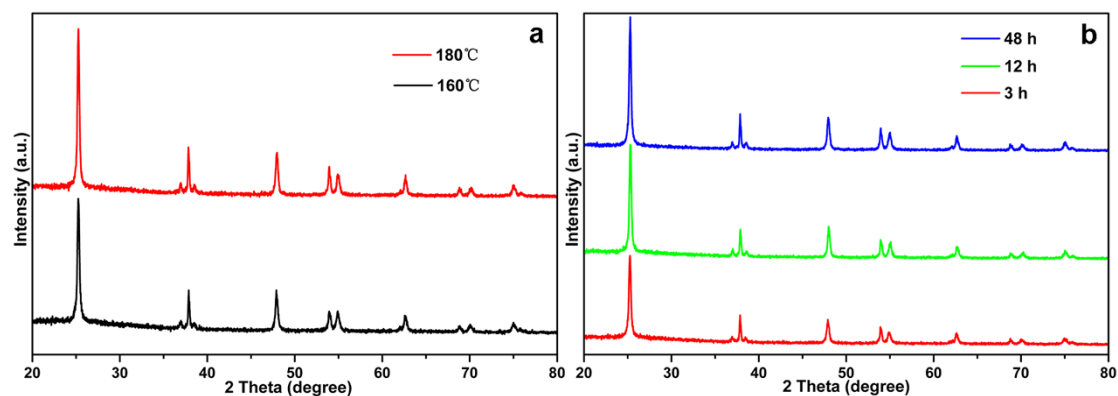
**Fig. S1** SEM images of the synthesized nanocrystals showing shape evolution with contents of  $\text{H}_2\text{O}_2$  and  $\text{NH}_3$ . The detailed synthetic conditions corresponding to each image are displayed in Table S1. All the scale bars are 100 nm.



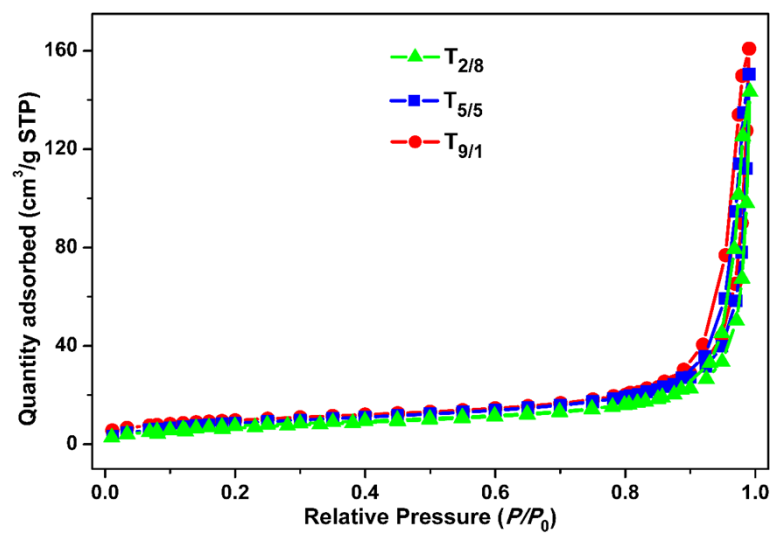
**Fig. S2** SEM images of nanocrystals synthesized with different volume ratios of  $\text{H}_2\text{O}_2$  to  $\text{NH}_3$  ( $x/y$ ) for 24 h at varied reaction temperatures. For  $x/y = 2/8$ : a, 180 °C; d, 160 °C. For  $x/y = 5/5$ : b, 180 °C; e, 160 °C. For  $x/y = 9/1$ : c, 180 °C; f, 160 °C. All the scale bars are 60 nm.



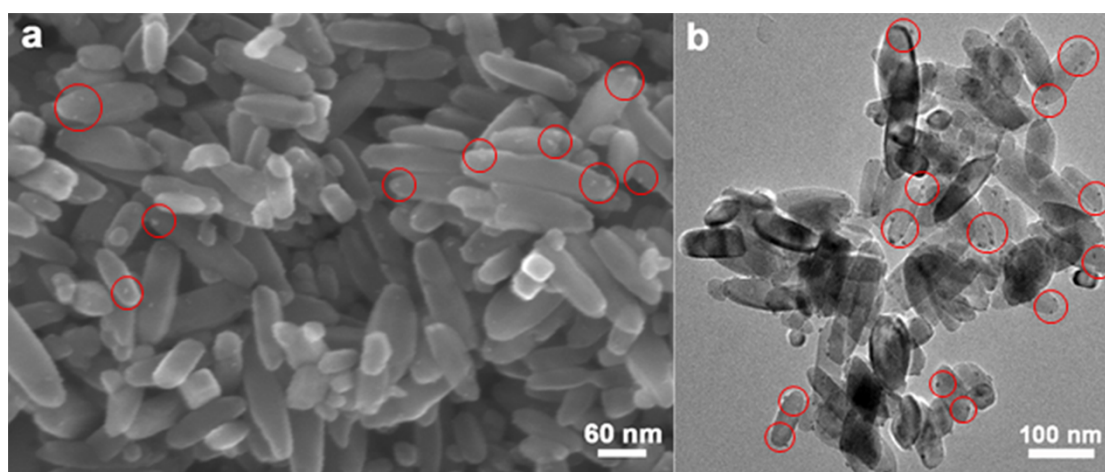
**Fig. S3** SEM images of nanocrystals synthesized with different volume ratios of  $\text{H}_2\text{O}_2$  to  $\text{NH}_3$  ( $x/y$ ) at  $200^\circ\text{C}$  for different reaction durations. For  $x/y = 2/8$ : a, 3 h; d, 12 h; g, 24 h; j, 48 h. For  $x/y = 5/5$ : b, 3 h; e, 12 h; h, 24 h; k, 48 h. For  $x/y = 9/1$ : c, 3 h; f, 12 h; i, 24 h; l, 48 h. All the scale bars are 60 nm.



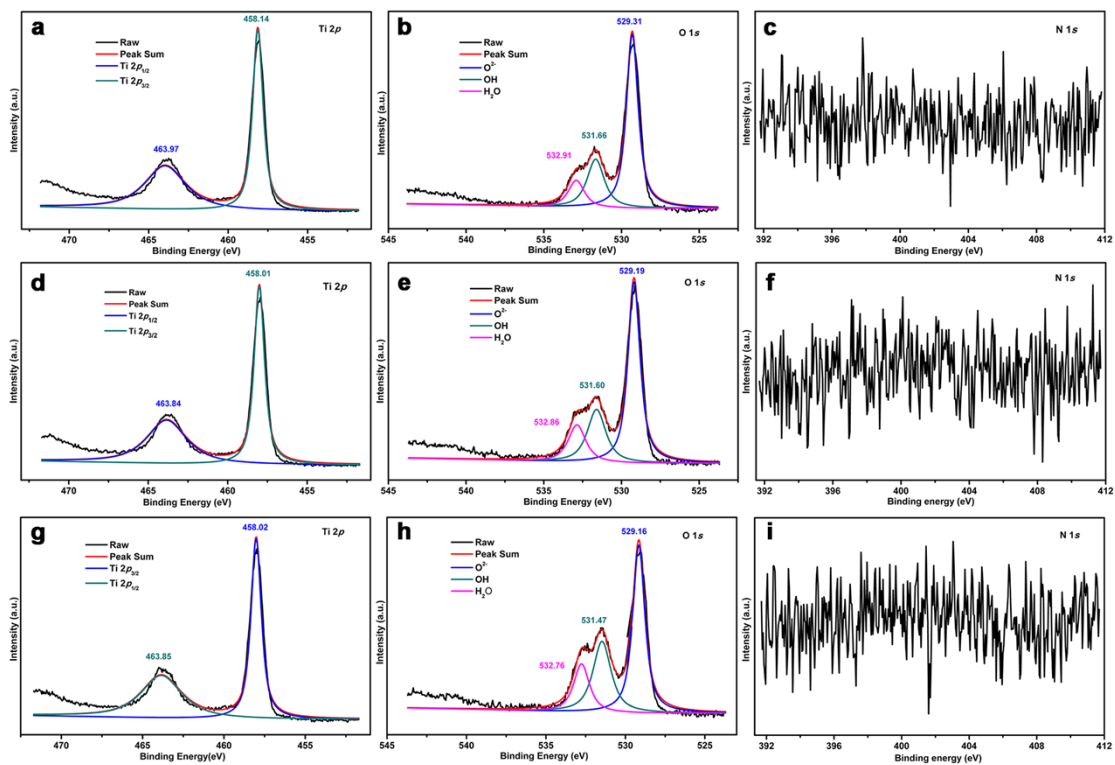
**Fig. S4** XRD patterns of samples synthesized with 9 mL of  $\text{H}_2\text{O}_2$  and 1 mL of  $\text{NH}_3$  at varied reaction temperatures for 24 h (a) and at  $200^\circ\text{C}$  for different reaction durations (b).



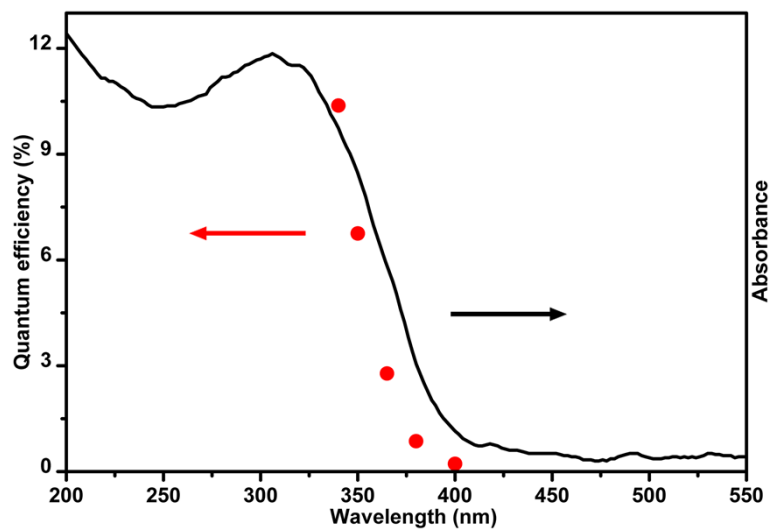
**Fig. S5** N<sub>2</sub> adsorption-desorption isotherm curves of the samples of T<sub>2/8</sub>, T<sub>5/5</sub> and T<sub>9/1</sub>.



**Fig. S6** SEM (a) and TEM (b) images of anatase TiO<sub>2</sub> nanorods (T<sub>9/1</sub>) loaded with Pt nanoparticles under UV light irradiation. The red circles indicate the locations of Pt nanoparticles.



**Fig. S7** Ti 2*p*, O 1*s* and N 1*s* X-ray photoelectron spectra (XPS) corresponding to samples of T<sub>2/8</sub> (a, b and c), T<sub>5/5</sub> (d, e and f) and T<sub>9/1</sub> (g, h and i).



**Fig. S8** Action spectrum of H<sub>2</sub> evolution for sample of T<sub>5/5</sub>, showing quantum efficiency variation with wavelength of incident light and the corresponding UV-visible absorption spectrum.