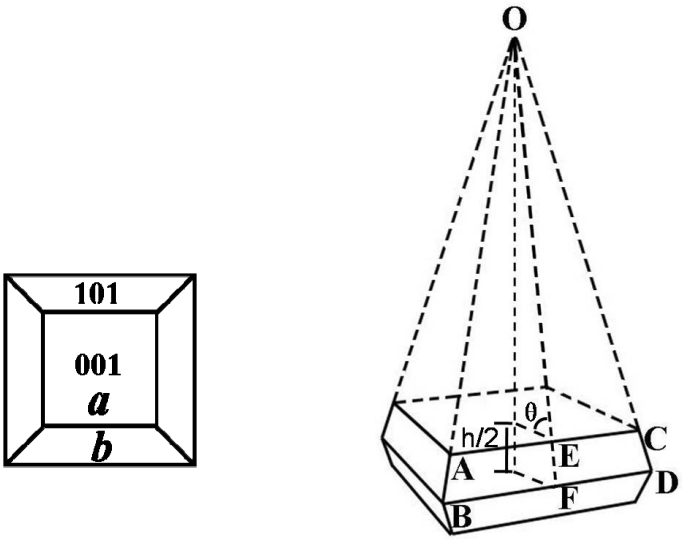

Fig. S1 (A) The planform of anatase TiO_2 nanosheet. (B) Equilibrium model of anatase TiO_2 crystal.

Percentage of {001} facets was calculated as follows[1-2]:

$$S_{001} = 2a^2$$

$$S_{101} = 8\left(S_{\triangle BD} - S_{\triangle AC}\right)$$

$$= 8\left(\frac{1}{2}OF \cdot BD - \frac{1}{2}OE \cdot AC\right)$$

$$= 8\left(\frac{1}{2} \times \frac{\frac{1}{2}b}{\cos\theta} \times b - \frac{1}{2} \times \frac{\frac{1}{2}a}{\cos\theta}\right)$$

$$= \frac{2(b^2 - a^2)}{\cos\theta}$$

$$S_{001}\% = \frac{S_{001}}{S_{001} + S_{101}}$$

$$= \frac{2a^2}{2a^2 + \frac{2(b^2 - a^2)}{\cos\theta}}$$

$$= \frac{1}{1 + \frac{(\frac{b^2}{a^2} - 1)}{\cos\theta}}$$

$$= \frac{\cos\theta}{\cos\theta + (\frac{a}{b})^{-2} - 1}$$

Here $a = b - h/\tan\theta$

The values of b and h were determined as showed as TEM image, θ is the theoretical value for the angle between the {101} and {001} facets of anatase, 68.3°. As indicated in the planform, two parameter a and b denote lengths of the side of square {001} 'truncation' facets and the side of bipyramid. The ratio of {001} facets to total surface area can be described by the value of S_{001}/S or a/b ($0 \leq a/b \leq 1$).

References

1. H. G. Yang, C. H. Sun, S. Z. Qiao, J. Zou, G. Liu, S. C. Smith, H. M. Cheng and G. Q. Lu, *Nature* 2008, **453**, 638.
2. Q. J. Xiang, J. G. Yu and M. Jaroniec, *Chem. Commun.* 2011, **47**, 4532.

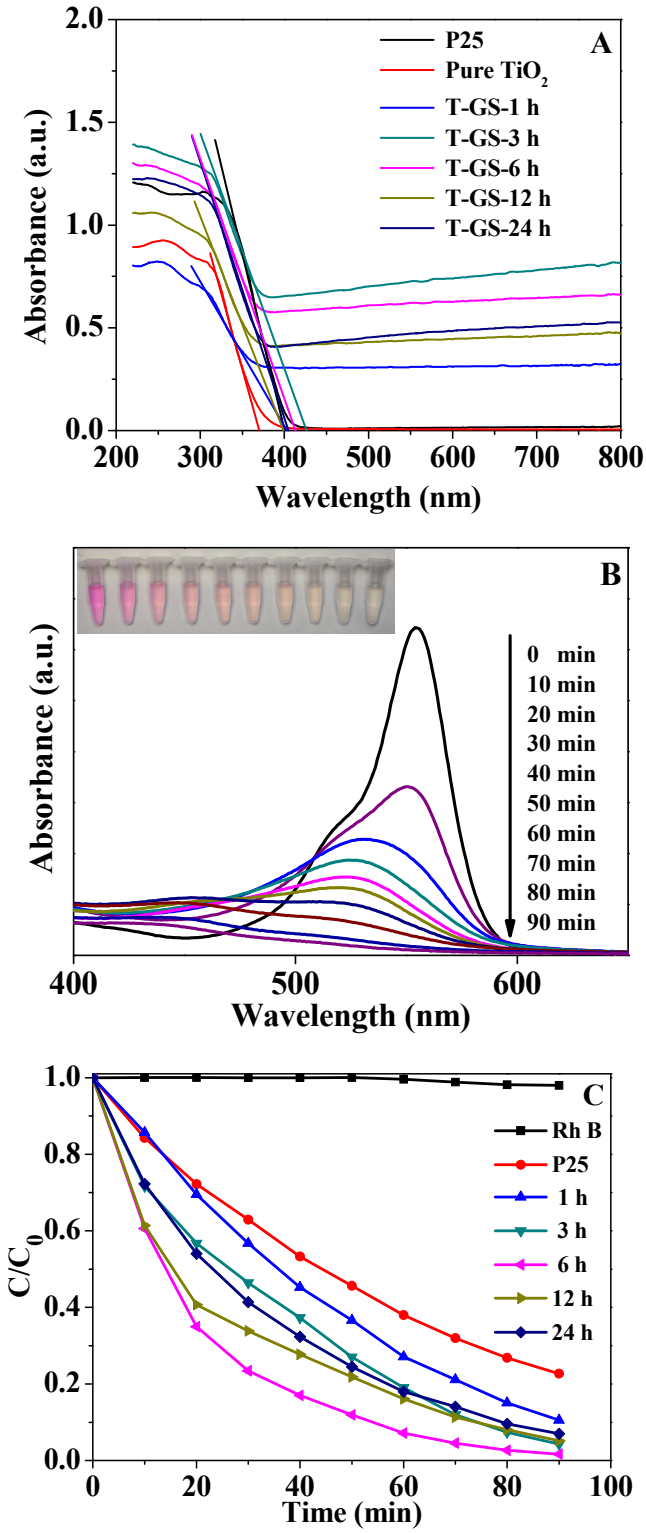

Fig. S2 UV-vis diffuse reflectance spectra (A) of P25, pure TiO_2 nanosheets and T-GS nanocomposites. Absorption spectra (B) of Rhodamine B (Rh B) solution between 400 to 600 nm with irradiation time in the present of T-GS-6 h. Inset in (B) show the photo of degradation of Rh B solution. Liquid–phase photocatalytic degradation (C) of Rh B under the irradiation of visible light (λ>400 nm) over P25 and T-GS nanocomposites.

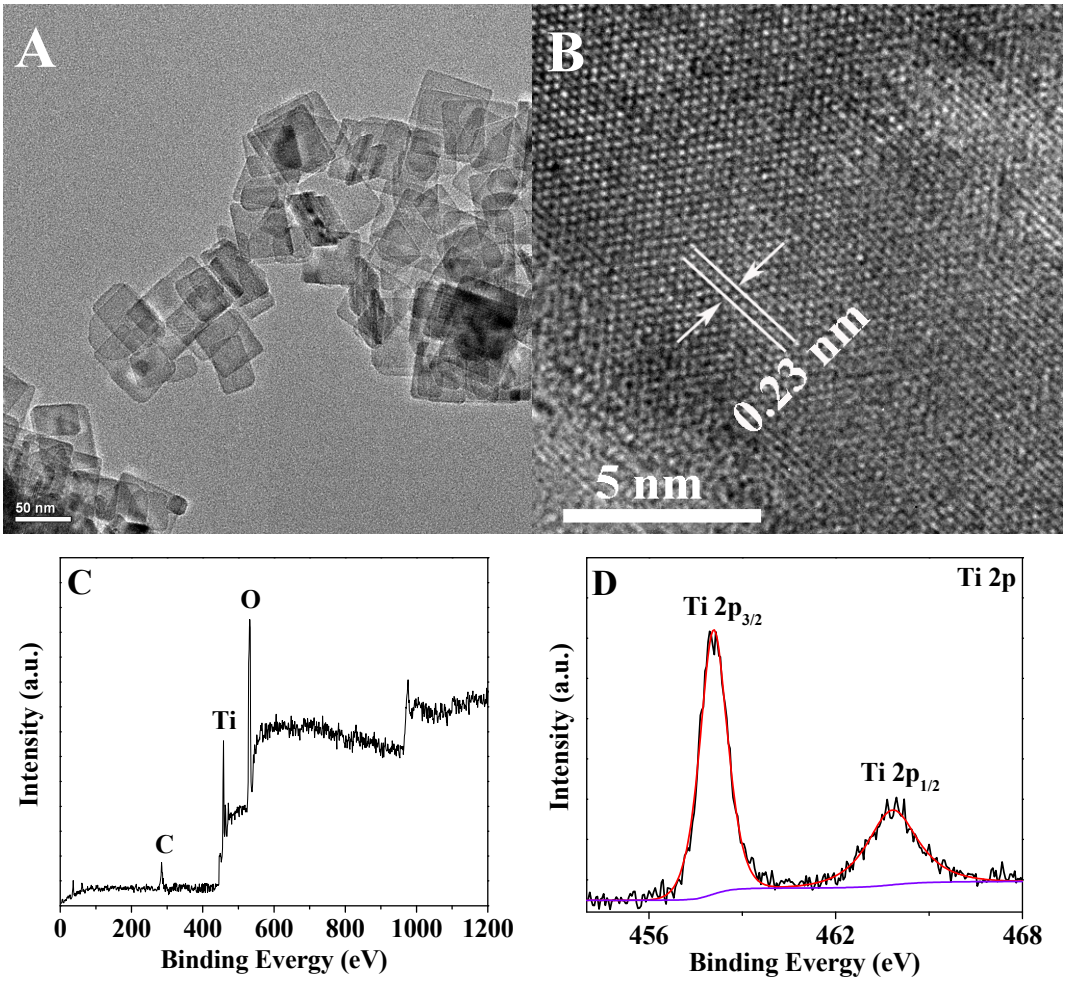

Fig. S3 Typical TEM image (A) of the pure TiO_2 nanosheets prepared with reaction time of 24 h. A high-resolution TEM image (B) of an individual TiO_2 nanosheet. The full-scale XPS spectra (C) of the pure TiO_2 nanosheets. The higher resolution curves of Ti 2p (D) on the surface of TiO_2 nanosheets. The purple and red lines represent the base line and fitted lines, respectively.

TiO_2 nanosheets	side length (nm)	thickness (nm)	S_{001} %	BET (m^2 g^{-1})
	50~60	5~6	78	89.2

Tbl. S1 Physical parameter of the pure TiO_2 nanosheets.