

## Electronic supporting information

### A Red Anatase TiO<sub>2</sub> Photocatalyst for Solar Energy Conversion

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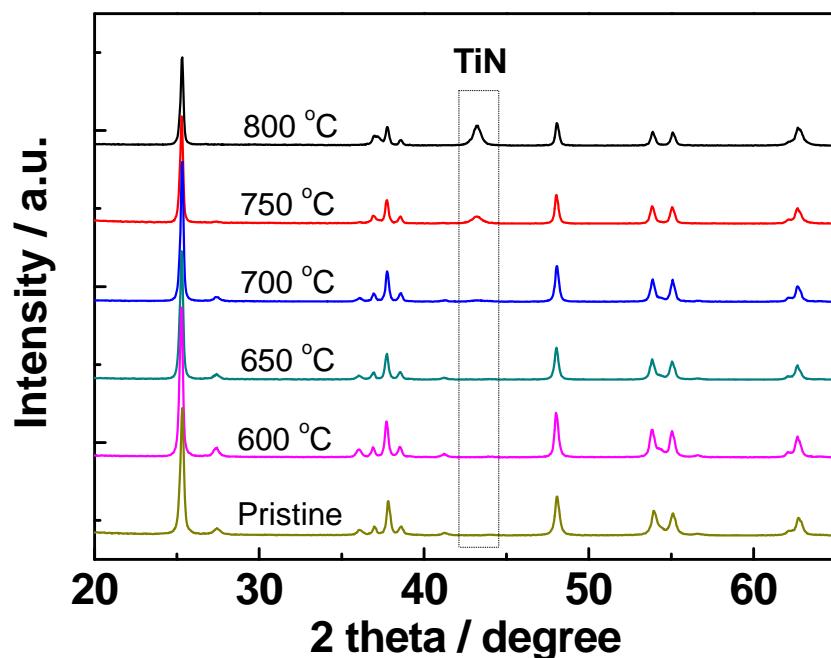


Fig S1 XRD patterns of the white TiO<sub>2</sub> microspheres treated in gaseous ammonia atmosphere at different temperatures from 600 °C to 800 °C for 1 h.

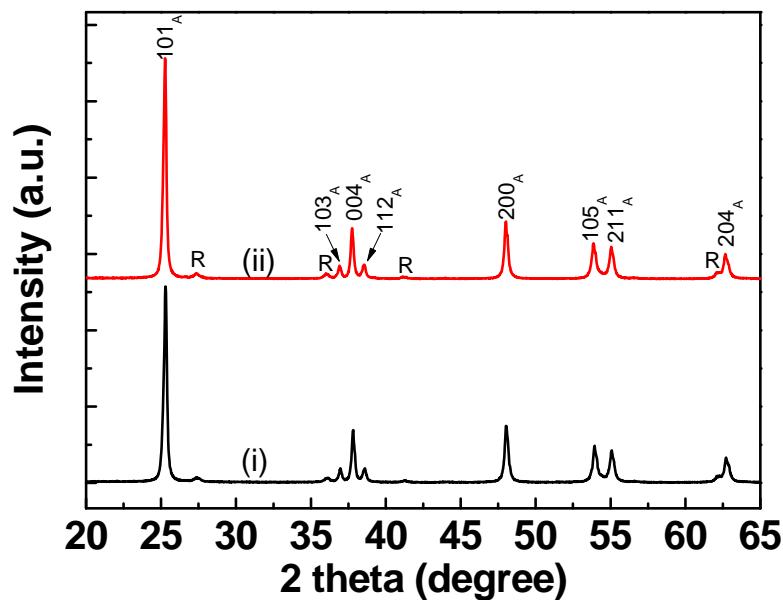


Fig S2 XRD patterns of the (i) white and (ii) red  $\text{TiO}_2$  microspheres. A: anatase; R: rutile.

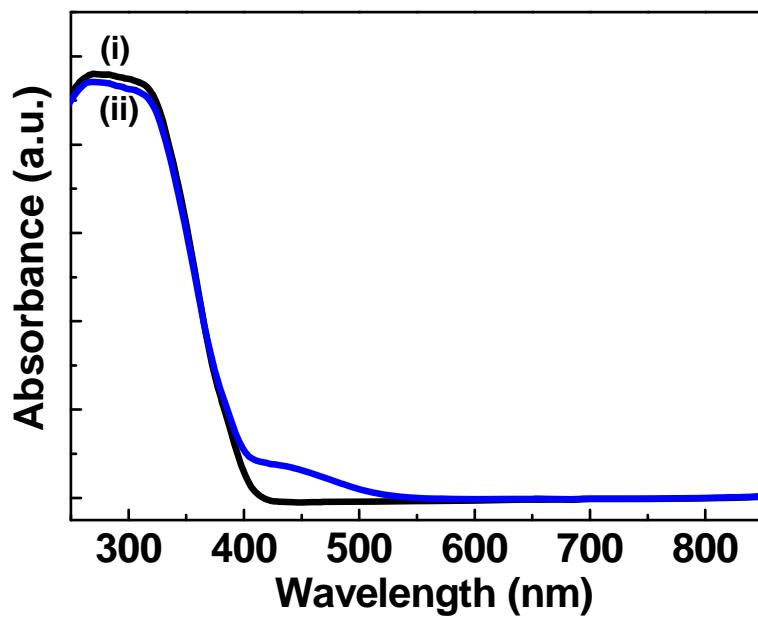


Fig S3 UV-visible absorption spectra of the reference anatase  $\text{TiO}_2$  without interstitial boron (i) before and (ii) after nitrogen doping.

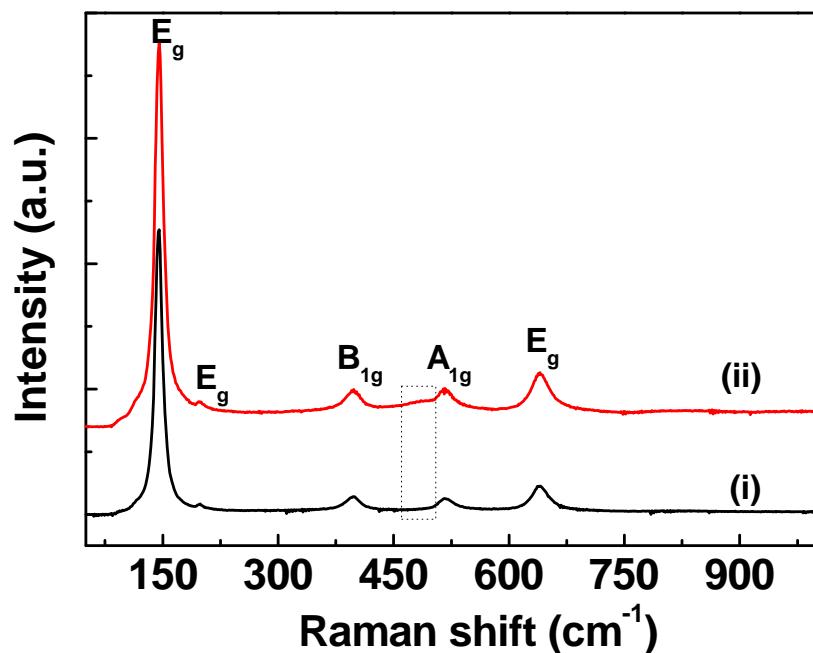


Fig S4 Raman spectra of the (i) white and (ii) red TiO<sub>2</sub> microspheres.

Table 1 Comparing XPS binding energies of Ti 2p, O 1s, B 1s and N 1s in the white and red TiO<sub>2</sub> microspheres. The data was collected from the pristine surface.

Sample	Ti 2p (eV) Percent (%)	O 1s Percent (%)	N 1s Percent (%)	B 1s Percent (%)
White TiO <sub>2</sub>	458.9	530.1	---	192.2
Red TiO <sub>2</sub>	458.3	529.5	397.6	191.6/190.1

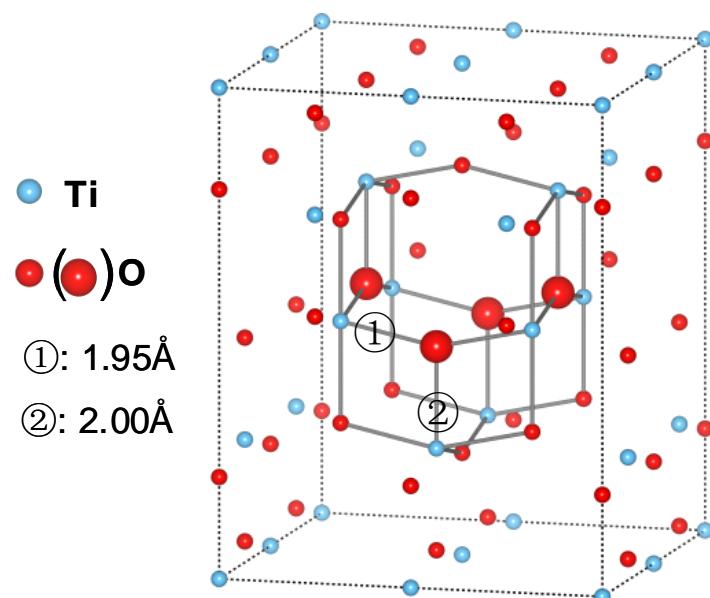


Fig. S5 A 2×2×1 supercell for anatase TiO<sub>2</sub>.

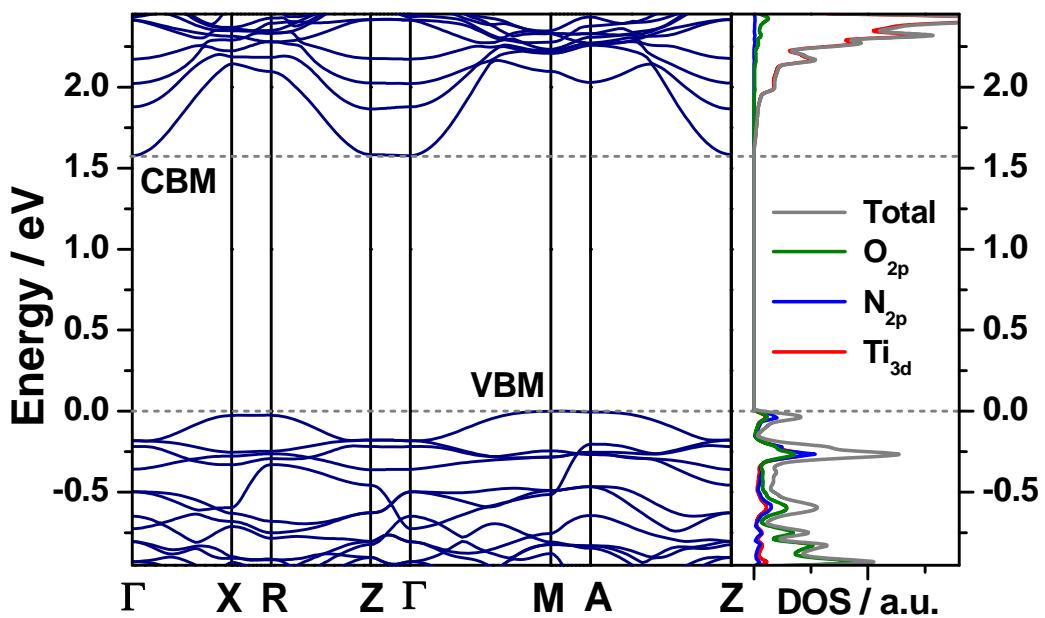


Fig S6 The calculated band structures of anatase  $\text{TiO}_2$  doped with  $[\text{BO}_{4-x}\text{N}_x]$  ( $x = 4$ ).

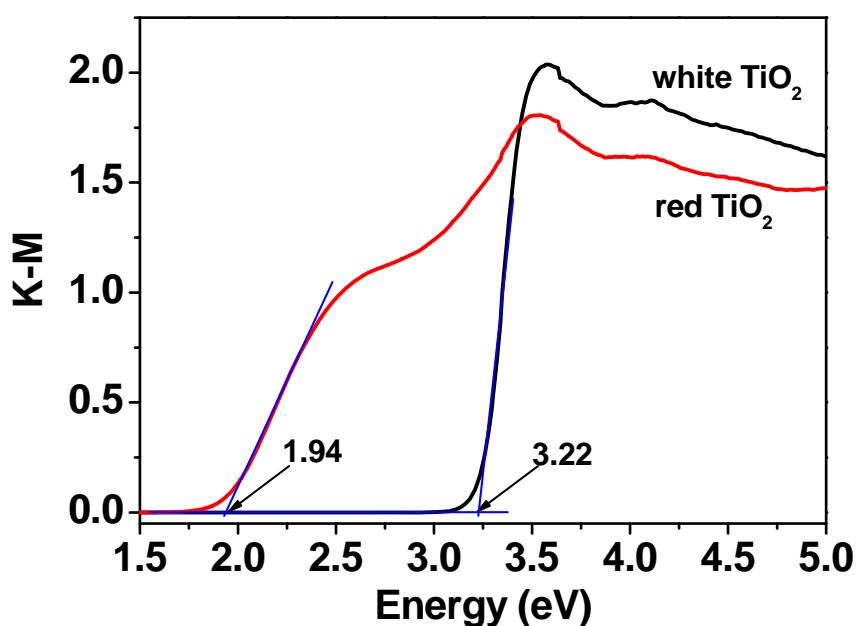


Fig S7 Plots of the transformed Kubelka–Munk function vs. the energy of light for the white and red  $\text{TiO}_2$  microspheres.

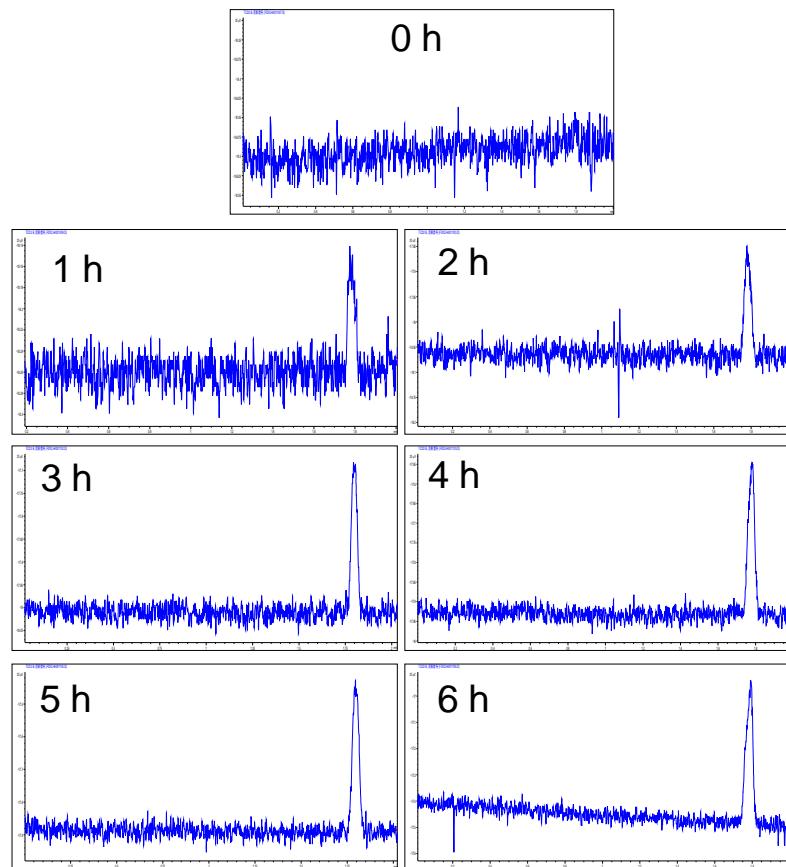


Fig S8 GC signal spectra of H<sub>2</sub> detected in the gaseous product from the photoelectrochemical cell after different irradiation times.