Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Slightly hydrogenated TiO_2 with enhanced photocatalytic performance

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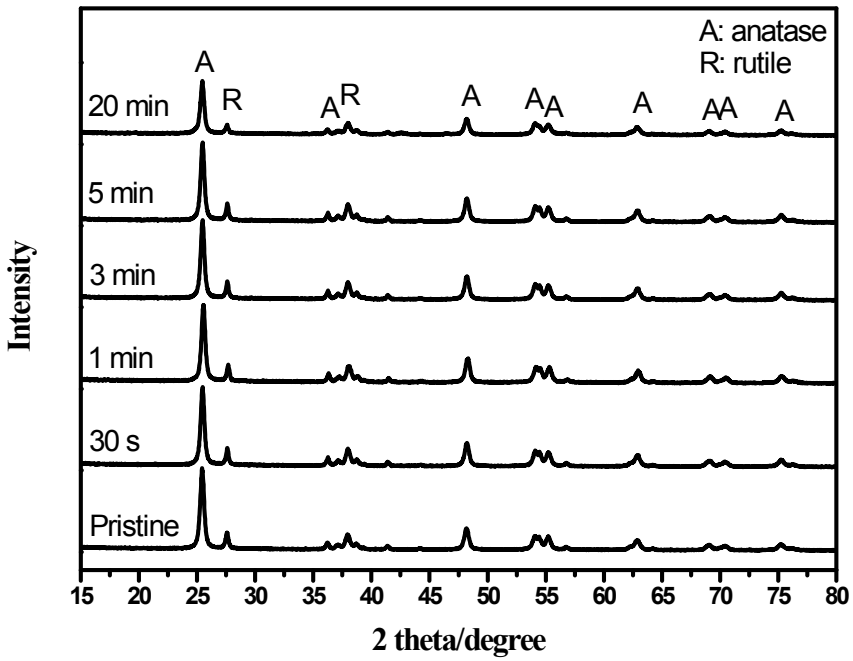


Figure S1. XRD patterns of the pristine-TiO_2 and H-TiO_2 prepared by H_2 plasma treatment after different times of 30 s, 1 min, 3 min, 5 min, and 20 min.

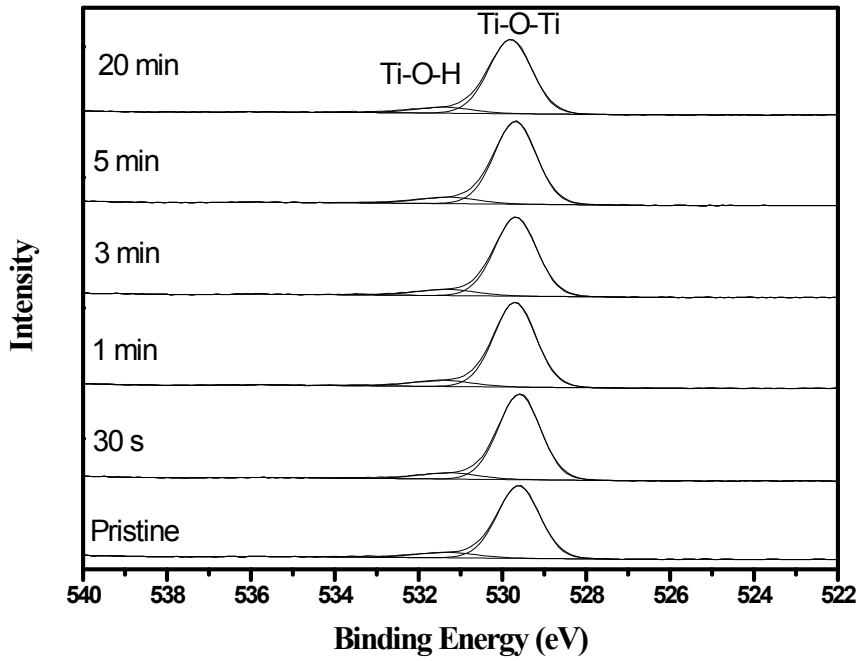


Figure S2. XPS O 1*s* core level spectrum of the pristine-TiO_2 and H-TiO_2 prepared by H_2 plasma treatment after different times of 30 s, 1 min, 3 min, 5 min, and 20 min.

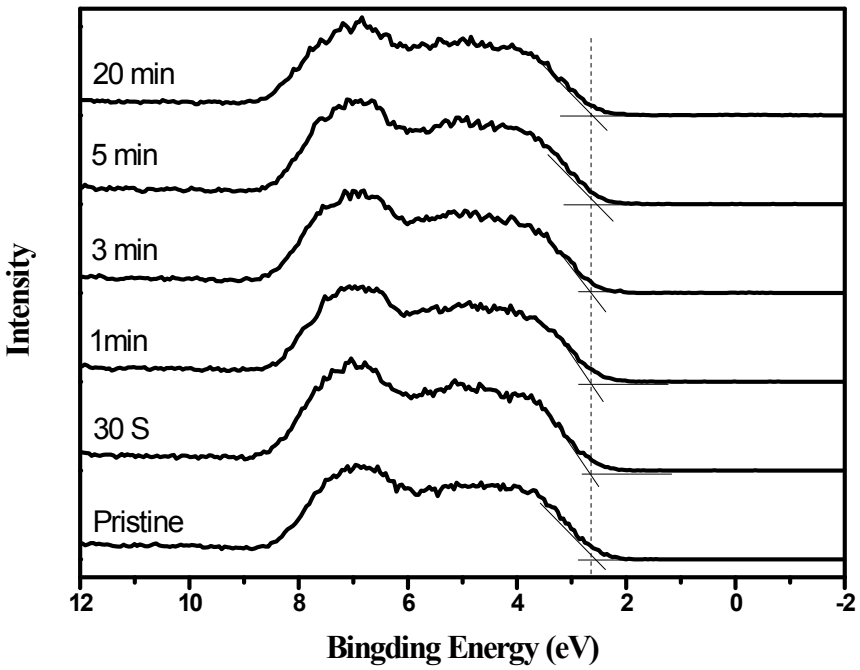


Figure S3. XPS valence band spectra of the pristine-TiO_2 and H-TiO_2 prepared by H_2 plasma treatment after different times of 30 s, 1 min, 3 min, 5 min, and 20 min.

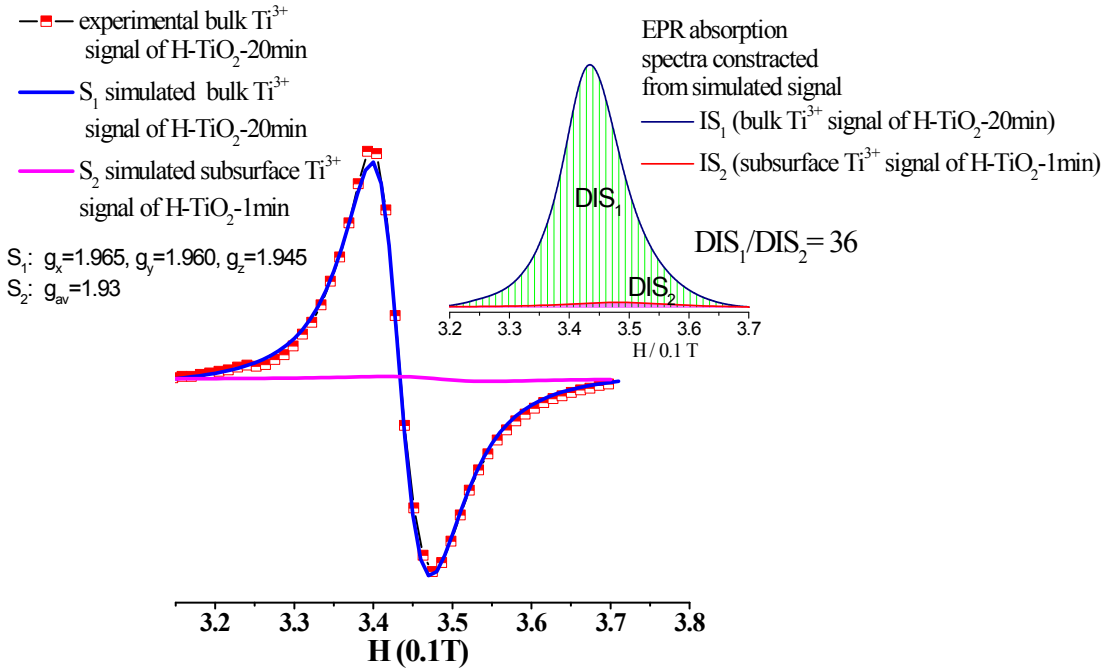
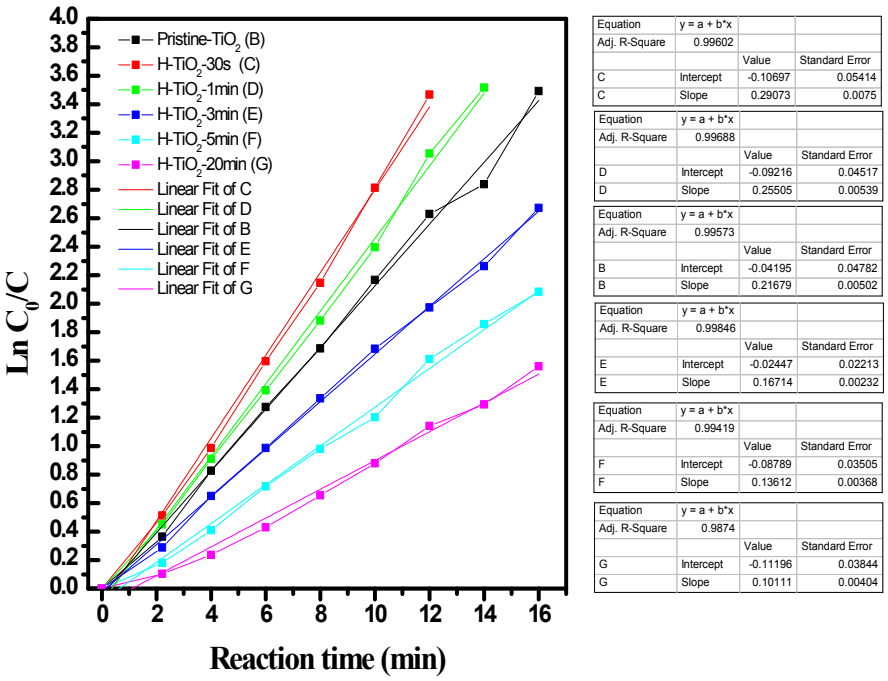


Figure S4. The experimental and simulated bulk Ti^{3+} signal of H-TiO_2-20min, and the simulated subsurface Ti^{3+} signal of H-TiO_2-1min without light irradiation, the relative amount of Ti^{3+} was appraised through the double integration of the resonance lines: S_1 and S_2 represented as signal 1 and 2, respectively; IS_1 and IS_2 represented as the integration of the signal 1 and 2, respectively (EPR absorption spectra); DIS_1 and DIS_2 represented as the double integration of the signal 1 and 2, respectively (green and red area in EPR absorption spectra).



Equation	y = a + b*x		
Adj. R-Square	0.99602		
		Value	Standard Error
C	Intercept	-0.10697	0.05414
C	Slope	0.29073	0.0075

Equation	y = a + b*x		
Adj. R-Square	0.99688		
		Value	Standard Error
D	Intercept	-0.09216	0.04517
D	Slope	0.25505	0.00539

Equation	y = a + b*x		
Adj. R-Square	0.99573		
		Value	Standard Error
B	Intercept	-0.04195	0.04782
B	Slope	0.21679	0.00502

Equation	y = a + b*x		
Adj. R-Square	0.99846		
		Value	Standard Error
E	Intercept	-0.02447	0.02213
E	Slope	0.16714	0.00232

Equation	y = a + b*x		
Adj. R-Square	0.99419		
		Value	Standard Error
F	Intercept	-0.08789	0.03505
F	Slope	0.13612	0.00368

Equation	y = a + b*x		
Adj. R-Square	0.9874		
		Value	Standard Error
G	Intercept	-0.11196	0.03844
G	Slope	0.10111	0.00404

Figure S5. Photocatalytic degradation of methylene blue (lnC_0/C versus irradiation time) over pristine-TiO_2 and H-TiO_2 prepared by H_2 plasma treatment after different times of 30 s, 1 min, 3 min, 5 min, and 20 min and their calculated reaction rates (k).

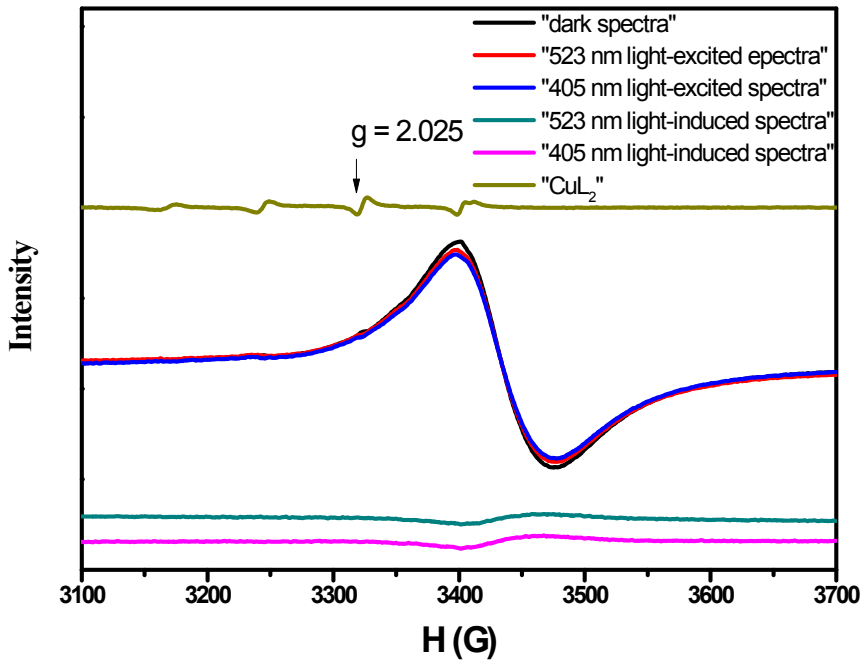


Figure S6. EPR analysis of H-TiO_2-20min: "dark spectra" represented as the spectra recorded without light irradiation; "523 nm light-excited spectra" represented as the spectra recorded under 523 nm irradiation; "405 nm light-excited spectra" represented as the spectra recorded under 405 nm irradiation; "523 nm light-induced EPR spectra"

represented as the spectra recorded under 523 nm irradiation subtracted by that of the spectra without light irradiation ("523 nm light-excited spectra" - "dark spectra"); "405 nm light-induced EPR spectra" represented as the spectra recorded under 405 nm irradiation subtracted by that of the spectra without light irradiation ("405 nm light-excited spectra" - "dark spectra"). "CuL_2" represented as the hyperfine structure lines of the $Cu^{2+}(DTC)_2$ complex in benzene solution, which has been used as the correct g factors of studied paramagnetic centre determination (low field maximum amplitude of m_I=-1/2 hfs line attributed to g=2.025).

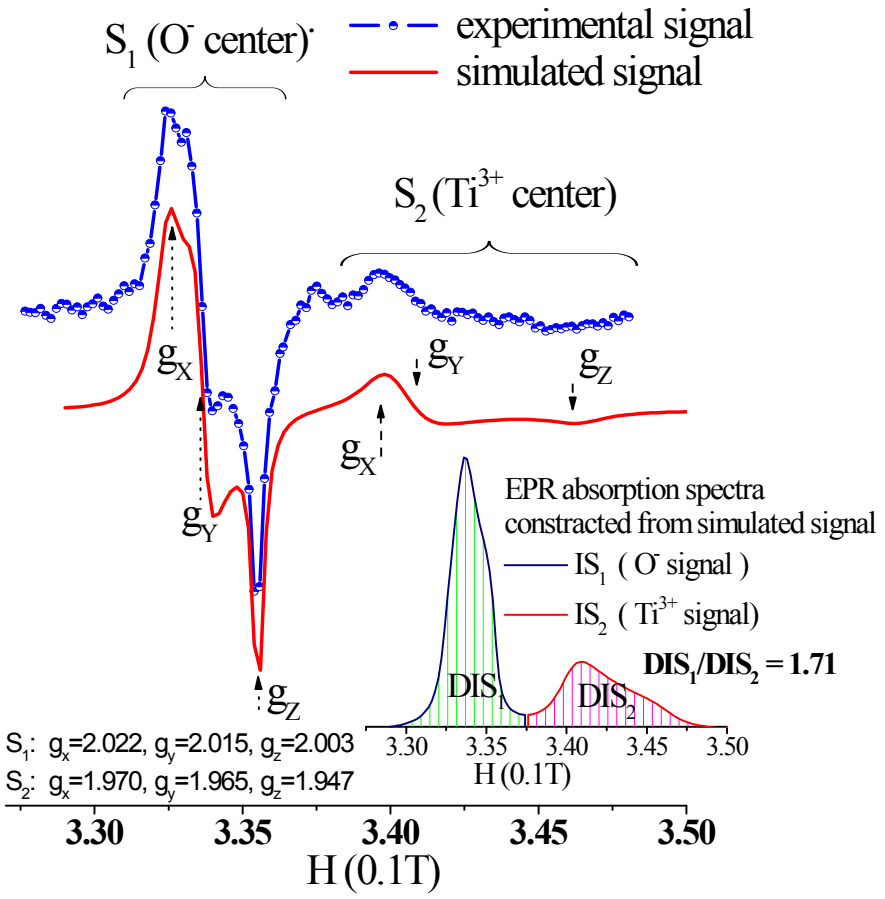


Figure S7. The experimental and simulated light-induced EPR spectra of prisine-TiO_2 under 405 nm light irradiation, the relative amount of Ti^{3+} and O^- were appraised through the double integration of the resonance lines: S_1 and S_2 represented as signal 1 and 2, respectively; IS_1 and IS_2 represented as the integration of the signal 1 and 2, respectively (EPR absorption spectra); DIS_1 and DIS_2 represented as the double integration of the signal 1 and 2, respectively (green and red area in EPR absorption spectra).