Supporting Information

Enhanced photoelectrocatalysis in porous single crystalline rutile titanium dioxide electrodes

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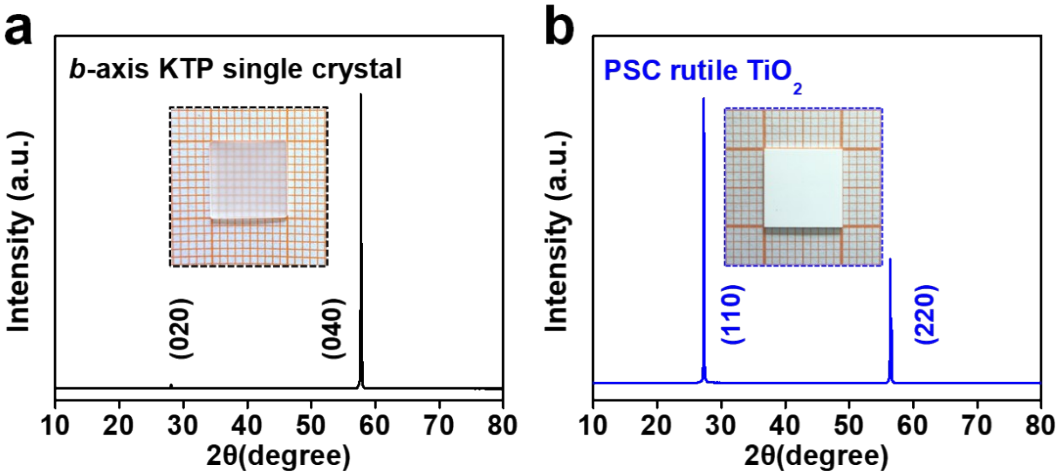

Figure S1. (a-b) XRD patterns of (020) KTP single crystal and PSC rutile (110) TiO_2. The insets are optical photographs, respectively.

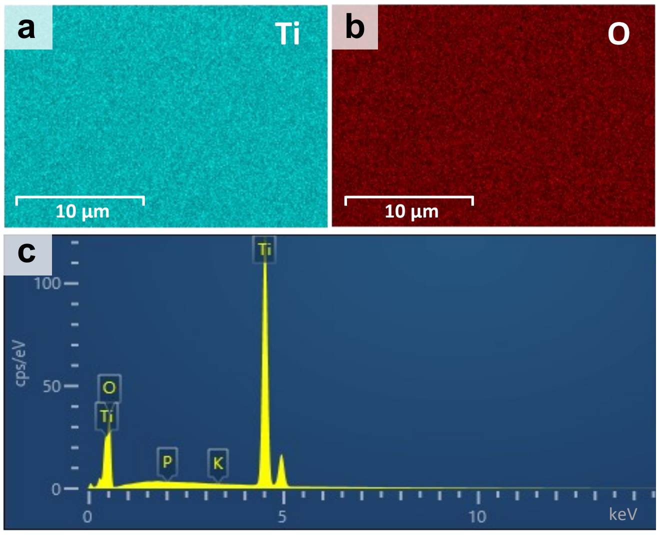

Figure S2. (a-b) Element mapping of PSC rutile TiO_2 monolith. (c) EDS test of PSC rutile TiO_2 monolith.

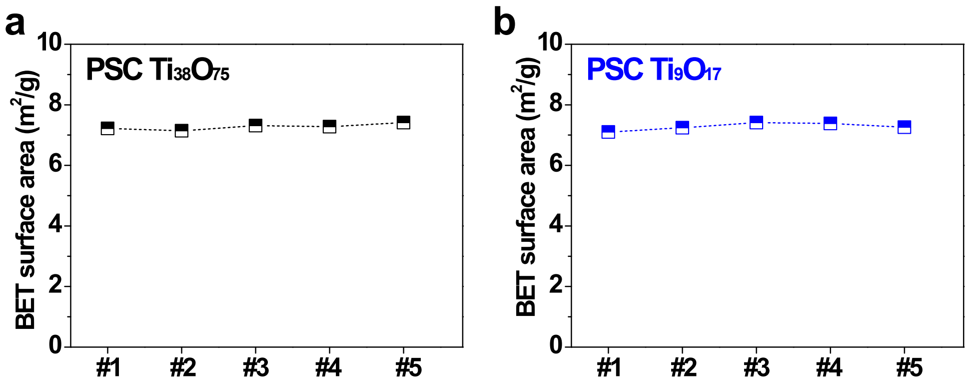

Figure S3. The specific surface area of PSC Ti_nO_{2n-1} (n=9, 38) monoliths. (a) PSC $Ti_{38}O_{75}$. (b) PSC PSC Ti_9O_{17}.

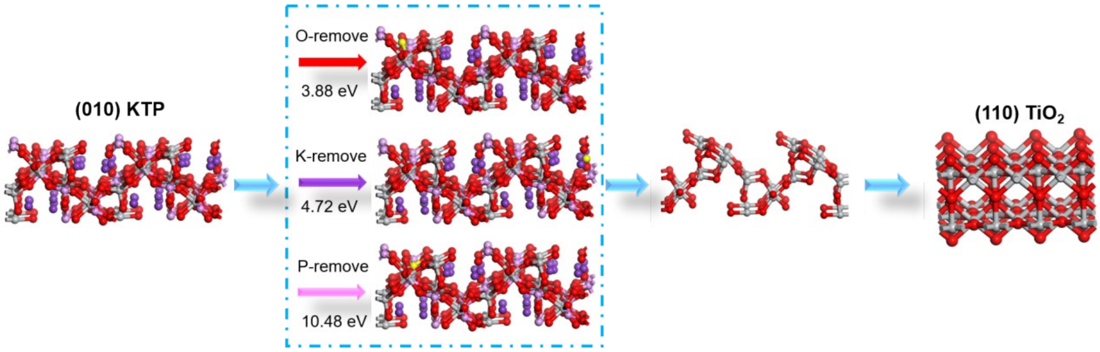

Figure S4. Theoretical calculations of energy barrier for transformation from (010) KTP to rutile (110) TiO_2.

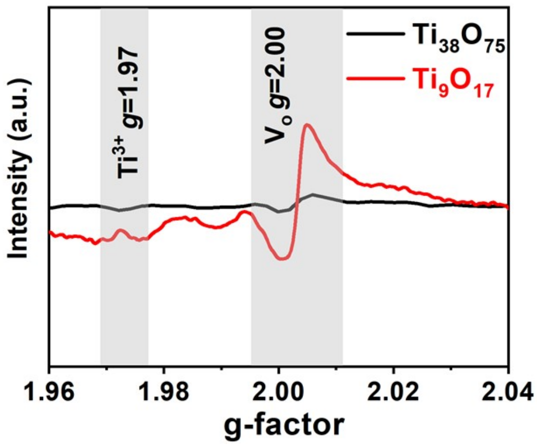

Figure S5. EPR spectra of PSC $Ti_{38}O_{75}$ and Ti_9O_{17}.

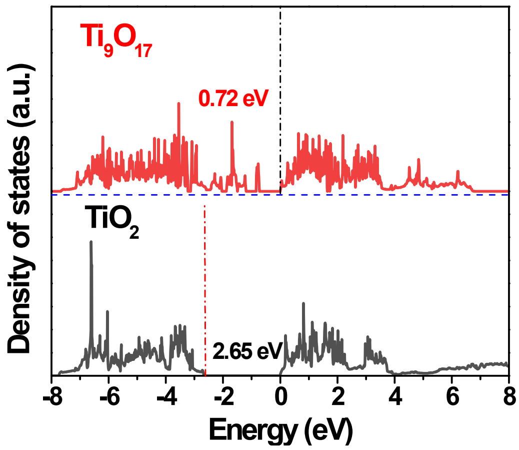

Figure S6. Density of states for rutile TiO_2 and Ti_9O_{17}.

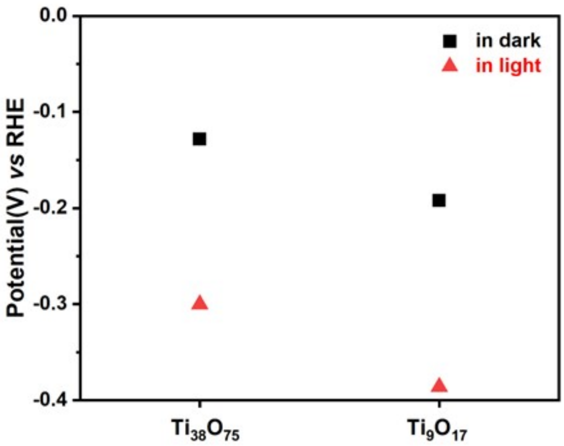

Figure S7. Open circuit potential for PSC $Ti_{38}O_{75}$ and Ti_9O_{17} photoelectrodes under dark and illuminated conditions in 1 M NaOH electrolyte.

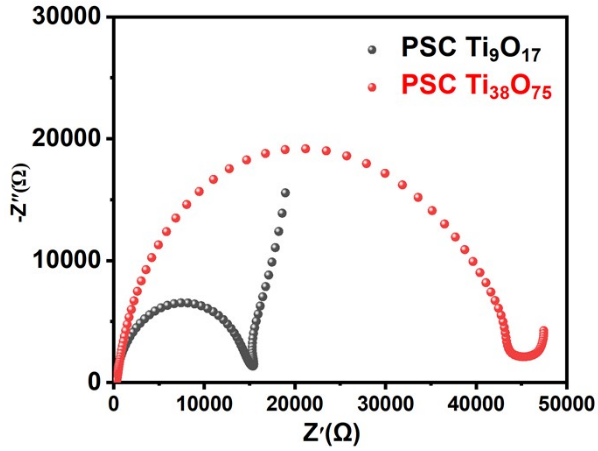

Figure S8. Impedance spectra of PSC Ti_9O_{17} and $Ti_{38}O_{75}$ electrode in 1 M NaOH electrolyte.

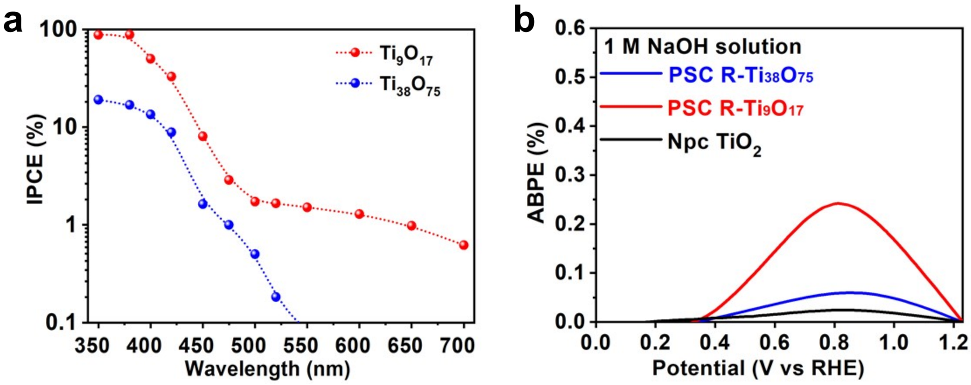

Figure S9. (a) IPCE measurements for PSC rutile (110) TiO_2 at 1.23V in 1M NaOH. (b) ABPE curve for PSC rutile (110) TiO_2 monolith under 10 AM 1.5 G illumination.

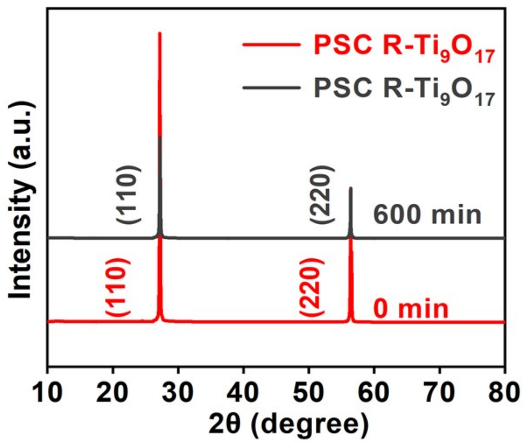

Figure S10. XRD patterns of the PSC R-Ti_9O_{17} catalyst after the stability test.

Table S1. Comparing the performance of TiO_2 photoanodes with reported works

Catalyst	Electrolyte	Photocurrent density(mA cm^{-2}) at 1.23 V VS. RHE	Photostability (min)	Reference
$TiO_2/Cu_2O/Al/Al_2O_3$	0.1 M Na_2SO_4	4.52	166.67	1
WO_{3-x}@TiO_{2-x} Core-shell Nanosheets	0.5 M Na_2SO_4	3.2	360	2
TiO_2 NR @ NB	1 M NaOH	1.24	100	3
PSN TiO_2	1 M NaOH	1.02	/	4
TiO_2@CoNi-LDHs NTAs	0.1 M Na_2SO_4	4.4	600	5
PSC Ti_nO_{2n-1}	1M NaOH	8	600	This work

References

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