Supporting Information

Constructing Porous TiO₂ Crystal by an Etching Process for Long-

Life Lithium Ion Batteries

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Figure S1. Structure of SrTiO₃.



Figure S2. (a) Element mapping and the SEM of the porous crystalline TiO_2 . (b) XPS of the porous crystalline TiO_2 .



Figure S3. (a) Pore distribution statistics of the porous crystalline TiO_2 calculated from HRTEM images. (b) Pore distribution of the porous crystalline TiO_2 using BHJ method from nitrogen adsorption-desorption experiment.



Figure S5. XRD patterns of TiO_2 porous crystals annealed in different temperatures in Ar atmosphere (TiO_2 -400, TiO_2 -500, TiO_2 -600, TiO_2 -700 and TiO_2 -800).



Figure S6. EPR spectra of TiO_2 porous crystals and TiO_2 -400, TiO_2 -500, TiO_2 -600, TiO_2 -700 and TiO_2 -800.



Figure S7. Digital photographs of TiO₂ porous crystals and TiO₂-500.



Figure S8. O 1s spectrum of TiO₂ porous crystals.



Figure S9. Rate capabilities of TiO_2 -400, 500, 600, 700 and 800 anodes at various current densities with the potential window of 0.01-3V.



Figure S10. (a) Cyclic voltammetry of TiO₂-500 anode with the scan rate of 0.3 mV s⁻¹ with the potential of 0.01–3 V. (b) Rate charging/discharging curves of TiO₂-500 between 0.01 and 3 V. (c) Cyclic voltammetry of TiO₂-700 anode with the scan rate of 0.3 mV s⁻¹ with the potential of 1–3 V. (d) Rate charging/discharging curves of TiO₂-700 between 1 and 3 V.



Figure S11. Cyclic voltammetry of TiO₂-400, 600, 800 anodes with the scan rate of 0.3 mV s⁻¹ with the potential of 0.01–3 V.



Figure S12. Comparison of second CV curves with the potential of 0.01-3 V.



Figure S13. The detailed cycling performance of TiO_2 -500 within 0.01–3 V at high rate of (a) 12 C, (b) 30 C and (c) 60 C.



Figure S14. The TEM and SAED of TiO₂-500 electrode at 60 C after 30000 cycles.



Figure S15. (a) Rate capability of TiO_2 -400, 500, 600, 700 and 800 anodes at various current densities with the potential window of 1–3V.



Figure S16. (a) Cyclic voltammetry of TiO_2 -700 with the scan rate of 0.3 mV s⁻¹ with the potential of 1–3 V. (b) Galvanostatic charging/discharging curves of TiO_2 -700 at 0.6 C between 1 and 3 V. (c) Cyclic voltammetry of TiO_2 -500 with the scan rate of 0.3 mV s⁻¹ with the potential of 1–3 V. (d) Galvanostatic charging/discharging curves of TiO_2 -500 at 0.6 C between 1 and 3 V.



Figure S17. (a) Cyclic voltammetry of TiO₂-500 anode with the scan rate from 0.1 to 20 mV s⁻¹ with the potential of 1–3 V. (b) The fitting of peak current (I) with scan rate (v) as followed: I(v)= av^b in TiO₂-500 anode with a cut-off potential of 1 V.



Figure S18. Galvanostatic charging/discharging 1^{st} and 5^{th} curves of TiO₂-400, 500, 600, 700 and 800 anodes at 0.6 C with the potential of 0.01–3 V.



Figure S19. The comparison of galvanostatic charging/discharging curves of TiO_2 -700 at different potential window.

Table S1.	BET	surface areas	and th	e main	pore size	distributions	of TiO ₂ samples.

Sample	BET surface area (m ² g ⁻¹)	Peak of pore distribution (nm)
Pristine TiO ₂	316	2-3
TiO ₂ -400	203	2-4
TiO ₂ -500	127	2-4
TiO ₂ -600	41	10-20
TiO ₂ -700	31	< 4
TiO ₂ -800	23	-