Influence of Metastable Disorder in Titanium Oxyhydroxides on High-Rate Sodium Ion Storage

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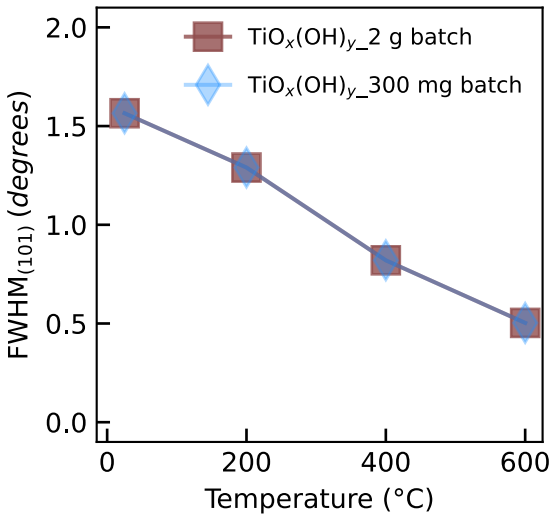

Figure S1. Comparative FWHM of the synthesized $TiO_x(OH)_y$-T_{anneal} samples across two different batch sizes.

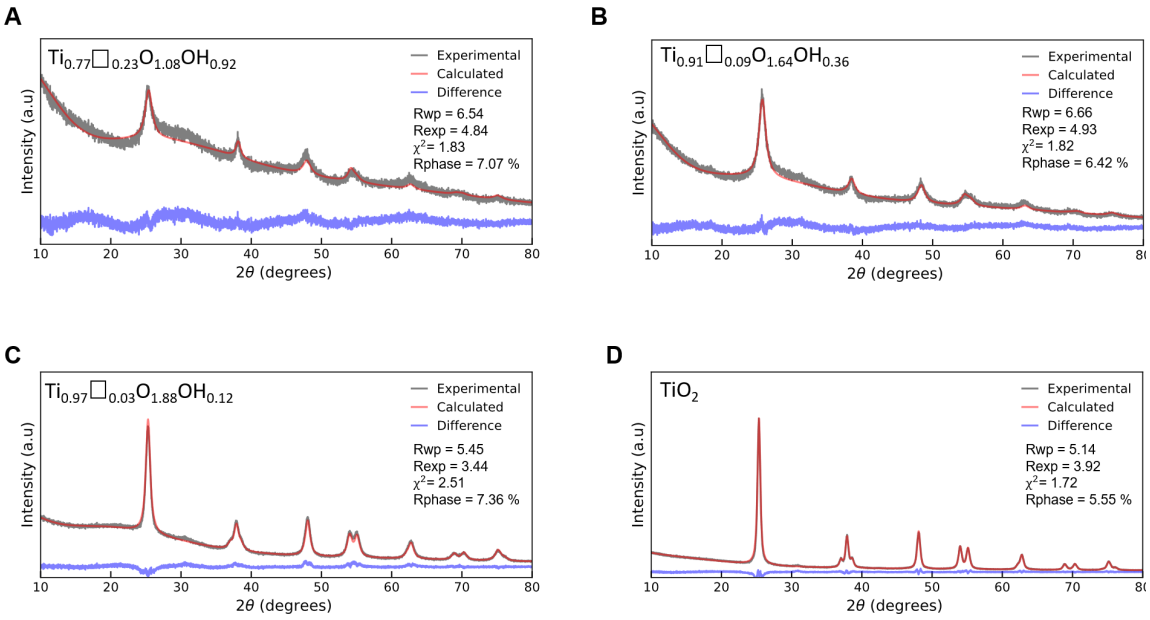

Figure S2. (A)-(D) Rietveld refinement of the powder XRD data of the various $TiO_x(OH)_y$-T_{anneal} samples. Black, red and blue lines represent the experimental, calculated and difference curves respectively.

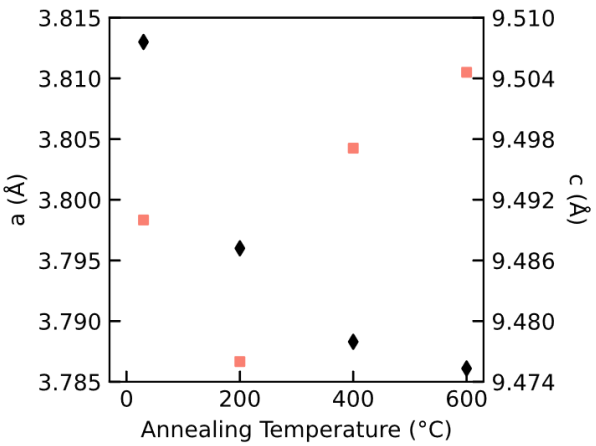

Figure S3. Variation of the 'a' and 'c' lattice parameter of the various $TiO_x(OH)_y$-T_{anneal} , as obtained from the Rietveld refinement.

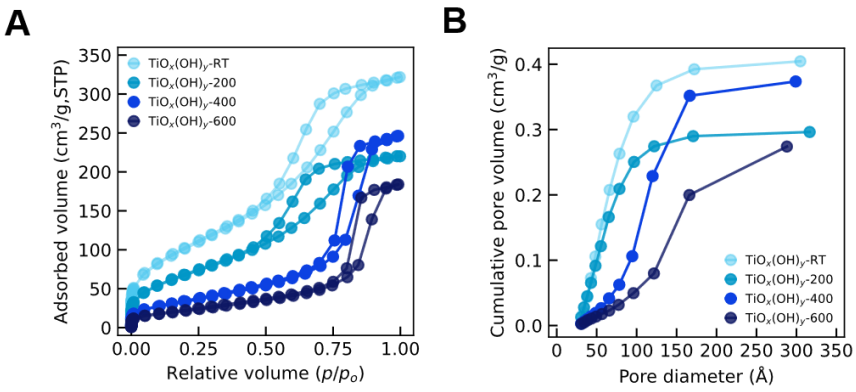

Figure S4. (A) Adsorption isotherms, and (B) pore volume distribution for various $TiO_x(OH)_y$-T_{anneal} samples.

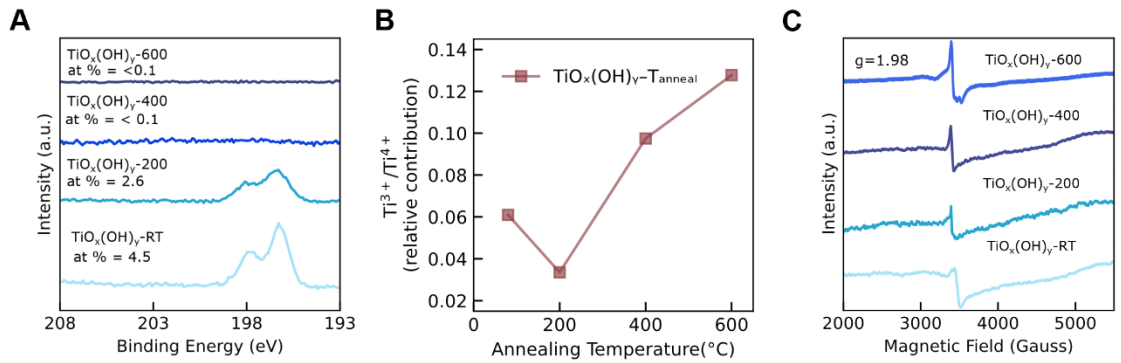

Figure S5. (A) Cl 2p XPS spectra. (B) Relative Ti^{3+}:Ti^{4+} ratio obtained from deconvolution of Ti 2p XPS signal. (B**)** Electron paramagnetic resonance (EPR) spectra for various $TiO_x(OH)_y$-T_{anneal} samples.

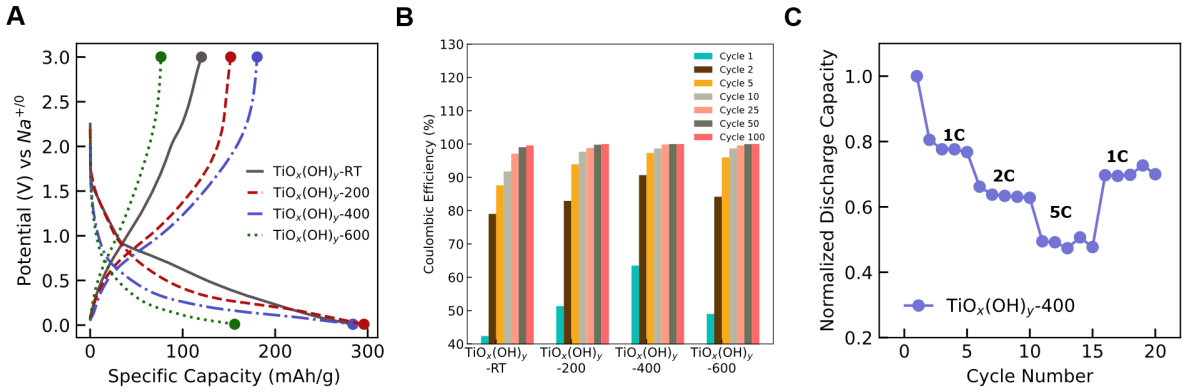

Figure S6. (A) First cycle GCD profiles and (B) coulombic efficiency of various $TiO_x(OH)_y$-T_{anneal} as a function of cycle number when cycled at 260 mA/g between 3 V - 0.01 V vs $Na^{+/0}$. (C) Rate capability tests for $TiO_x(OH)_y$-400.

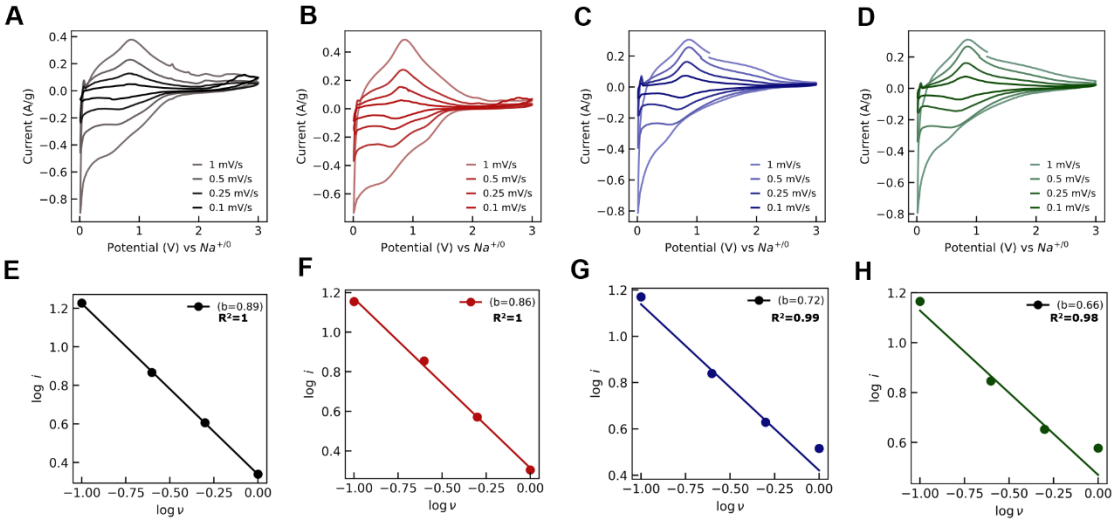

Figure S7. Cyclic voltammograms for (A) $TiO_x(OH)_y$-RT, (B) $TiO_x(OH)_y$-200, (C) $TiO_x(OH)_y$-400, and (D) $TiO_x(OH)_y$-600 (scan rates as indicated); (B) corresponding log i vs. log ν plots for $TiO_x(OH)_y$-T_{anneal} (b-values were obtained from the slope of each linear fit) as shown.

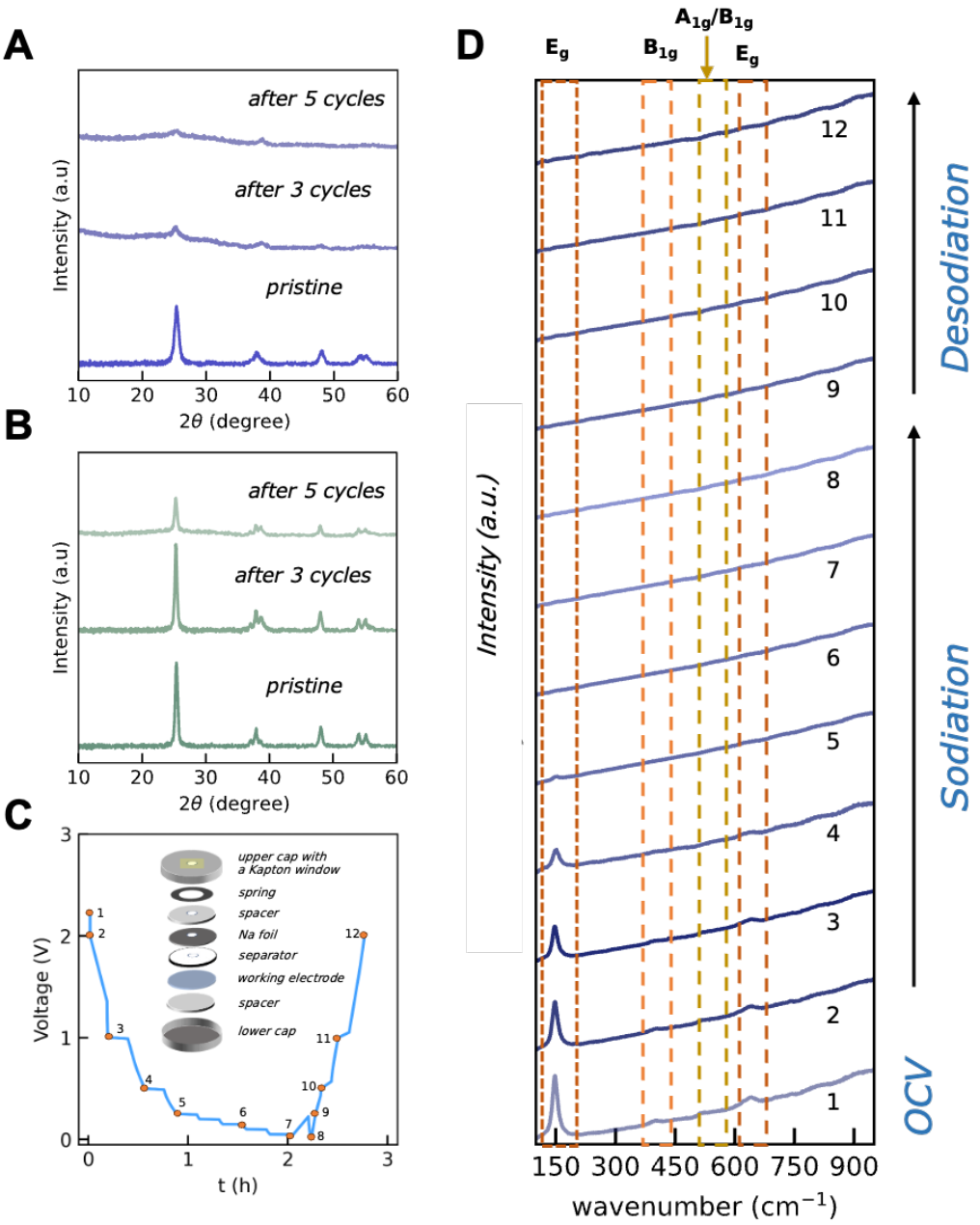

Figure S8. pXRD data for (A) $TiO_x(OH)_y$-400 (B) $TiO_x(OH)_y$-600 after 3rd and 5th cycle respectively (GCD at 260 mA/g). (C)-(D) In situ Raman spectra of $TiO_x(OH)_y$-400 electrode when cycled at 260 mA/g (the cell setup is shown as an inset).

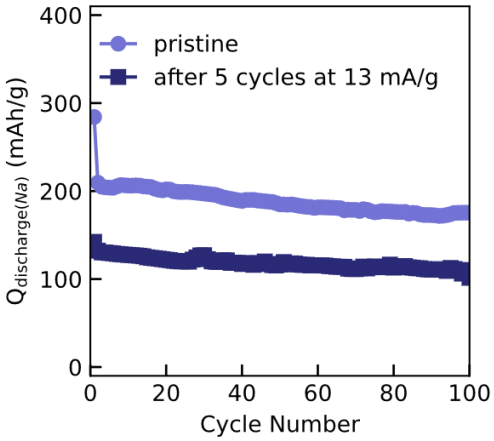

Figure S9. Comparative cycling performance for $TiO_x(OH)_y$-400 at 260 mA/g, with and without 5 initial cycles at 13 mA/g.

Table S1. Water content in $TiO_x(OH)_y$-T_{anneal} as determined from TGA.

S. No.	Sample	Water content
1	$TiO_x(OH)_y$-RT	0.78
2	$TiO_x(OH)_y$-200	0.43
3	$TiO_x(OH)_y$-400	0.10
4	$TiO_x(OH)_y$-600	0.04