



Electronic Supplementary Information (ESI) for RSC Advances

Supporting Information

Symmetric sodium-ion batteries based on the phosphate material of NASICON-structured $\text{Na}_3\text{Co}_{0.5}\text{Mn}_{0.5}\text{Ti}(\text{PO}_4)_3$

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Table S1. Crystallographic data of $\text{Na}_3\text{Co}_{0.5}\text{Mn}_{0.5}\text{Ti}(\text{PO}_4)_3$ from Rietveld refinement. Reliability factors of the Rietveld refinement for the XRD pattern: $R_p = 2.45\%$, $R_{wp} = 3.11\%$, and $\text{CHI}^2 = 0.82$.

Atom	Wyckoff site	x	y	z	Occupancy
Na(1)	6b	0.000000	0.000000	0.000000	0.9128
Na(2)	18e	0.633451	0.000000	0.250000	0.7178
Co(1)	12c	0.000000	0.000000	0.149509	0.2500
Mn(1)	12c	0.000000	0.000000	0.149509	0.2500
Ti(1)	12c	0.000000	0.000000	0.149509	0.5000
P(1)	18e	0.302500	0.000000	0.250000	1.0000
O(1)	36f	0.040017	0.208490	0.196016	1.0000
O(2)	36f	0.192015	0.178041	0.085161	1.0000

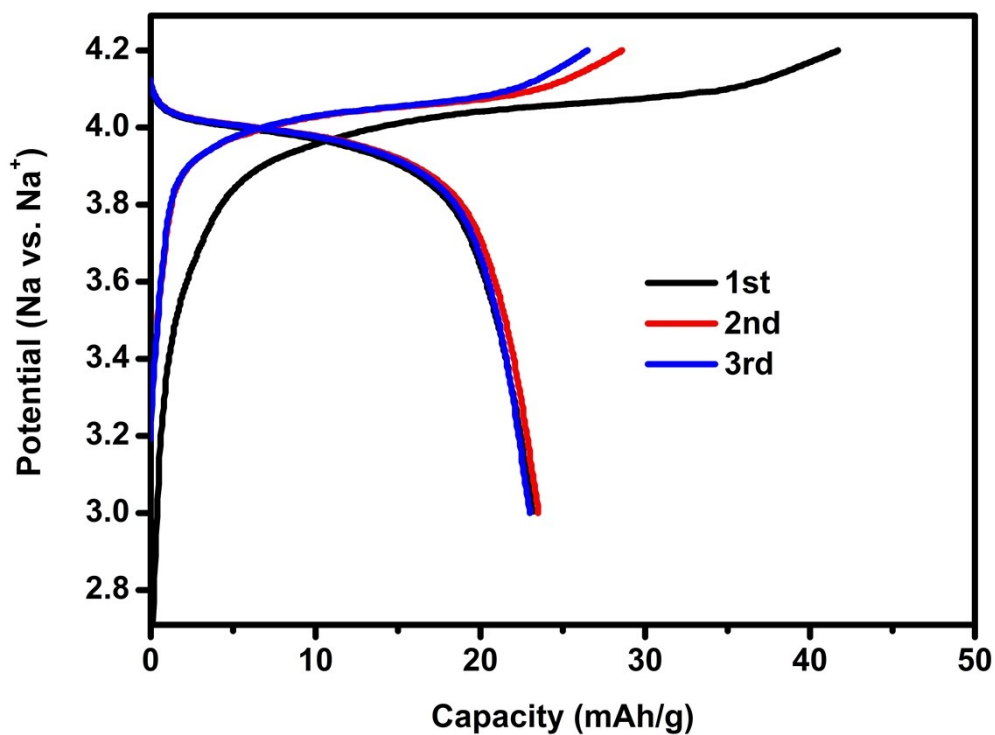


Figure S1. Typical charge/discharge profiles of $\text{Na}_3\text{CoTi}(\text{PO}_4)_3$ electrode in the voltage of 3.0-4.2 V at a current rate of 0.1 C.

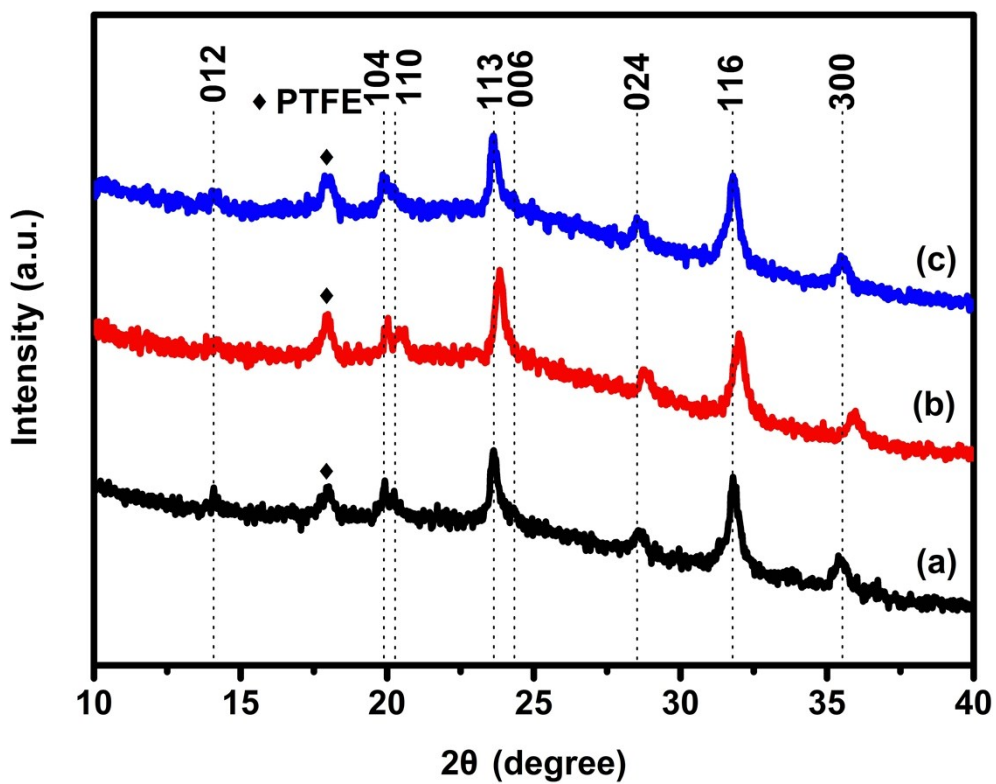


Figure S2. Ex-situ XRD patterns of $\text{Na}_3\text{Co}_{0.5}\text{Mn}_{0.5}\text{Ti}(\text{PO}_4)_3$ as cathode at the pristine state (a), charged to 4.2 V (b), and discharged to 2.8 V (c).

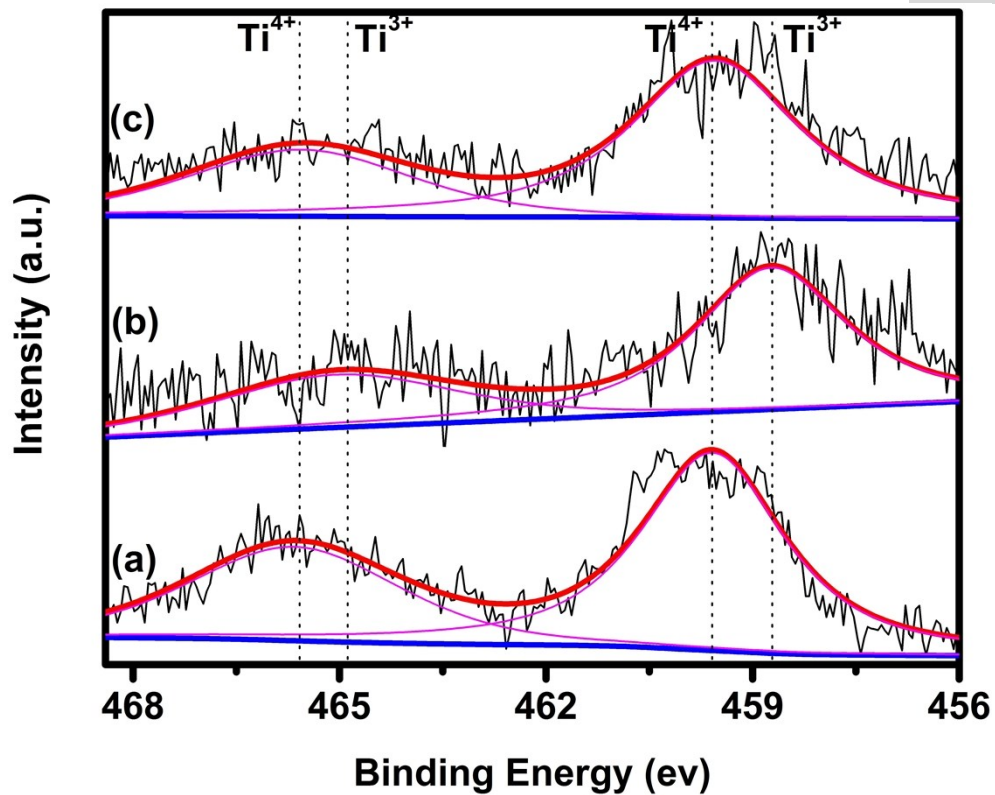


Figure S3. XPS spectra of Ti 2p when $\text{Na}_3\text{Co}_{0.5}\text{Mn}_{0.5}\text{Ti}(\text{PO}_4)_3$ was used as anode at the pristine state (a), discharged to 1.5 V (b), and charged to 3.0 V (c).

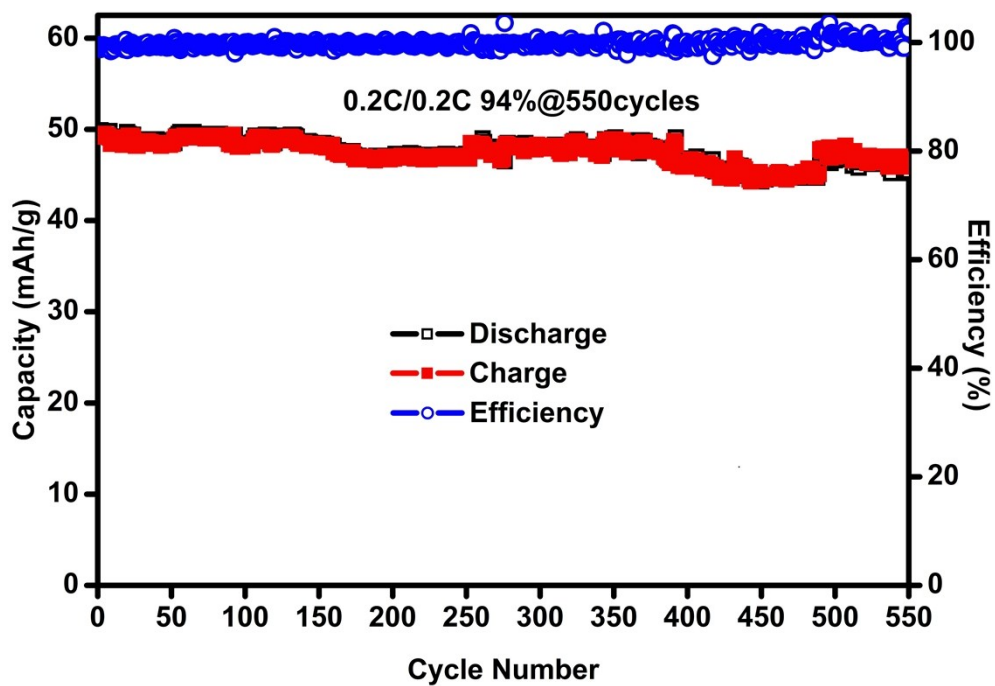


Figure S4. Cycling performance of $\text{Na}_3\text{Co}_{0.5}\text{Mn}_{0.5}\text{Ti}(\text{PO}_4)_3$ electrode as anode with corresponding coulombic efficiency over 550 cycles at a rate of 0.2 C in half-cell system.

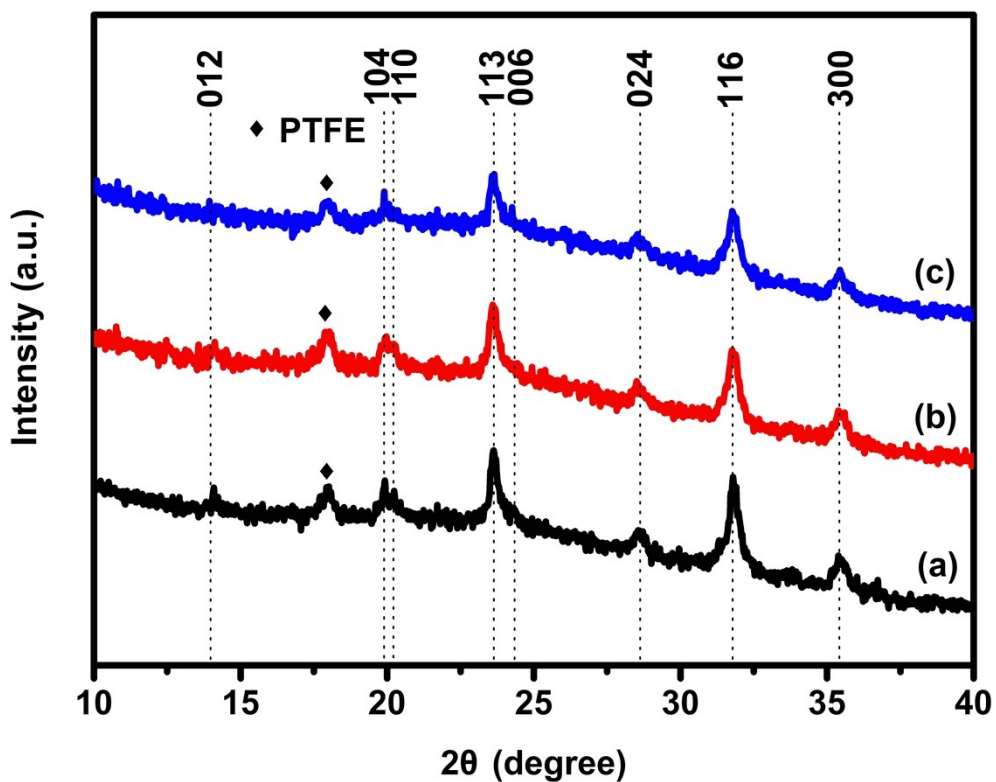


Figure S5. Ex-situ XRD patterns of $\text{Na}_3\text{Co}_{0.5}\text{Mn}_{0.5}\text{Ti}(\text{PO}_4)_3$ as anode at the pristine state (a), discharged to 1.6 V (b), and charged to 2.8 V (c).