ADVANCED ENERGY MATERIALS

Supporting Information

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$KTi_2(PO_4)_3$ with Large Ion Diffusion Channel for High-Efficiency Sodium Storage

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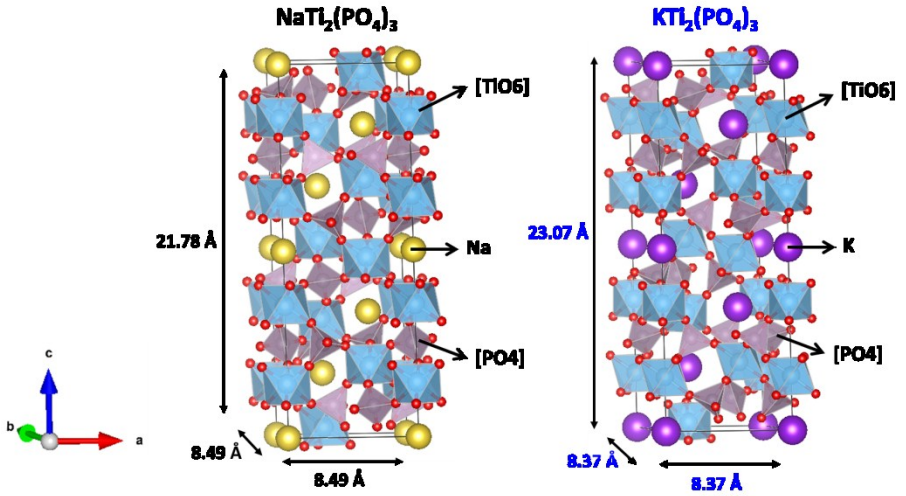


Figure S1. Diagram of crystal structures of $NaTi_2(PO_4)_3$ and $KTi_2(PO_4)_3$.

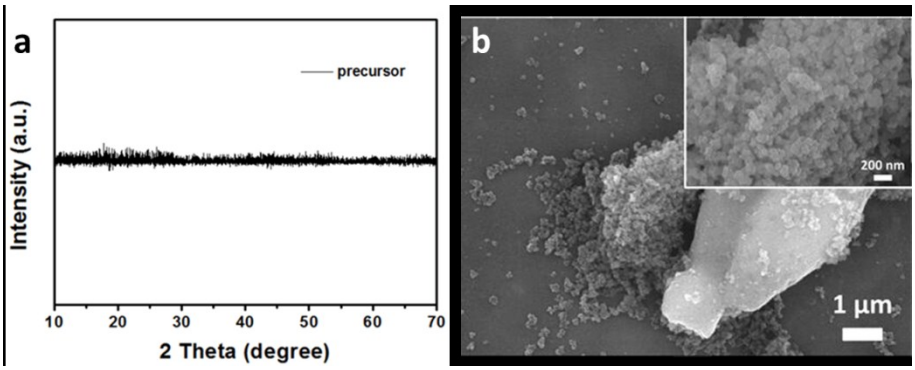
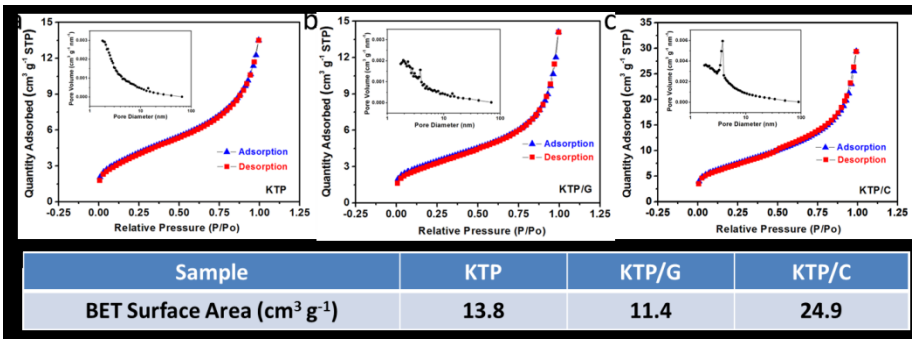


Figure S2. XRD pattern (a) and SEM images (b) of the $KTi_2(PO_4)_3$ precursor.



Sample	KTP	KTP/G	KTP/C
BET Surface Area ($cm^3\ g^{-1}$)	13.8	11.4	24.9

Figure S3. Nitrogen adsorption-desorption isotherms of KTP (a), KTP/G (b), KTP/C (c) and the corresponding pore size distribution (insets); (d) BET surface areas of the three samples.

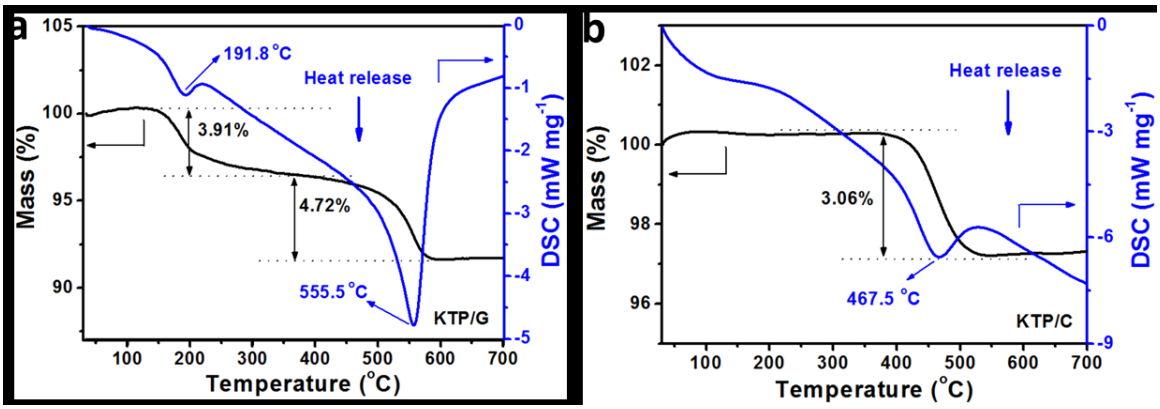


Figure S4. TG-DSC curves of KTP/G (a) and KTP/C (b) obtained in air atmosphere.

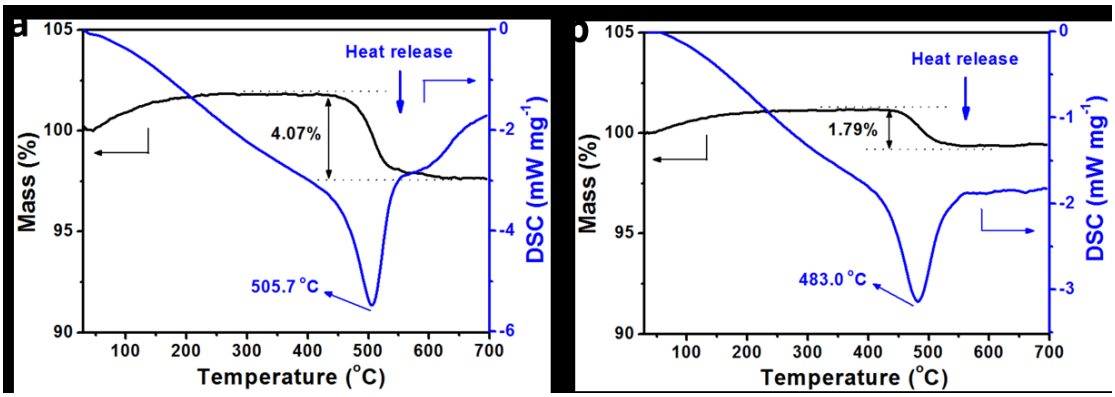


Figure S5. TG-DSC curves of the precursor washed by 0 (a) and 5 (b) times.

Table S1. Resistances fitted by the EIS results.

	KTP	KTP/G	KTP/C
R_s (Ω)	3.363	2.905	1.224
R_{ct} (Ω)	765.8	680.2	516.1

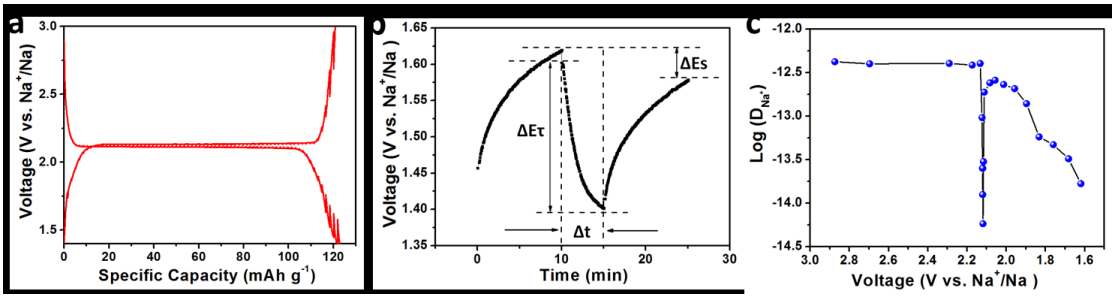


Figure S6. (a) GITT curves of KTP/C in the second cycle; (b) demonstration of a single titration during the GITT measurement; (c) diffusivity versus state of discharge.

Equation S1

$$C = \frac{\frac{1}{3.6} \times n \times F}{M}$$

C ---- Specific capacity;
n ---- Transfer electronic number in a molecular;
F ---- Faraday constant;
M ---- The molecular weight

Equation S2

On the basis of Fick's second law, the diffusion coefficient of Na^+ could be calculated using the equation:

$$\tilde{D}_{Na^+} = 4/\pi \left(\frac{m_B V_M}{M_B A}\right)^2 \left(\frac{\Delta E_s}{\tau \left(\frac{dE_\tau}{d\sqrt{\tau}}\right)}\right)^2 (\tau \ll L^2/\tilde{D}_{Na^+})$$

where L represents the thickness of the electrode material, m_B and M_B are the mass and the molecular weight. V_M is the molar volume of the compound, S represents the active surface areas. τ is the time period of current pulse. $dE_\tau/d(\tau^{1/2})$ is the derivative of the voltage change during the current pulse with respect to the charge or discharge time τ. ΔE_s is the change of the steady-state voltage at the end of the relaxation period over a single galvanostatic titration.

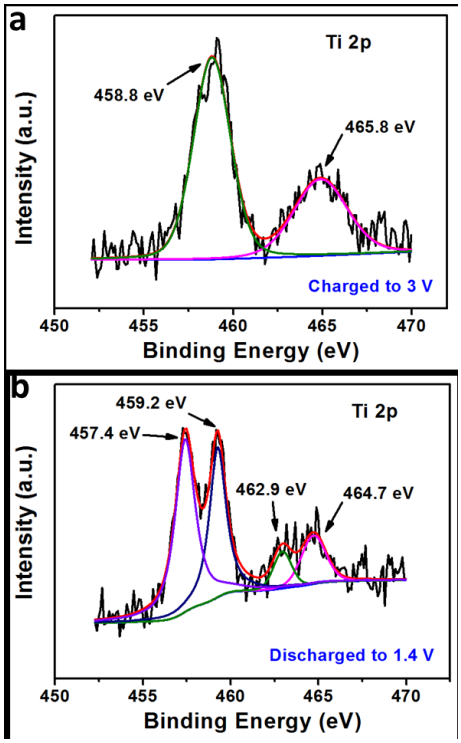


Figure S7. XPS spectra and fitting curves of Ti 2p in KTP/C of the charged (a) and discharged (b) state.

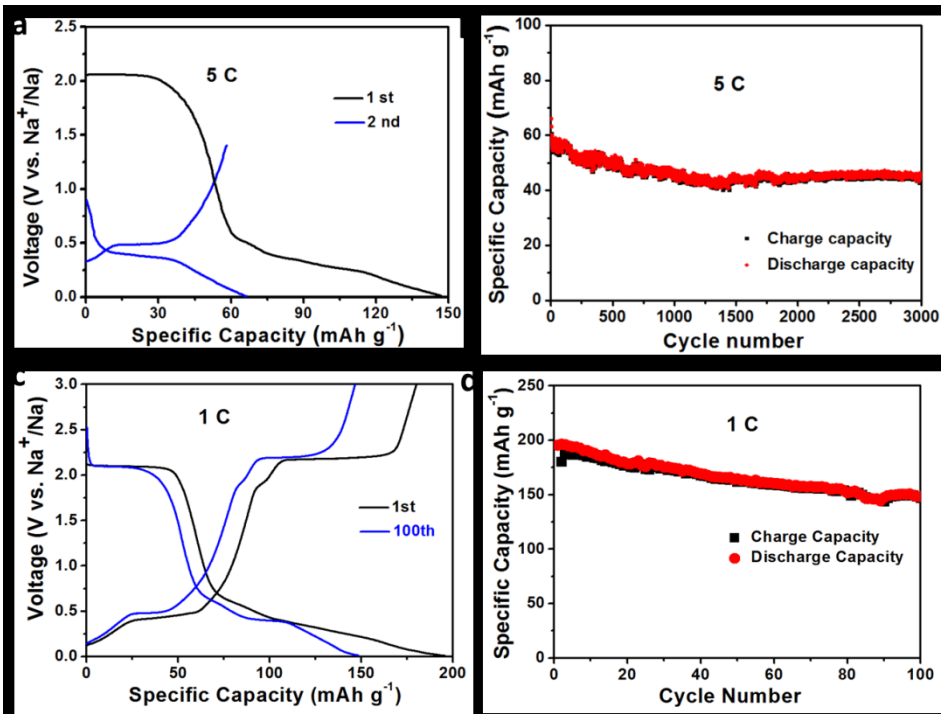


Figure S8. Charge-discharge curves (a) and cycling performance (b) of KTP/C under the voltage window of 0.01-1.4 V; charge-discharge curves (c) and cycling performance (d) of KTP/C under the voltage window of 0.01-3.0 V.

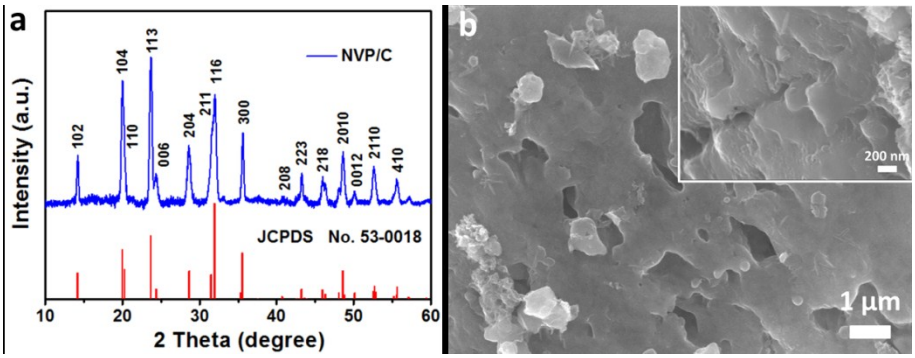


Figure S9. XRD pattern (a) and SEM images (b) of NVP/C.

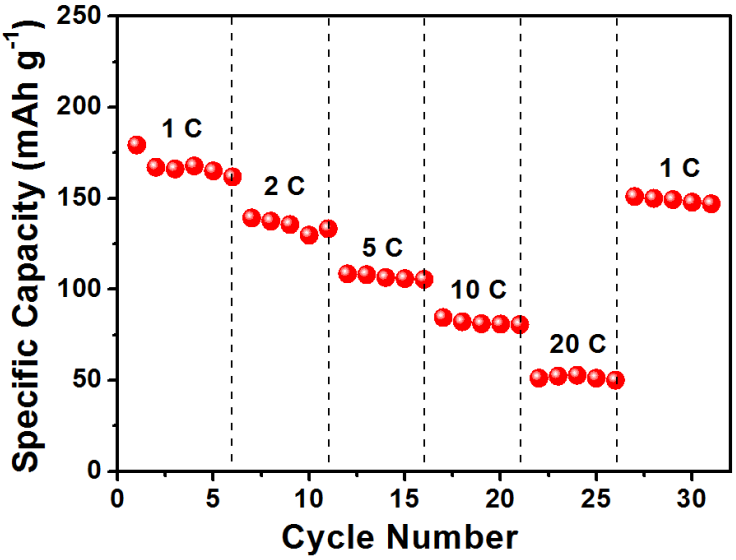


Figure S10. Rate performance of the NVP/C//KTP/C full cell.