Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

$K_2Nb_8O_{21}$ Nanotubes with Superior Electrochemical Performance towards Ultrastable Lithium Storage

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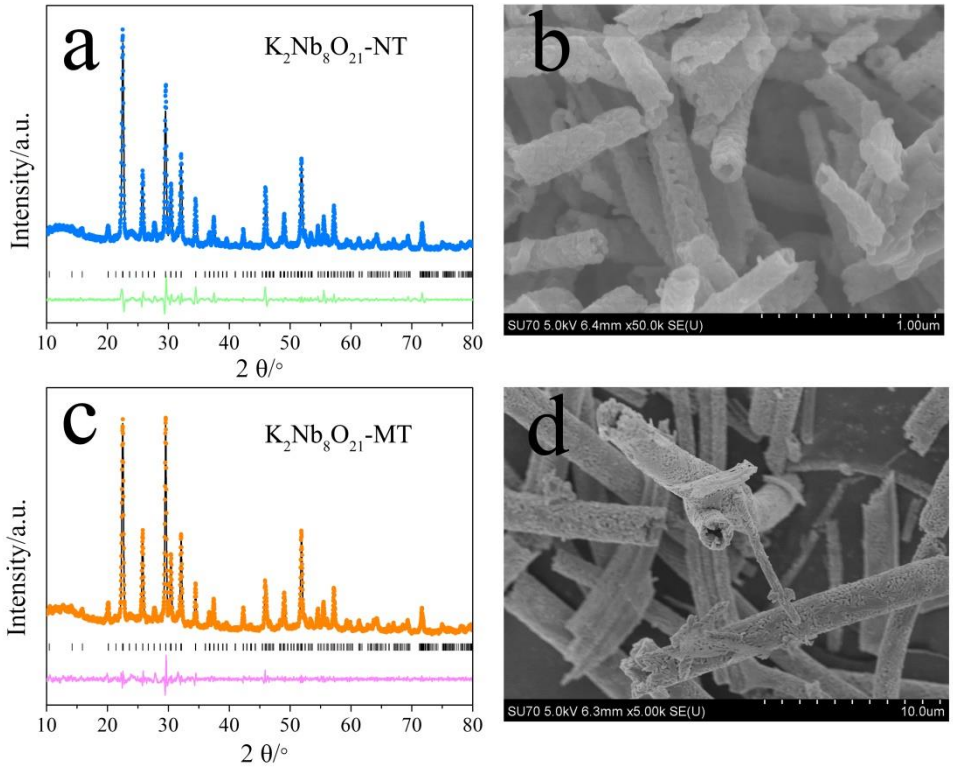

Figure S1. Rietveld refinement XRD patterns and SEM images of $K_2Nb_8O_{21}$-NT (a, b) and $K_2Nb_8O_{21}$-MT (c, d).

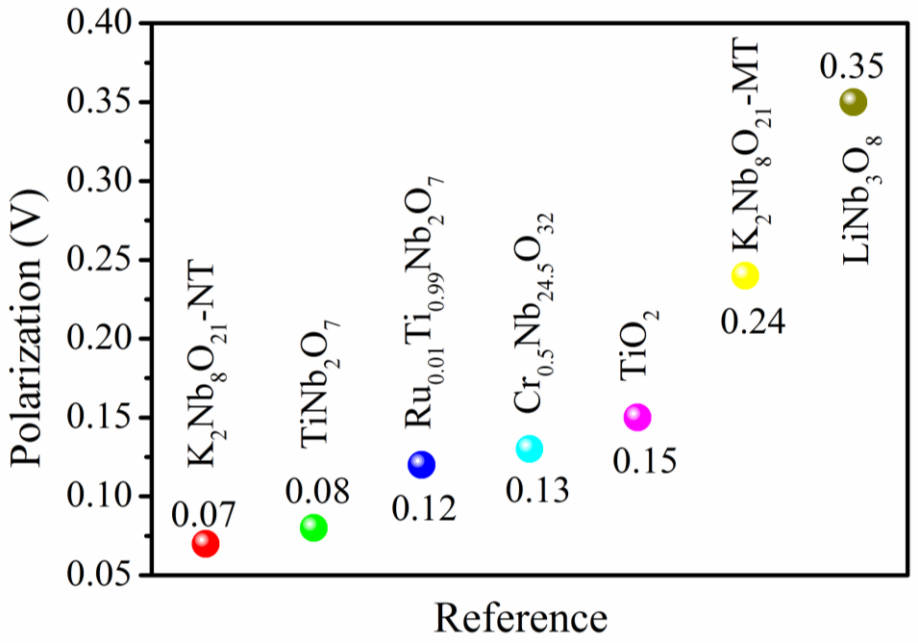

Figure S2. Comparison of redox polarization of $K_2Nb_8O_{21}$-NT and $K_2Nb_8O_{21}$-MT with previously reported niobium- and titanium-based anode materials.

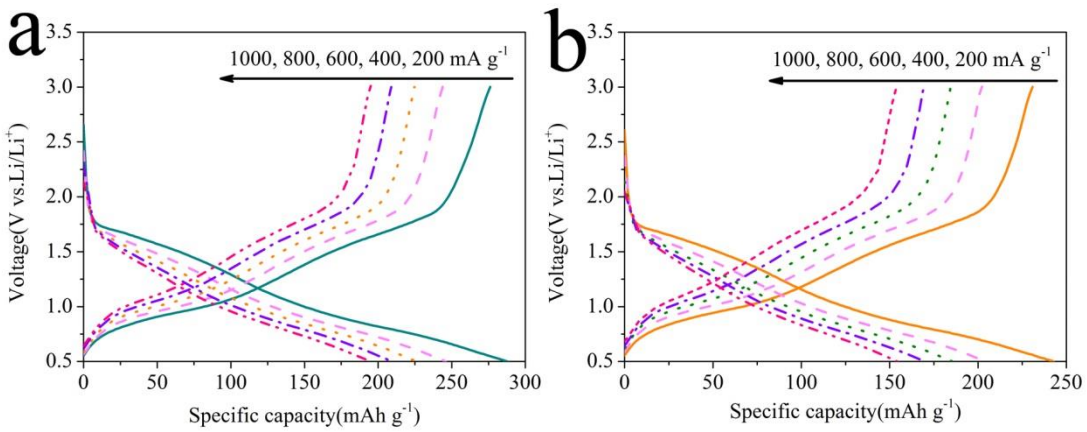

Figure S3. Charge/discharge curves collected at 200, 400, 600, 800, and 1000 mA g^{-1} for (a) $K_2Nb_8O_{21}$-NT, (b) $K_2Nb_8O_{21}$-MT.

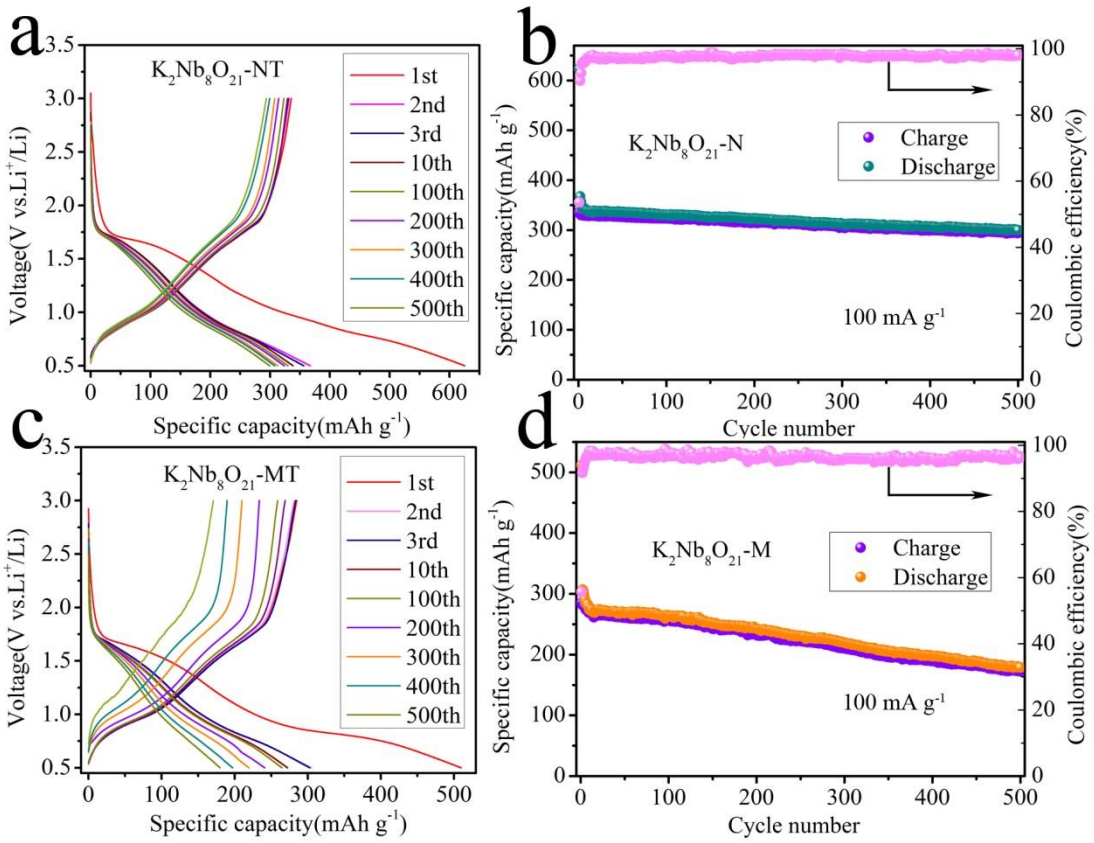

Figure S4. Charge/discharge curves and corresponding cycling performances of (a, b) $K_2Nb_8O_{21}$-NT and (c, d) $K_2Nb_8O_{21}$-MT in the 1st, 2nd, 3rd, 10th, 100th, 200th, 300th, 400th, and 500th cycles between 0.5 and 3.0 V at a current density of 100 mA g^{-1}.

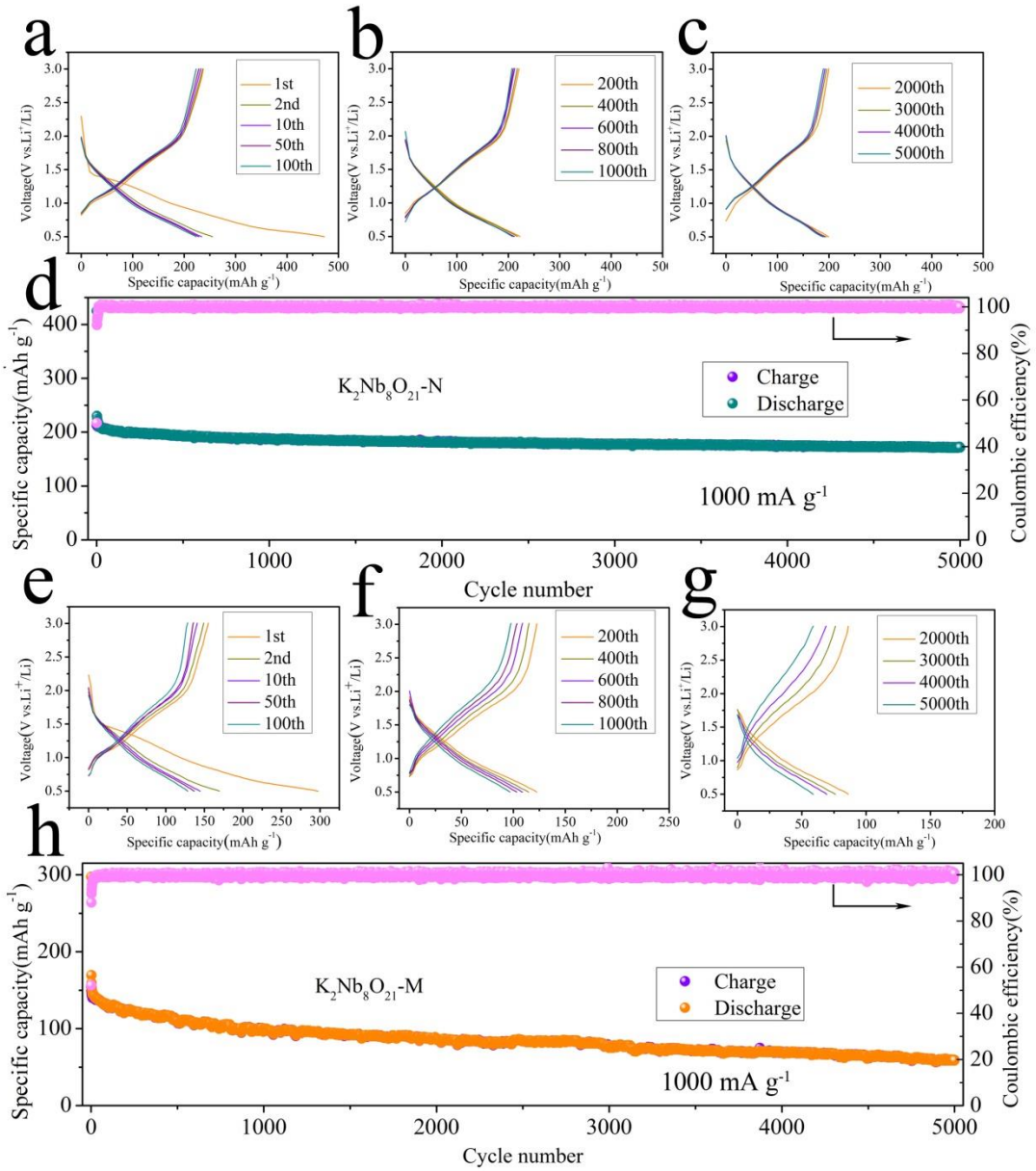

Figure S5. Charge/discharge curves and corresponding cycling performances of (a-d) $K_2Nb_8O_{21}$-NT and (e-h) $K_2Nb_8O_{21}$-MT for the 1st, 2nd, 10th, 100th, 200th, 400th, 600th, 800th, 1000th, 2000th, 3000th, 4000th, and 5000th cycles between 0.5 and 3.0 V at a current density of 1000 mA g^{-1}.

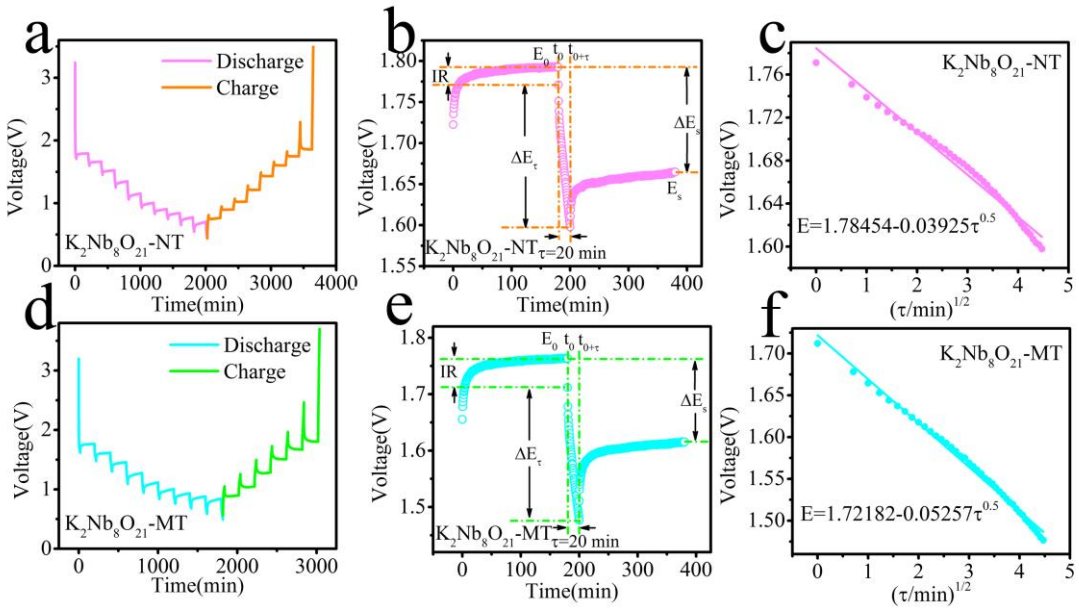

Figure S6. (a, d) GITT curves of $K_2Nb_8O_{21}$-NT and $K_2Nb_8O_{21}$-MT in 0.5-3 V; (b, e) the voltage profiles of single step; (c, f) variation of cell voltage during single titration plotted against $\tau^{1/2}$ to show liner fit in GITT.

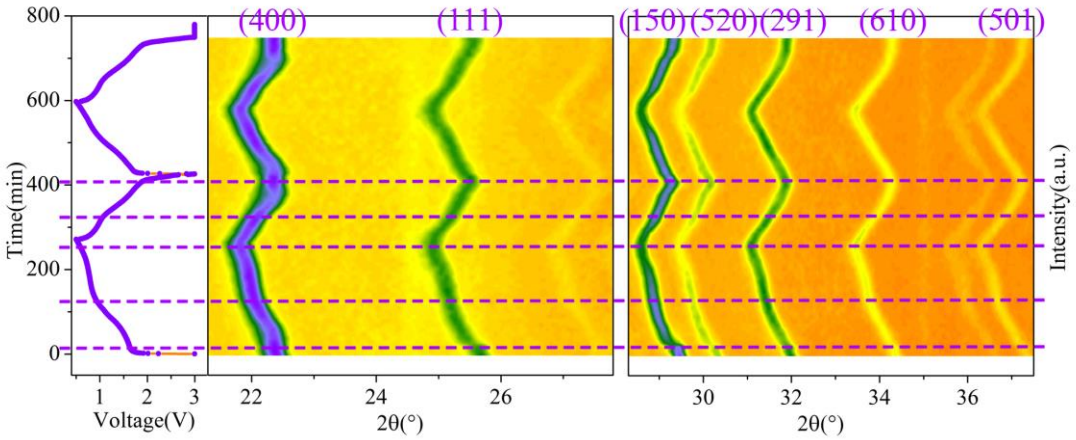

Figure S7. In-situ XRD patterns of $K_2Nb_8O_{21}$-NT in the first two cycles.

Table S1. Comparison of redox polarization of $K_2Nb_8O_{21}$-NT and $K_2Nb_8O_{21}$-MT with previously reported niobium- and titanium-based anode materials

	$K_2Nb_8O_{21}$-NT	**$TiNb_2O_7$**	**$Ru_{0.01}Ti_{0.99}Nb_2O_7$**	**$Cr_{0.5}Nb_{24.5}O_{62}$**	**TiO_2**	**$K_2Nb_8O_{21}$-MT**	**$LiNb_3O_8$**
Cathode/V	1.61	1.60	~1.58	1.59	1.76	1.51	~1.45
Anode/V	1.68	1.68	~1.70	1.72	1.91	1.75	~1.80
Polarization/V	0.07	0.08	~0.12	0.13	0.15	0.24	~0.35

Table S2. Comparison of specific capacity of $K_2Nb_8O_{21}$-NT and $K_2Nb_8O_{21}$-MT with previously reported niobium- and titanium-based anode materials.

Anode	Rate	Reversible capacity	Cycle number	plateau	Reference
$BaLi_2Ti_6O_{14}$	~0.1 C	120 mAh g^{-1}	50 cycles (0.5-3.0 V)	1.36 V	[58]
$SrLi_2Ti_6O_{14}$	0.1 C	168.4 mAh g^{-1}	5 cycles (0.5-3.0 V)	1.373 V	[59]
$FeNbO_4$	0.1 C	125.5 mAh g^{-1}	50 cycles (0.5-3.0 V)	~1.5 V	[35]
$Cr_{0.5}Nb_{24.5}O_{62}$-N	0.1 C	344 mAh g^{-1}	2 cycles (0.8-3.0 V)	~1.65 V	[46]
$Cr_{0.5}Nb_{24.5}O_{62}$-M	0.1 C	322 mAh g^{-1}	2 cycles (0.8-3.0 V)	~1.65 V	[46]
$K_2Nb_8O_{21}$-NT	100 mA g^{-1}	331 mAh g^{-1}	500 cycles (0.5-2.5 V)	~1.61 V	This work
$K_2Nb_8O_{21}$-MT	100 mA g^{-1}	285 mAh g^{-1}	500cycles (0.5-2.5 V)	~1.51 V	This work
KNb_5O_{13}	15 mA g^{-1}	130 mAh g^{-1}	30 cycles (0.5-3.0 V)	1.6 V	[37]
$K_6Nb_{10.8}O_{30}$	25 mA g^{-1}	160 mAh g^{-1}	30 cycles (0.5-3.0 V)	~1.6 V	[37]