Supporting Information

Preparation of $Zn_3Nb_2O_8$ anode material for high-performance lithium/sodium-ion batteries

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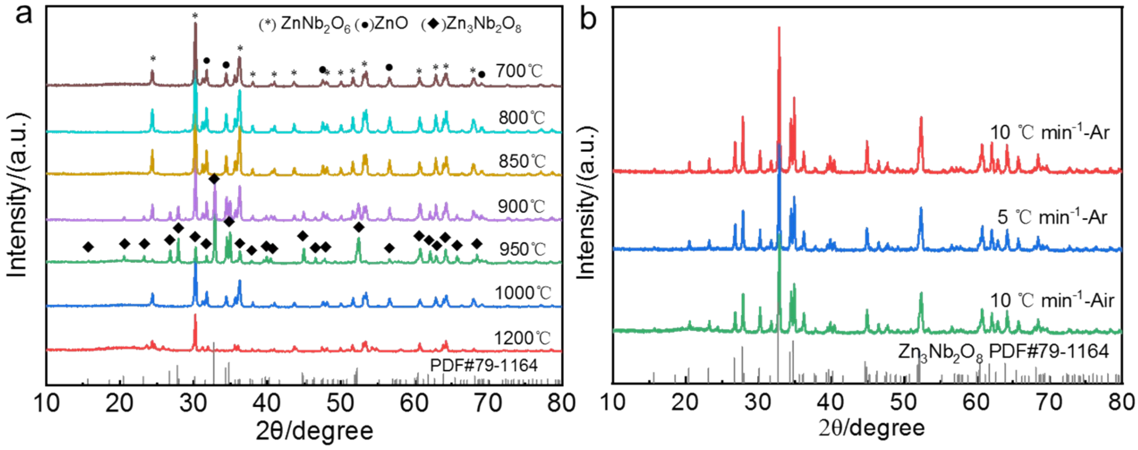

Figure S1. (a)XRD patterns of zinc niobate materials calcined to 700-1200 °C at 10 °C min^{-1} in air. (b)XRD patterns of zinc niobium oxide with different calcination conditions.

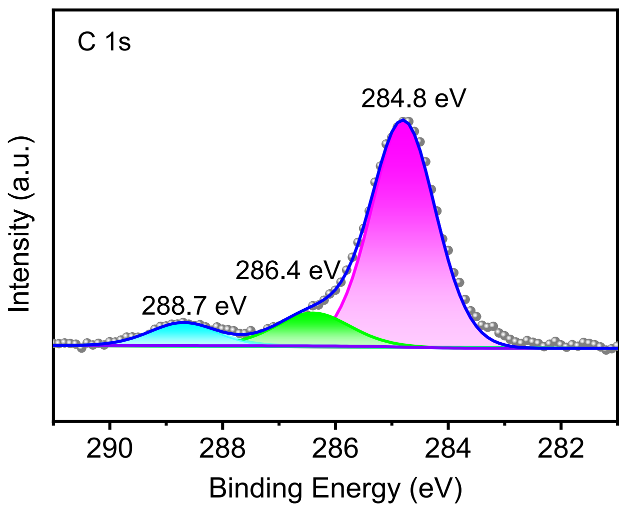

Figure S2. XPS spectra of $Zn_3Nb_2O_8$-B for C 1s.

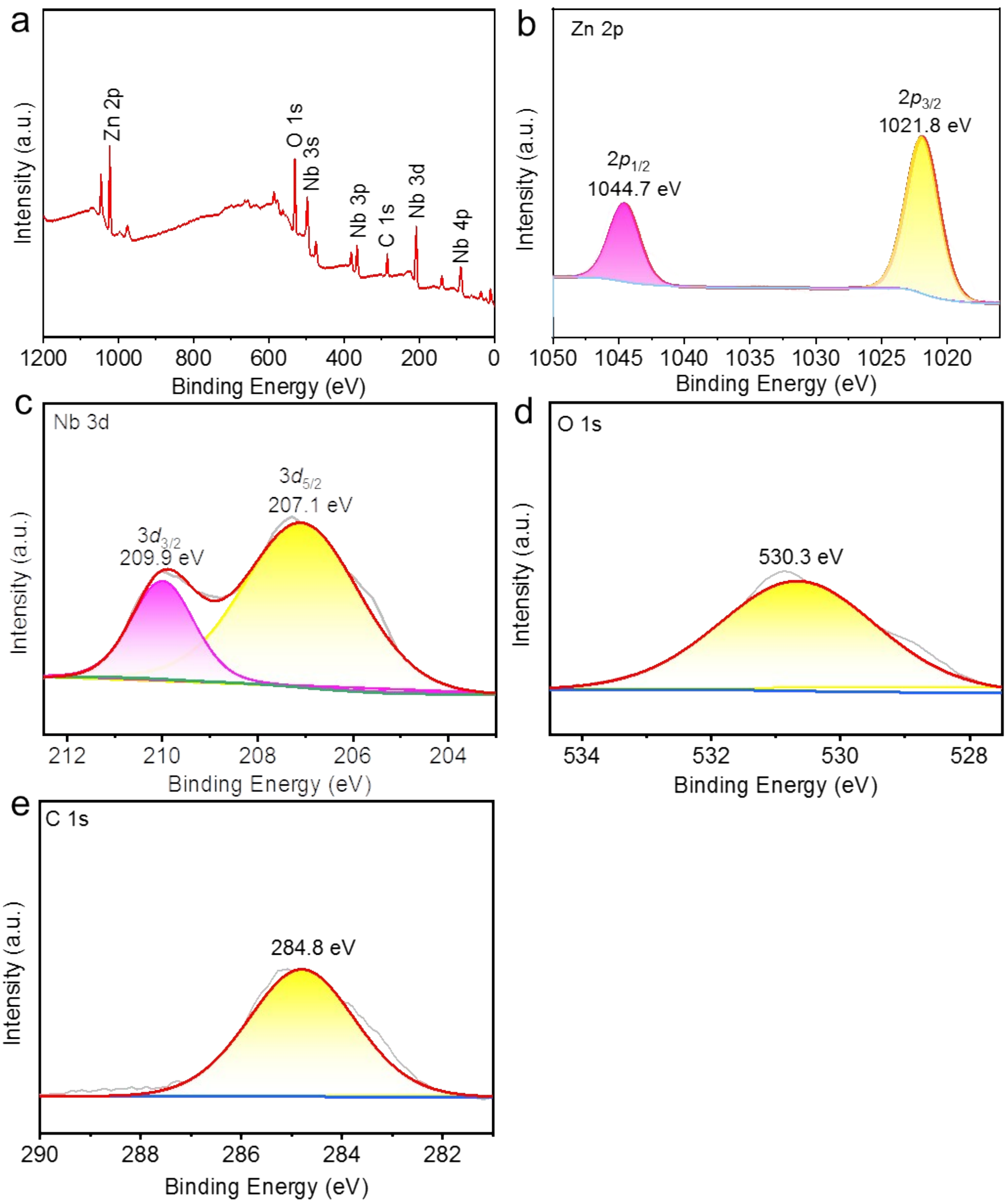

Figure S3. (a) XPS survey spectra of $Zn_3Nb_2O_8$-A; XPS spectra of $Zn_3Nb_2O_8$-A for (b) Zn 2p, (c) Nb 3d, (d) O 1s and (e) C 1s.

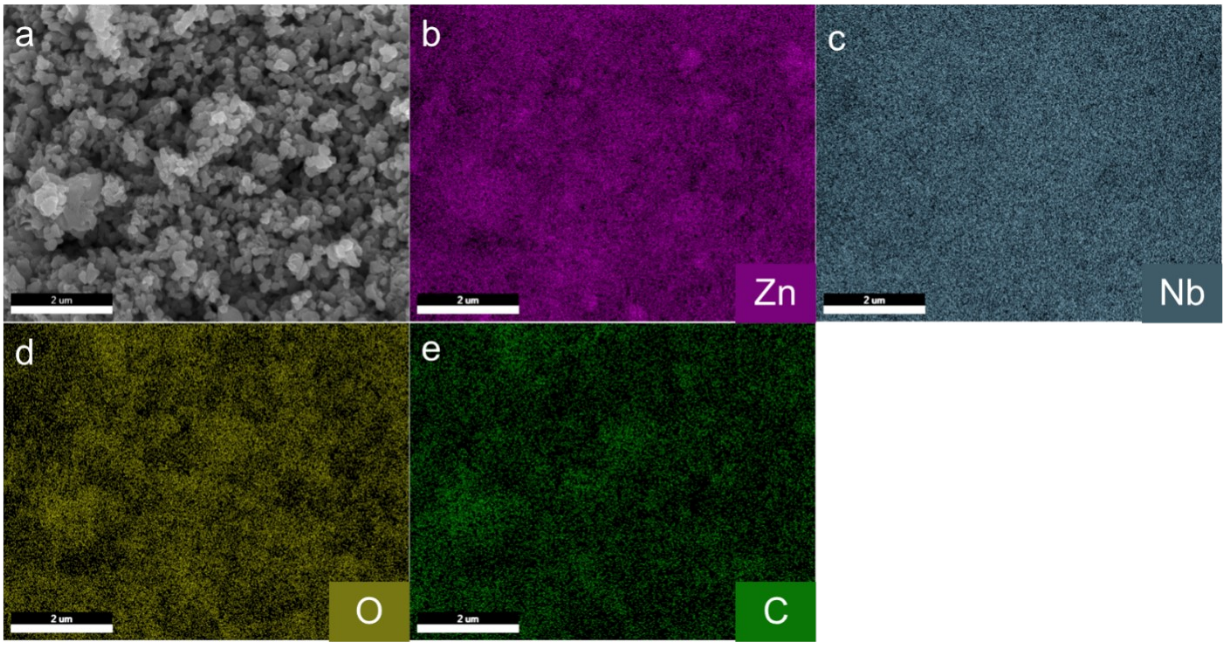

Figure S4. EDX mapping images of $Zn_3Nb_2O_8$-A

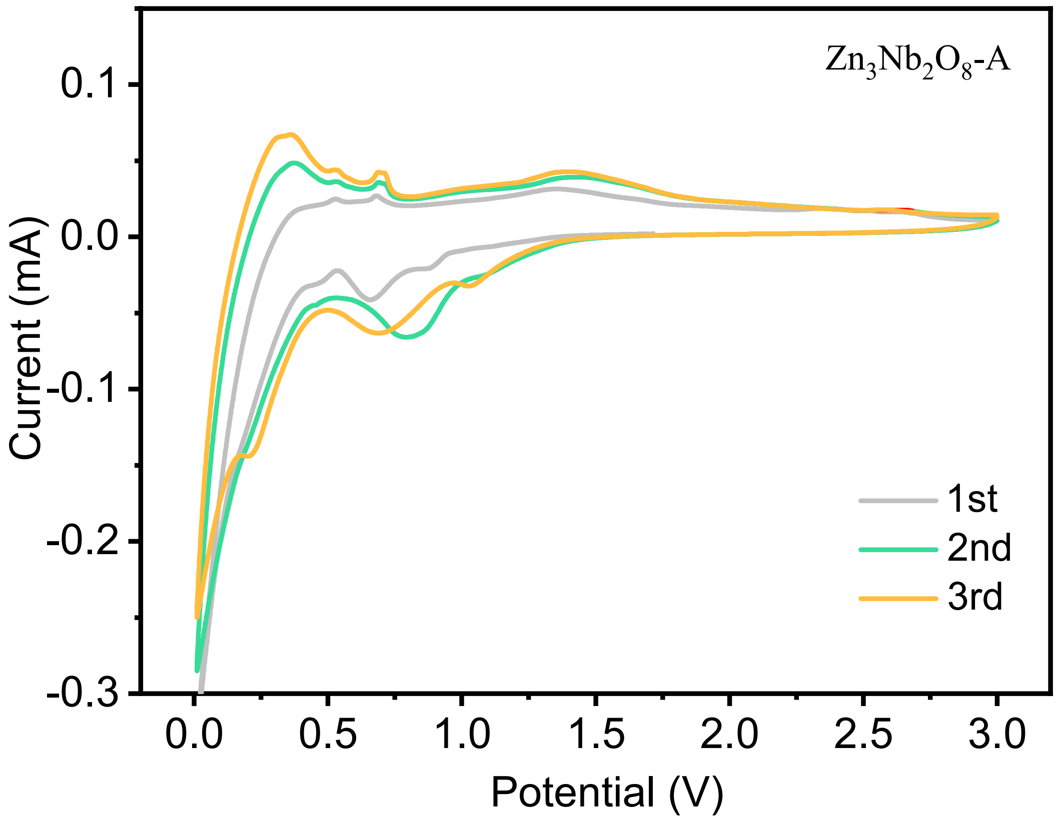

Figure S5. CV curves of $Zn_3Nb_2O_8$-A at the scan rate of 0.1 mV s^{-1}

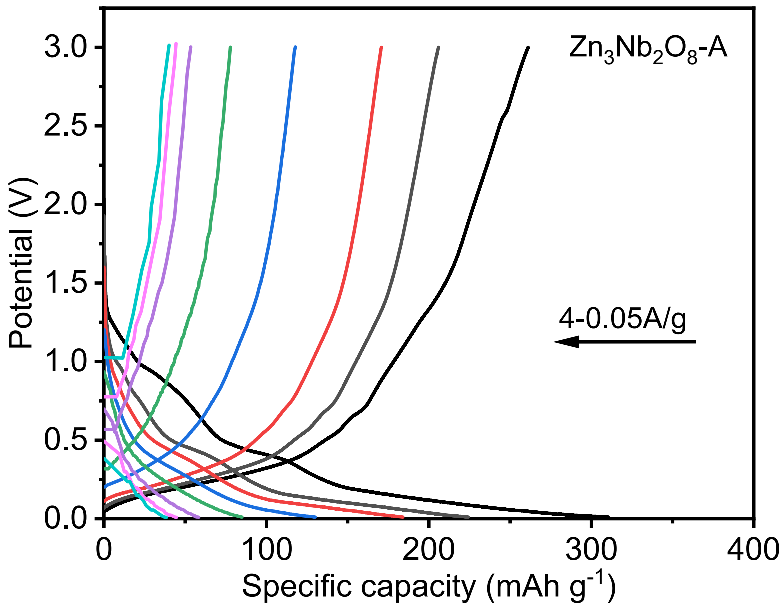

Figure S6. Galvanostatic charge/discharge (GCD) curves of $Zn_3Nb_2O_8$-A at different current densities from 0.05 to 4.0 A g^{-1}

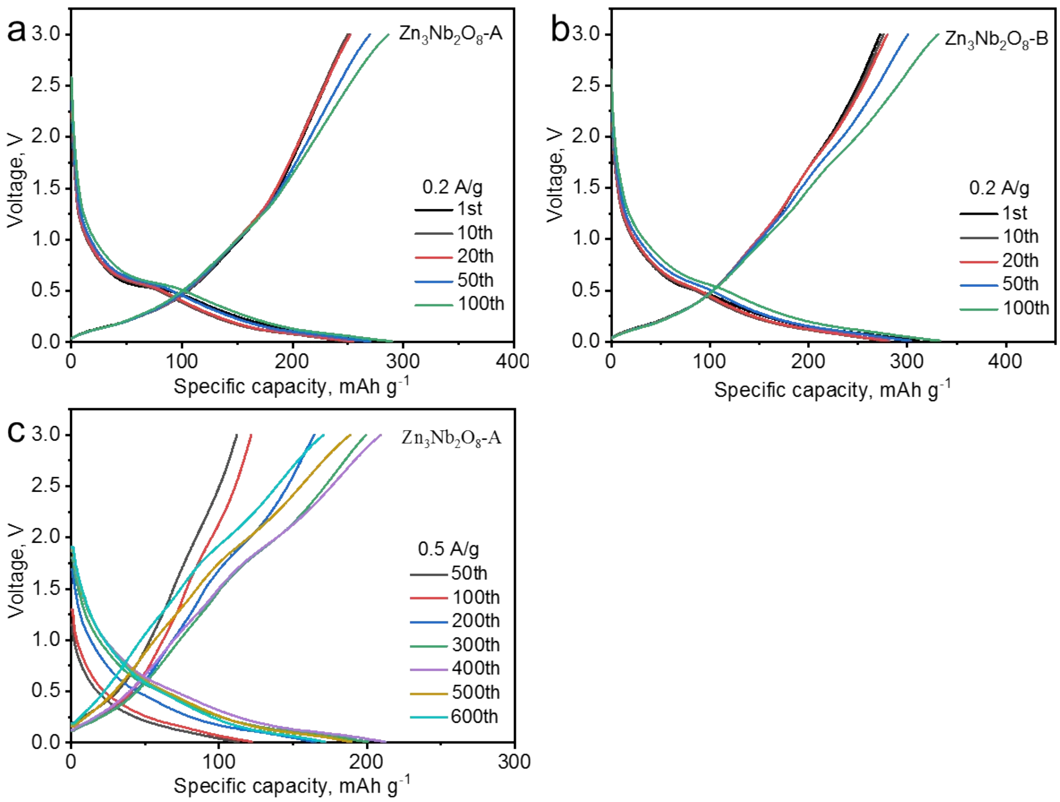

Figure S7. Discharge and charge curves of (a) $Zn_3Nb_2O_8$-A and (b) $Zn_3Nb_2O_8$-B at a current density of 0.2 A g^{-1}; (c) Discharge and charge curves of $Zn_3Nb_2O_8$-A at a current density of 0.5 A g^{-1}

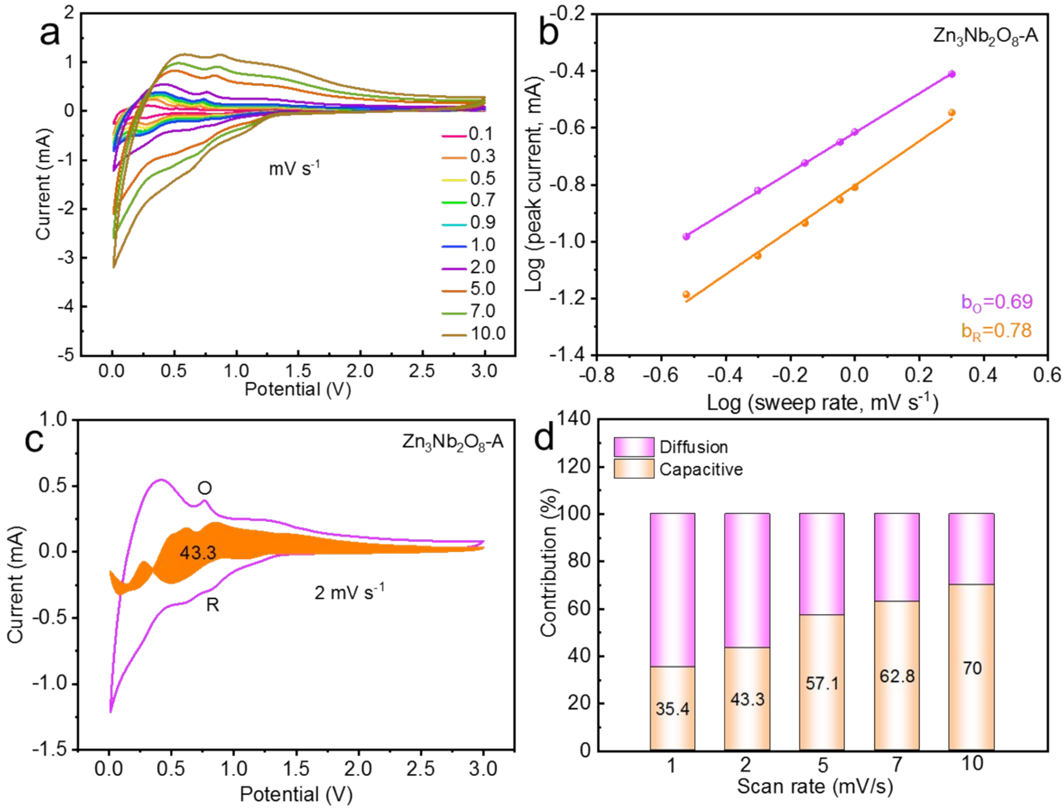

Figure S8. (a) CV curves of $Zn_3Nb_2O_8$-A from 0.1 to 10.0 mV s^{-1}; (b) Plots of log(i) vs. log(v) of the $Zn_3Nb_2O_8$-A/Li cell; (c) The pseudo-capacitive contribution of $Zn_3Nb_2O_8$-B electrode at the sweep rate of 2 mV s^{-1}; (d) Contribution ratios of diffusion- and capacitive- controlled capacities at different scan rates.

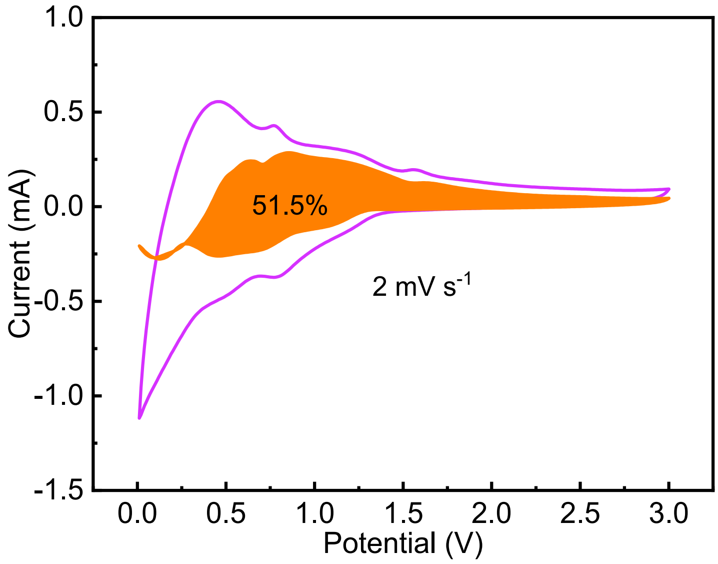

Figure S9. The pseudo-capacitive contribution of Zn3Nb2O8-B electrode at the sweep rate of 2 mV s-1;

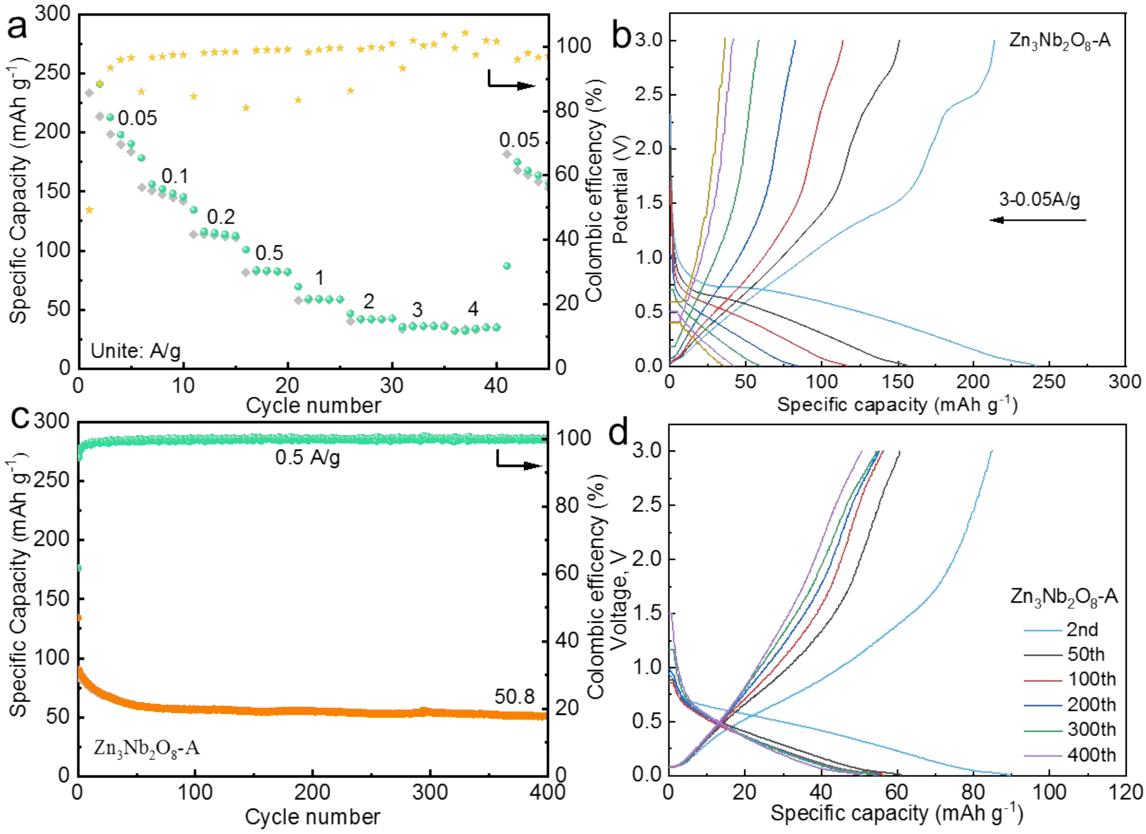

Figure S10. (a) Rate performances of $Zn_3Nb_2O_8$-A at different current densities for SIBs; (b) Galvanostatic discharge and charge curves of $Zn_3Nb_2O_8$-A at different current densities from 0.05 to 3.0 A g^{-1}. (c) Cycling performances of $Zn_3Nb_2O_8$-A at a current density of 0.5 A g^{-1}; (d) Discharge and charge curves of $Zn_3Nb_2O_8$-A at a current density of 0.5 A g^{-1};

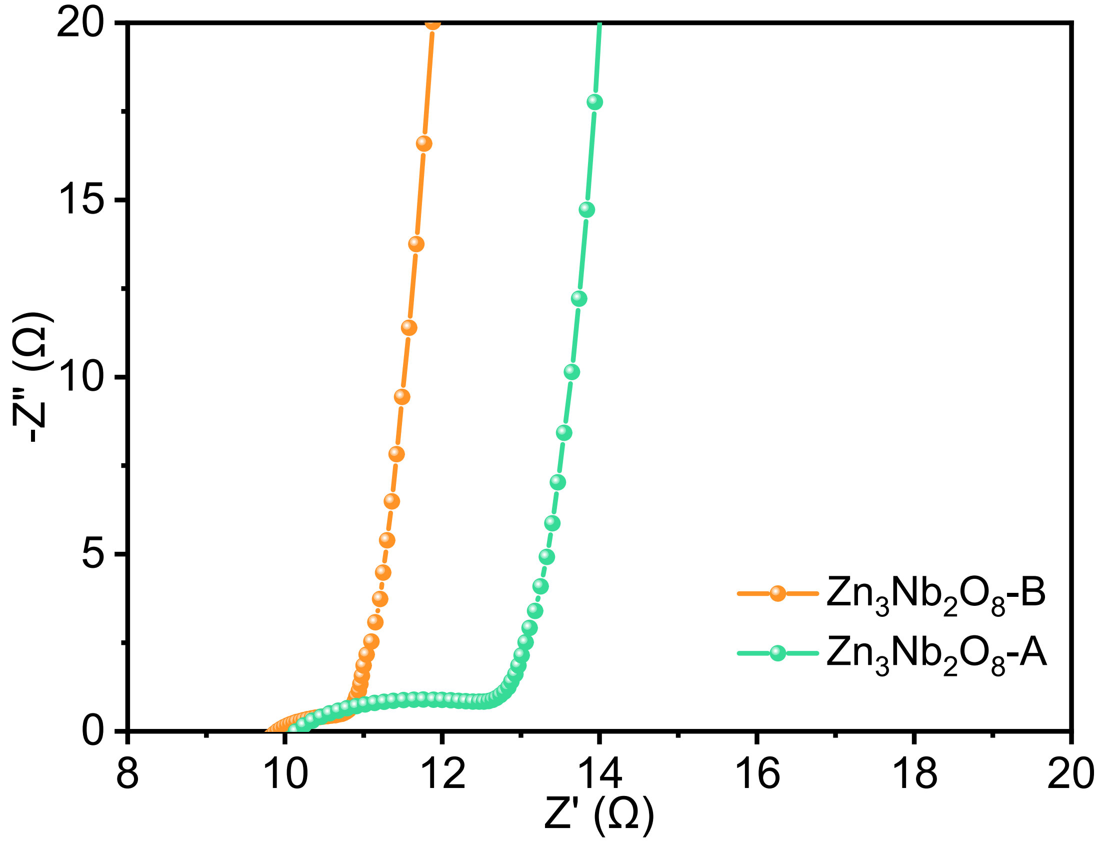

Figure S11. Nyquist plots of $Zn_3Nb_2O_8$-A and $Zn_3Nb_2O_8$-B

Table S1. Electrochemical energy storage performances of the reported Nb-based for the application in LIBs.

Anode	Current density (mA g^{-1})	Cycling stability (mAh g^{-1})-capacity retention	Current density (mA g^{-1})/ capability (mAh g^{-1})	Potential (V)	Ref.
Nb_2O_5	50	60.0 after 100 cycles (98%)	1000/16	0.01-3.0	[1]
$K_6Nb_{10.8}O_{30}$	100	150.0 after 400 cycles (80%)	800/50	0.5-3.0	[2]
ZnNb2O6	100	181.9 after 100 cycles (50%)	5000/18	0.005–3.0 V	[3]
VNb_9O_{25}	100	205.0 after 600 cycles (94.2%)	1000/105	1.0-3.0	[4]
Bi5Nb3O15	100	212.1 after 100 cycles (66.4%)	700/88.2	0.01-3.0	[5]
$TiNb_2O_7$@C	100	225.2 after 500 cycles (75.6%)	3880/157.9	0.01-3.0	[6]
$CrNb_{49}O_{124}$	200	190.0 after 500 cycles (66%)	500/198.0	1.0-3.0	[7]
SnNb2O6@C	500	102.5 after 800 cycles (41%)	10000/67	0.01-3.0	[8]
GeNb18O47	500	162.1 after 200 cycles (94.6%)	1000/123.2	1.0-3.0	[9]
$WNb_{12}O_{33}$	700	140.0 after 700 cycles (86.1%)	700/115	1.0-3.0	[10]
$Zn_3Nb_2O_8$	500	291.7 after 650 cycles (139.5%)	4000/91.4	0.01-3.0	This work

References:

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