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

Supporting Information

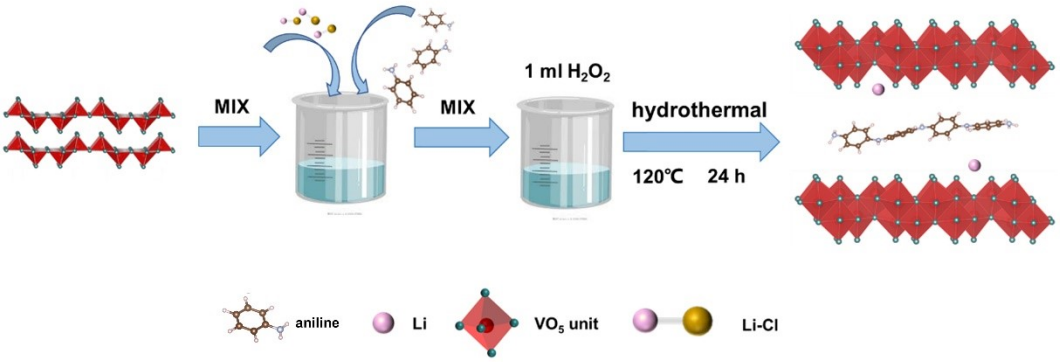

Figure S1 Schematic diagram of the preparation processes of the LPVO architectures.

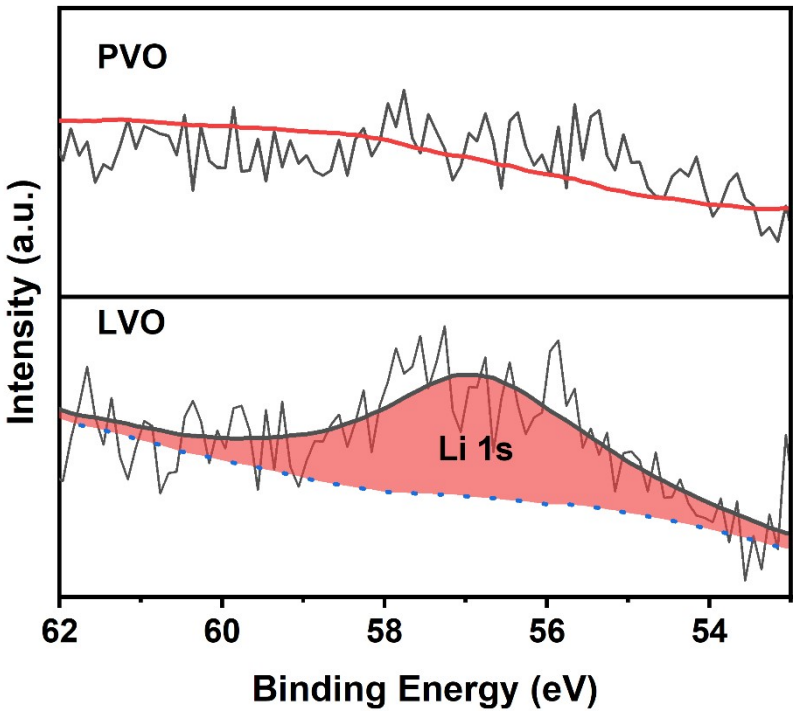

Figure S2 The Li 1s XPS spectrum of PVO and LVO.

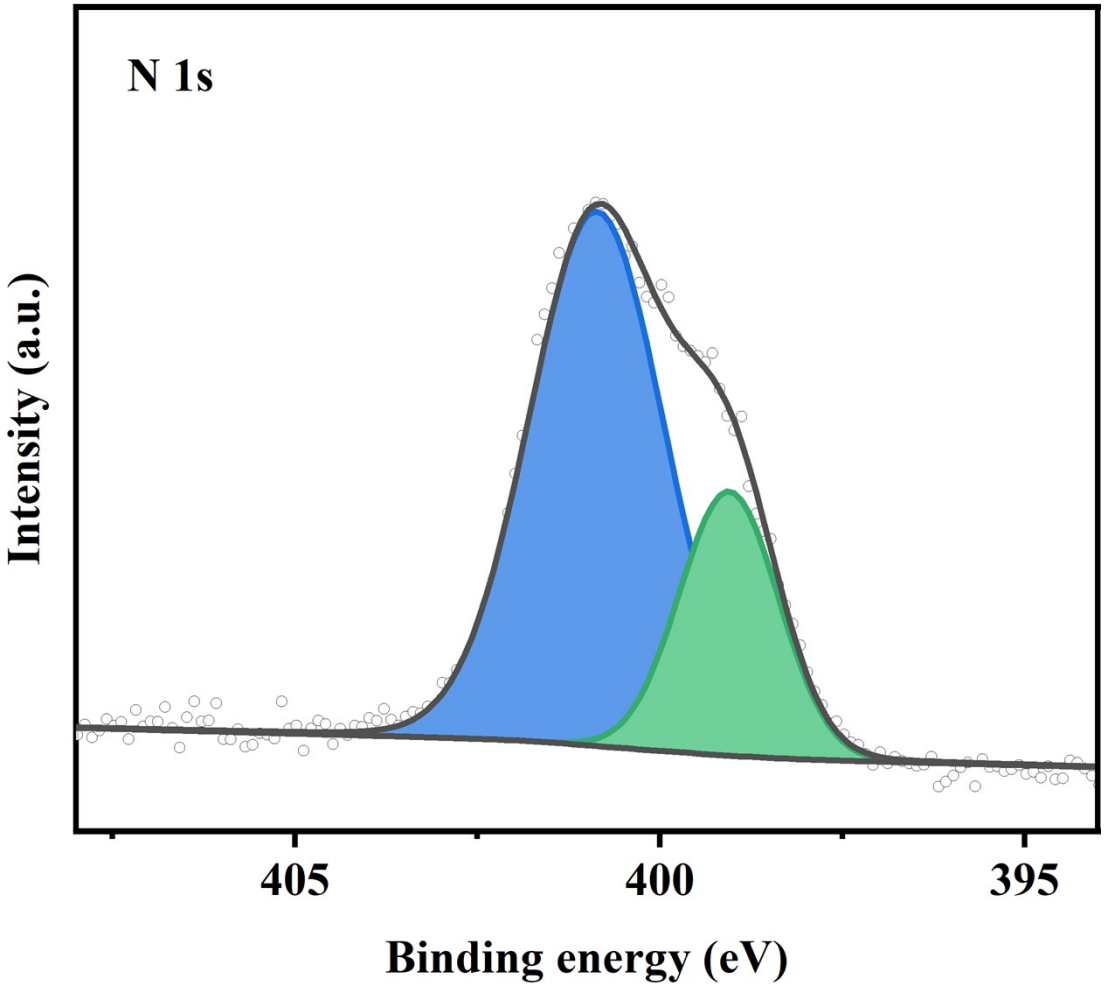

Figure S3 The N1s XPS spectrum of LPVO.

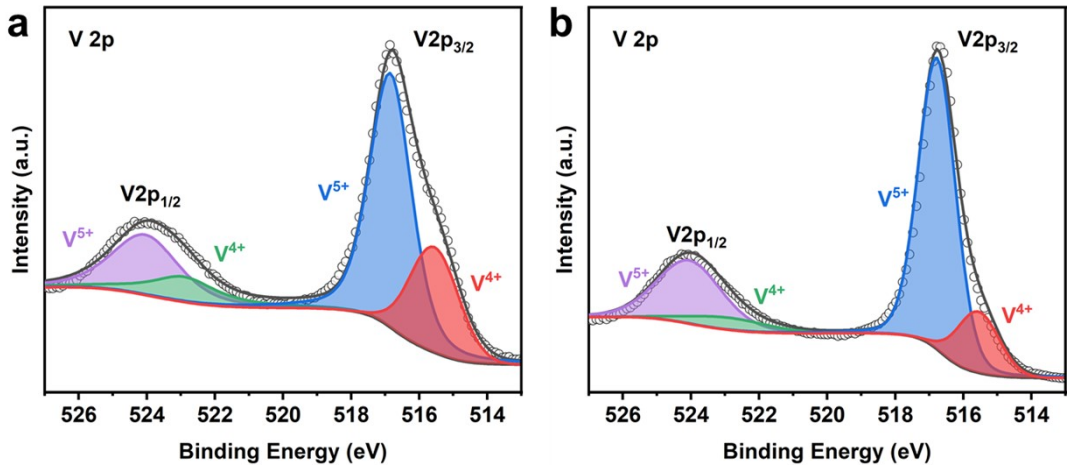

Figure S4 The V 2p XPS spectrum of PVO(a) and LVO (b).

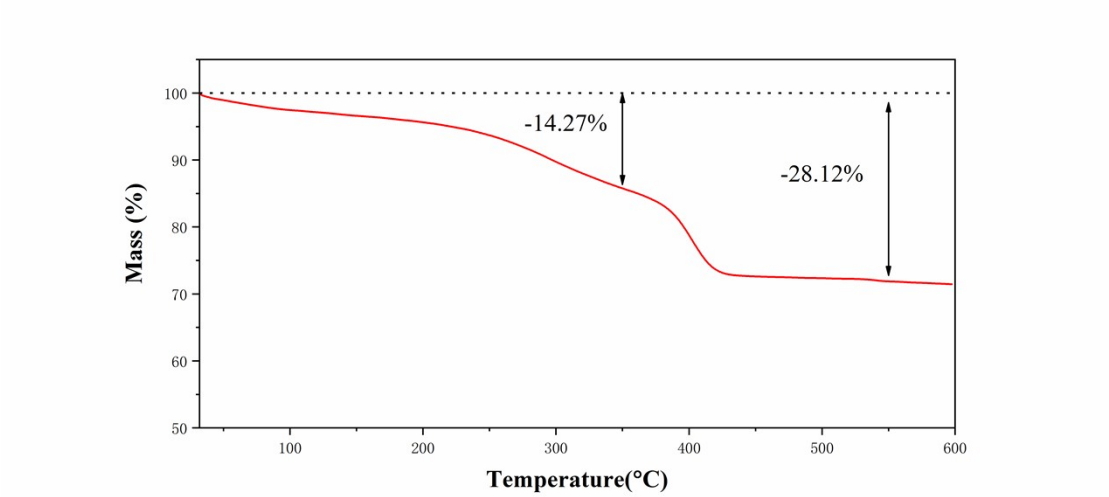

Figure S 5 The TGA curves of LPVO cathode.

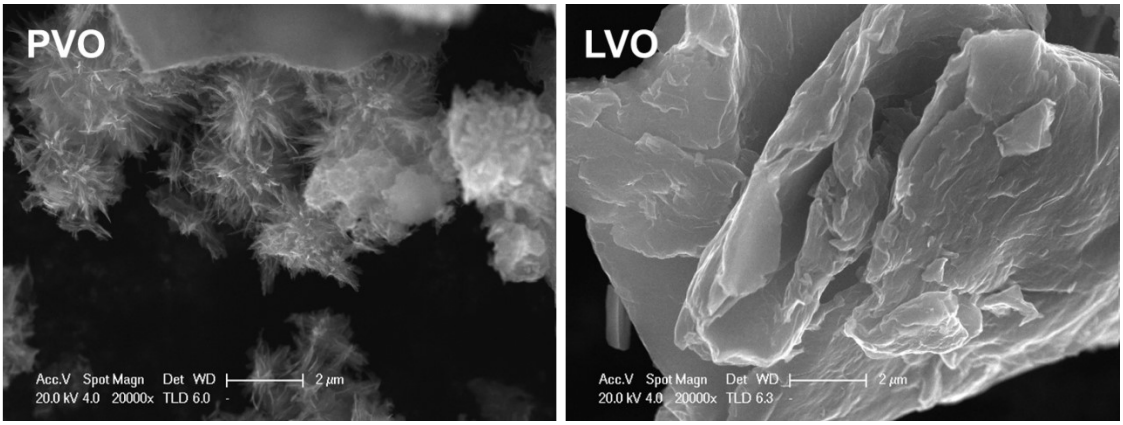

Figure S6 SEM images of PVO and LVO.

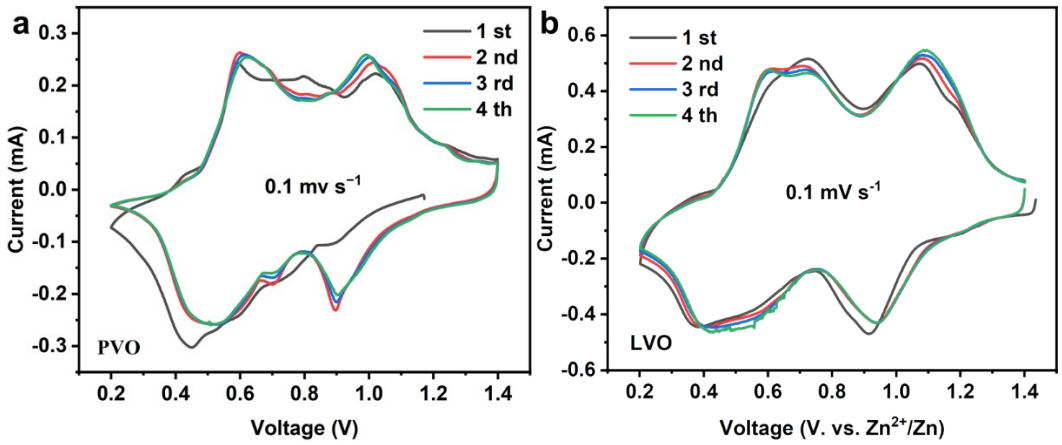

Figure S7 CV curves of PVO (a) and LVO (b).

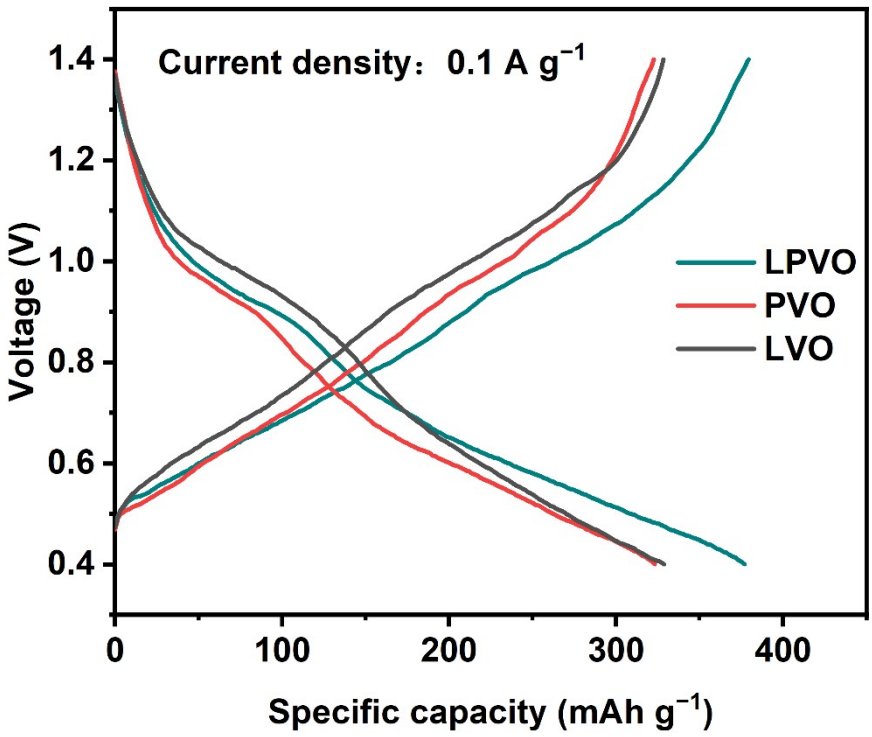

Figure S8 Galvanostatic charge–discharge profiles at 0.1 A g−1 of LPVO, PVO and LVO.

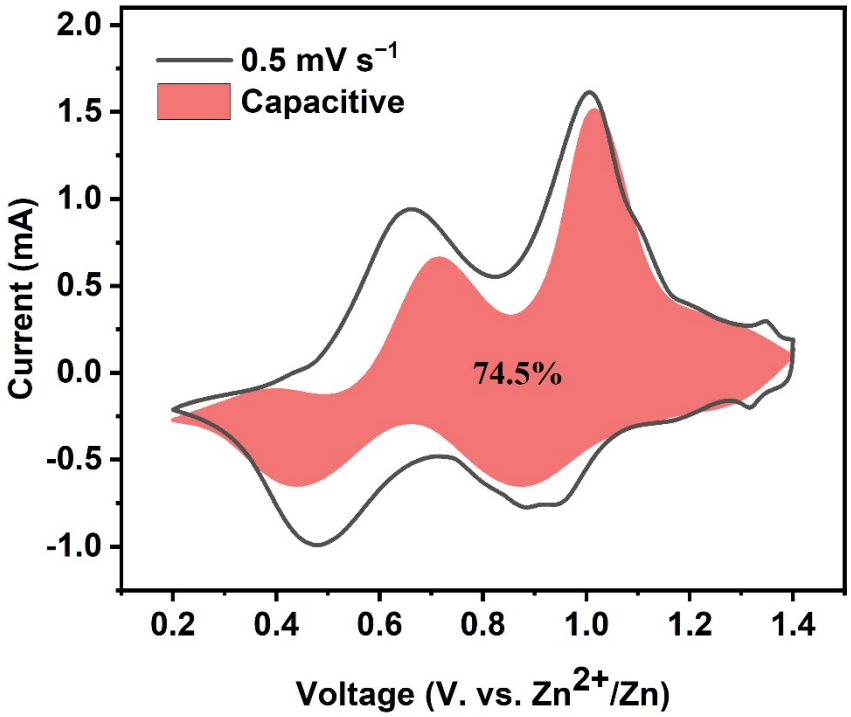

Figure S9 Capacitive behaviors and intercalation reaction contributions of LPVO at 0.5 mVs^{-1}.

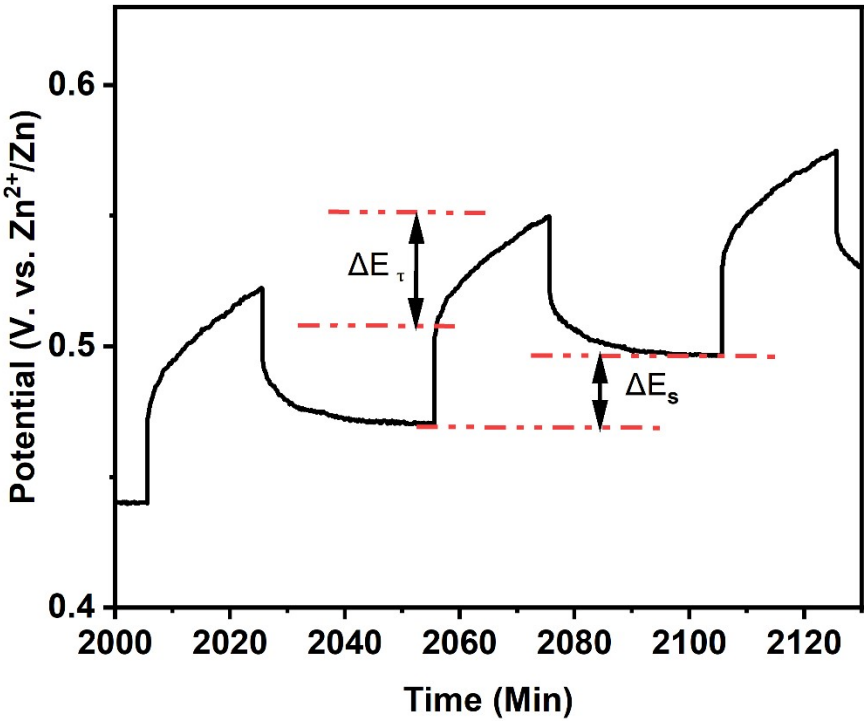

Figure S 10 The selected steps of GITT during the charging process of LPVO.

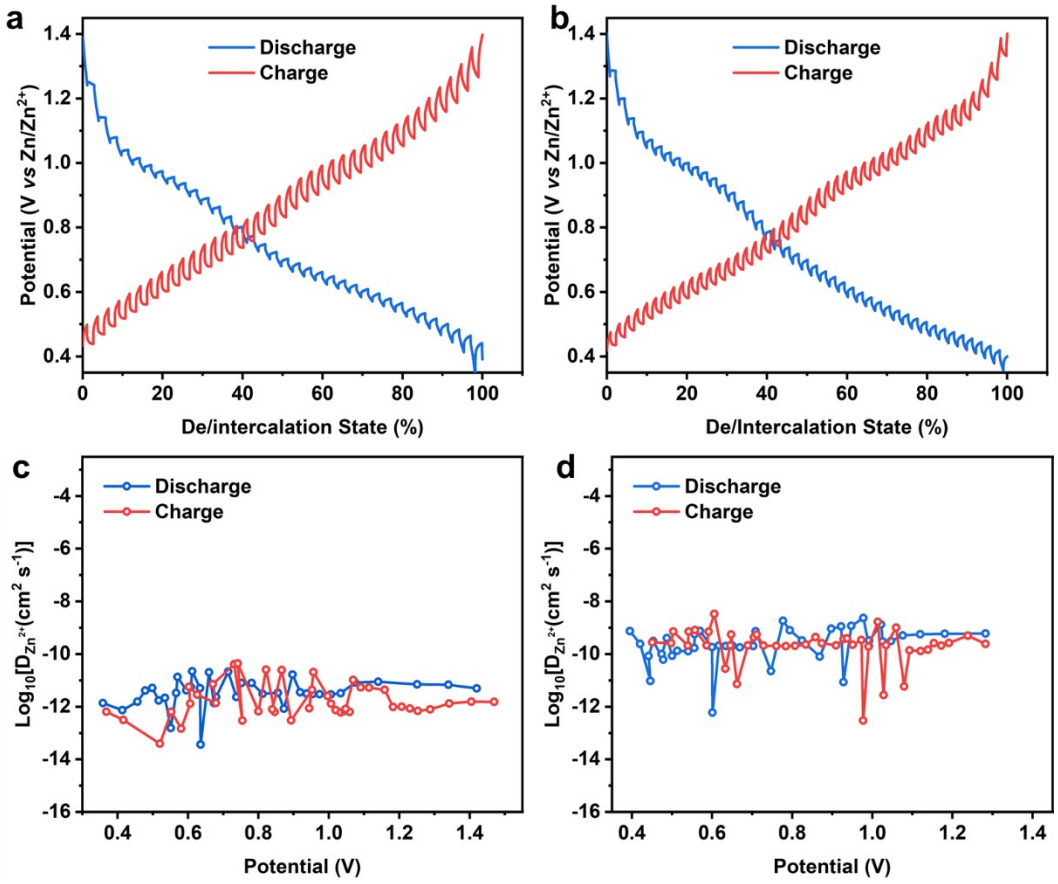

Figure S11 Galvanostatic intermittent titration technique (GITT) curves at the current density of 0.2 A g^{-1} of LVO (a) and PVO (b); and the corresponding Zn^{2+} diffusion coefficient of LVO (c) and PVO (d) at various states of charging and discharging process.

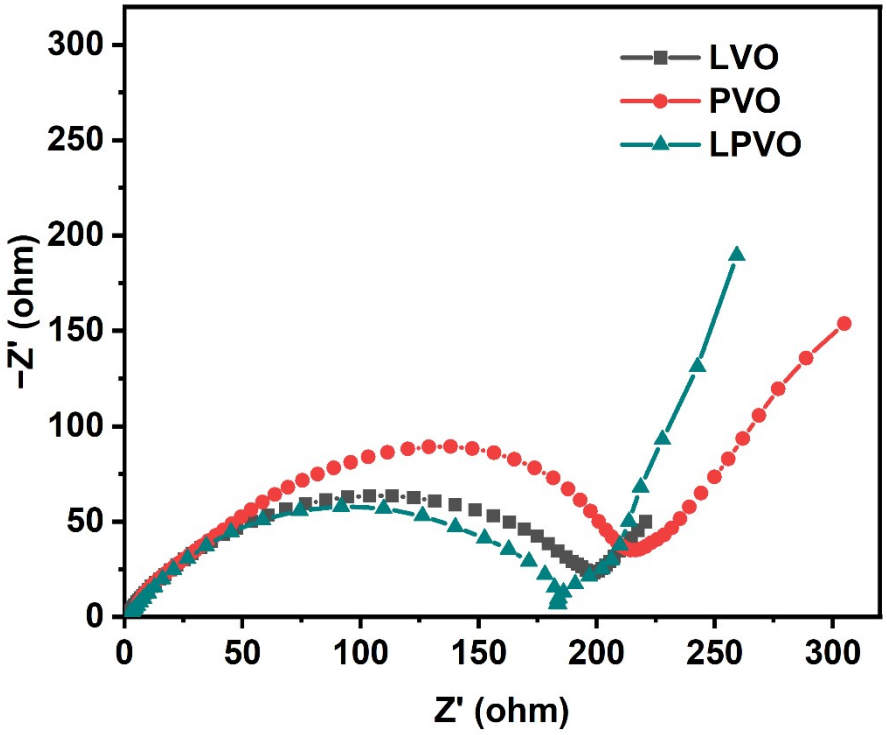

Figure S 22 Nyquist plots of three samples before cycling.

Table S1 The lattice space of (001) in various vanadium cathode.

cathode	Lattice space of (001) (nm)
$Na_2V_6O_{16}·1.63H_2O$[1]	0.79
$LixV_2O_5·nH_2O$[2]	1.37
$K_{0.5}V_2O_5·0.76H_2O$[3]	0.94
K^+ stabilized hydrated vanadate (KVOH)[4]	0.99
$Zn_{0.25}V_2O_5·nH_2O$[5]	1.29
$Mg_{0.34}V_2O_5·0.84H_2O$[6]	1.34
$Ca_{0.25}V_2O_5·nH_2O$[7]	1.41
$Mn_{0.15}V_2O_5·nH_2O$8	1.33
MnVO9	1.29
δ-$Ni_{0.25}V_2O_5$. nH_2O10	1.03
$Mg_{0.23}V_2O_5·1.0H_2O$[11]	1.39
$V_2O_5·nH_2O$[12]	1.26
Polyaniline intercalated vanadium oxide (PVO)[13]	1.40
$V_2O_5·0.3C_6H_6N·1.5H_2O$[14]	1.42
PANI-intercalated V2O515	1.39
PEDOT-$NH_4V_3O_8$[16]	0.83
$NaCa_{0.6}V_6O_{16}·3H_2O$[17]	1.08

Table S2 The redox pairs and voltage differences in both three samples

Sample	Redox pairs (V)	difference
LPVO	0.99/0.90	0.09
	0.60/0.52	0.08
PVO	0.99/0.90	0.09
	0.62/0.50	0.12
LVO	1.09/0.94	0.16
	0.71/0.37	0.34

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