

Electronic Supplementary Information for

## ***In-situ* soft chemistry synthesis of $\beta$ - $\text{Na}_{0.33}\text{V}_2\text{O}_5$ nanorods as high-performance cathode for lithium-ion batteries**

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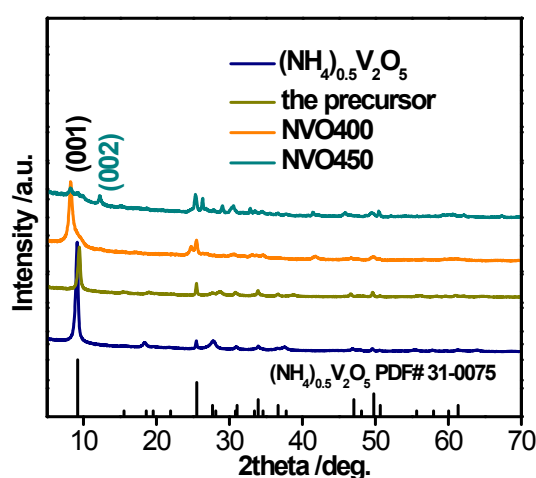


Fig. S1 XRD patterns of (NH<sub>4</sub>)<sub>0.5</sub>V<sub>2</sub>O<sub>5</sub>, Na-intercalated precursor and calcination products under 400 and 450 °C.

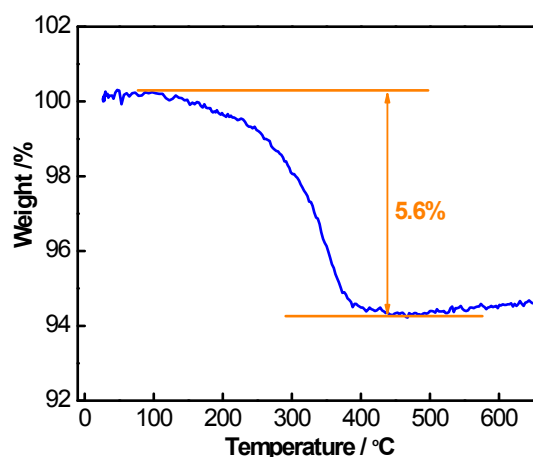
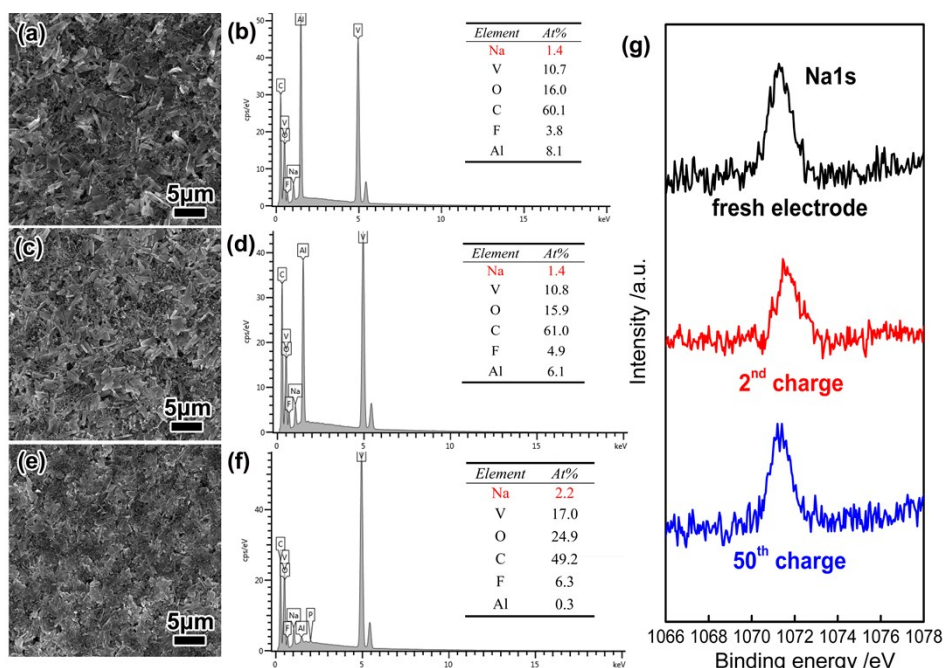
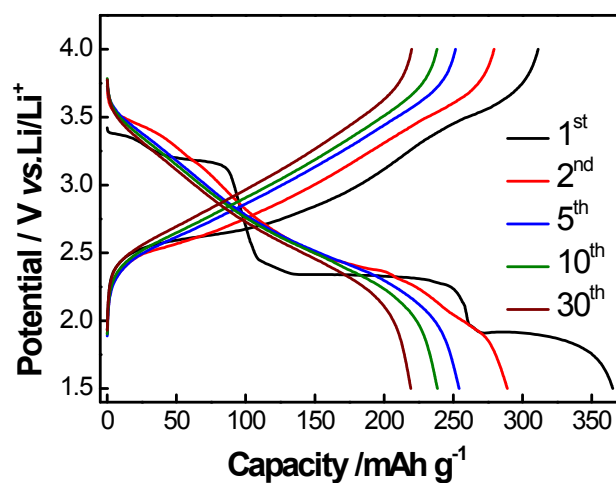


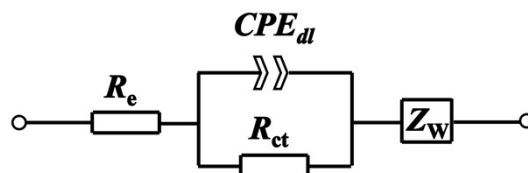
Fig. S2 TG curve of Na-intercalated precursor recorded at a ramping rate of 10 °C min<sup>-1</sup>.



**Fig. S3** SEM images, EDX and XPS spectra of NVO600 electrode under different states: (a, b) before cycling; (c, d) 2<sup>nd</sup> charge state; (e, f) 50<sup>th</sup> charge state. (g) Comparison of Na 1s spectra.



**Fig. S4** Charge-discharge curves of the V<sub>2</sub>O<sub>5</sub> electrode at current density of 60 mA g<sup>-1</sup>.



**Fig. S5** The equivalent circuit model for EIS analysis.

**Table S1.** Comparison of electrochemical performance for  $\beta$ -Na<sub>0.33</sub>V<sub>2</sub>O<sub>5</sub> cathode.

Electrode materials	Current density (mA g <sup>-1</sup> )	Voltage range (V)	Capacity after cycles (mAh g <sup>-1</sup> ) /cycle number	Capacity retention	Refs.
$\beta$ -Na <sub>0.33</sub> V <sub>2</sub> O <sub>5</sub> microspheres	1000	1.5–4.0	111 /35	70.7%	[S1]
mesoporous $\beta$ -Na <sub>0.33</sub> V <sub>2</sub> O <sub>5</sub>	50	1.5–4.0	177 /50	60.2%	[S2]
NaV <sub>6</sub> O <sub>15</sub> nanorods	50	1.5–4.5	297 /60	----	[S3]
highly crystalline $\beta$ -Na <sub>0.33</sub> V <sub>2</sub> O <sub>5</sub>	3.8	1.5–4.0	253 /70	89%	[S4]
Na <sub>0.33</sub> V <sub>2</sub> O <sub>5</sub> -graphene hybrids	150	1.5–4.0	310 /50	94.8%	[S5]
$\beta$ -Na <sub>0.33</sub> V <sub>2</sub> O <sub>5</sub> nanorods	60	1.5–4.0	182 /50	81.3%	This work

**Table S2.** EIS fitted results for NVO600 electrode after different cycles.

Cycles	1st	10th	20th	50th
$R_e / \Omega$	5.809	4.467	4.088	4.137
$R_{ct} / \Omega$	135.8	223.7	226.5	263.4

**References:**

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