Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information for:

Controlled Growth and Ion Intercalation Mechanism of Monocrystalline Niobium Pentoxide Nanotubes for Advanced Rechargeable Aluminum-Ion Batteries

Authors:

Lei Wang,[1,#] Huinan Lin,[1,#] Weihua Kong,[1] Yi Hu,[1] Renpeng Chen,[1] Peiyang Zhao,[1] Mohammadreza Shokouhimehr,[3] Xiao Li Zhang,[4] Zuoxiu Tie,[1] and Zhong Jin[1,2]*

Affiliations:

[1] *Key Laboratory of Mesoscopic Chemistry of MOE, School of Chemistry and Chemical Engineering, Nanjing University, Nanjing, Jiangsu 210023, China.*

[2] *Shenzhen Research Institute of Nanjing University, Shenzhen 518063, China.*

[3] *Department of Materials Science and Engineering, Research Institute of Advanced Materials, Seoul National University, Seoul 08826, Republic of Korea.*

[4] *School of Materials Science and Engineering, Zhengzhou University, Zhengzhou 450001, China.*

[#]*These authors contributed equally.*

*Address correspondence to: zhongjin@nju.edu.cn (Prof. Z. Jin).

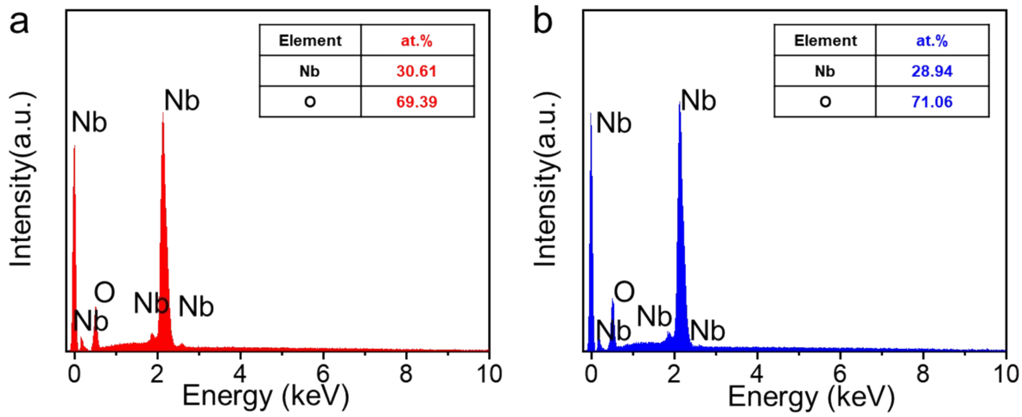

Figure S1. EDS analysis of (a) Nb_2O_5 nanotubes and (b) commercial Nb_2O_5, respectively. The insets are the corresponding calculated elemental contents.

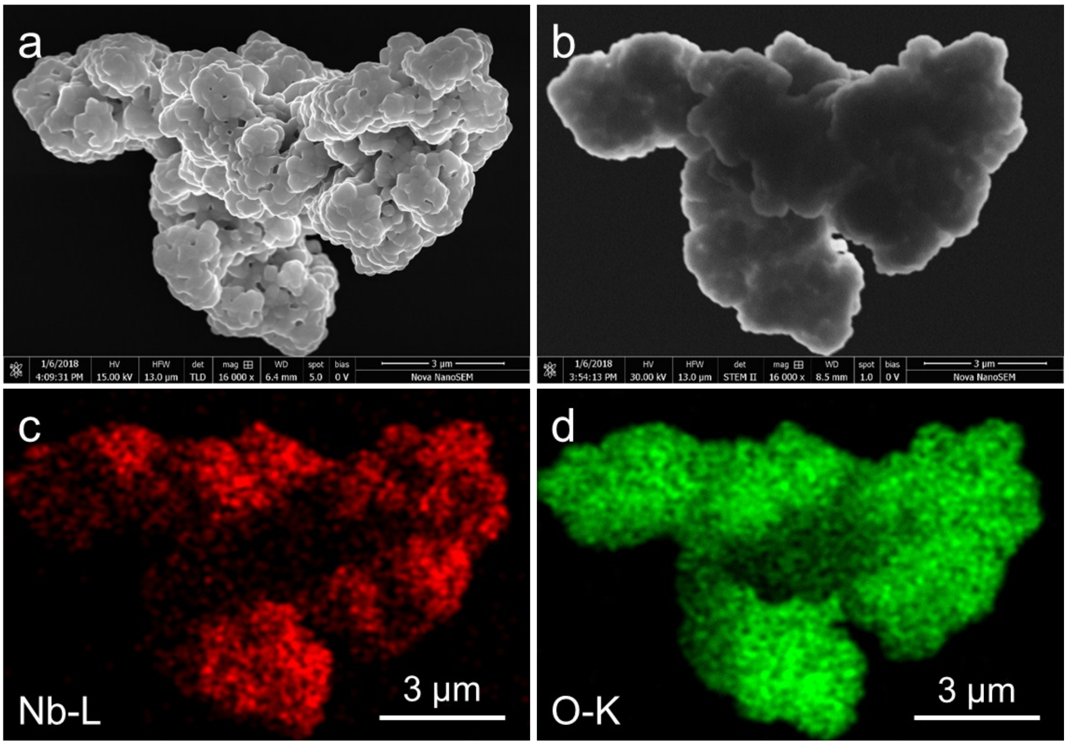

Figure S2. Morphology and composition characterizations of commercial Nb_2O_5 powder as a control sample. (a) SEM image, (b) HAADF-STEM image and (c-d) corresponding EDS elemental mappings of (c) Nb and (d) O, respectively.

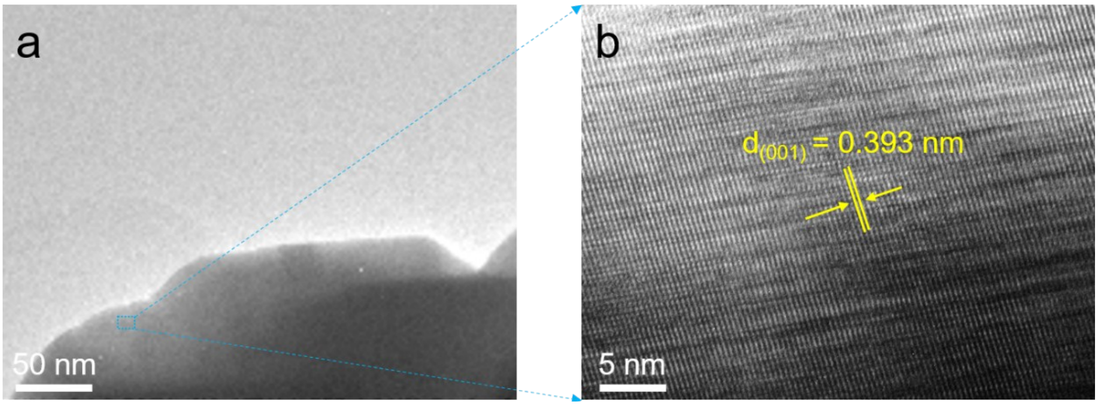

Figure S3. (a) TEM and (b) High-resolution TEM images of commercial Nb_2O_5 powder.

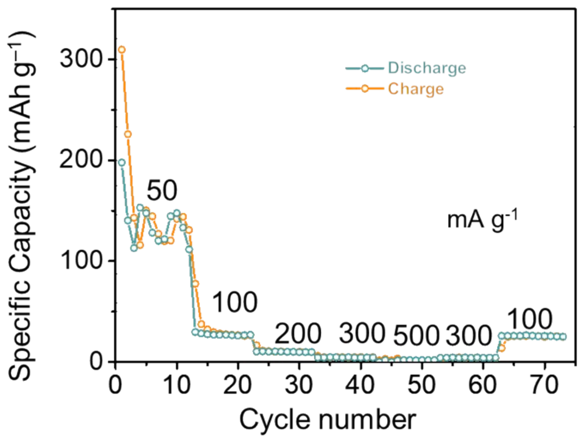

Figure S4. Rate performance of commercial Nb_2O_5 powder as cathode material in RAIBs.

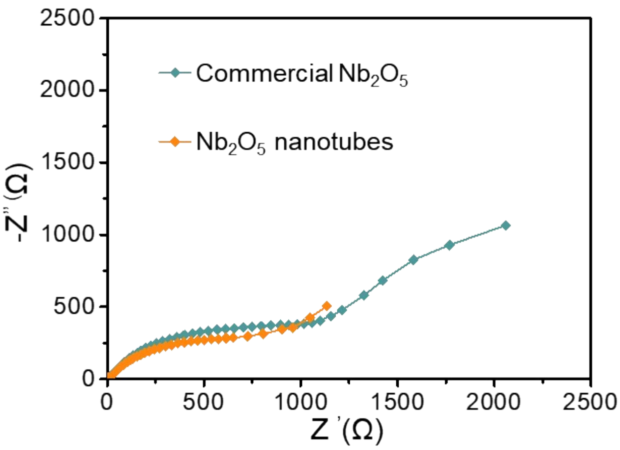

Figure S5. EIS analysis of freshly-assembled RAIBs based on Nb_2O_5 nanotubes and commercial Nb_2O_5, respectively.

Table S1. Electrochemical performance comparisons of Nb_2O_5 nanotubes with other previously-reported transition metal oxide or sulfide based cathode materials for RAIBs.

Ref.	Cathode material	Current density (mA/g)	Cycle number	Reversible capacity (mA h/g)
This work	**Nb_2O_5 nanotubes**	**25**	**2 (25 °C)**	**556 (25 °C)**
		100	**110 (25 °C)**	**113 (25 °C)**
			30 (50 °C)	**213 (50 ℃)**
S1	CuS@C microspheres	20	100	90
S2	Binder-free V_2O_5	44.2 (0.1 C)	5	≤190
S3	Amorphous V_2O_5/carbon	22.1 (0.05 C)	30	70
S4	VO_2	50	100	116
S5	$Al_xMo_{2.5+y}VO_{9+z}$	100	20	≤50
S6	MoS_2 microspheres	40	≤105	66.7
S7	Ni_3S_2@graphene	100	100	≈60
S8	Mo_6S_8	12	50	≈70
S9	TiO_2	20	3	≤120

Supporting References

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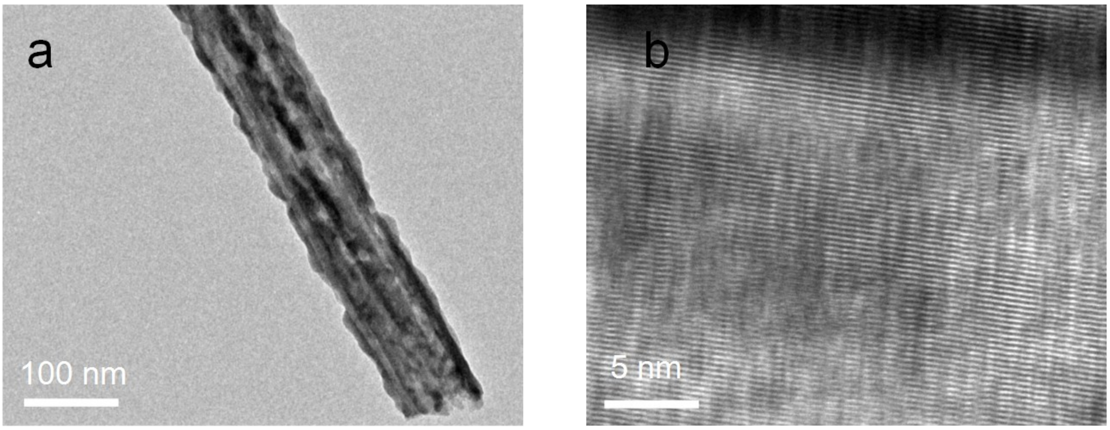

Figure S6. (a) TEM and (b) HRTEM images of a fully-discharged Nb_2O_5 nanotube after 2 charge/discharge cycles.