Ta-doped Nb_2O_5 with enhanced performance for lithium-ion batteries

Shuyu Wang, Shuoqing Zhao, Lijiang Zhao, Xinghua Liu, Xungang Diao, Huiwu Long and Junying Zhang**

Dr. Ms. S.Y. Wang, L.J. Zhao, Ms. X.H. Liu, Prof. J.Y. Zhang
School of Physics, Beihang University, Beijing 100191, China.
E-mail: zjy@buaa.edu.cn
Prof. S.Q. Zhao
Key Laboratory of Physics and Technology for Advanced Batteries (Ministry of Education), College of Physics, Jilin University, Changchun, 130012, Jilin, China.
E-mail: shuoqingzhao@jlu.edu.cn
Dr. L.J. Zhao, Prof. X. G. Diao
School of Energy and Power Engineering, Beihang University, Beijing 100191, China.

Dr. H. Long
College of Materials Science and Engineering, Chongqing University, Chongqing 400044, China.
E-mail: huiwu_long@126.com

Supplementary Figures

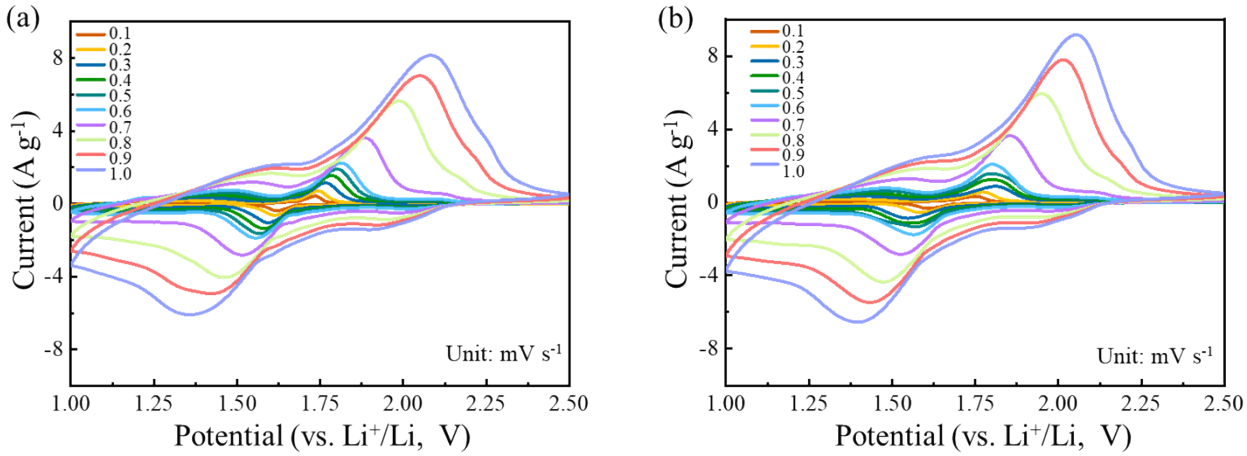

Figure S1. CV curves of Nb_2O_5 (a) and $Ta_{0.2}Nb_2O_{5.5}$ (b) at scan rate of 0.1 to 1.0 mV s^{-1}.

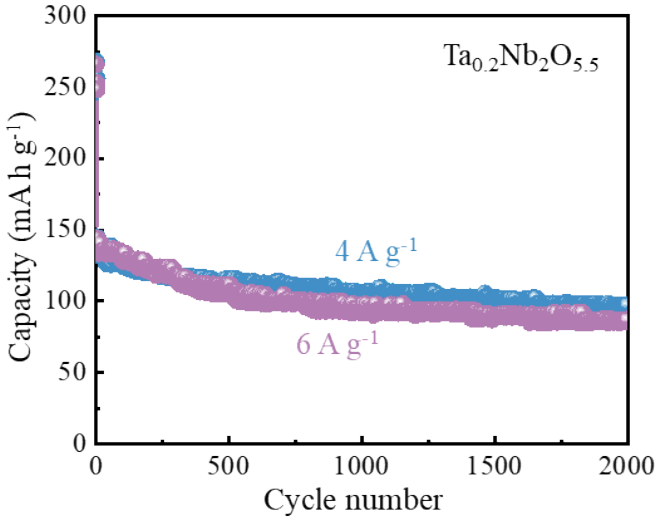

Figure S2. Cycling tests of $Ta_{0.2}Nb_2O_{5.5}$ at 4 A g^{-1} and 6 A g^{-1}.

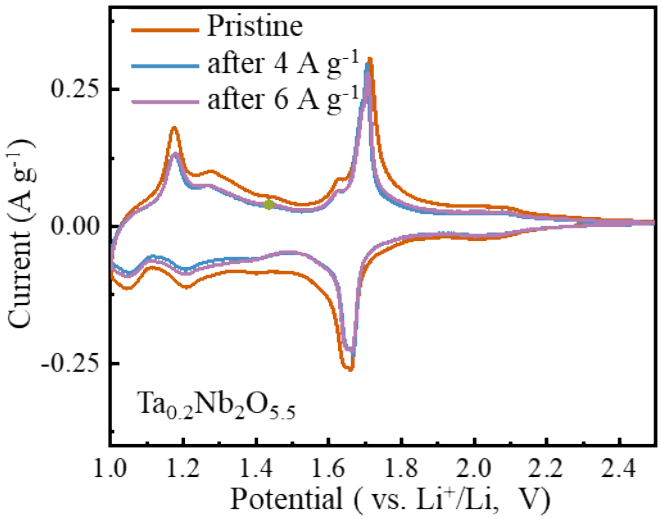

Figure S3. CV curves of $Ta_{0.2}Nb_2O_{5.5}$ before and after cycling at different current densities at scan rate of 0.1 mV s^{-1}.

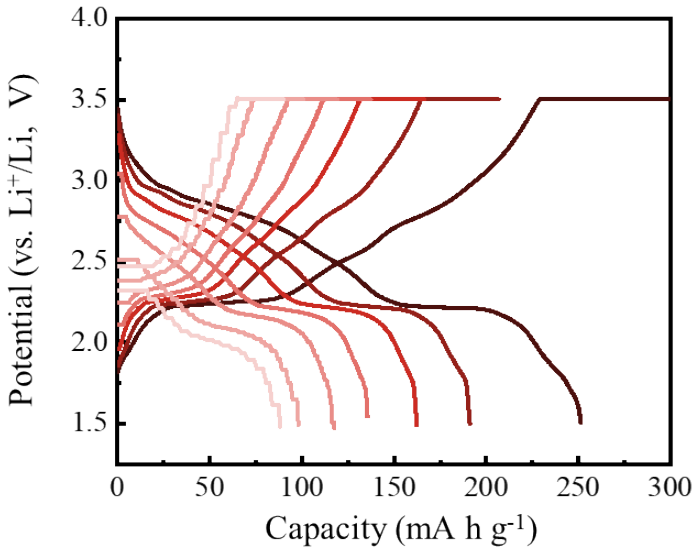

Figure S4. Charge-discharge voltage profiles of LCO//Nb_2O_5 at 0.1, 0.2, 0.5, 1, 2, 4 and 6 A g^{-1}.

Supplementary Tables

Table S1 Comparison among $Ta_{0.2}Nb_2O_{5.5}$ and other element-doped Nb_2O_5 anodes reported in literatures.

Materials	Characterized size (μm)	Electrode composition	Electrode density (mg cm^{-2})	High-rate capacity (mAh g^{-1})	Cycling capacity retention after cycles	Refs
$Ta_{0.2}Nb_2O_{5.5}$	**2.0 ~ 5.0**	**90:5:5**	**1.0 ~ 2.0**	**86 (20 A g^{-1}) 149 (4 A g^{-1})**	**64%, 1000 cycles (8 A g^{-1}) 86.8%, 1500 cycles (2 A g^{-1})**	**This work**
W^{6+}-doped Nb_2O_5	0.5 ~ 6	7:2:1	N/A	167.1 (20 C)	70.1%, 600 cycles (5 C)	[1]
Cu-doped Nb_2O_5	N/A	7:2:1	~1.0	144.2 (4 A g^{-1})	69.2%, 5000 cycles (1 A g^{-1})	[2]
$Nb_{1.94}Mo_{0.06}O_5$@C	0.02 ~ 0.2	8:1:1	3.0 ~ 4.0	132.3 (5 C)	90%, 100 cycles (0.2 C)	[3]
Phosphorus-doped urchin-like Nb_2O_5	3.0	7:2:1	~ 1.9	89 (10 C)	93.9%, 1000 cycles (5 C)	[4]
V-doped T-Nb_2O_5 sub-microspheres	~ 1.0	8:1:1	N/A	107 (10 C)	82.2%, 5000 cycles (5 C)	[5]
$KNb_6O_{15}F$-wired Nb_2O_5	0.1 ~ 1.0	7:2:1	~ 2.0	80 (20 C)	75%, 200 cycles (0.5 C)	[6]
Hierarchical flower-like N-doped Nb_2O_5@N-doped carbon composites	2.0 ~ 3.0	7:2:1	N/A	158 (20 C)	81%, 2500 cycles (10 C)	[7]

Note: in this work, 1C is approximately 0.2 A g^{-1}

Supplementary References

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