Supporting information

Understanding the Formation of Ultrathin Mesoporous $Li_4Ti_5O_{12}$ Nanosheets and Their Application for High-Rate, Long-Life Lithium-Ion Anodes

Dongdong Wang, [a,b] *Zhongqiang Shan,* [b] *Jianhua Tian* [b] *and Zheng Chen* [a,c,*]

[a]*Department of NanoEngineering, University of California San Diego, La Jolla, CA 92093*

[b]*School of Chemical Engineering and Technology, Tianjin University, Tianjin 300350, P. R. China*

[c]*Program of Materials Science and Engineering, University of California San Diego, La Jolla, CA 92093*

**Correspondence to: zhengchen@eng.ucsd.edu*

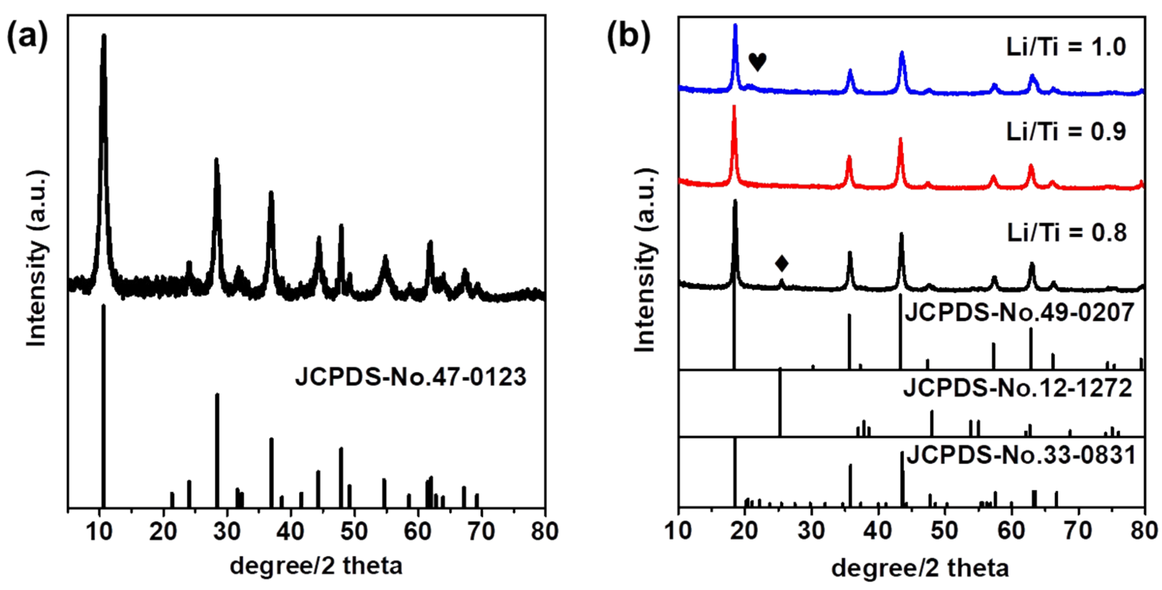

Fig. S1. XRD patterns of UM-LTONS precursor (a) and LTO samples synthesized with different Li/Ti molar ratios.

Table S1. ICP results of UM-LTONS precursor and UM-LTONS.

Samples	Li (wt%)	Ti (wt%)	Molar Ratio (Li/Ti)
UM-LTONS precursor	5.59%	42.62%	0.91
UM-LTONS	6.03%	52.10%	0.80

Table S2 Summary of the BET analysis results of the three UM-LTONS samples.

Samples	S_{BET} (m^2 g^{-1})	V_{Tot} (cm^3 g^{-1})
UM-LTONS-700	125.8	0.53
UM-LTONS-600	181.7	0.67
UM-LTONS-500	174.5	0.64

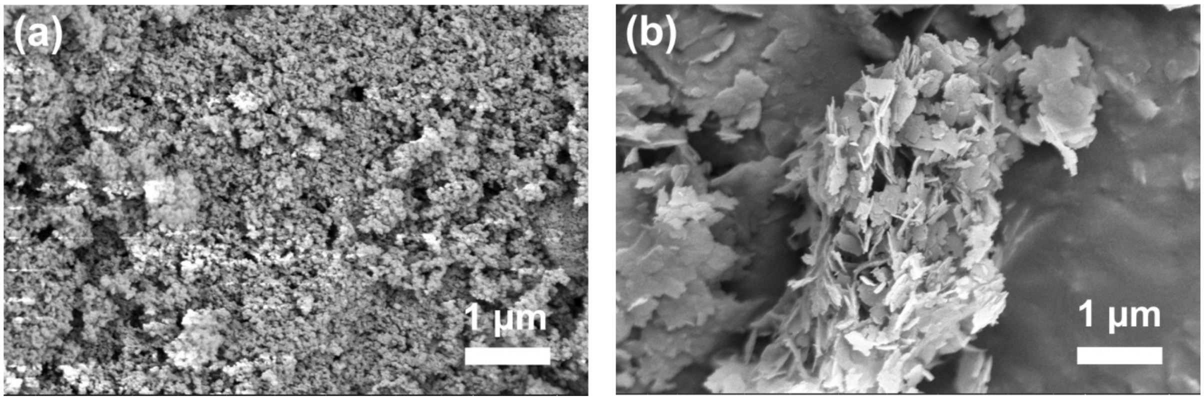

Fig. S2. SEM images of the LTO samples synthesized when the volume ratio between tert-butanol and water is increased to 2:1 (a) and is decreased to 1:2 (b).

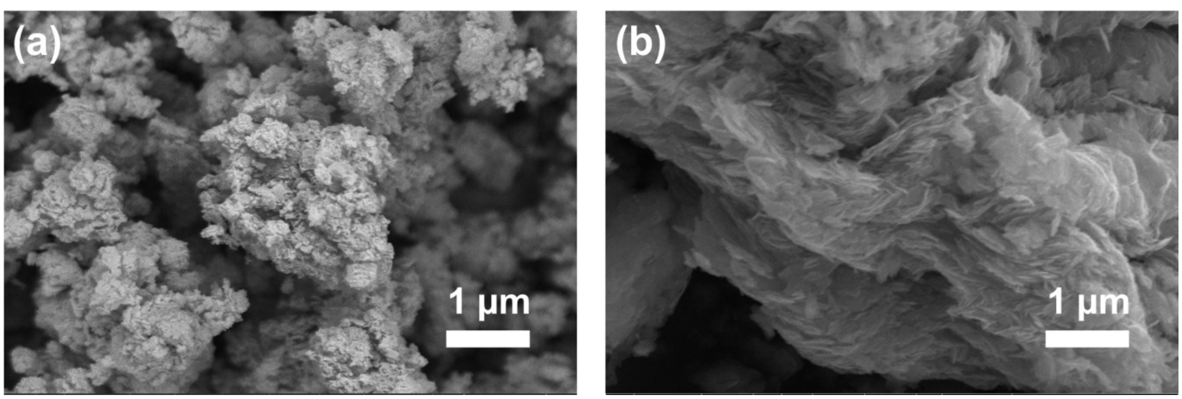

Fig. S3. SEM images of the LTO samples synthesized by keeping volume ratio between tert-butanol and water of 1:1 and solvothermal time of 12 hours: (a) without CTAB; (b) with CTAB.

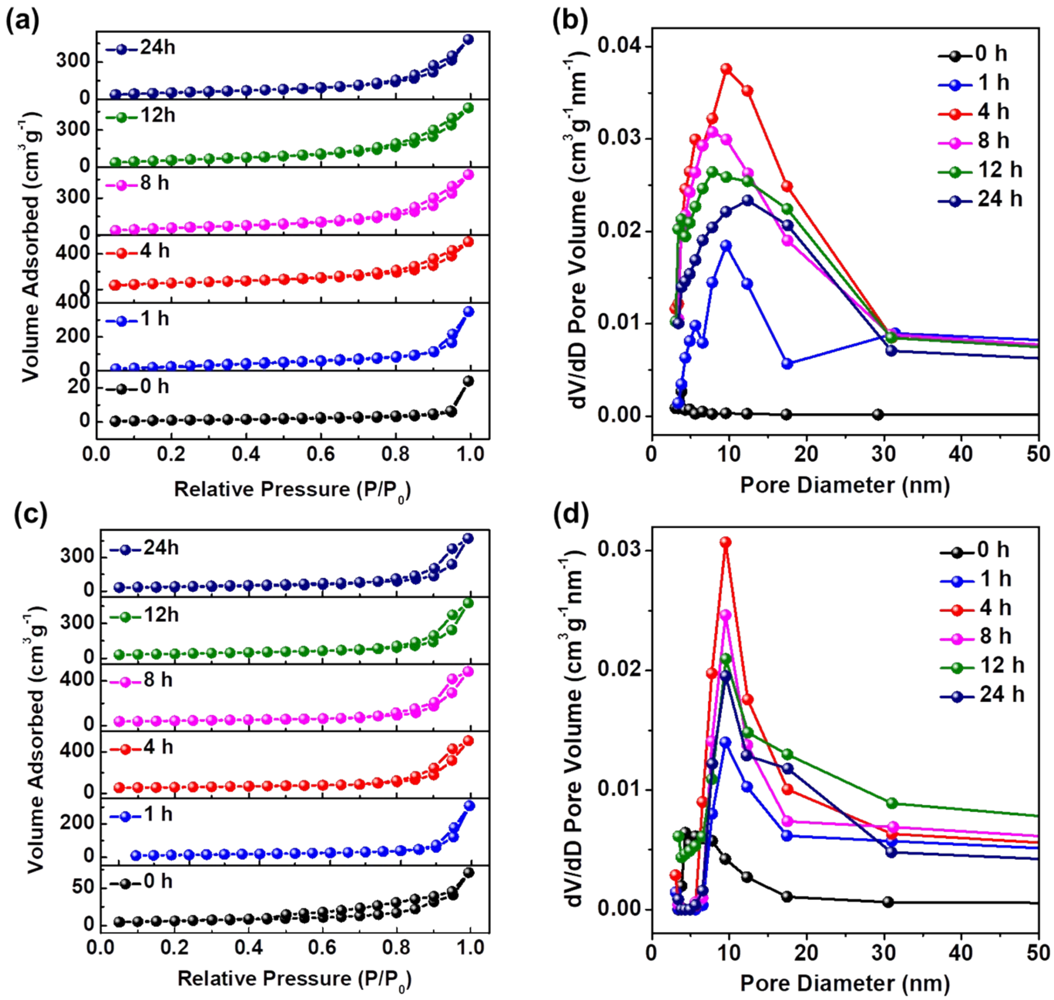

Fig. S4 Nitrogen adsorption-desorption isotherms (a) and pore size distribution curves (b) of obtained UM-LTONS precursors prepared from different solvothermal reaction times; Nitrogen adsorption-desorption isotherms (c) and pore size distribution curves (d) of the obtained UM-LTONS prepared from different solvothermal reaction times.

Table S3 Summary of the BET analysis results of obtained samples before and after calcination prepared from different solvothermal reaction times.

Solvothermal time (h)	Before Calcination		After Calcination	
	S_{BET} (m^2 g^{-1})	V_{Tot} (cm^3 g^{-1})	S_{BET} (m^2 g^{-1})	V_{Tot} (cm^3 g^{-1})
0	4.12	0.04	22.1	0.11
1	104.9	0.45	87.2	0.38
4	275.9	0.83	206.3	0.74
8	216.5	0.76	193.4	0.70
12	203.3	0.70	181.7	0.67
24	200.1	0.70	179.0	0.66

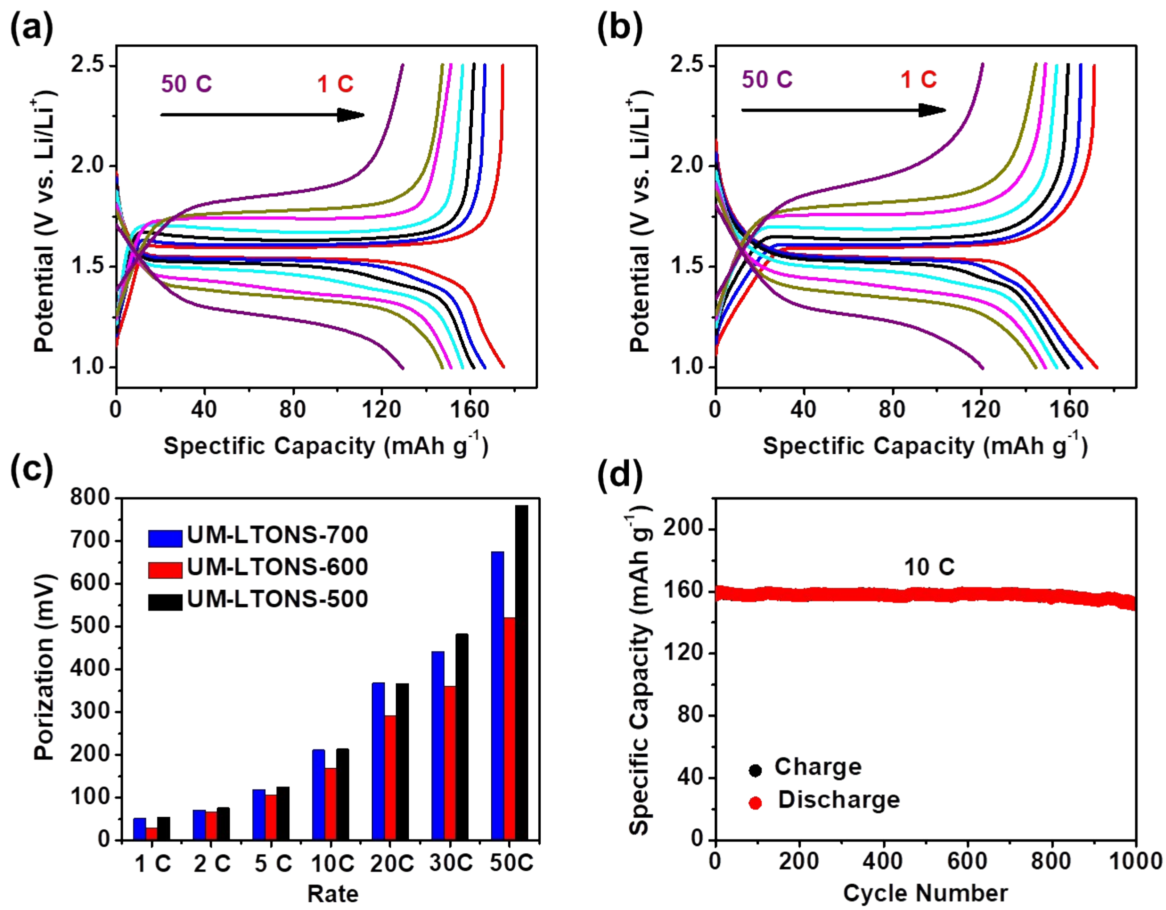

Fig. S5 Galvanostatic discharge-charge voltage profiles of UM-LTONS-700 (a) and UM-LTONS-500 (b) at different rates; (c) The polarization voltages of different UM-LTONS at different rates; (d) Cycle performance of the UM-LTONS-600 at rate of 10 C.

Table S4. Summary of the high-rate cycle performance of the UM-LTONS-600 and the state-of-the-art LTO-based nanosheets anode materials.

Samples	Cycle performance	Ref
Co-doped LTO nanosheets	1000 cycles at 50 C with 97% capacity retention	1
Wavelike LTO	150 cycles at 50 C with 92.7% capacity retention	2
Copper-Doped LTO-TiO_2 Nanosheets	500 cycles at 30 C with 90.3% capacity retention	3
Ti^{3+}-free three-phase LTO/TiO_2 nanosheets	1000 cycles at 4000 mA g^{-1} with 80% capacity retention	4
Ag quantum dots promoted LTO/TiO_2 nanosheets	500 cycles at 30 C with capacity retention of 93.3%	5
LTO/rutile TiO_2 nanosheets	500 cycles at 50 C with 93.1% capacity retention	6
UM-LTONS-600	**2500 cycles at 20 C with 95% capacity retention**	**This work**

Table S5 Summary of the EIS simulation results of the three UM-LTONS electrodes.

Elecrodes	R_s (Ω cm^{-2})	R_{ct} (Ω cm^{-2})	σ	D_{Li} (cm^2 s^{-1})
UM-LTONS-700	7.393	74.17	6.34	3.06×10^{-12}
UM-LTONS-600	4.546	33.42	2.08	2.85×10^{-11}
UM-LTONS-500	10.78	81.65	8.13	1.86×10^{-12}

References:

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