Electronic Supplementary Information

Super high-rate, long cycle life of europium modified carbon coated hierarchical mesoporous lithium titanate anode materials for lithium ion batteries

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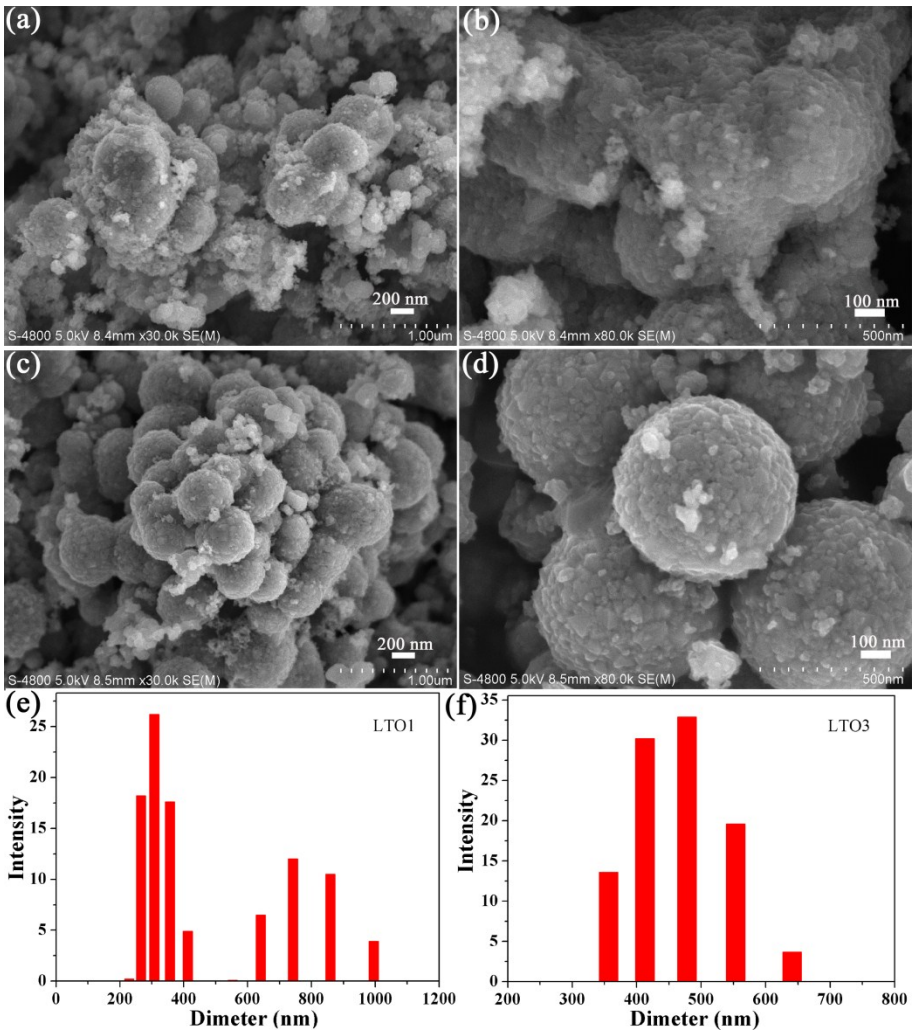

Fig. S1 SEM images of LTO1 (a,b) and LTO3 (c,d), particle size distributions of LTO1 and LTO3 images (e,f).

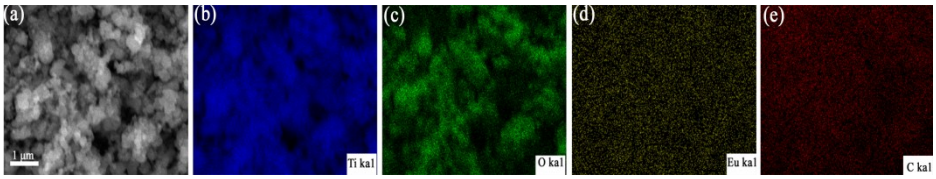

Fig. S2 FESEM image of LTO3 (a), and the corresponding EDX mapping images of the elements Ti (b), O (c), Eu (d) and C (e).

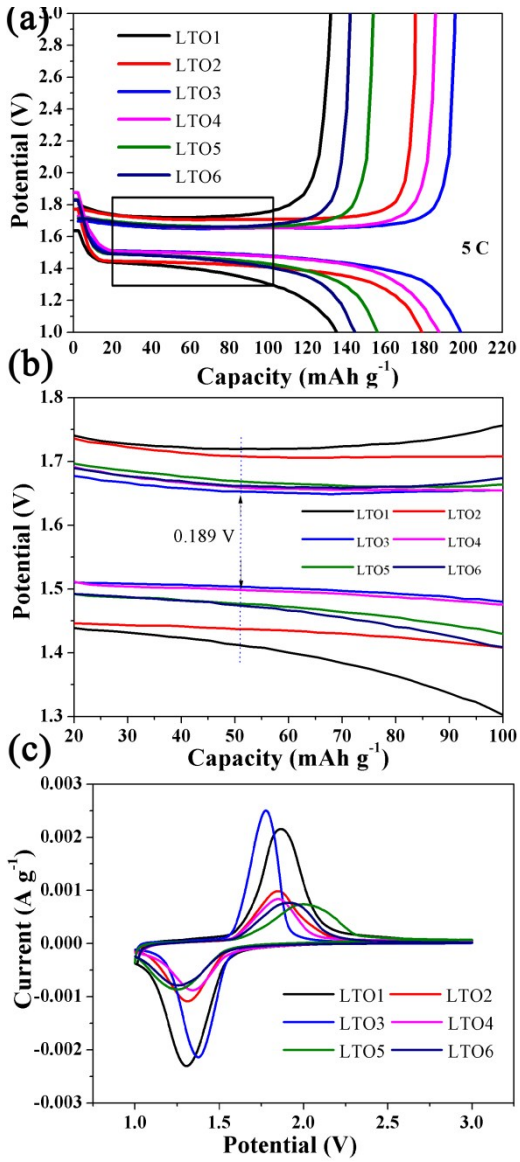

Fig. S3 Initial charge-discharge curves of the as-prepared samples at 5 C (a), with the inset showing a magnification (b) of the indicated region of (a), CVs of the as-prepared samples (c).

Table S1 Summary of the CV results for LTO1 and LTO3 obtained at different scanning rates from 1 mV s^{-1} to 5 mV s^{-1}.

Scanning rate ($mV\ s^{-1}$)	Potential values/V					
	LTO1-E_{pa1}	LTO1-E_{pc1}	LTO3-E_{pa1}	LTO3-E_{pc1}	LTO1-ΔE1	LTO3-ΔE1
1	1.864	1.305	1.779	1.372	0.559	0.407
2	1.937	1.209	1.846	1.309	0.728	0.537
3	1.979	1.150	1.912	1.257	0.829	0.655
4	1.998	1.105	1.950	1.224	0.893	0.726
5	2.010	1.050	1.983	1.194	0.960	0.789

Table S2 Summary of the CV results for LTO1 and LTO3 obtained at different scanning rates and the Li^+ diffusion coefficients. E_{pa}: anodic peak potential, E_{pc}: cathodic peak potential, ΔE: the separation between E_{pa} and E_{pc}.

Scanning rate ($mV\ s^{-1}$)	Potential values/V					
	LTO1-E_{pa1}	LTO1-E_{pc1}	LTO3-E_{pa1}	LTO3-E_{pc1}	LTO1-ΔE1	LTO3-ΔE1
0.5	1.819	1.361	1.723	1.420	0.458	0.303
0.6	1.820	1.354	1.742	1.412	0.466	0.330
0.7	1.835	1.342	1.749	1.397	0.493	0.352
0.8	1.846	1.327	1.757	1.387	0.519	0.370
0.9	1.853	1.316	1.764	1.382	0.537	0.382
1	1.868	1.298	1.779	1.372	0.570	0.407
D_{Li+} ($10^{-8}\ cm^2\ S^{-1}$)	0.941		7.45			

Table S3 Fitted results of the as-prepared materials by EIS.

Samples	R_s (Ω)	R_{ct} (Ω)
LTO1	3.18	266.30
LTO3	3.06	120.80