Supporting Information

Enhanced performance in hybrid perovskite solar cell by modification with spinel lithium titanate

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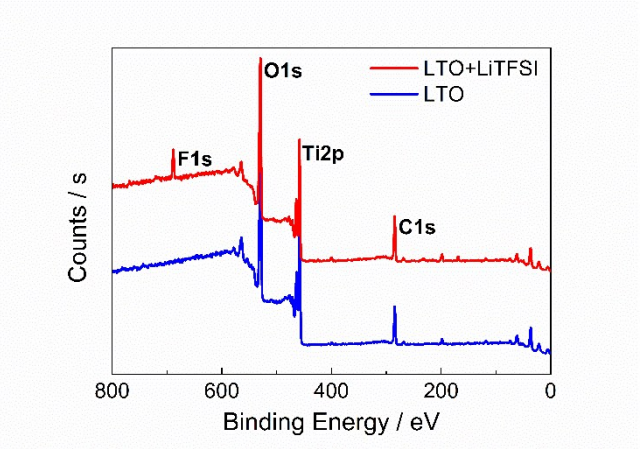

Figure S1. Overall XPS results of LTO after reaction with LiTFSI in HTM solution. The labelled F 1s peak is indicative of adsorbed $TFSI^-$ on the surface of reacted LTO.

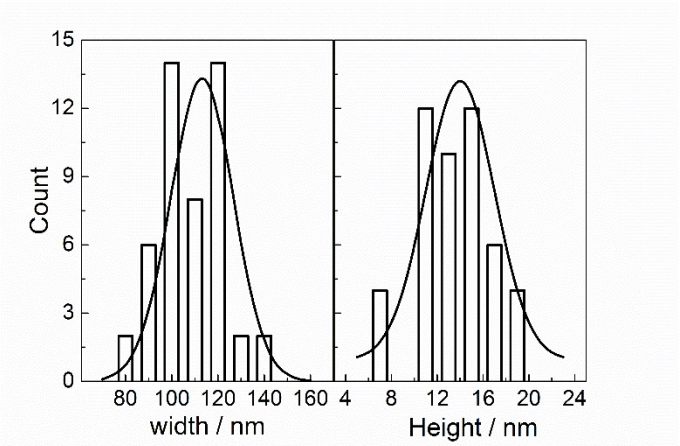

Figure S2. Size distributions of width and height of LTO nanosheets deposited on silicon substrate obtained from AFM measurements.

Table S1 Molar ratio of Ti/Li and corresponding Li composition in LTO and the reacted LTO derived from ICP-OES results

Samples	LTO	LTO + LiTFSI
Ti/Li	0.823	0.833
x in $Li_{4+x}Ti_5O_{12}$	0.12	0.18

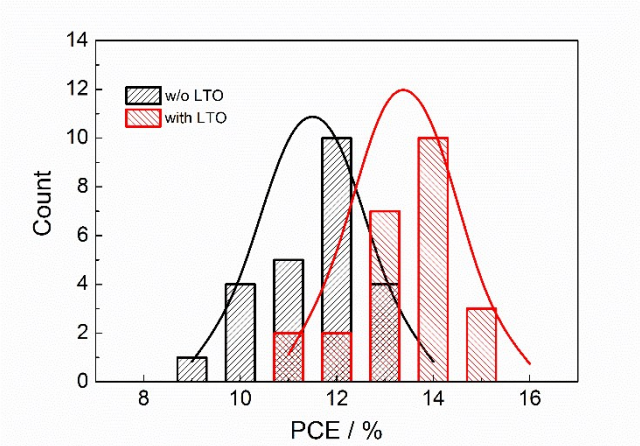

Figure S3. Histogram of conversion efficiencies for 24 samples of devices with (red) and without (black) LTO modification. With optimized concentration of LTO solution settled, the compact TiO_2 layer in these devices were prepared with ALD methods as stated in the experiment part.

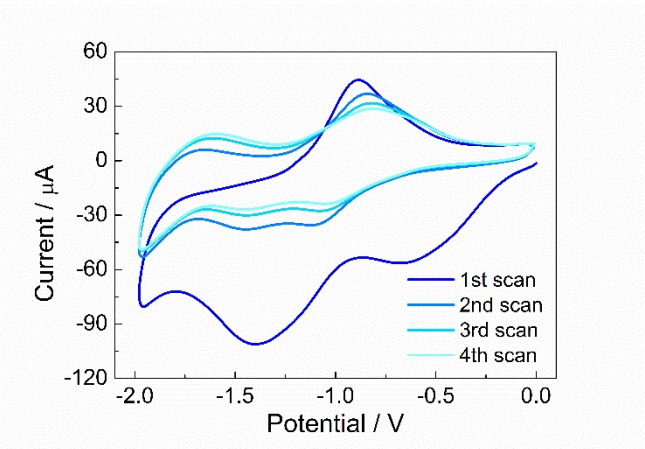

Figure S4. First four scans of CVs with LTO working electrode, Pt counter electrode and Ag reference electrode in 0.1M $LiClO_4$/acetonitrile at a scan speed of 50 mV/s.

Table S2 Photovoltaic parameters of devices with LTO and reacted LTO (r-LTO) modification from the same batch

Samples	V_{OC} / V	J_{SC} / mA·cm^{-2}	FF	PCE / %
Control group	0.94	20.21	0.65	12.2
LTO modification	1.00	20.85	0.72	15.0
r-LTO modification	0.96	20.34	0.71	13.9