

Figure S1. LSV curves of the Pt electrode in STD and 0.5% MDTD electrolytes recorded at a rate of $0.5 \text{ mV}\cdot\text{s}^{-1}$.

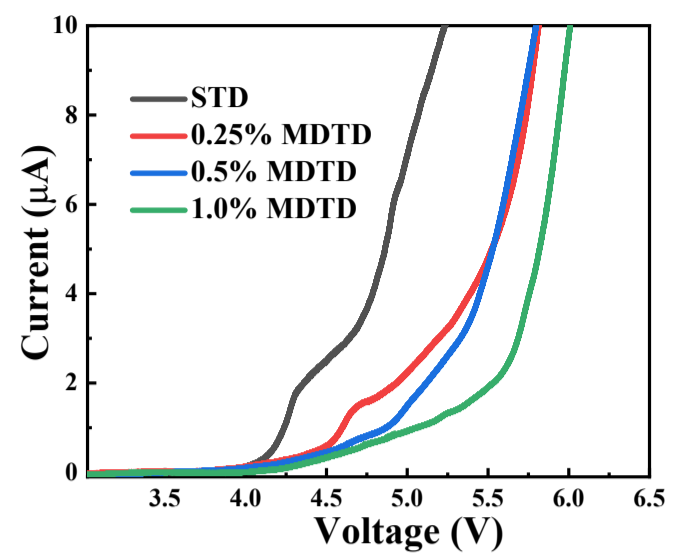


Figure S2. Charge–discharge curves of LNMO/Li half-cells in the (a) STD, (b) 0.25% MDTD, (c) 0.5% MDTD and (d) 1.0% MDTD electrolytes at different rates.

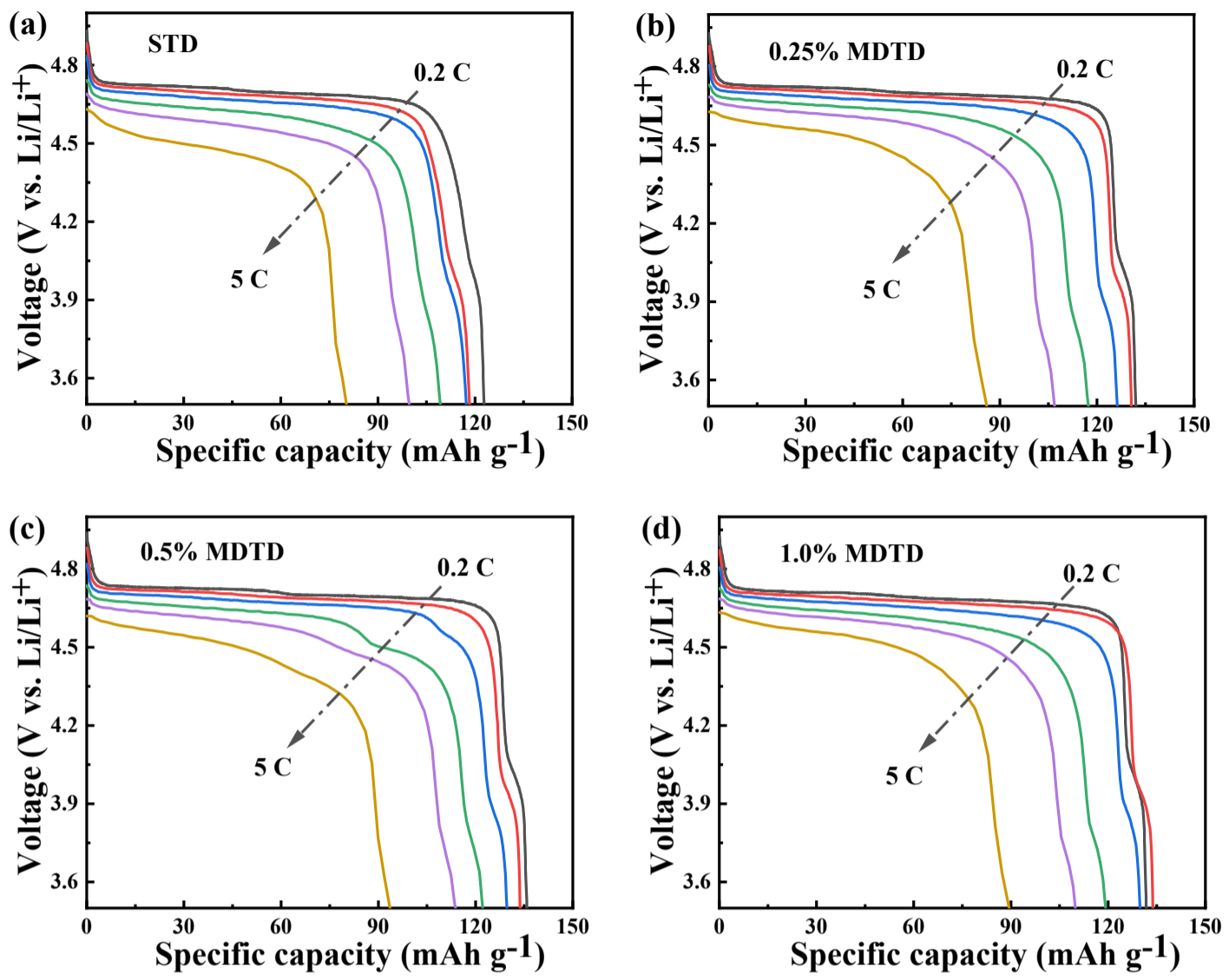


Figure S3. Charge–discharge curves of LNMO/Li half-cells in the STD, 0.25% MDTD, 0.5% MDTD and 1.0% MDTD electrolytes from representative cycles at (a–d) 3 C and (e–h) 5 C.

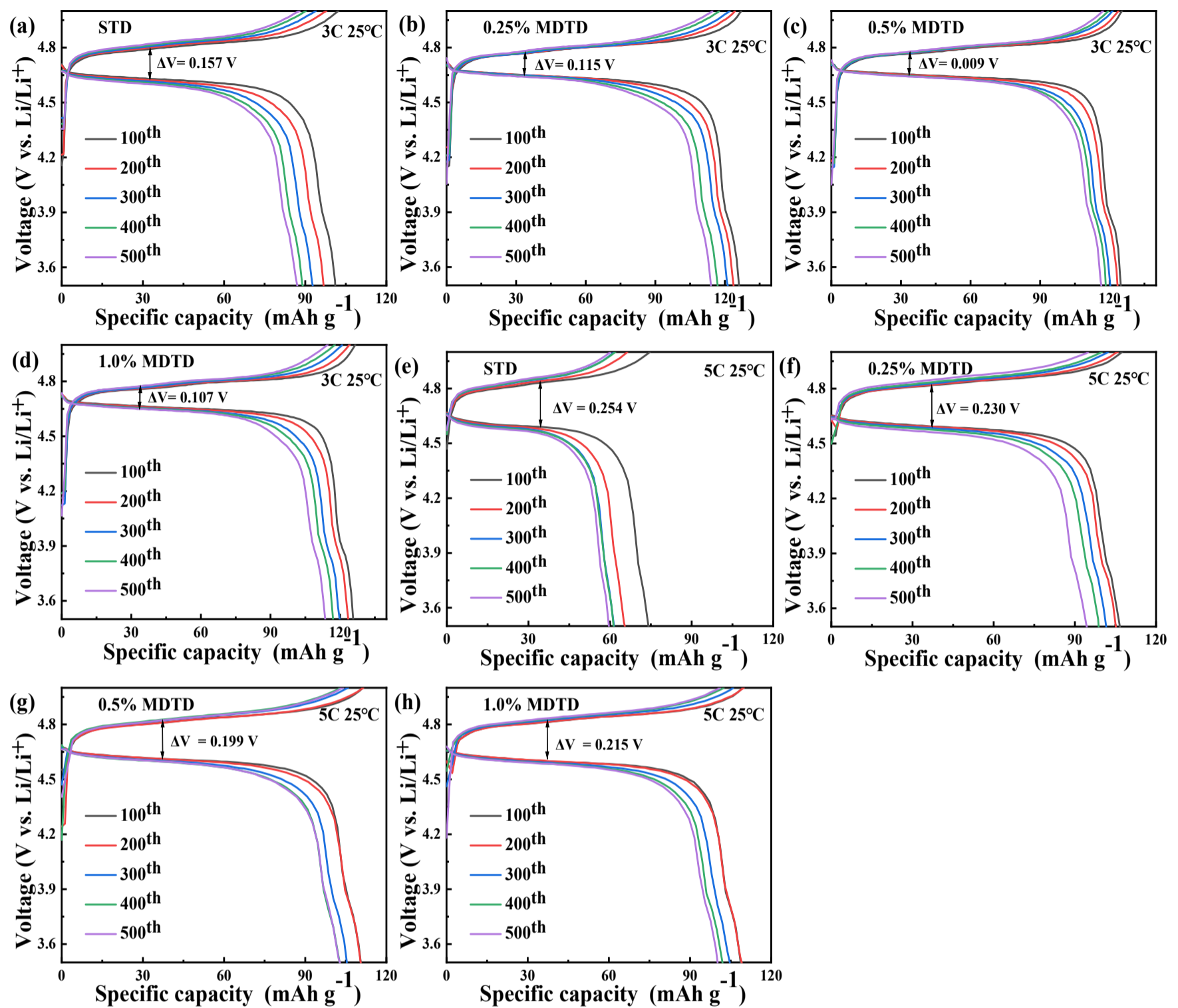


Figure S4 Cyclic voltammetry curves for the LNMO/Li half-cells in the (a) STD, (b) 0.25% MDTD, (c) 0.5% MDTD and (d) 1.0% MDTD electrolytes at scan rates from 0.1 to 0.5 mV s^{-1} after 200 cycles at 5 C. (e) EIS equivalent circuit model of the LNMO/Li half-cells with the four electrolytes.

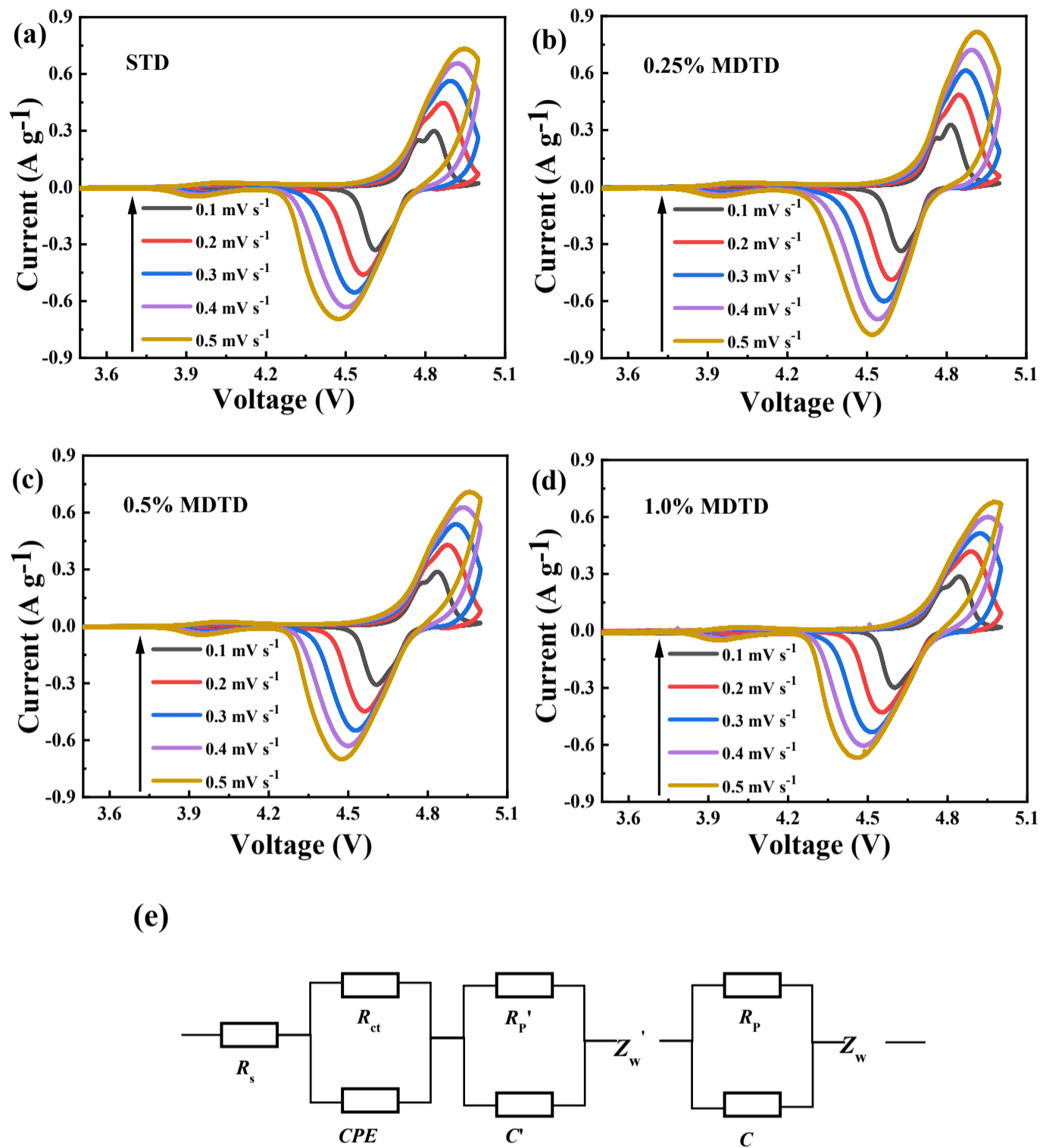
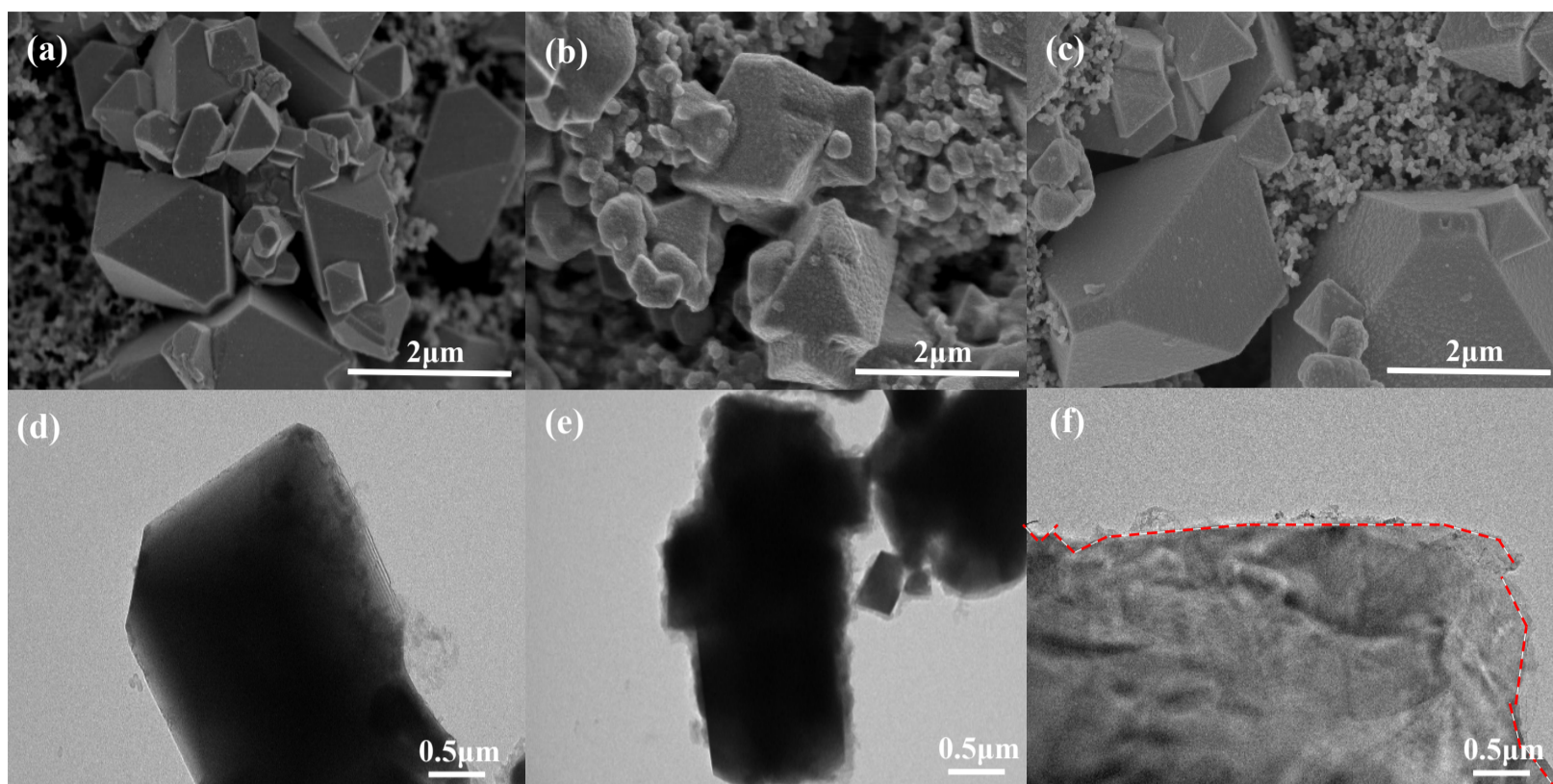


Figure S5. SEM and TEM images of (a, d) a fresh LNMO electrode, and LNMO electrodes disassembled from the LNMO/Li half-cells in the (b, e) STD, and (c, f) 0.5% MDTD electrolytes after 500 cycles at 5 C.



Figures S6. (a) Cycling performances and (b) galvanostatic charge–discharge curves of the graphite/Li half-cells in the STD and 0.5% MDTD electrolytes after 500 cycles at 1 C.

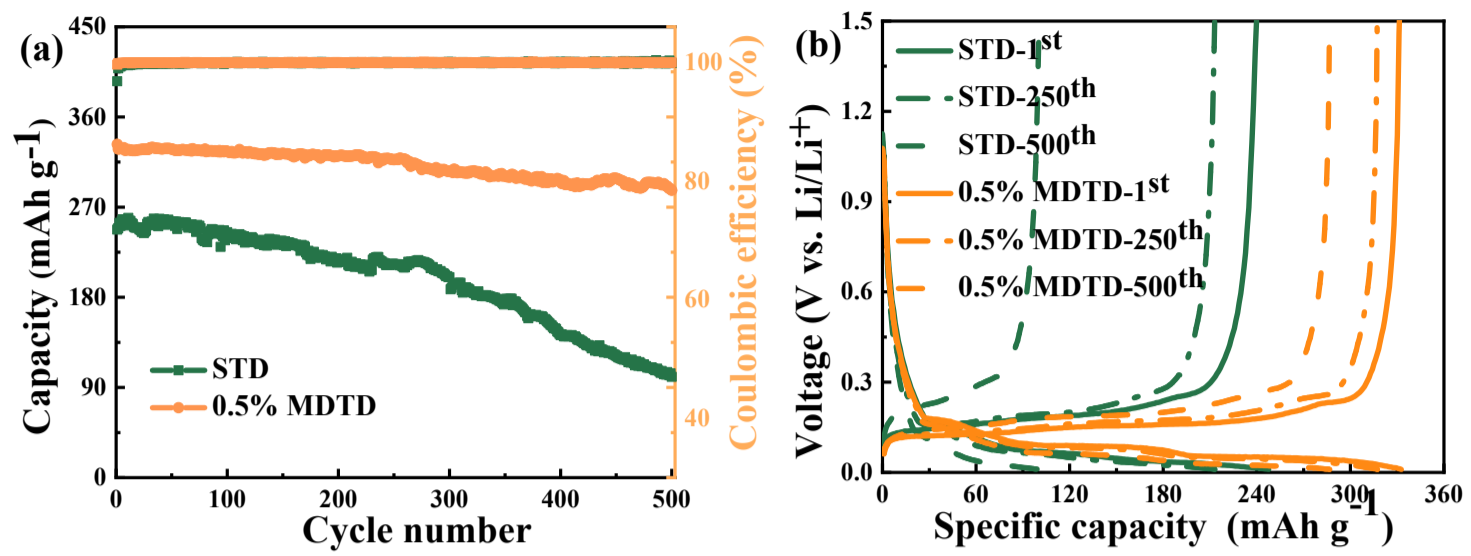


Figure S7. Cyclic voltammetry curves for the LNMO/LTO full-cells in the (a) STD and (b) 0.5% MDTD electrolytes before cycling at scan rates from 0.1 to 0.5 mV s^{-1} .

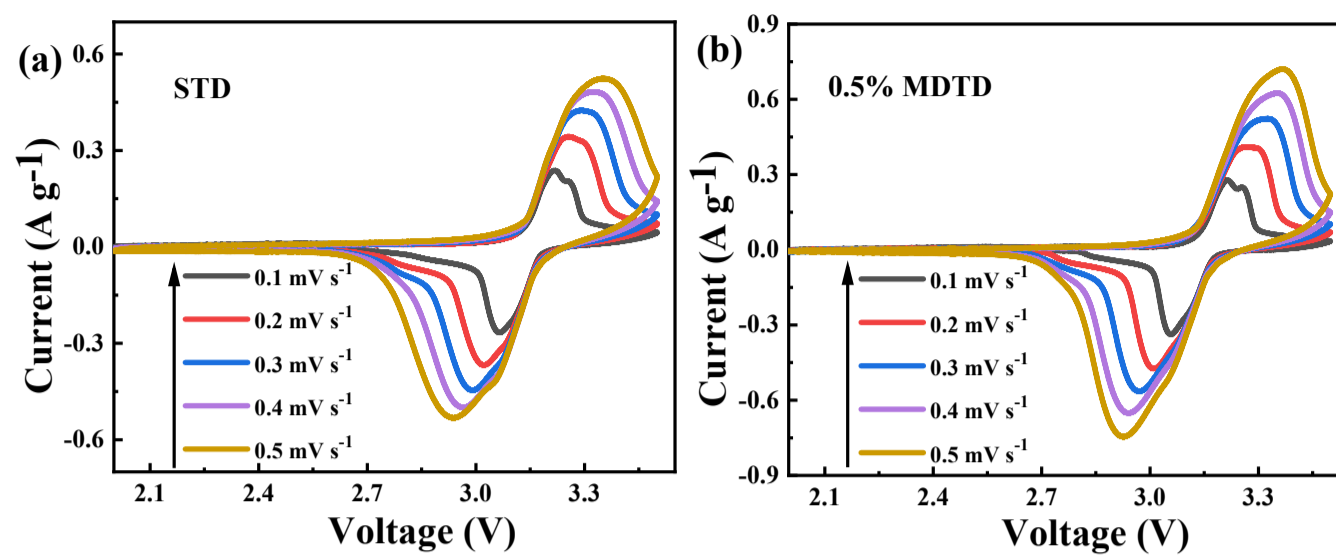


Table S1 The cycling performance of LNMO/LTO full-cells in representative reports

Battery system (Voltage range)	Key characteristics	Cyclability of the electrolyte with and without additive (Initial discharge capacity, retention, cycles, rate, temperature)	References
LNMO/LTO (2.0–3.5 V)	2 mol L ⁻¹ LiBF ₄ -GBL/ADN (1:1, vol%) +2% FEC	96.9 vs. 82.5 mAh·g ⁻¹ , 84.0% vs. 63.0% after 100 cycles, at 1 C rate, at 25°C	55
LNMO/LTO (1.4–3.4 V)	LiTFSI/RTIL-based electrolytes	90.0 vs. 81.0 mAh·g ⁻¹ , 47.0% vs. 28.0% after 50 cycles, at 0.5 C rate, at 40°C	69
LNMO/LTO (1.5–3.5 V)	GA as an electrolyte additive	130.0 vs. 133.0 mAh·g ⁻¹ , 85.0% vs. 75.0% after 120 cycles, at 0.2 C rate, at 20°C	70
LNMO/LTO (2.0–3.5 V)	1.2 M LiPF ₆ FEC/EMC/DEC (3/3/4, wt%)	93.5% after 500 cycles vs. 84.6% after 100 cycles, at 0.05 C rate, at 25°C	71
LNMO/LTO (2.0–3.5 V)	Cross-linking PAMM-based electrolyte	128.0 vs.127.8 mAh·g ⁻¹ , 98.9% vs. 61.5% after 100 cycles, at 0.1 C rate, at 25°C	72
LNMO/LTO (2.0–3.5 V)	LiDFOB as an electrolyte additive	150.1 vs. 150.0 mAh·g ⁻¹ , 85.6% vs. 13.3% after 2000 cycles, at 5 C rate, at 25°C	73
LNMO/LTO (2.0–3.5 V)	MDTD as an electrolyte additive	97.4 vs. 93.9 mAh·g ⁻¹ , 81.8% vs. 37.2% after 200 cycles, at 5 C rate, at 25°C	This work