

Table S1. Fitting values of VTF parameters for various electrolytes.

Electrolyte system	σ_0 (mS cm ⁻¹)	E _a (kJ mole ⁻¹)	T ₀ (K)	R ²
0% IL incorporation	3.41	0.58	240	0.999
25% IL incorporation	3.45	1.08	205	0.999
50% IL incorporation	3.75	2.03	192	0.999
75% IL incorporation	4.59	3.82	183	0.999

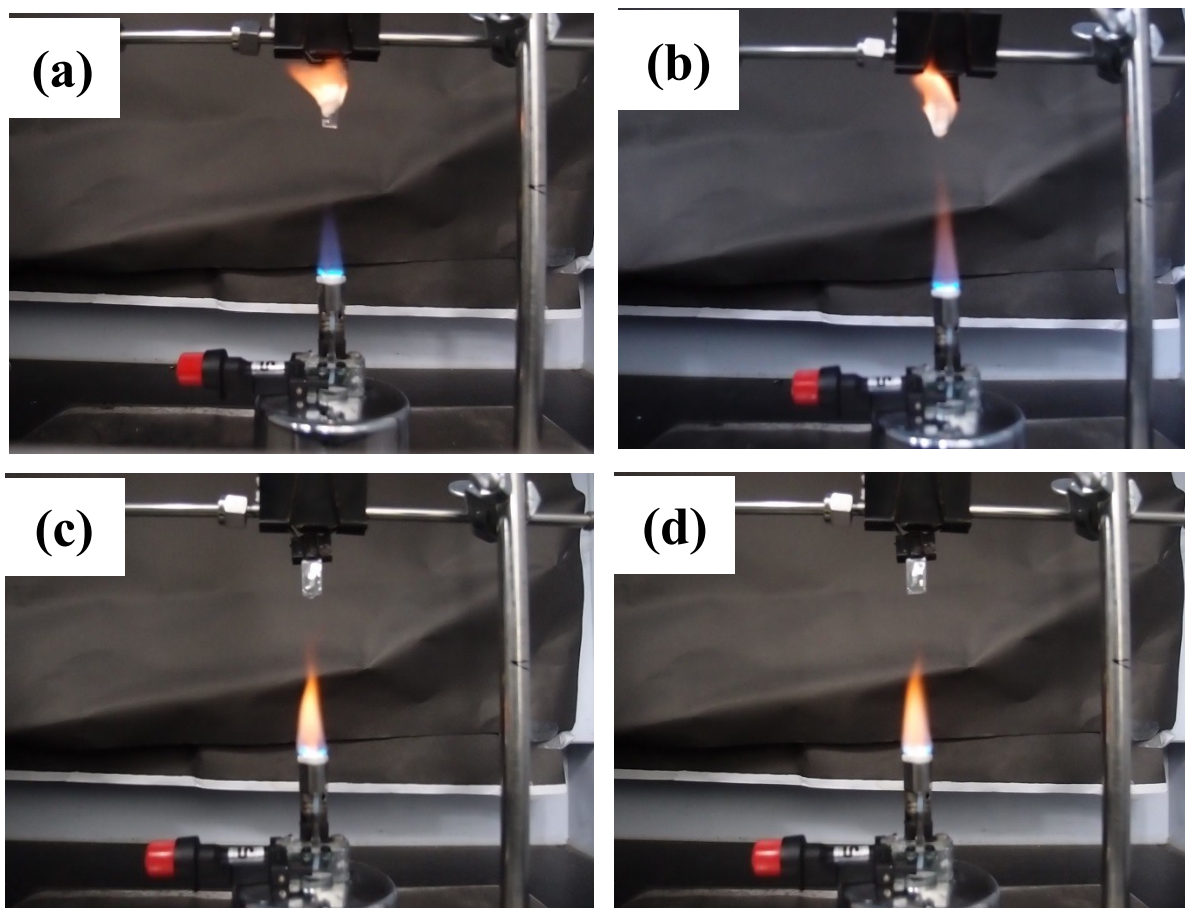


Fig. S1. Flammability tests of (a) 0%, (b) 25%, (c) 50%, and (d) 75% IL-incorporated electrolytes.

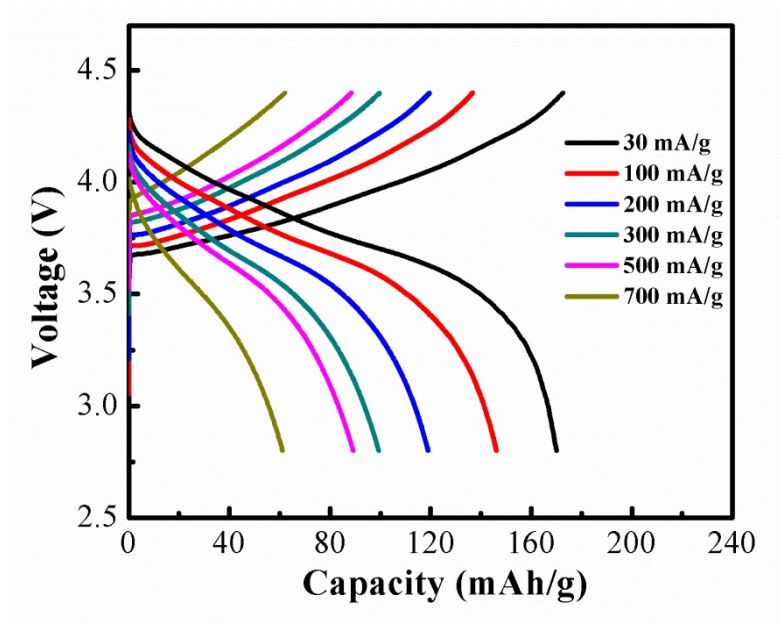
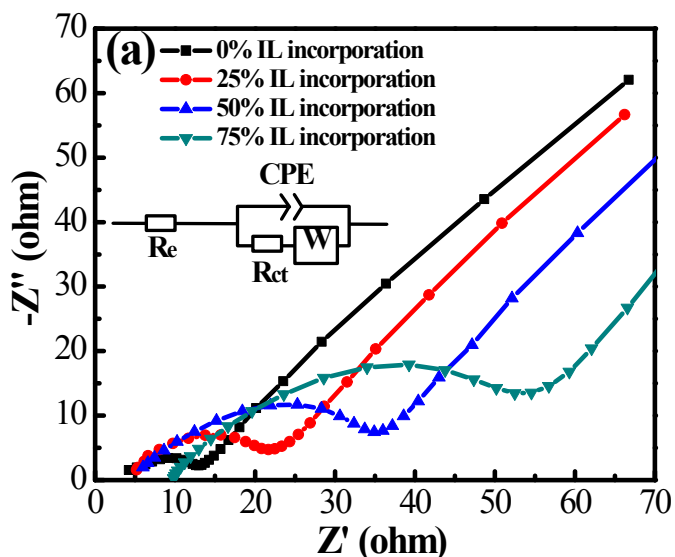
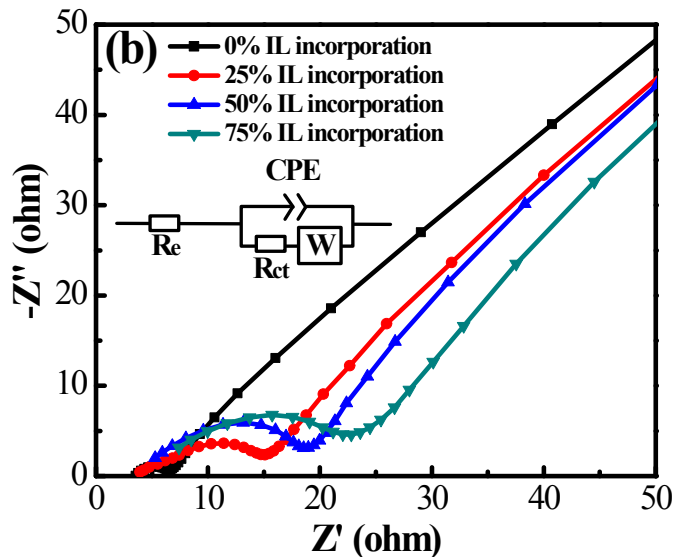


Fig. S2. Charge–discharge curves of an LNCA electrode recorded at various current densities in conventional organic electrolyte (1 M LiPF₆ in EC/DEC) at 25 °C.



25 °C

Electrolyte	Re (Ω)	Rct (Ω)	Li ⁺ diffusion coefficient ($\text{cm}^2 \text{s}^{-1}$)
0 % IL	4.2	8.8	4.5×10^{-11}
25 % IL	5.2	16.5	4.3×10^{-11}
50 % IL	6.0	29.0	4.3×10^{-11}
75 % IL	10.0	42.6	4.2×10^{-11}



50 °C

Electrolyte	Re (Ω)	Rct (Ω)	Li ⁺ diffusion coefficient ($\text{cm}^2 \text{s}^{-1}$)
0 % IL	3.6	2.9	7.4×10^{-11}
25 % IL	4.0	11.2	7.1×10^{-11}
50 % IL	5.3	13.3	6.7×10^{-11}
75 % IL	7.4	15.4	6.4×10^{-11}

Fig. S3. Electrochemical impedance spectroscopy data of LNCA electrodes in various electrolytes at (a) 25 °C and (b) 50 °C acquired in CR2032 coin cells with Li foil as counter electrodes. The frequency range and AC amplitude are 10^5 – 10^{-2} Hz and 10 mV, respectively. The Re, Rct, CPE, and W in the equivalent circuit represent electrolyte resistance, interfacial charge transfer resistance, constant-phase element at the electrode/electrolyte interface, and Warburg impedance, respectively.

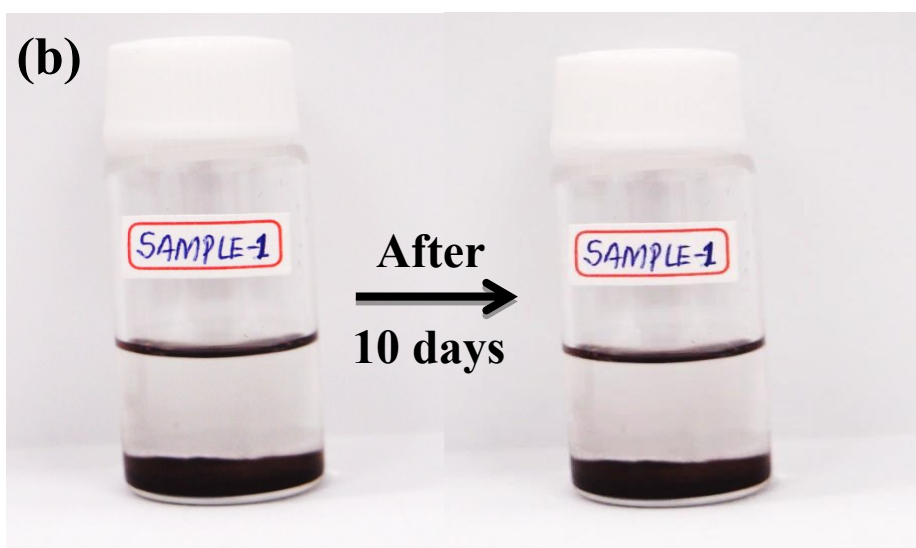
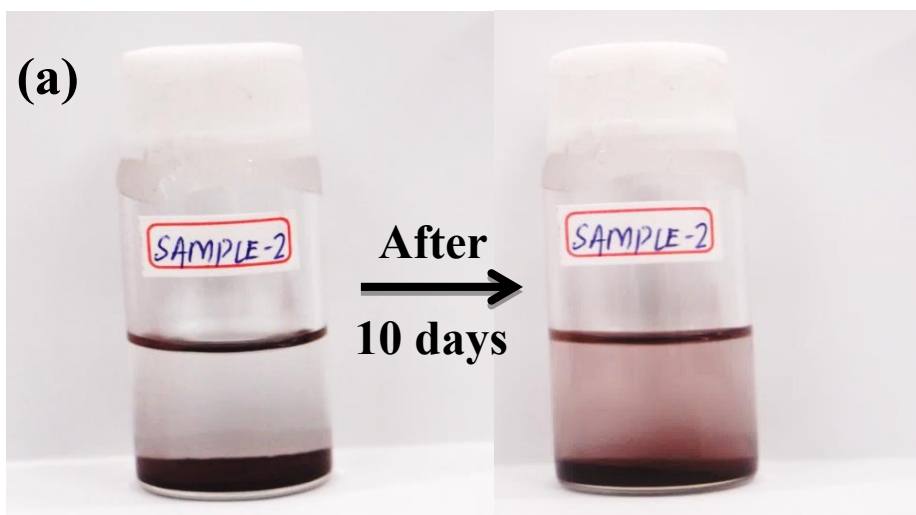


Fig. S4. Immersion tests of LNCA powder in (a) 0% IL-incorporated and (b) 75% IL-incorporated electrolytes at 80 °C for 10 days.