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Supporting Information

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Nonsacrificial Nitrile Additive for Armoring High-Voltage $LiNi_{0.83}Co_{0.07}Mn_{0.1}O_2$ Cathode with Reliable Electrode–Electrolyte Interface toward Durable Battery

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Table S1. HOMO, LUMO energy of HTCN, DENE, EC, DEC and $LiPF_6$.

	HOMO	LUMO
HTCN	-8.050	-1.093
DENE	-6.563	-0.576
EC	-6.933	-0.300
DEC	-6.218	0.269
$LiPF_6$	-8.851	-0.894

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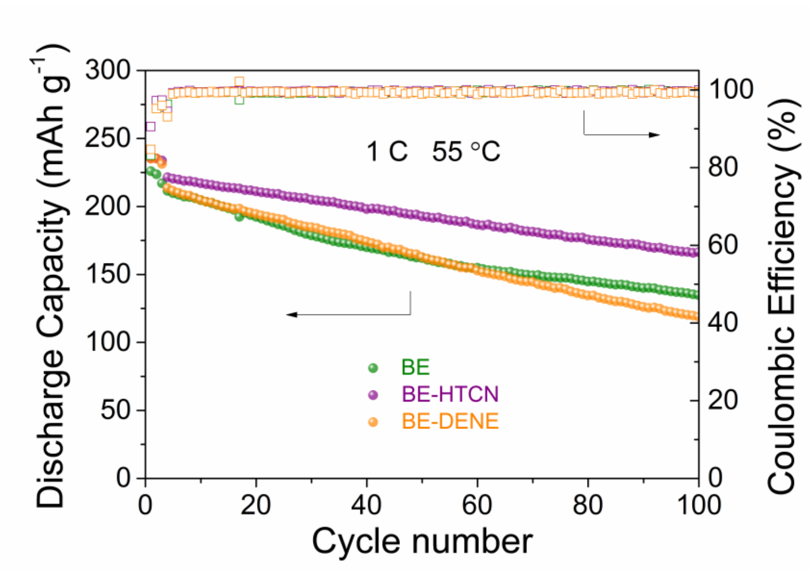

Figure S1. Cycle performance and coulombic efficiency of NCM83/graphite full cells with different electrolytes after 100 cycles at 55 °C.

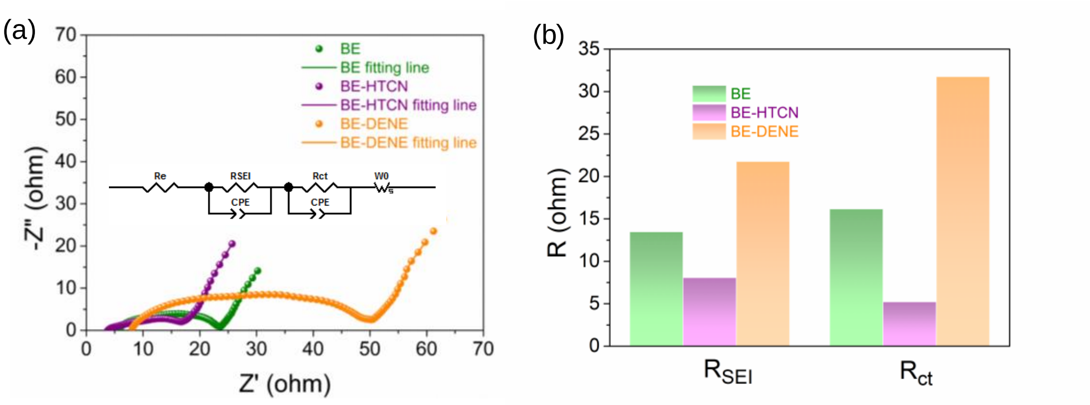

Figure S2. (a) EIS Nyquist plots of NCM83/graphite full cells using BE, BE-HTCN and BE-DENE electrolytes (inset of equivalent circuit model). (b) The electrochemical impedance of the NCM83 electrode with three different electrolytes.

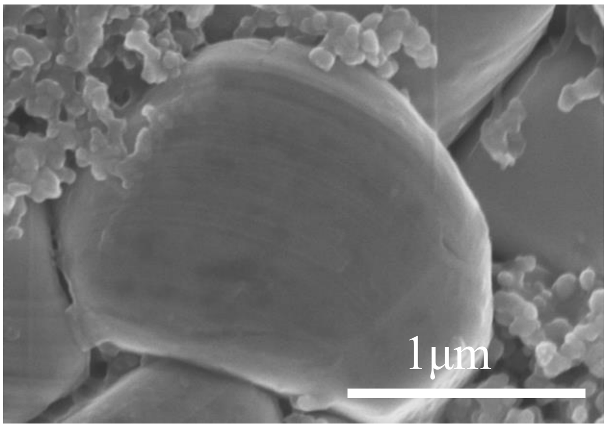

Figure S3. SEM image of the internal morphology of the particle before charge-discharge cycles.

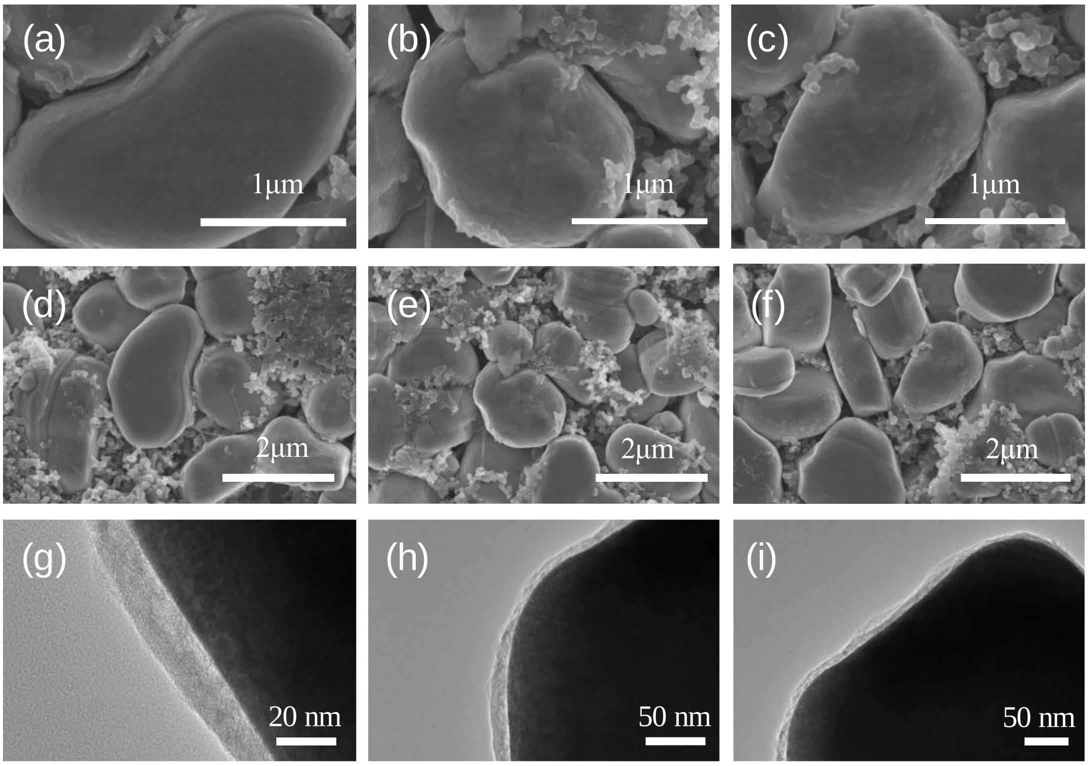

Figure S4. SEM and TEM images of the cycled NCM83 particles with BE-HTCN electrolyte. (a-f) SEM images, (g-i) TEM images.

Table S2. The surface contents of different elements on the cycled electrodes with the BE, BE-HTCN and BE-DENE electrolyte.

Elements	C 1s (%)	O 1s (%)	F 1s (%)	P 2p (%)	N 1s (%)
BE	20.27	17.68	45.32	0.54	- - -
BE-HTCN	21.72	22.72	34.06	0.33	5.46
BE-DENE	45.89	12.71	33.15	1.32	2.76

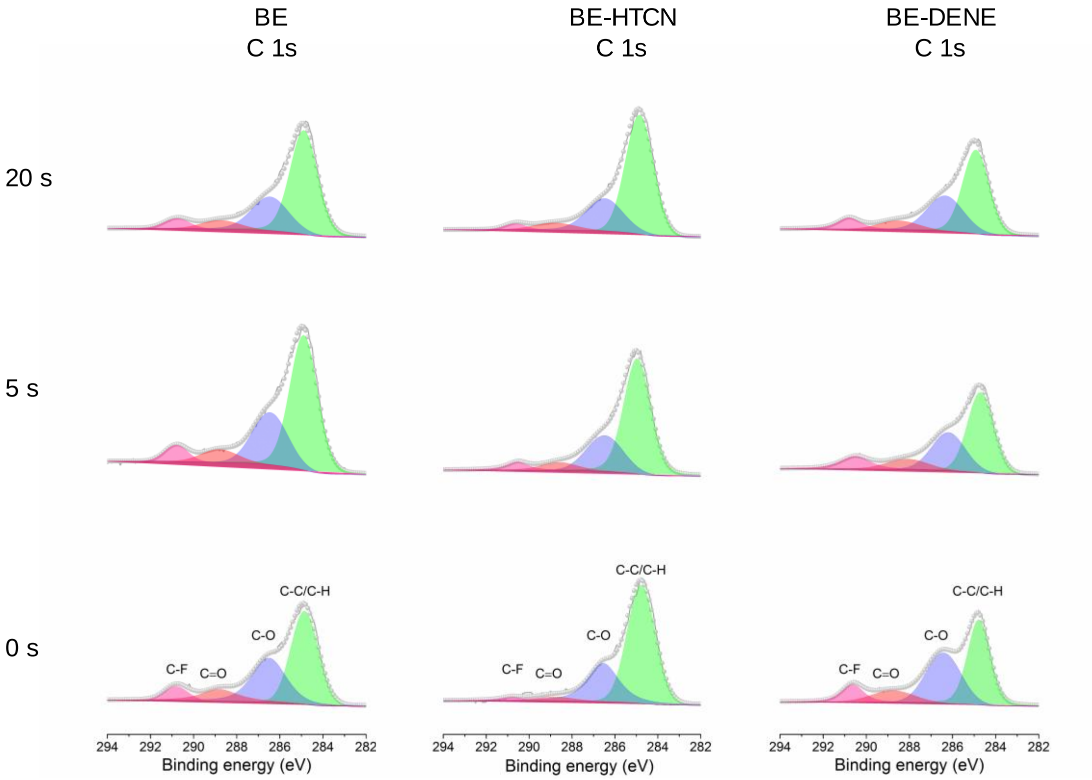

Figure S5. In-depth XPS spectra C1s of CEI layer of NCM83/graphite cells in different electrolytes after 200 cycles for 0, 5 and 20 s, respectively.

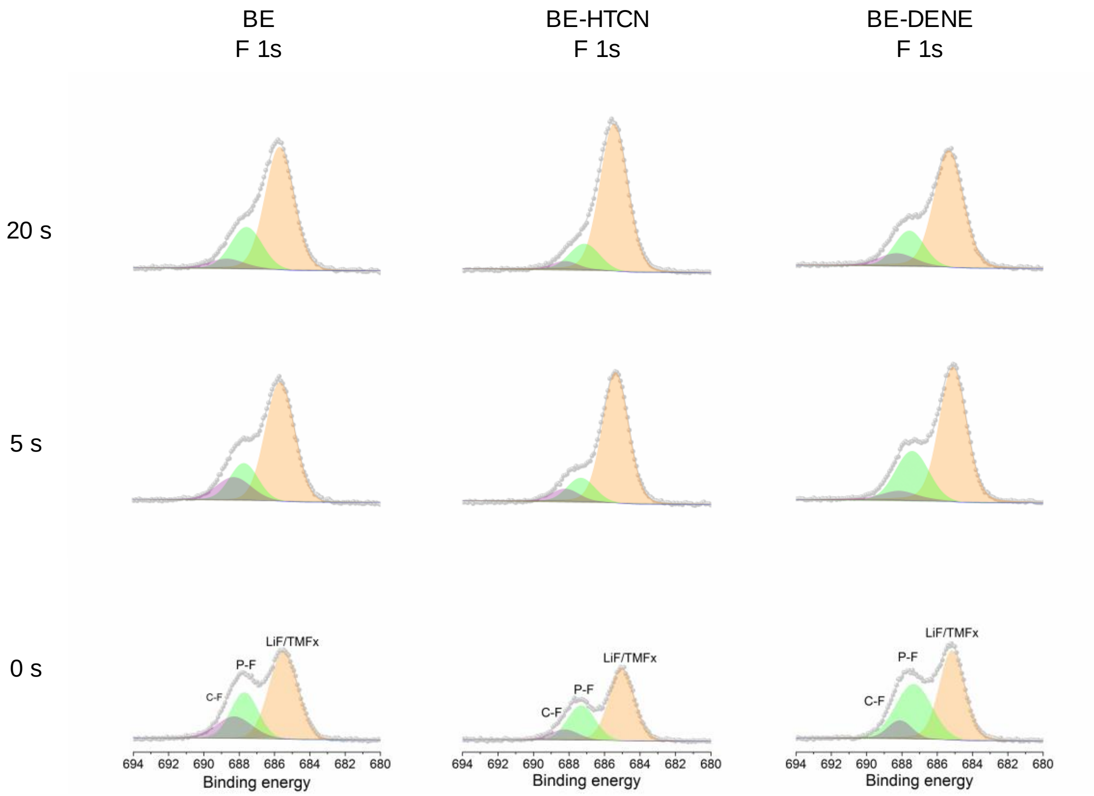

Figure S6. In-depth XPS spectra F1s of CEI layer of NCM83/graphite cells in different electrolytes after 200 cycles for 0, 5 and 20 s, respectively.