

## Support Information

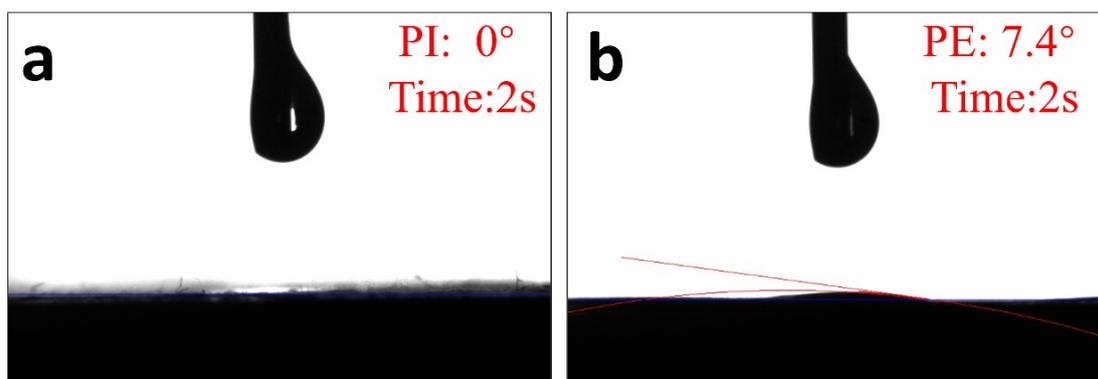
### **Ni-catalyzed Degradation of Polyimide Separators in Quasi-Solid-State Li-ion Batteries**

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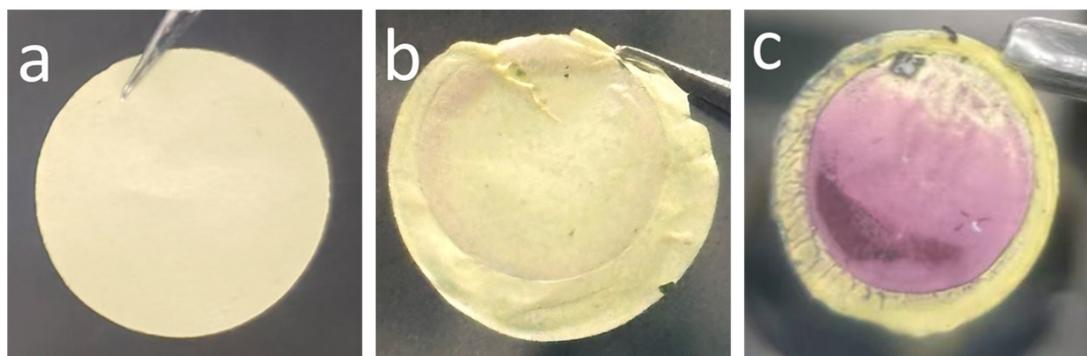
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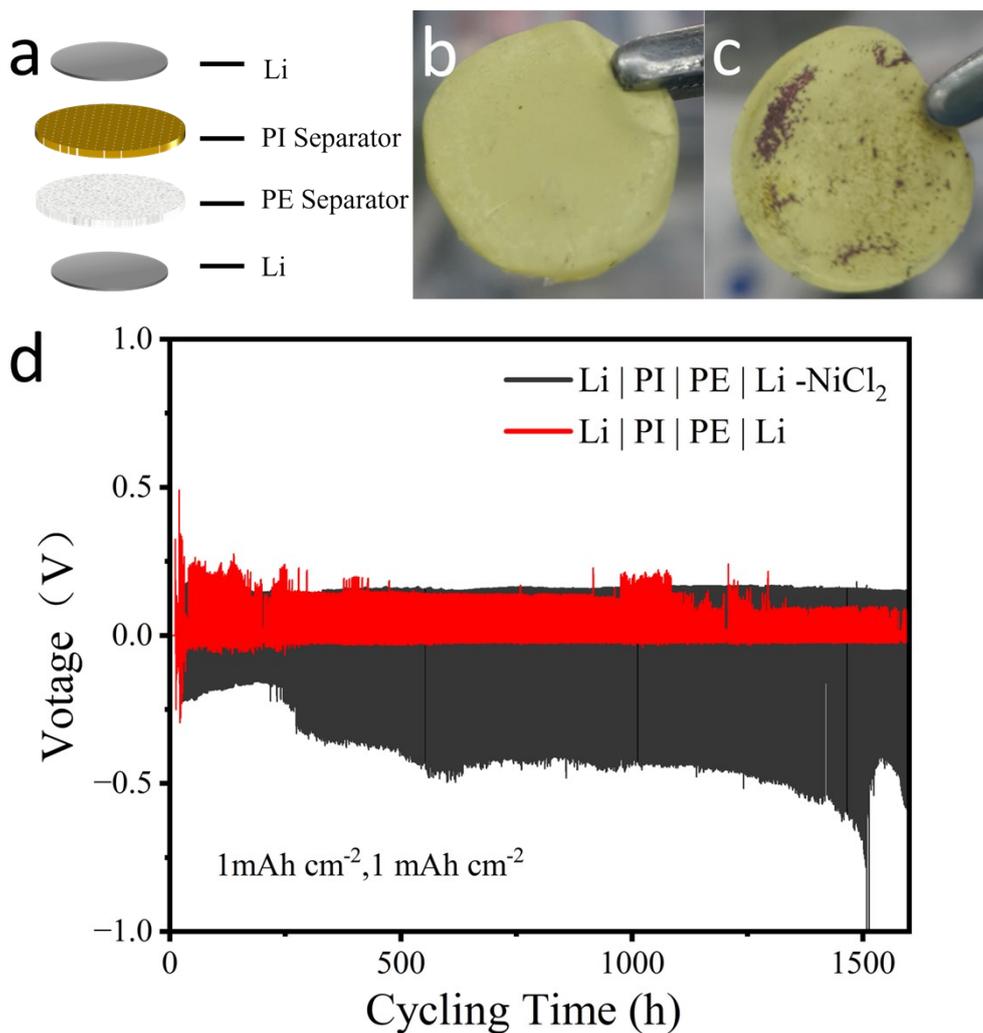
*c: National Key Laboratory of Advanced Polymer Materials, Polymer Research Institute, Sichuan University, Chengdu, Sichuan 610065, China.*



**Figure S1.** Electrolyte contact angles of PI (a) separator and PE (b) separator after 2 seconds.



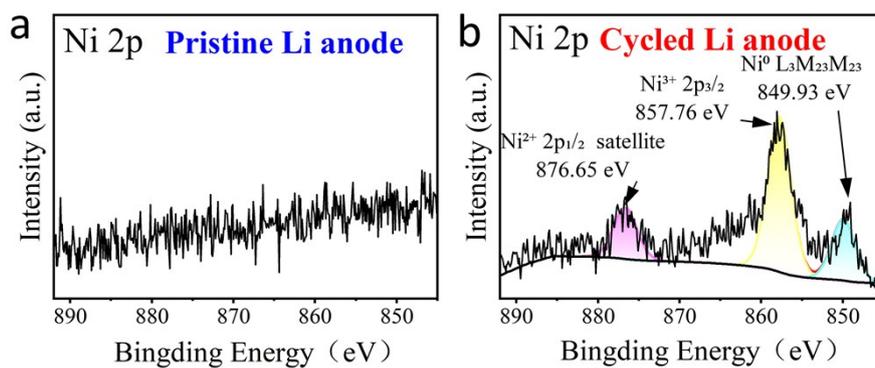
**Figure S2.** Digital photographs showing the status of PI separators: (a) Pristine separator. (b) After a 40-hour charge in a Li||NCM811 cell, and disassembled immediately; (c) After a 40-hour charge and a subsequent 60-day (~1440 h) storage period in another Li||NCM811 cell.



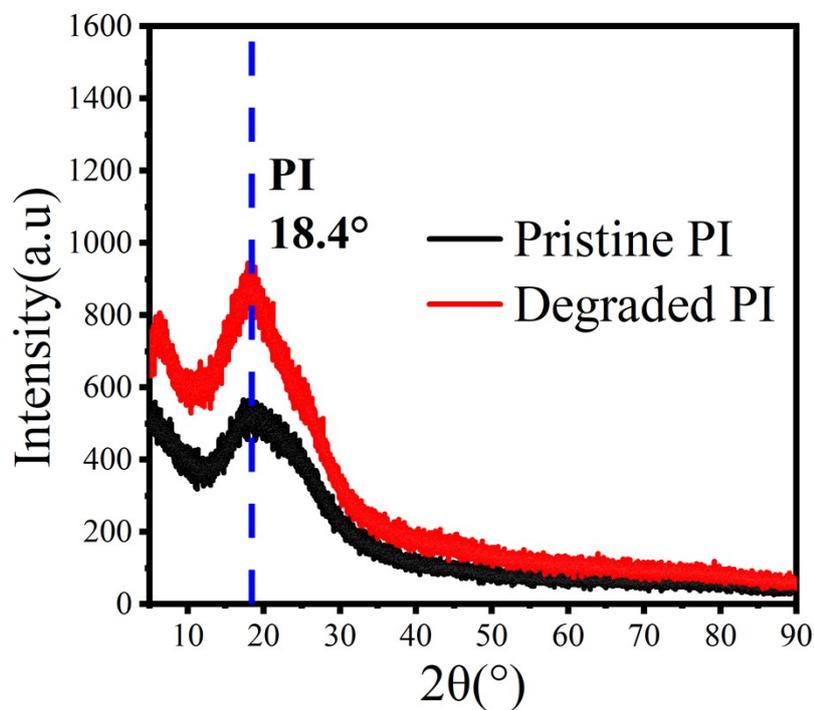
**Figure S3.** (a) Schematic of the Li | PI | PE | Li symmetric cell; (b, c) PI separators from Li | PI | PE | Li symmetric cells stored for 30 days with (b) and without (c) NiCl<sub>2</sub> in the electrolyte. (d) Voltage profiles of Li | PI | PE | Li symmetric cells, using electrolytes with or without NiCl<sub>2</sub> additive.

**Table S1.** The atomic ratio in Fig.1e

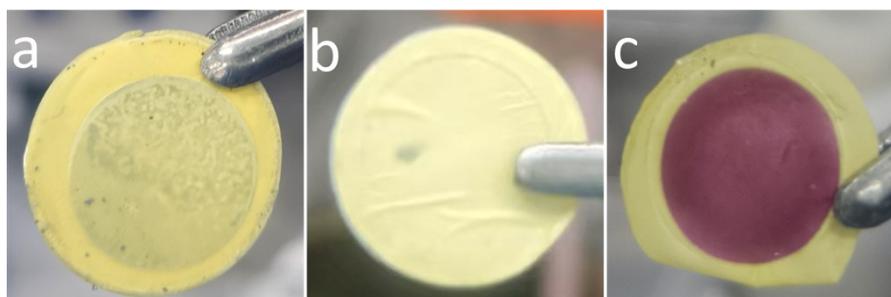
Element	C	O	F	S	Mn	Co	Ni	Total
wt%	50.79	27.2	6.0	5.3	0.9	0.8	9.0	100%



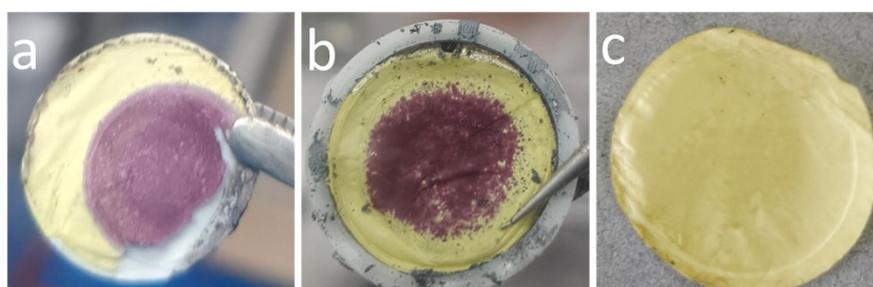
**Figure S4.** (a) Ni 2p XPS spectra of the pristine Li anode; (b) Ni 2p XPS spectra of the cycled Li anode; Note that the profound Ni<sup>0</sup> peak suggests the reduction of Ni<sup>2+/3+</sup> that originates from NCM dissolution and shuttling.



**Figure S5.** XRD patterns of the degraded separator versus the pristine PI separator.



**Figure S6.** Optical images of PI separators extracted from Li | PE | PI | NCM811 cells after 7 (a), 30 (b), and 90 (c) days of static storage, note PI is adjacent to the positive electrode side).



**Figure S7.** Morphology of PI separators from: (a) Li | PE | PI | NCM811 batteries after 100 cycles; (b) Li | PI | PE | NCM811 batteries after 100 cycles; (c) Li | PI | PE | PI | NCM811 batteries after 350 cycles.