

Supporting Information for *Journal of Materials Chemistry A*

Pre-lithiation carbon anodes mitigating potassium loss toward for high-performance potassium-ion energy storage devices

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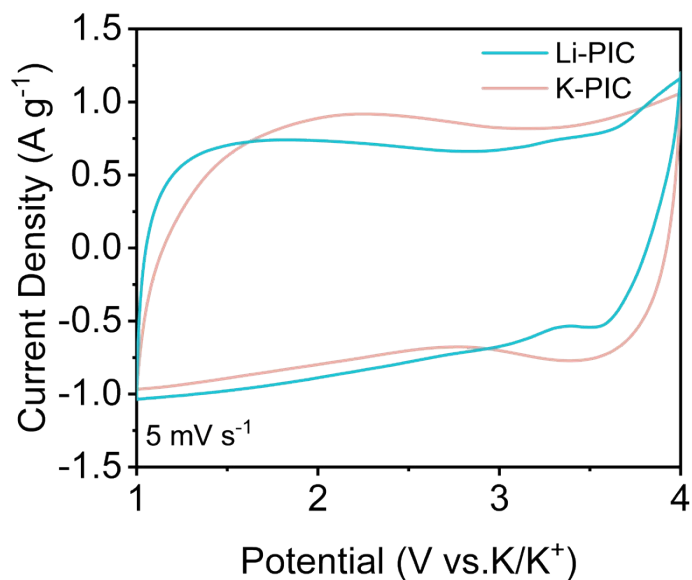


Fig. S1 A comparison of CV curves of Li-PIC and K-PIC at a scan rate of 5 mV s^{-1} .

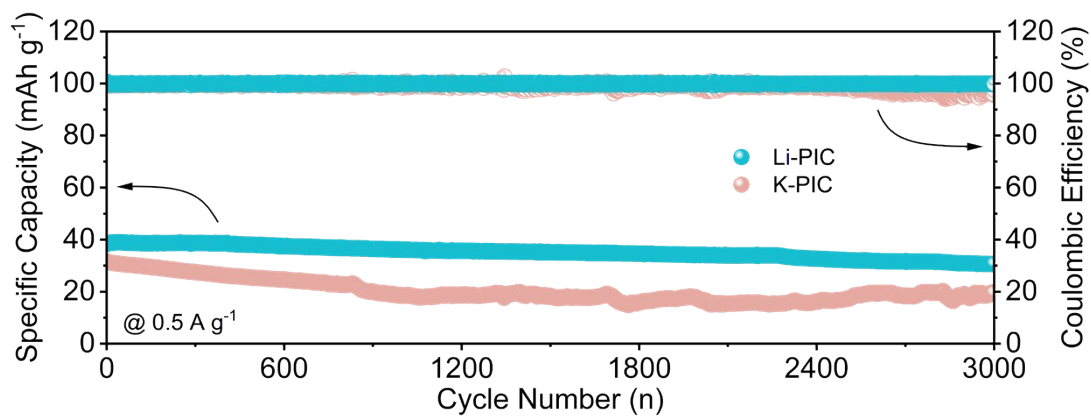


Fig. S2 The comparison of long-term cycling performance and corresponding coulombic efficiencies for 3000 cycles of at 0.5 A g^{-1} for Li-PIC and K-PIC.

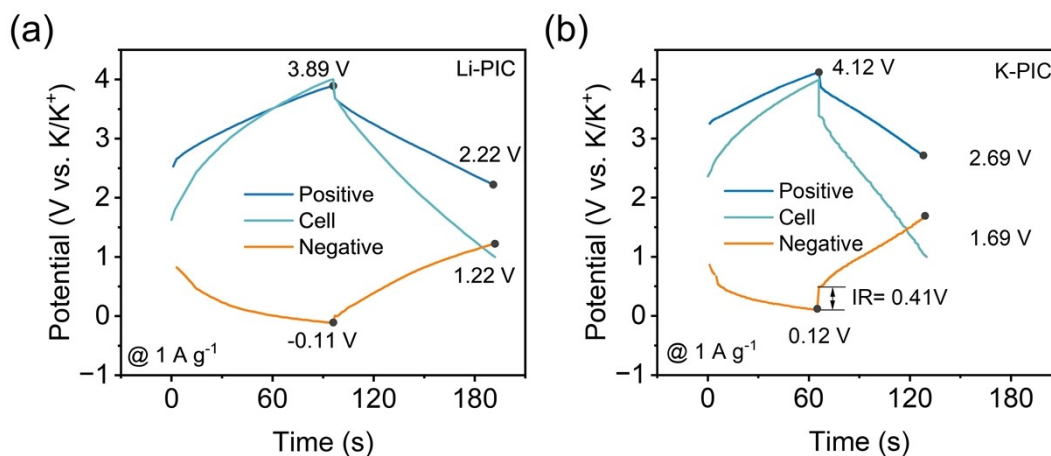


Fig. S3 In situ monitoring of the SC//PC PIC during the GCD test using the Swagelok three-electrode system with reference electrode of metal K at 1 A g^{-1} , (a) Li-PIC, (b) K-PIC.

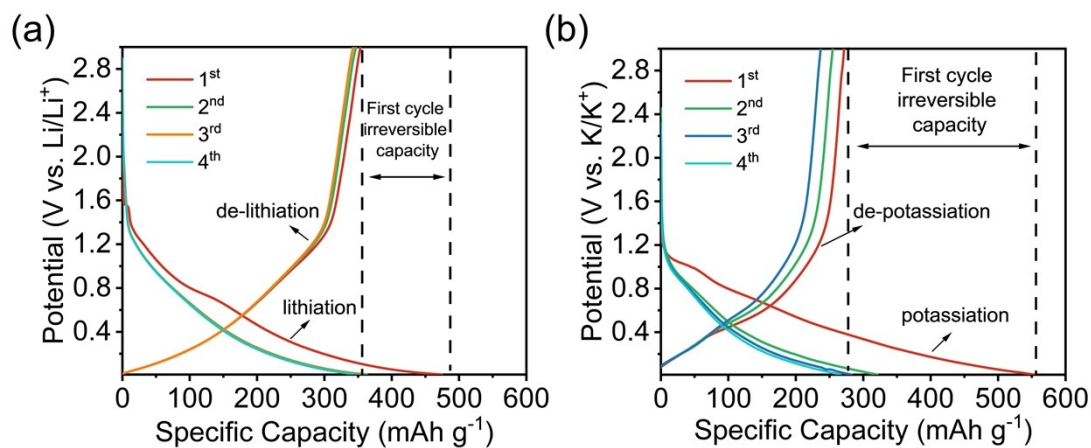


Fig. S4 The charge/discharge profiles of (a) the pre-lithiation process and (b) pre-potassiation process at 0.1 A g^{-1} .

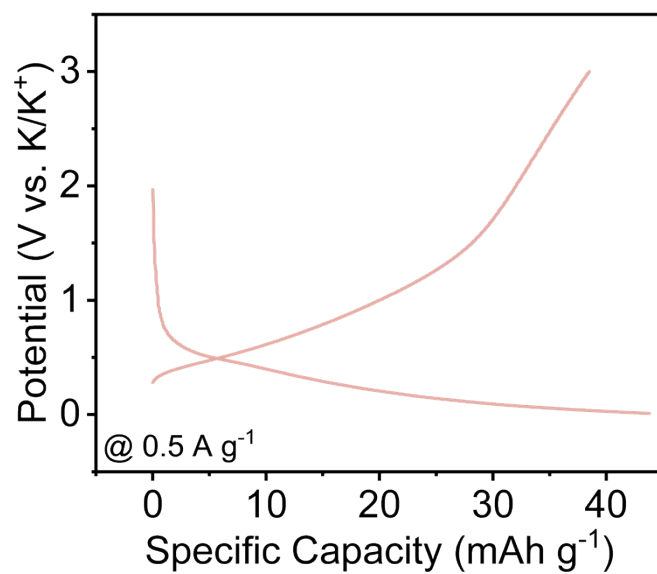


Fig. S5 The charge/discharge profiles at 0.5 A g^{-1} of K-PIB.

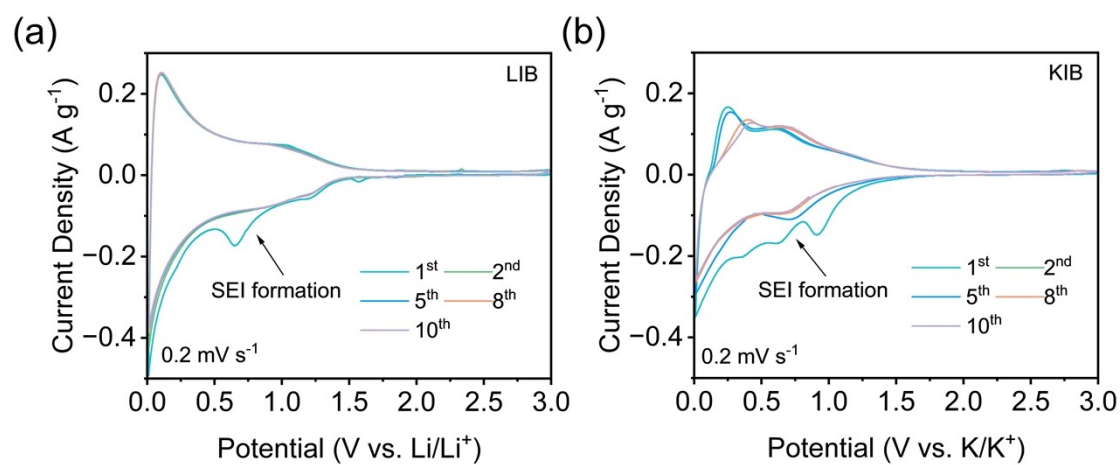


Fig. S6 A comparison of CV curves at a scan rate of 0.2 mV s^{-1} (a) LIB and (b) KIB.

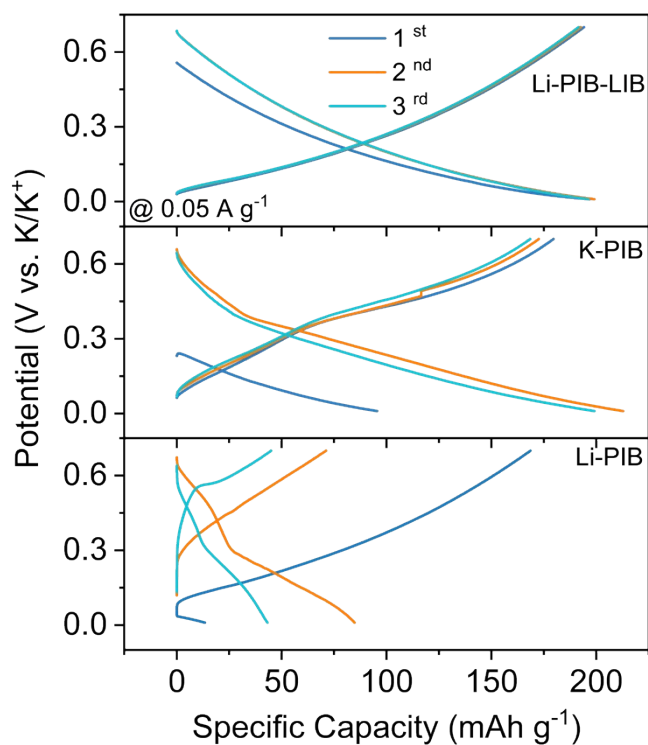


Fig. S7 The charge/discharge profiles of the first three cycles at 0.05 A g^{-1} for Li-PIB (bottom), K-PIB (middle) and Li-PIB-LIB (top).

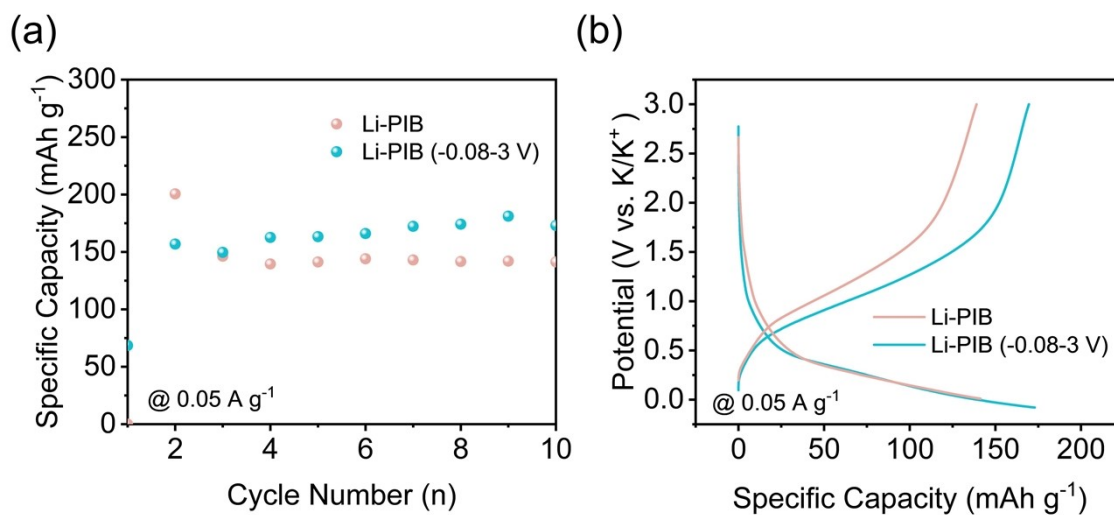


Fig. S8 (a) The capacity comparison of LIB within an extended potential range from -0.08 to 3.0 V at 0.05 A g^{-1} . (b) The corresponding charge/discharge profiles.

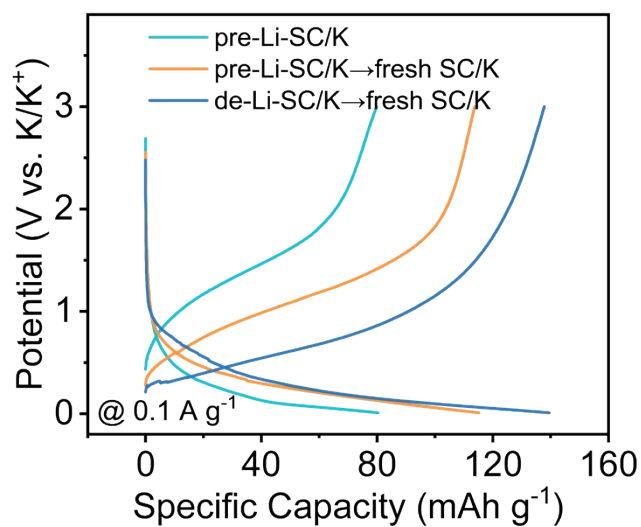


Fig. S9 The capacity comparison of pre-Li-SC/K half-cells treated under different conditions at 0.1 A g^{-1} .

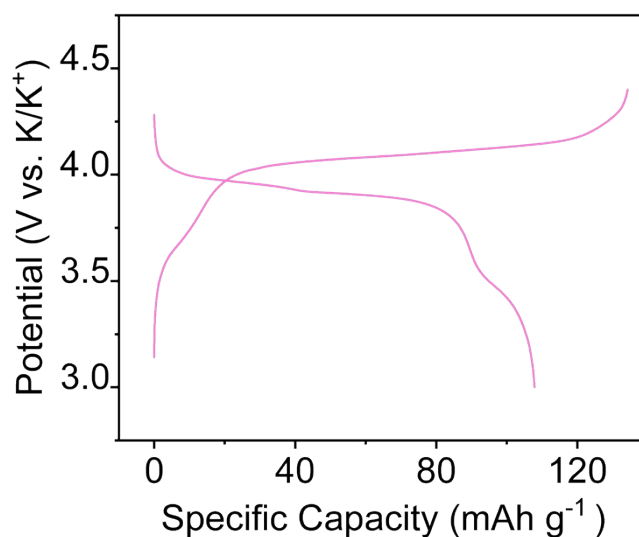


Fig. S10 Charge/discharge curves of assembled PB half-cell in the voltage range of 3-4.4 V at a current density of 0.05 A g^{-1} .

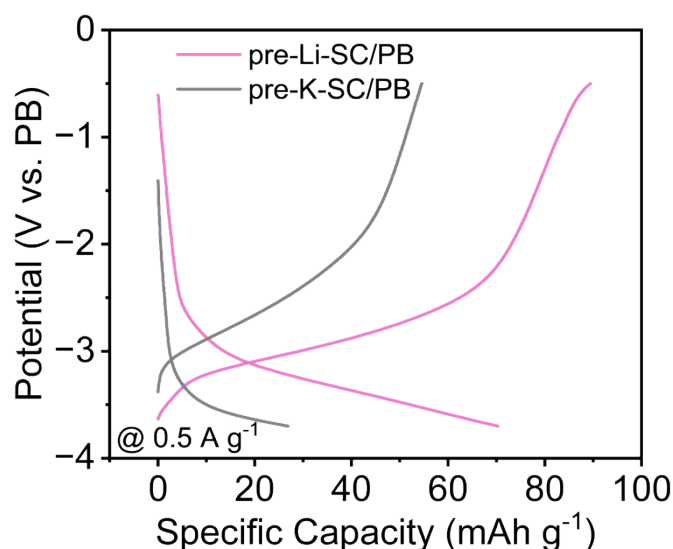


Fig. S11 The charge/discharge profiles at 0.5 A g^{-1} of pre-Li-SC/PB and pre-K-SC/PB.

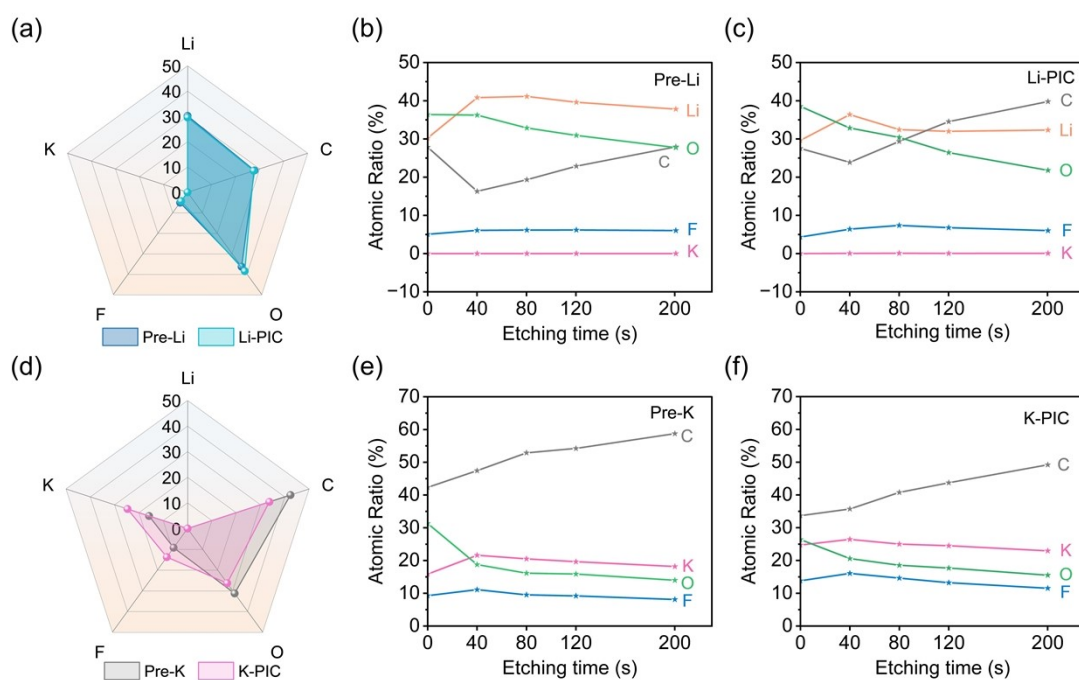


Fig. S12 (a) The elemental concentrations of the SEI on the surfaces of Pre-Li and Li-PIC. Atomic compositions of Li, O, C, F and K collected at different depths on prelithiated SC (b) Pre-Li and (c) Li-PIC. (d) Comparison of the elemental concentrations of the SEI on the surfaces of prepotassiated of Pre-K and K-PIC. Atomic compositions of O, C, F and K collected at different depths on prepotassiated SC anode (e) Pre-K and (f) K-PIC.

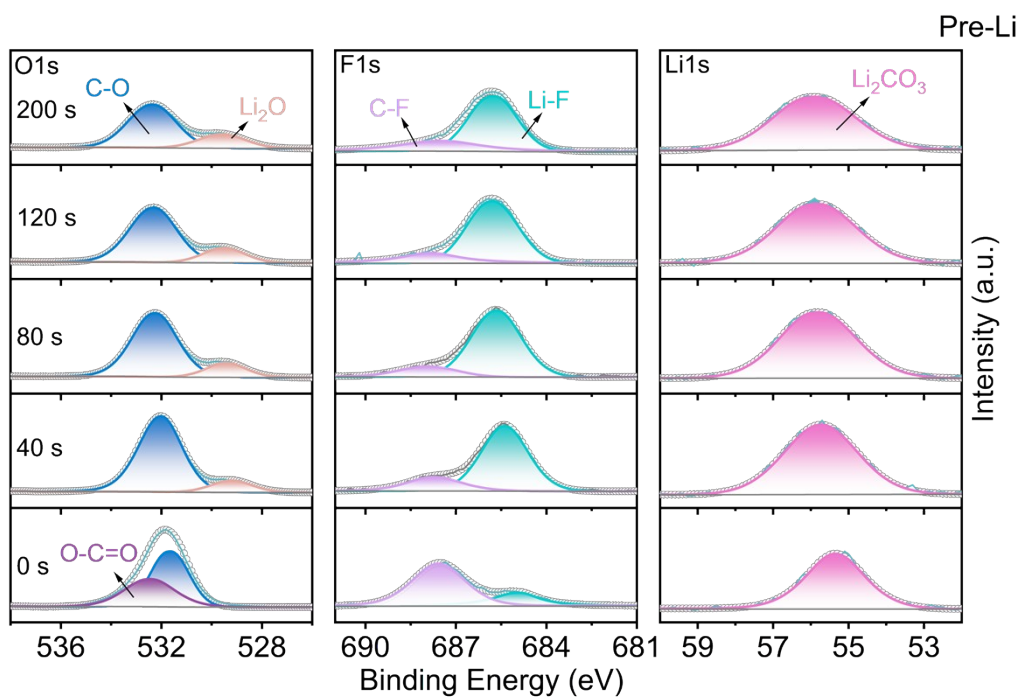


Fig. S13 XPS spectra with O 1s, F 1s and Li 1s sputtered at 0 s, 40 s, 80 s, 120 s and 200 s for Pre-Li.

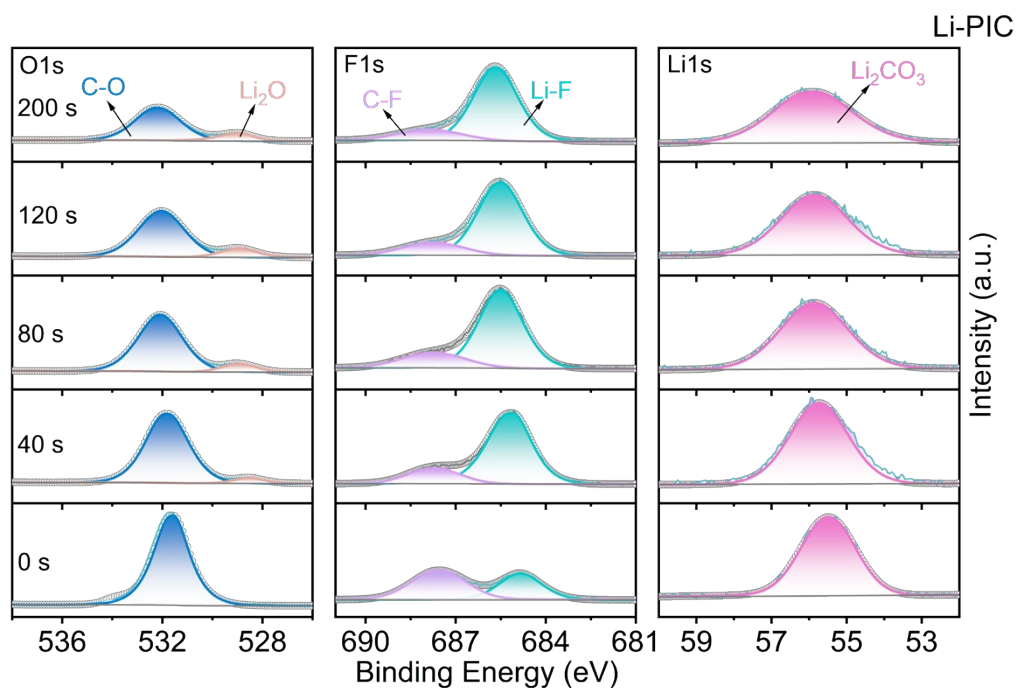


Fig. S14 XPS spectra with C 1s, O 1s, F 1s and Li 1s sputtered at 0 s, 40 s, 80 s, 120 s and 200 s for Li-PIC.

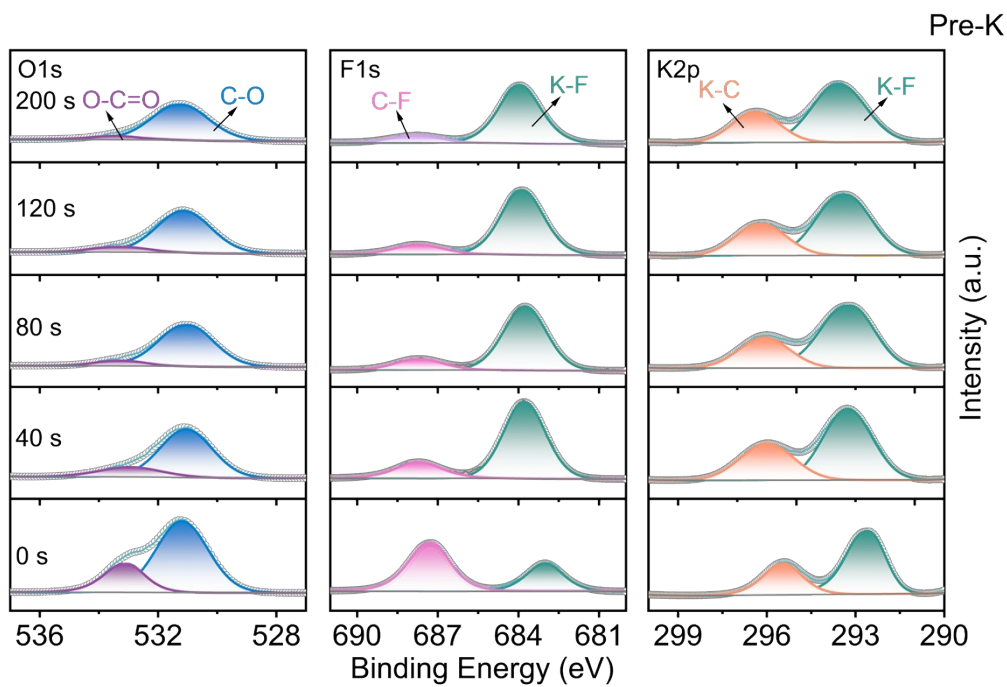


Fig. S15 XPS spectra with O 1s, F 1s and Li 1s sputtered at 0 s, 40 s, 80 s, 120 s and 200 s for Pre-K.

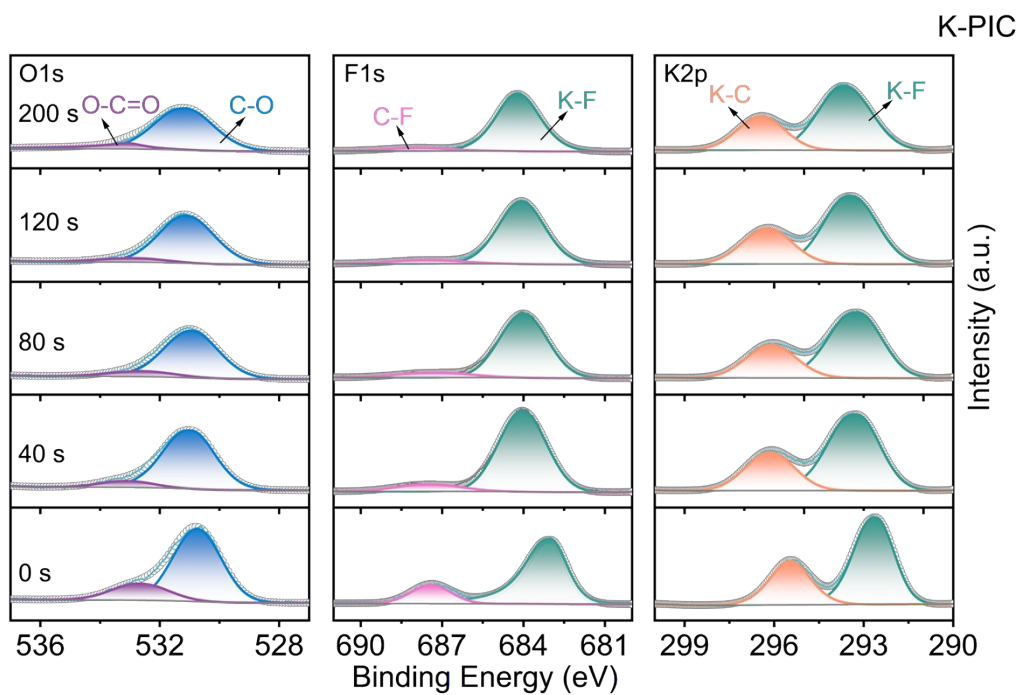


Fig. S16 XPS spectra with O 1s, F 1s and Li 1s sputtered at 0 s, 40 s, 80 s, 120 s and 200 s for K-PIC electrode.

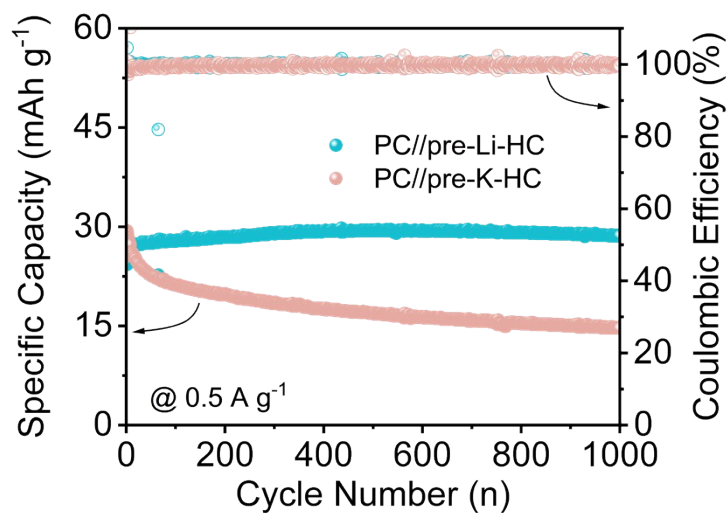


Fig. S17 The comparison of long-term cycling performance and corresponding coulombic efficiencies for 1000 cycles of at 0.5 A g^{-1} for PC//pre-Li-HC and PC//pre-K-HC PICs.

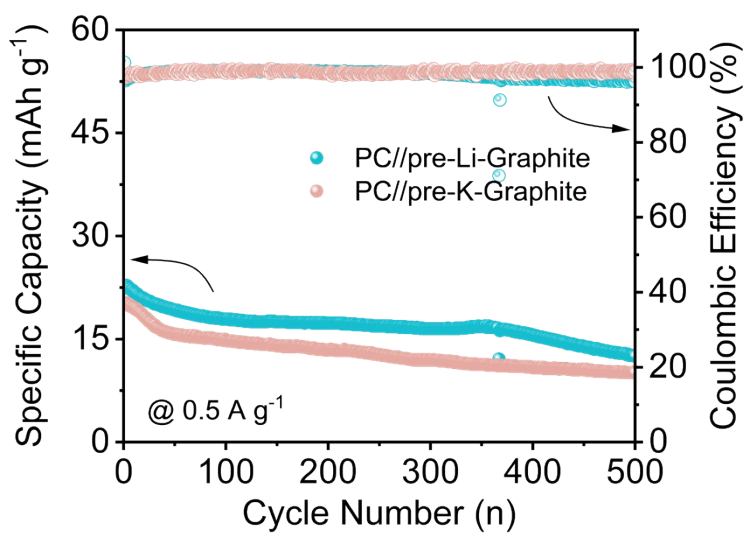


Fig. S18 The comparison of long-term cycling performance and corresponding coulombic efficiencies for 500 cycles of at 0.5 A g^{-1} for PC//pre-Li-Graphite and PC//pre-K-Graphite PICs.

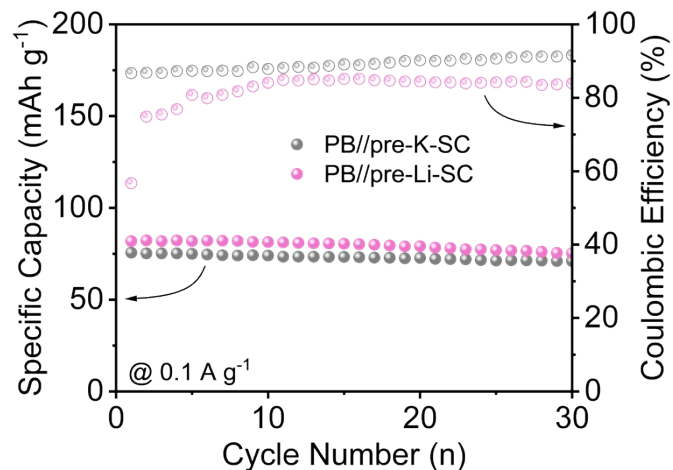


Fig. S19 The comparison of long-term cycling performance and corresponding coulombic efficiencies at 0.1 A g^{-1} of PB//pre-Li-SC and PB//pre-K-SC PIBs.

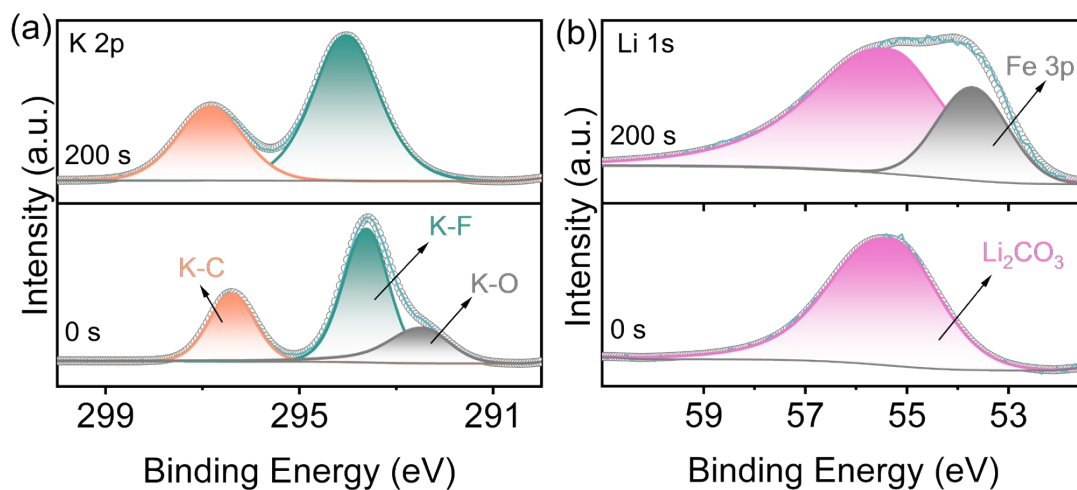


Fig. S20 XPS spectra c-PB electrode before and after sputtered 200 s: (a) K 2p and (b) Li 1s.

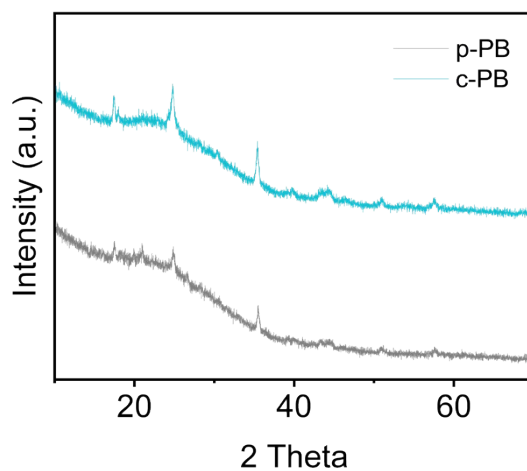


Fig. S21 XRD patterns of p-PB and c-PB electrode (after three cycles in PB//pre-Li-SC full-cell at 0.1 A g^{-1}).

Table S1. ICP results of pre-Li-SC/K and pre-Li-SC/PC.

samples	Parametric	Instrument readings (mg/L)	Measured elements	Content (mg/L)	K/Li molar ratio
1	pre-Li-SC/K	9.9686	K	199.4	2.05
	half cells	0.8632	Li	17.3	
2	pre-Li-SC/PC	10.642	K	212.8	2.16
	PICs	0.8763	Li	17.5	