Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.

Study on boron-containing electrolyte at extra-high temperature for lithium ion batteries

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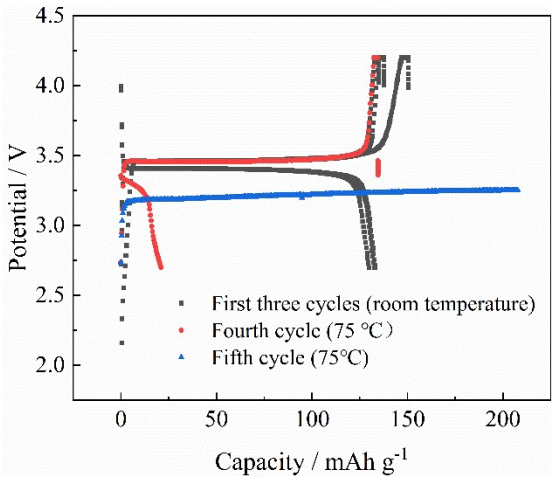
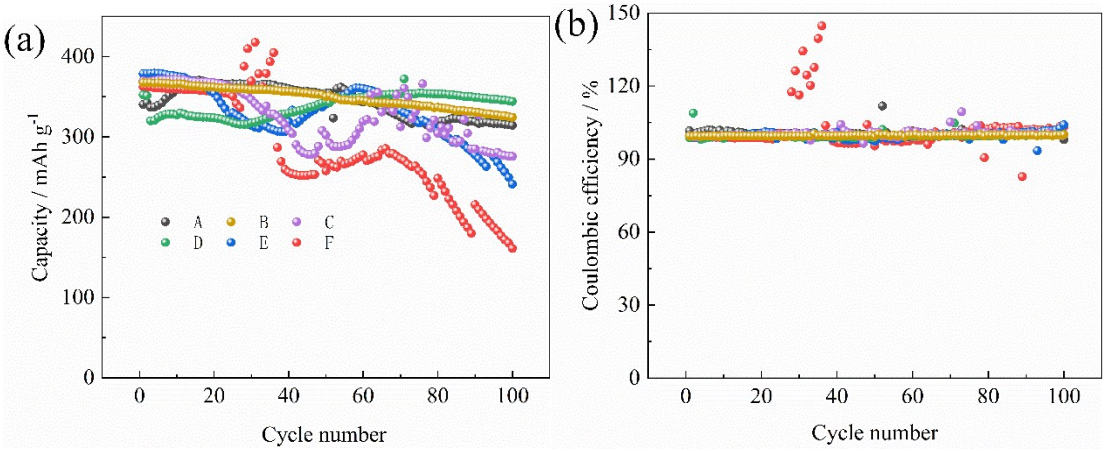


Fig. S1 The charge-discharge profiles of LFP/Li cells with LiPF6-EC/DEC at room temperature (first three cycles) and 75 ℃ (fourth cycle) respectively.



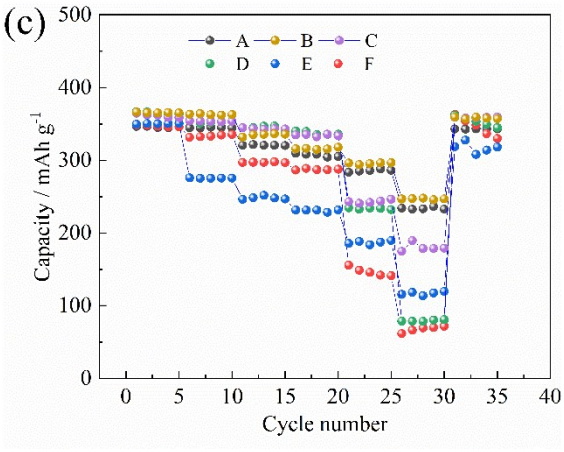


Fig.S2 (a) The cyclic curves with a rate of 0.5 C, (b) coulomb efficiency and (C) rate performance (0.1 C, 0.2 C, 0.5 C, 1.0 C, 2 C, 5 C and 0.1 C) curves of Li/graphite cells at 75 ° C.

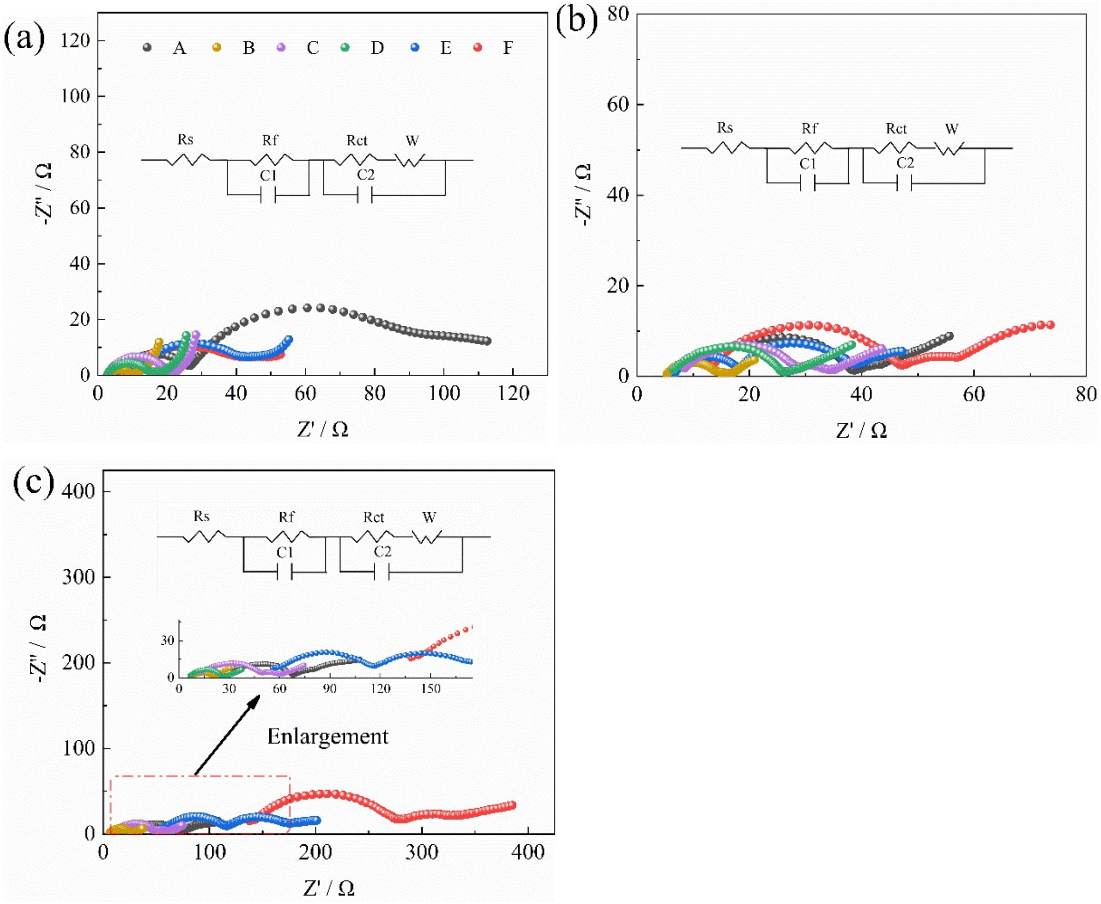


Fig. S3 The EIS spectra of Li/ graphite cells after (a) 1, (b) 50 and (c) 100 cycles at 75℃ (tested at a fully lithium-embedded state).

Table S1 The EIS fitting data of Li/graphite cellls with different electrolytes at 75℃ after first, 50 and 100 cycles

Electrolyte	Rs/Ω	Rf/Ω	Rct_f/Ω	Rs/Ω	Rf/Ω	Rct_f/Ω	Rs/Ω	Rf/Ω	Rct_f/Ω
	1 cycle			50 cycles			100 cycles		
A	6.40	5.32	19.68	9.66	30.13	5.12	23.92	47.77	15.34
B	3.84	5.26	1.39	5.86	7.07	1.39	8.25	5.40	6.84
C	3.15	11.79	5.34	7.33	22.56	4.61	12.71	25.53	16.63
D	2.79	12.38	2.57	5.72	20.99	3.15	8.77	28.41	7.23
E	4.84	7.23	26.03	7.40	10.79	18.31	61.52	53.04	52.61
F	5.07	4.07	25.52	12.00	36.11	8.37	146.6	118.8	60.83

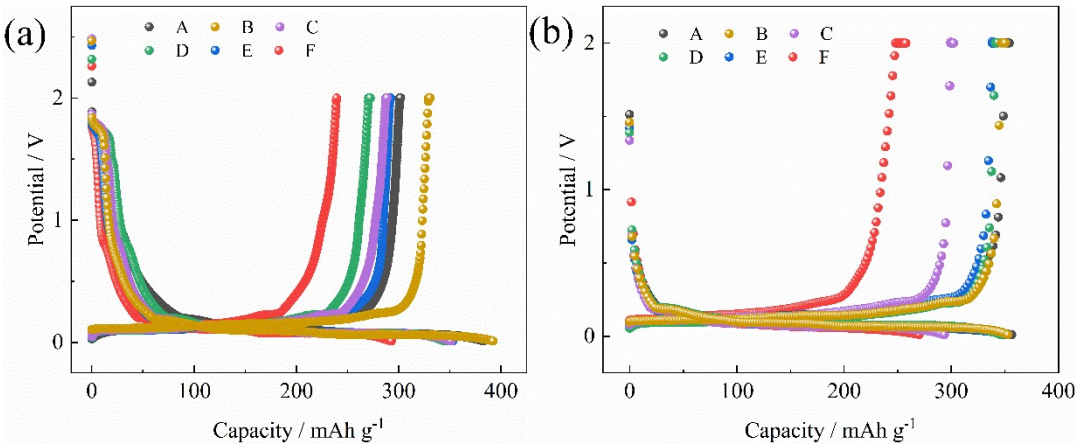


Fig. S4 (a) The first and (b) the 50th charge-discharge curves of Li/graphite cells cycled at 75℃

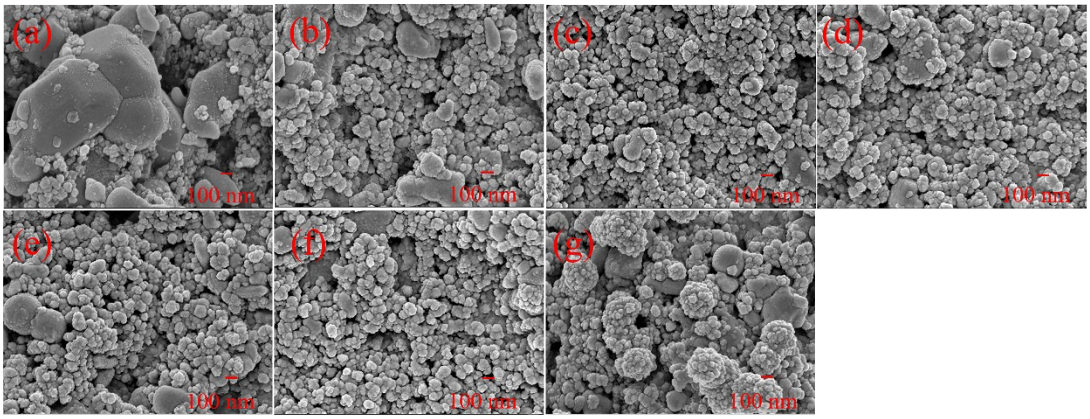


Fig. S5 SEM images of (a) fresh LFP and LFP after 10 cycles at 75 °C with different electrolytes: (b) electrolyte A, (c) electrolyte B, (d) electrolyte C, (e) electrolyte D, (f) electrolyte E, (g) electrolyte F.

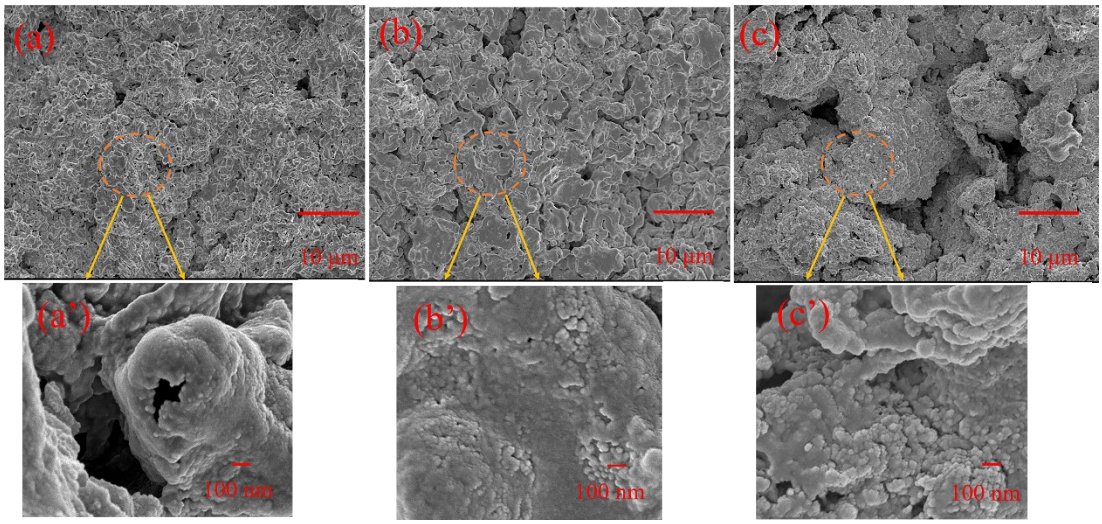


Fig. S6 SEM images of graphite after 100 cycles in (a) electrolyte A, (b) electrolyte B and (c) electrolyte F.