

## Supporting Information

# Biodegradable Bacterial Cellulose-Supported Quasi-Solid Electrolyte for Lithium Batteries

*Mingxia Yan,<sup>a</sup> Wenjie Qu,<sup>a,\*</sup> Qingdong Su,<sup>c</sup> Shi Chen,<sup>a,b</sup> Yi Xing,<sup>a</sup> Yongxin Huang,<sup>a</sup>*

*Nan Chen,<sup>a,b</sup> Yuejiao Li,<sup>a,b</sup> Li Li,<sup>a,b</sup> Feng Wu<sup>a,b</sup> and Renjie Chen<sup>a,b\*</sup>*

a School of Material Science & Engineering, Beijing Institute of Technology, Beijing 100081, China.

b Collaborative Innovation Center of Electric Vehicles in Beijing, Beijing 100081, China

c Rocket Force University of Engineering, Xian 710025, China

\* E-mail: chenrj@bit.edu.cn (C.R.J); wenjie\_8989@126.com

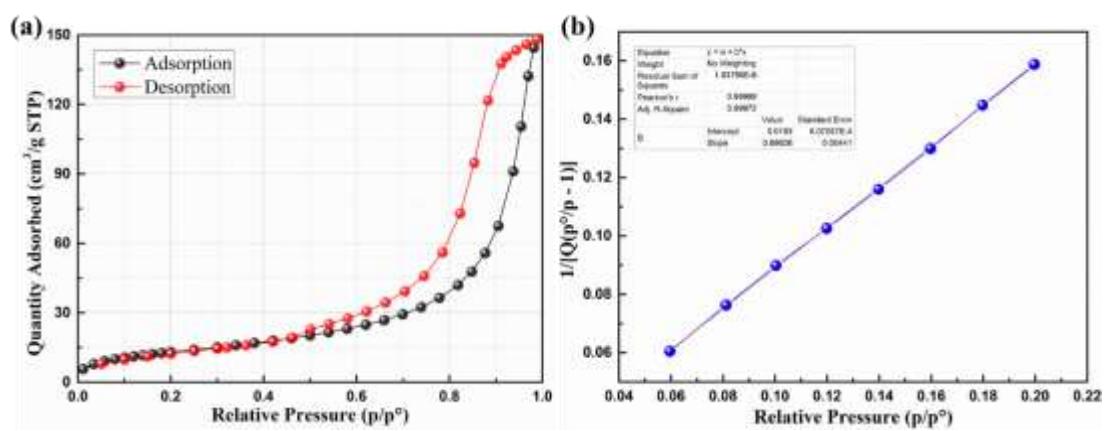


Figure S1. The N<sub>2</sub> adsorption and desorption curve and the Brunauer-Emmett-Teller test of the BC

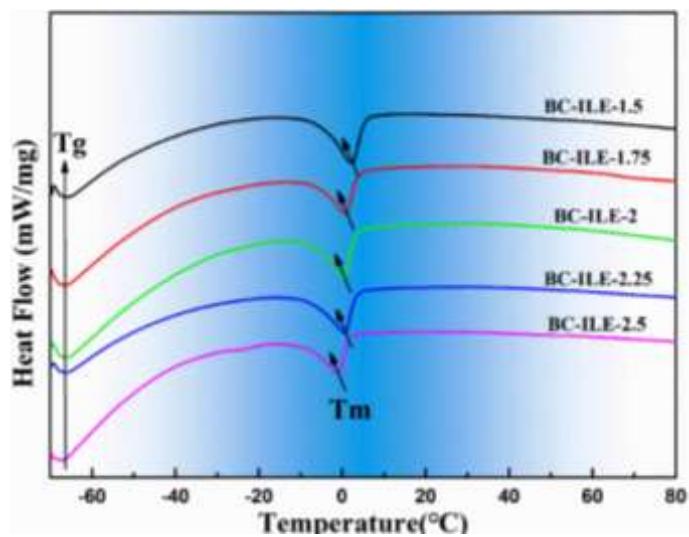


Figure S2. DSC curves of electrolytes with different ratios

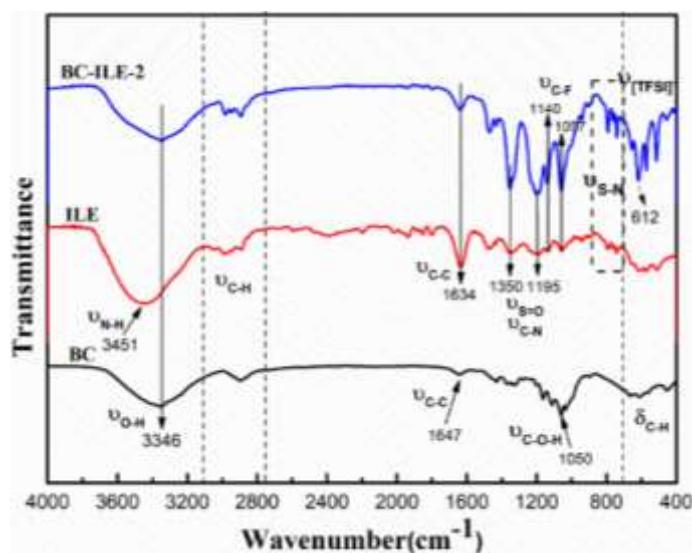


Figure S3. FT-IR spectra of the ILE、BC and BC-ILE-2

Table S1. Conductivity values of electrolytes with different ratios at different temperatures

T(°C)	Ionic conductivity (mS cm <sup>-1</sup> )				
	BC-IL-1.5	BC-IL-1.75	BC-IL-2	BC-IL-2.25	BC-IL-2.5
0°C	0.00640198	0.01044672	0.004034747	0.0029917	0.007492
10°C	0.01510682	0.06450494	0.054159601	0.0552765	0.091275
20°C	0.03103435	0.1235111	0.112249363	0.1031988	0.17145
25°C	0.04129147	0.16493383	0.137619033	0.1409692	0.238112
30°C	0.05416995	0.21125441	0.176038312	0.1765631	0.299935
40°C	0.07779372	0.30243165	0.269373309	0.2735112	0.483552
50°C	0.12984538	0.47660534	0.399896108	0.3984073	0.694413
60°C	0.1995618	0.72332731	0.597037583	0.590994	1.047607
70°C	0.25423159	0.90992478	0.768151838	0.7301964	1.304314
80°C	0.33913302	1.20431221	1.01412888	0.934425	1.787727

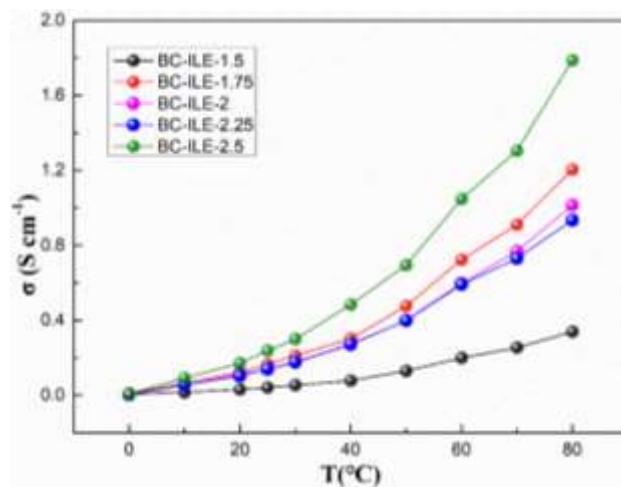


Figure S4. The relationship between conductivity and temperature of different ratios of BC-ILE.

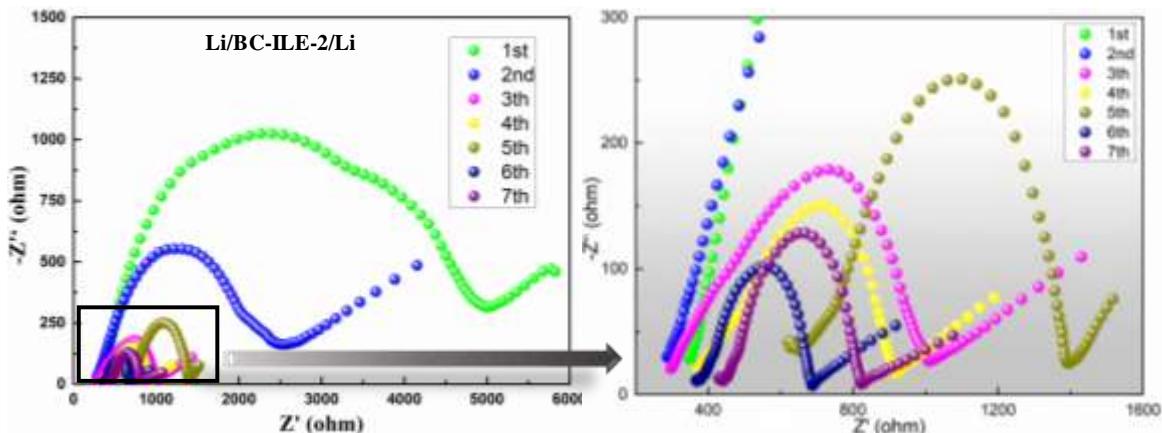


Figure S5. Time evolution of the ac impedance plots for the Li/BC-ILE-2/Li battery and the schematic diagram of the partially amplified impedance changes.

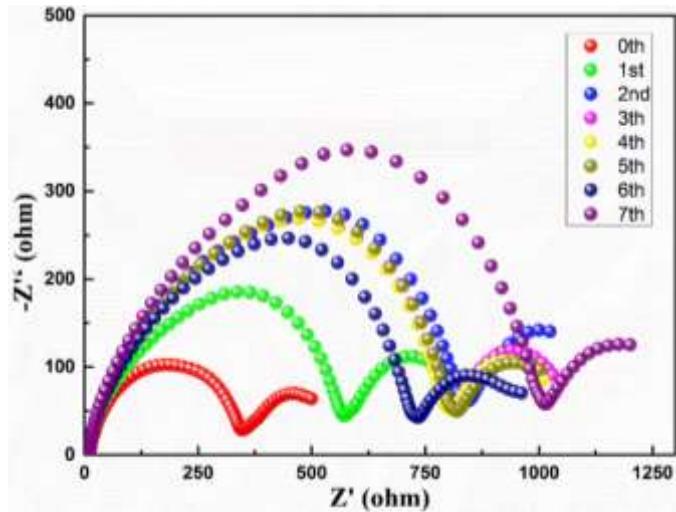


Figure S6. Time evolution of the ac impedance plots for the Li/ILE/Li battery

Table S2. The calculation results of density functional theory (DFT)

Structure	$\text{Li}^+$	$\text{TFSI}^-$	$\text{LiTFSI}$	$\text{BC}$	$\text{BC-Li}^+$	$\text{BC-TFSI}^-$	$\text{BC-LiTFSI}$
Total Energy (Ha)	—	—	—	—	—	—	—
	7.4329984	1822.1430026	1822.1430026	681.5899633	689.0350633	2503.7397893	2511.1819953



Figure S7. Schematic diagram of degradation experiment results