

Supporting information

Spiro-Twisted Benzoxazine Derivatives bearing Nitrile Group for All-Solid-State Polymer Electrolytes in Lithium Batteries

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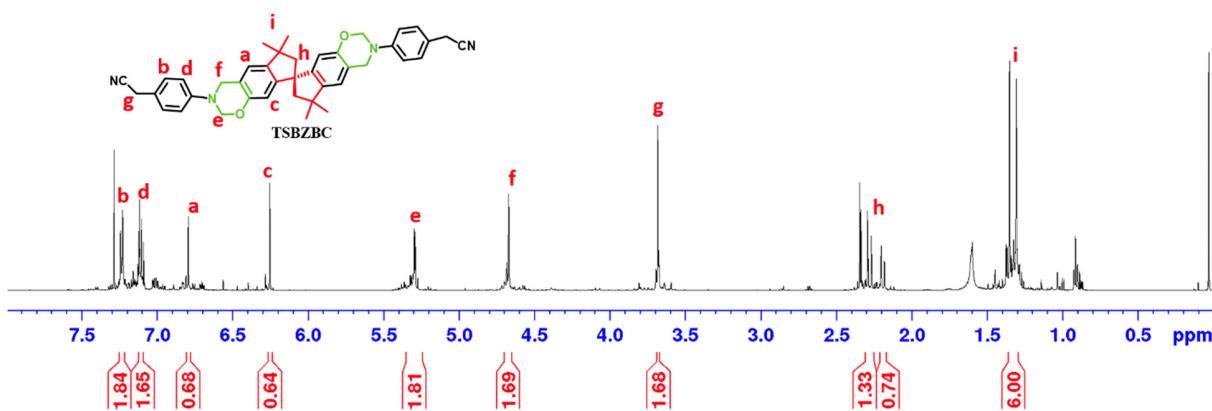


Figure S1. ¹H NMR spectrum of TSBZBC.

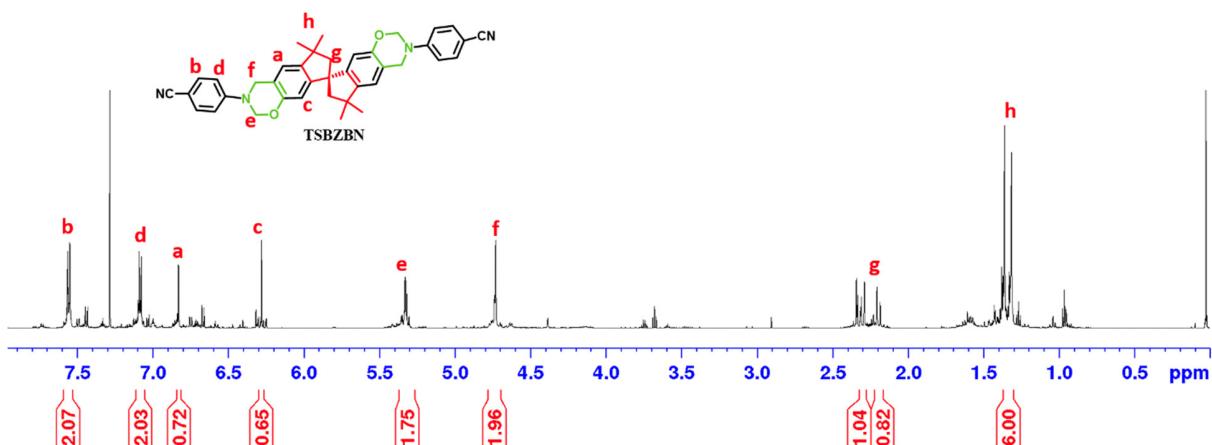


Figure S2. ¹H NMR spectrum of TSBZBN.

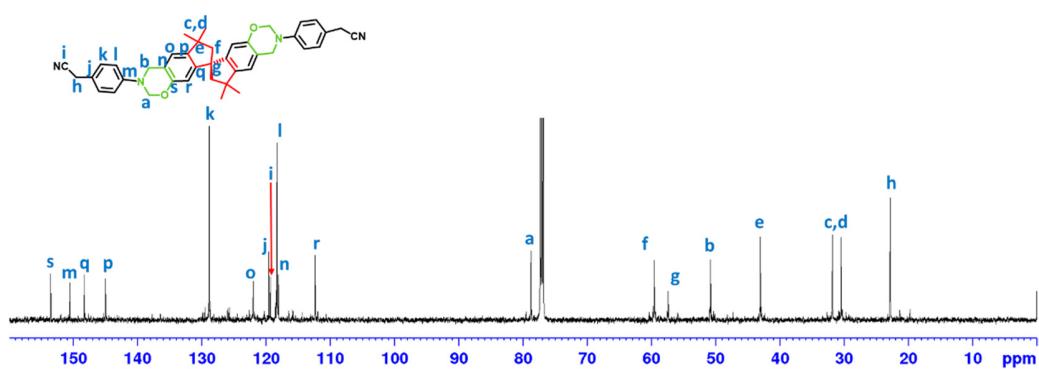


Figure S3. The ¹³C NMR spectra for TSBZBC.

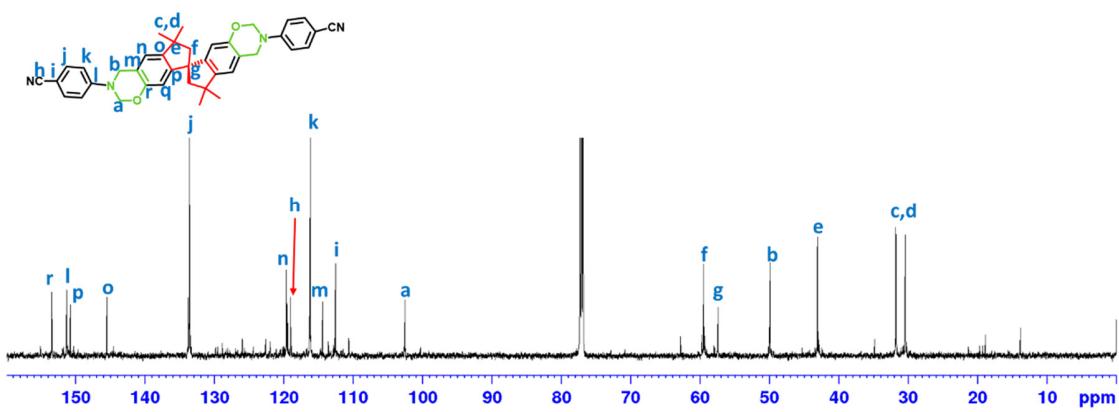


Figure S4. The ^{13}C NMR spectra for TSBZBN.

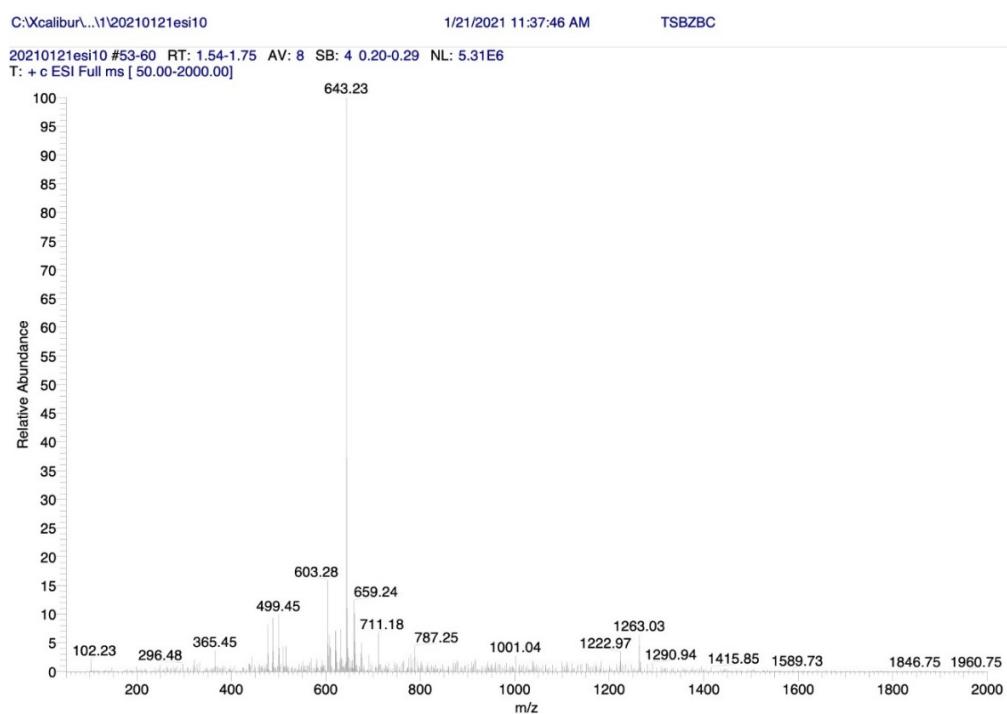


Figure S5. The ESI mass spectra of TSBZBC.

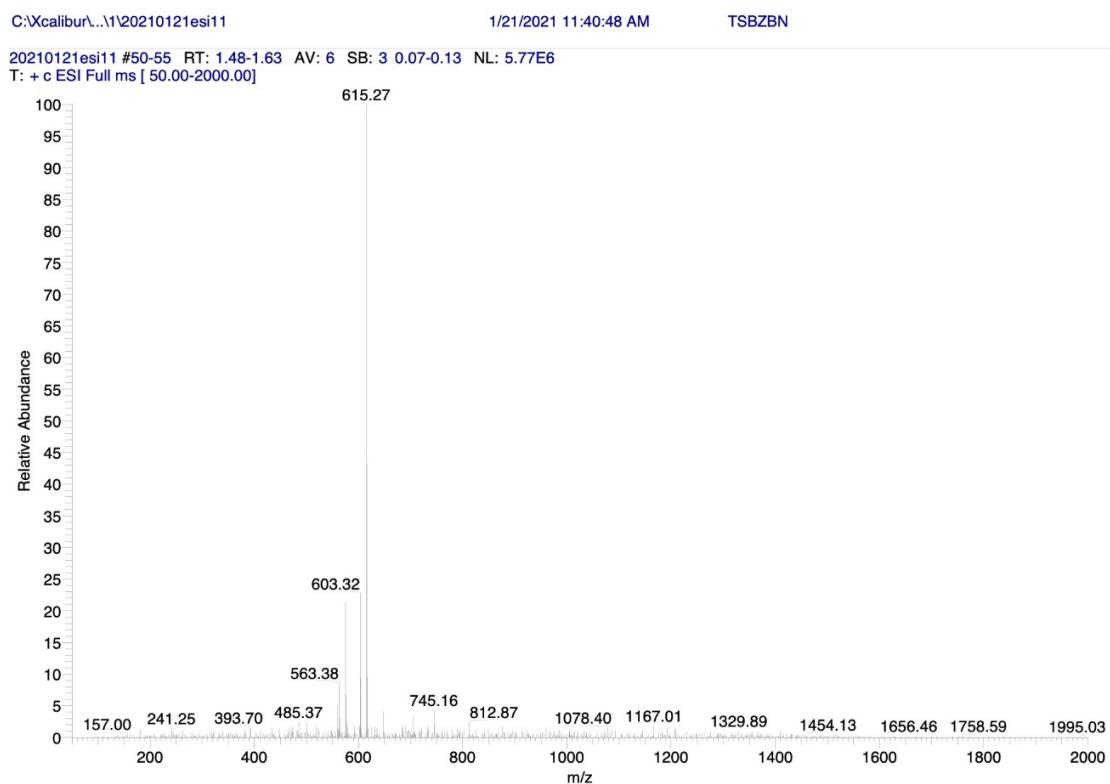


Figure S6. The ESI mass spectra of TSBZBN.

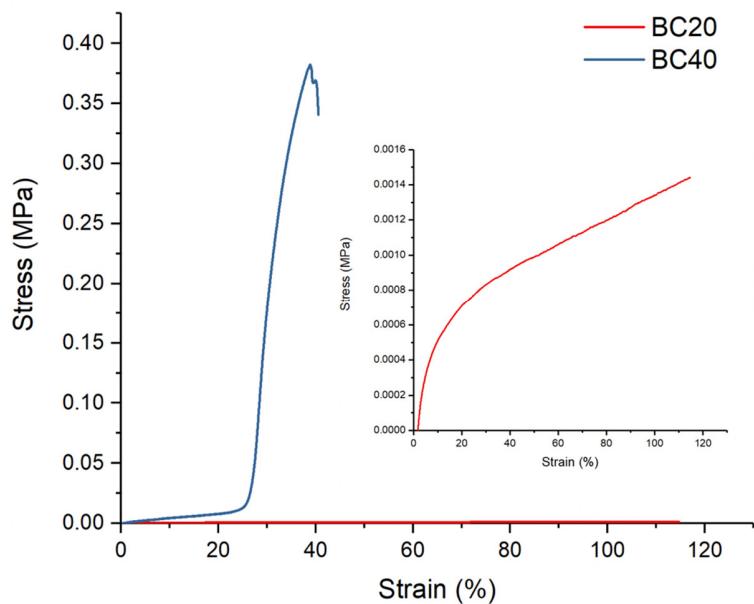


Figure S7. DMA stress-strain curves of the BC20 and BC40 sample.

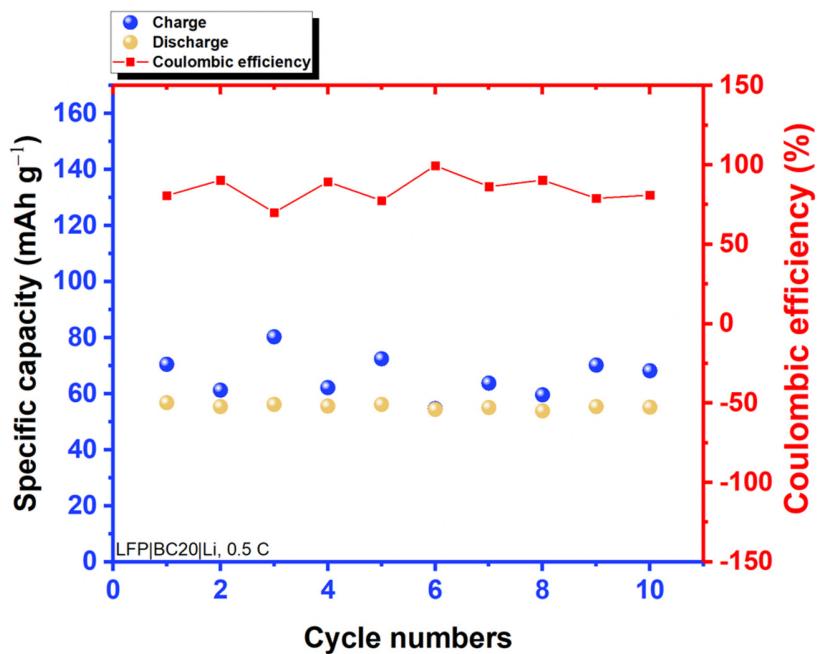


Figure S8. Cycling performance of the LFP|BC20|Li cell at 0.5 C (80 °C).

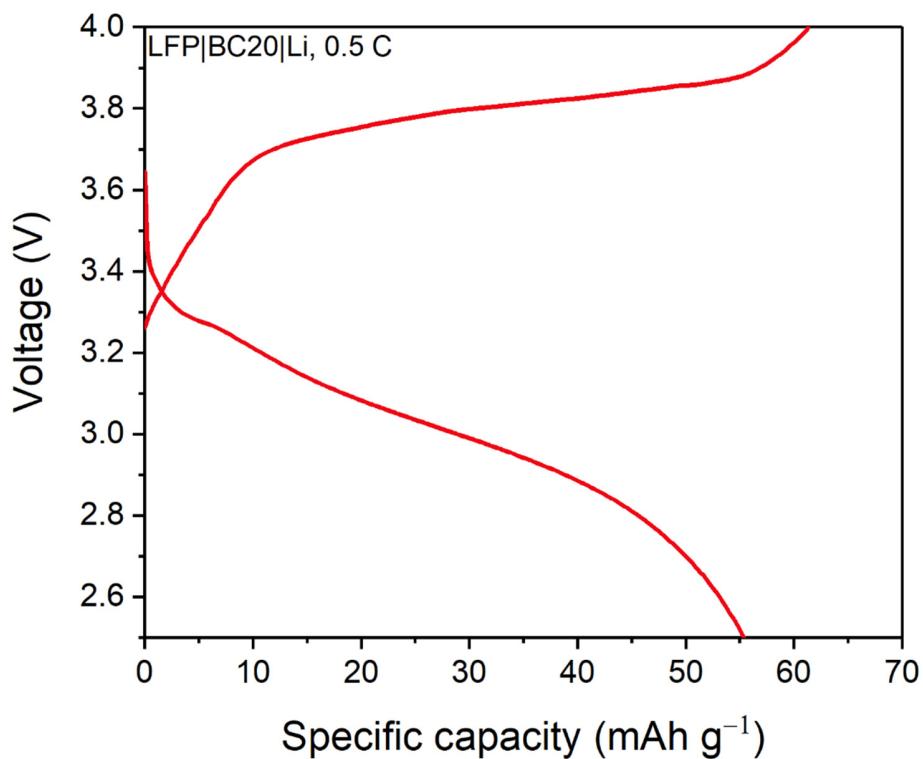


Figure S9. Charge/discharge profile of the LFP|BC20|Li cell at 80 °C.

Table S1 The ionic conductivities result of the BC10, BC20, BC30, and BC40 samples at various temperatures.

Ionic Conductivities (S cm ⁻¹) SPE	Temperature (°C)	RT	40	60	80
BC10		2.27×10^{-5}	1.33×10^{-4}	4.48×10^{-4}	9.32×10^{-4}
BC20		7.04×10^{-6}	3.50×10^{-5}	1.42×10^{-4}	3.24×10^{-4}
BC30		3.63×10^{-6}	2.20×10^{-5}	7.50×10^{-5}	2.44×10^{-4}
BC40		3.03×10^{-6}	1.23×10^{-5}	5.63×10^{-5}	2.41×10^{-4}

Table S2. Comparison of SPEs in this work and those reported in literature.

Electrolyte	Transference number	Conductivity (S cm ⁻¹)	Lithium plating/stripping tests (current density [mA cm ⁻²]/cycle time [h])	Discharge capacity (mAh g ⁻¹)	Operating temp. (°C)	Ref
BC20	0.187	3.23×10^{-4}	0.1/2700	158.4 (0.1 C)	80	This work
BN20	0.143	2.63×10^{-4}	0.1/900	153.4 (0.1 C)	80	This work
PT20	0.17	3.53×10^{-4}	0.1/200	165.6 (0.1 C)	80	[29]
PEO/LiTFSI	-	5.58×10^{-4}	0.1/144		80	[29]
T1-00(PEO/LiTFSI)	0.32	5×10^{-4}	0.1/130	158 (0.05 C)	80	[65]
T1-20	0.43	5.61×10^{-4}	0.1/450	156 (0.05 C)	80	[65]
PEO/LiTFSI	0.18	1×10^{-3}	-	-	80	[68]
PEO/LiFSI	0.14	$>1 \times 10^{-3}$	-	146 (0.2 C)	80	[68]

3PEG-SSH	0.32	1.78×10^{-4} (80 °C)	-	135 (0.1 C)	60	[69]
PEO-PEGDA-DVB-LiTFSI	0.21	1.4×10^{-4}	-	138 (0.1 C)	70	[70]
PEO₈-LiPCSI	0.84	7.33×10^{-5}	0.01/1000	141 (0.1 C)	60	[71]
PTSPE	0.36	2.3×10^{-4}	0.1/500	~165 (0.1 C)	60	[72]