Metal-organic framework-modified separator enables long cycling lithium-ion capacitors with asymmetric electrolyte design

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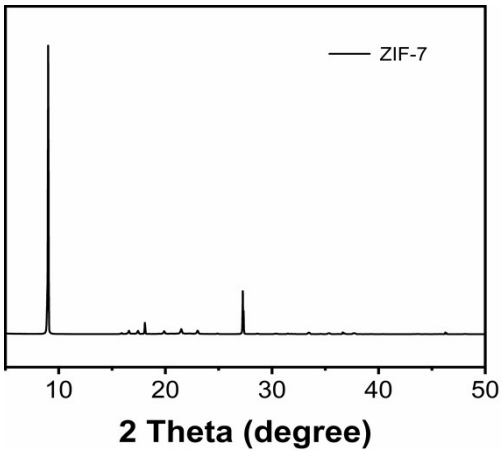

Figure S1. XRD characterization of as-synthesized ZIF-7 particles.

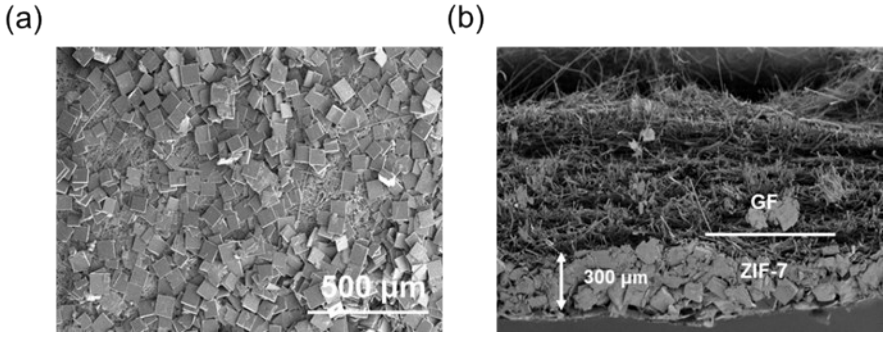

Figure S2. (a) SEM image of the as-synthesized ZIF-7 particles. (b) Cross-sectional SEM image of a ZIF-7 modified glass fiber separator.

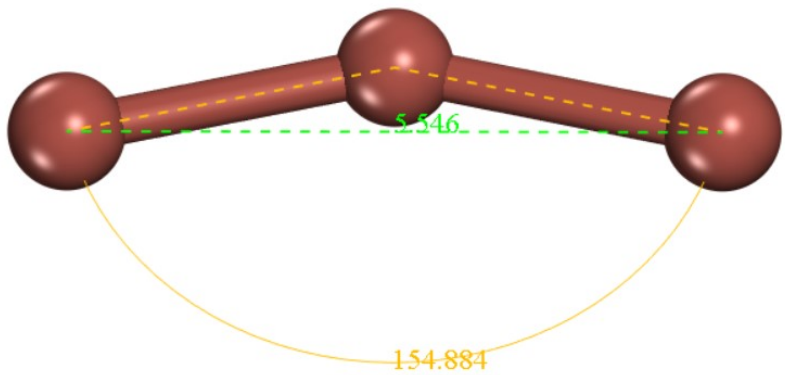

Figure S3. The dimension of I_3^- species.

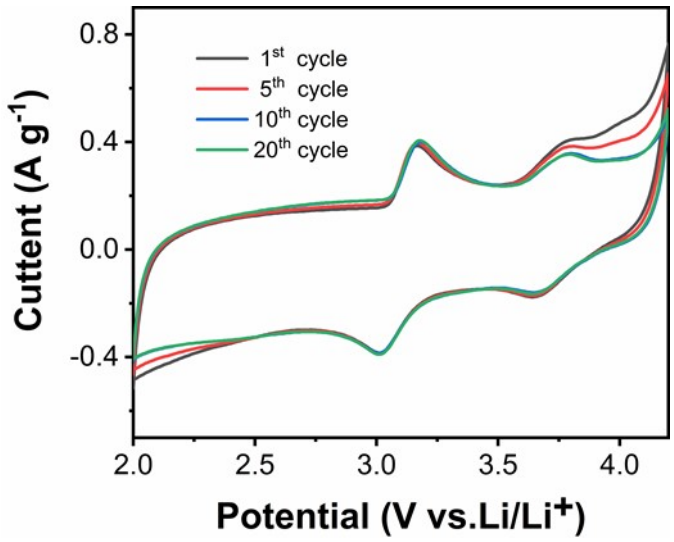

Figure S4. CV curves of the cell using the AC cathode at the scan rate of 0.5 mV/s of different cycles.

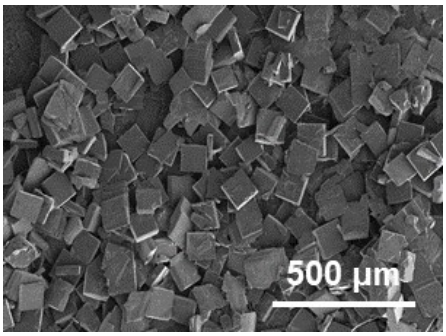

Figure S5. SEM image of the ZIF-7 particles after long-term cycling.

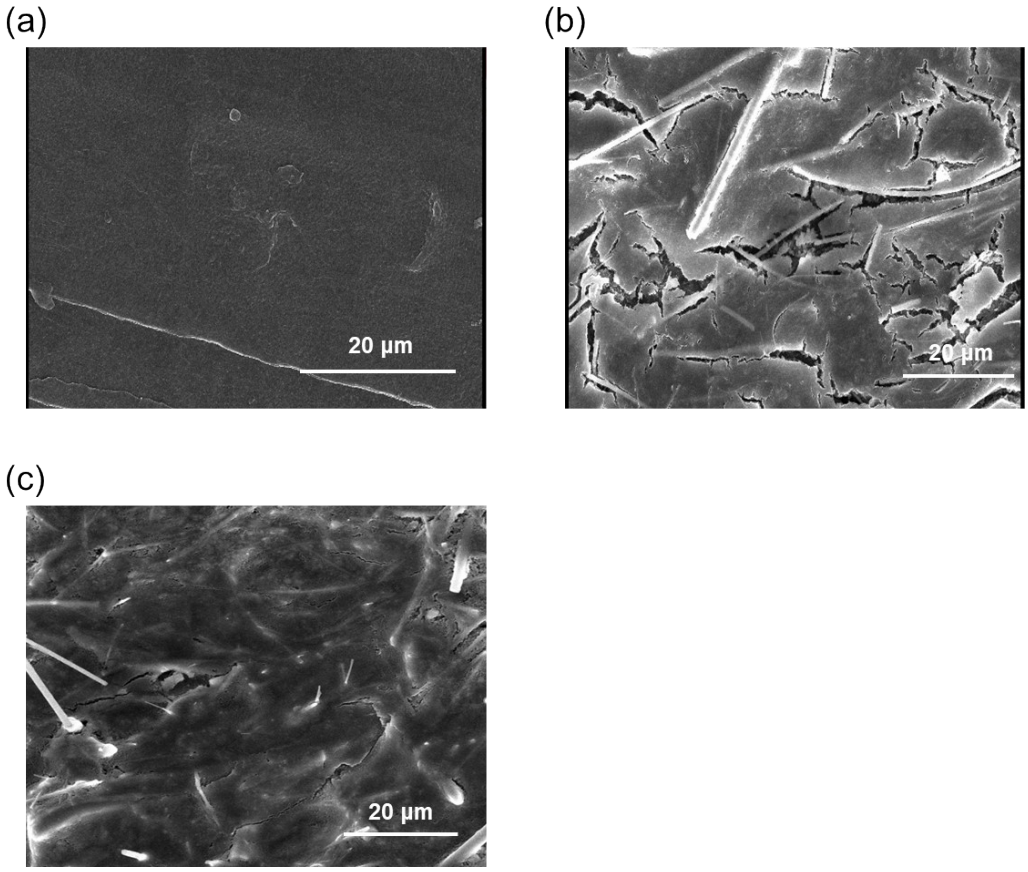

Figure S6. SEM image of (a) fresh surface of a lithium foil. SEM images of the cycled lithium foil surface from the cell using the traditional separator (b) and ZIF-7 modified separator.

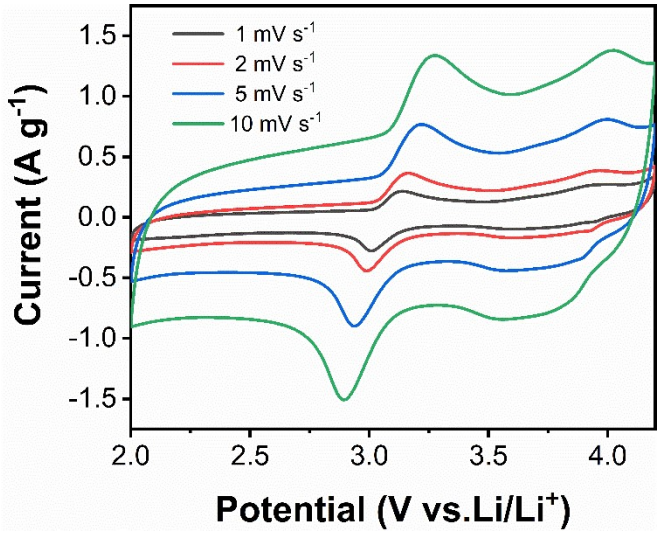

Figure S7. CV curves of the cell using the AC cathode at different scan rates.

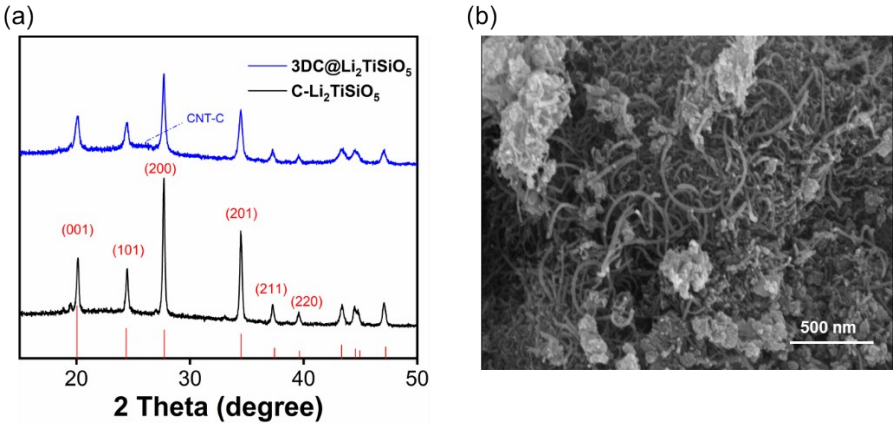

Figure S8. (a) XRD and (b) SEM characterization of as-synthesized 3DC@Li_2TiSiO_5 powder.

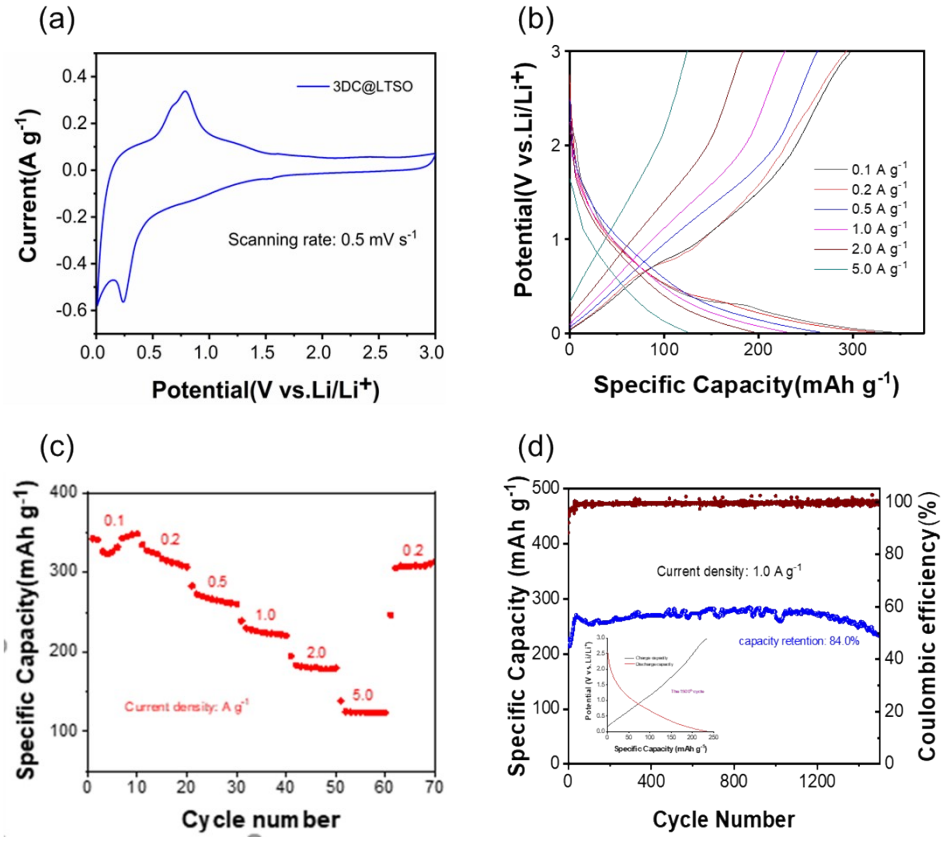

Figure S9. Electrochemical performance test of 3DC@Li_2TiSiO_5. (a) CV curves, (b) GCD profiles, (c) rate performance, and (d) cyclic capability of 3DC@Li_2TiSiO_5. The insert curve in (d) is GCD profile of the 1500th cycle.

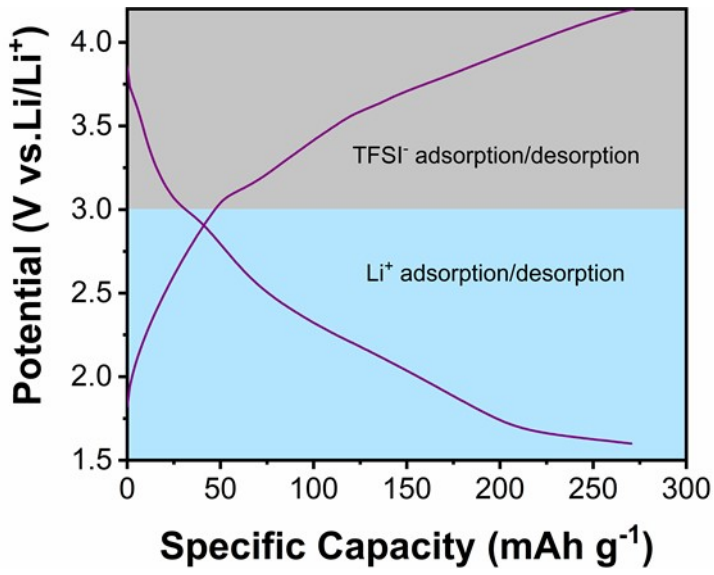

Figure S10. Schematic illustration of dual ion adsorption of the AC cathode at 0.1 A g^{-1}.

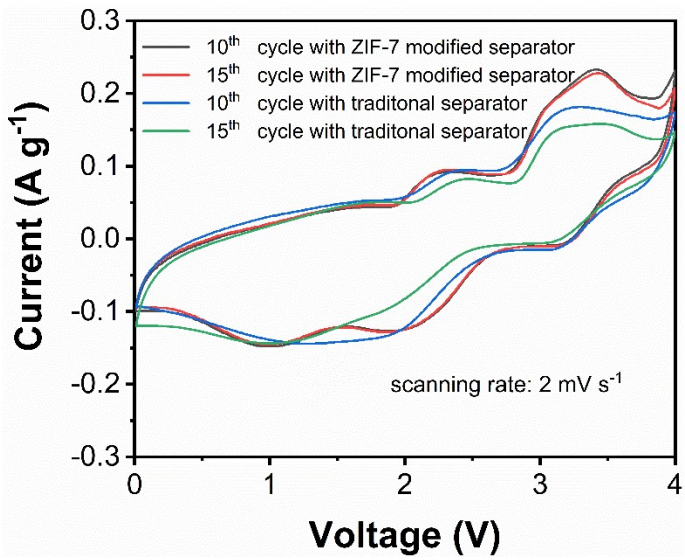

Figure S11. CV curves of AC//3DC@Li_2TiSiO_5 LICs with traditional and ZIF-7 modified separators after several cycles.

Table S1 Comparison of electrochemical performance of lithium ion capacitors.

Anode	Cathode	Energy Density (Wh kg-1)	Cycling Number	Capacity Retention	Ref.
SnO_2	rGO	186	5000	70 %	[1]
Li_3VO_4	AC	136.4	1500	87 %	[2]
CNT@ pLTO	GF	101.8	5000	84.8 %	[3]
Zr-MOF	AC	122.5	1000	86 %	[4]
graphite	AC	162.3	-	-	[5]
PHC	AC	104	5000	84.7 %	[6]
NPCM-A	MoS2/N-NPCM	120	4000	85.5 %	[7]
Li_5ReO_6	AC	40	5000	-	[8]
G–LTO	graphene–sucrose	95	500	94 %	[9]
LTSO	AC+LiI	238.56	4000	85.2 %	This work

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