Supporting Information

Ionic Liquid - Metal-Organic Framework Modified Composite Electrolyte for High-Performing Lithium-Ion Batteries

Aparna S Potdar,[#$] Rushikesh B Kale,[#] Reshma Ballal,[#] Ramchandra S Kalubarme,[#] Nageshwar D Khupse,[#] Jalindar Ambekar,[#] Bharat B Kale,*[#$] Milind V Kulkarni*[#]

[#]Centre for Materials for Electronics Technology (C-MET), Panchawati, *Off* Dr Homi Bhabha Road, Pune 411008, INDIA

[$]MIT World Peace University, Kothrud, Pune, INDIA

Email: milind@cmet.gov.in, bbkale1@gmail.com

Table S1. Impedance study of UIO@IL-CE II membrane at a different temperature

Sr. No.	Temperature (°C)	Ionic Conductivity (Scm^{-1})
1	25	6.14×10^{-4}
2	30	7.25×10^{-4}
3	35	8.91×10^{-4}
4	40	9.80×10^{-4}
5	45	1.17×10^{-3}

6	50	1.26 X 10^{-3}
7	55	1.40 X 10^{-3}
8	60	1.58 X 10^{-3}
9	65	1.63 X 10^{-3}
10	70	1.68 X 10^{-3}
11	75	1.72 X 10^{-3}

Table S2.: The comparative literature data on the reported system

MOF	Ionic liquids	σ (Scm^{-1})/T (°C)	LSV (V)	tLi^+	Discharge Capacity (mA h g^{-1}), C-Rate	Ref
UiO-66-SO_3Na	Na [Bmpyr][TFSI]	3.6 × 10^{-4}/RT	4.6	0.34	97.5 (C/20)	1
MIL-121	Li [EMIM][TFSI]	2.0 × 10^{-4}/RT	-	-		2
UiO-67	Li [EMIM][TFSI]	4.3 × 10^{-4}/RT	4.8	0.45	149 (0.1C)	3
ZIF-8	[EMIM][TFSI]	2.6 × 10^{-5}/22	-	-	-	4
ZIF-8	[$Li_{0.2}EMIM_{0.8}$][TFSI]	4.4 × 10^{-6}/22	-	-	-	5
ZIF-8	Li [EMIM][TFSI]	4.26 × 10^{-4}/30	4.5	0.67	160(0.1C)	6
ZIF-8	Li [EMIM][TFSI]	2.09 × 10^{-4}/25	4.7	0.45	152 (C/5)	7
ZIF-8	[$Na_{0.1}EMIM_{0.9}$] [TFSI]	2.0 × 10^{-4}/RT	-	-	-	8
UiO-66	Li [EMIM][TFSI]	3.2 × 10^{-4}/25	-	-	119 (1C)	9
UIO-66	**Li[BMPyrr][TFSI]**	**6.1 × 10^{-4}/25**	**5.2**	**0.75**	**150(0.1C)** **148(0.2C)** **144(0.5C)** **140 (1C)** **116(2C)** **81(5C)**	**Our work**

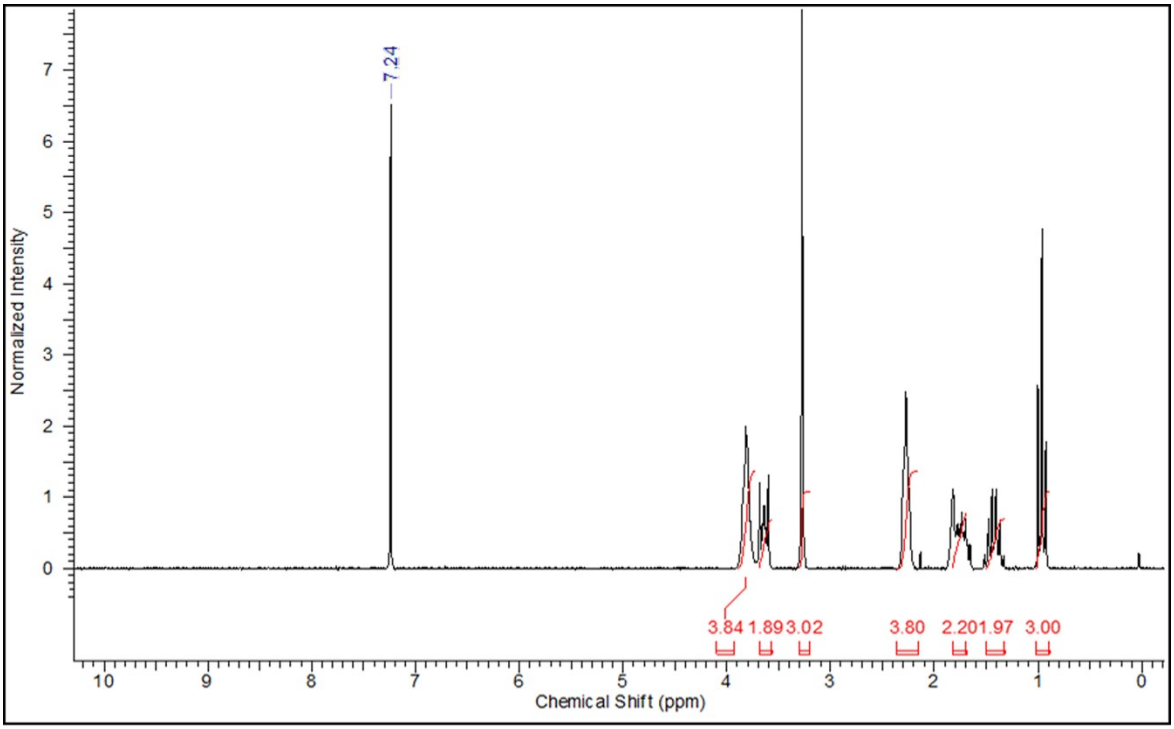

Figure S1.[1]H NMR spectrum of 1-Butyl-1-methylpyrrolidinium bis (trifluoro methane sulfonyl) imide in $CDCl_3$(0.99δ (t, 3H), 1.32δ (m, 2H), 1.71δ (m, 2H), 2.2δ (s, 4H), 3.1δ (s, 3H), 3.4δ (m, 2H), 3.6δ (m, 4H)).

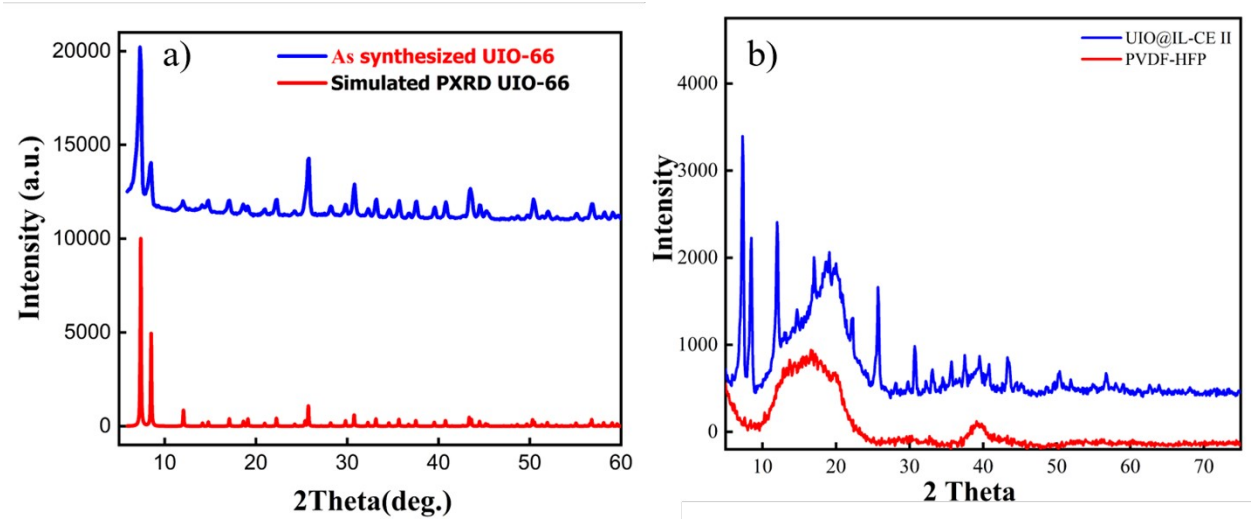

Figure S2. a) PXRD patterns of simulated UIO-66 and as-synthesized UIO-66, b) XRD pattern of plane PVDF-HFP film and UIO@IL-CE II membrane.

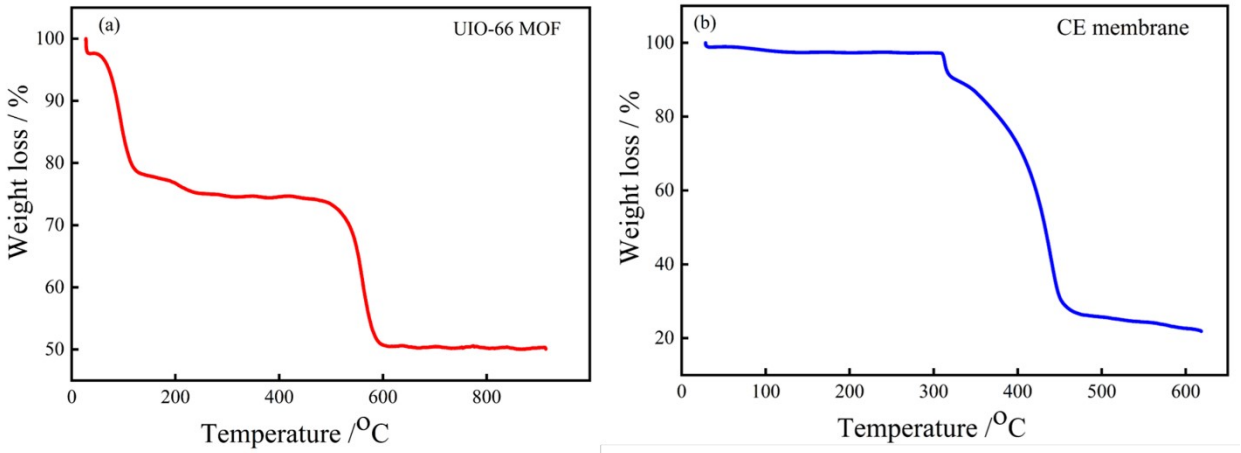

Figure S3. TGA plots of a) UIO-66 MOF and b) CE membrane.

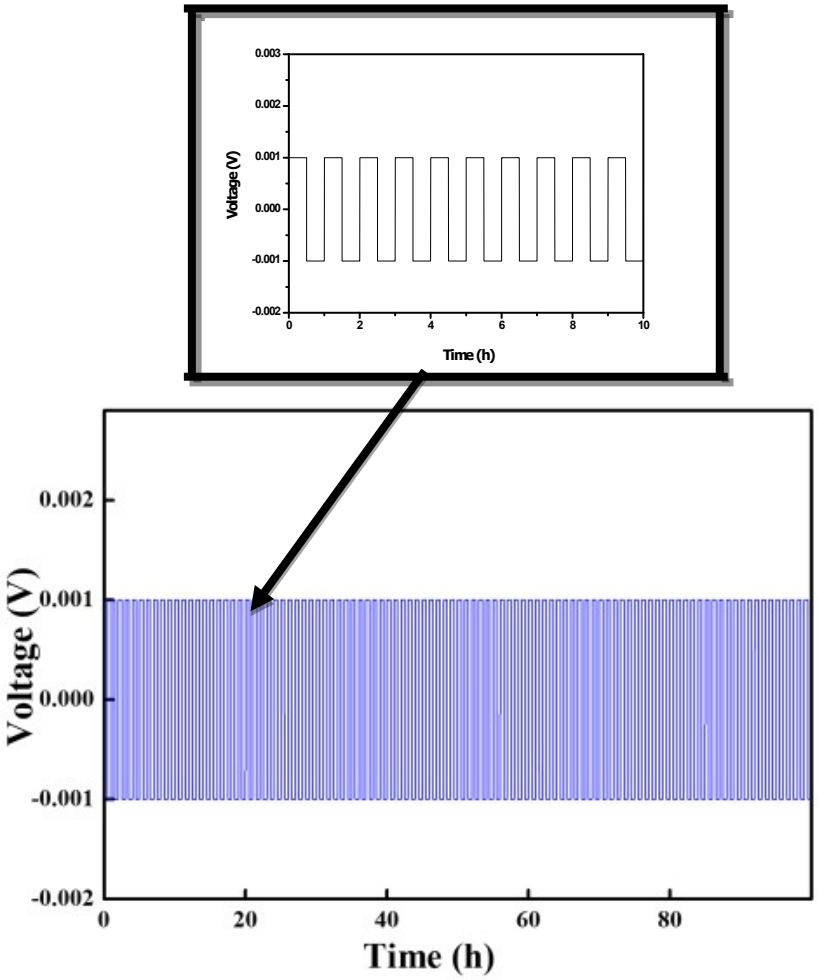

Figure S4. Strip-plate analysis at 0.1 mA cm^{-2}

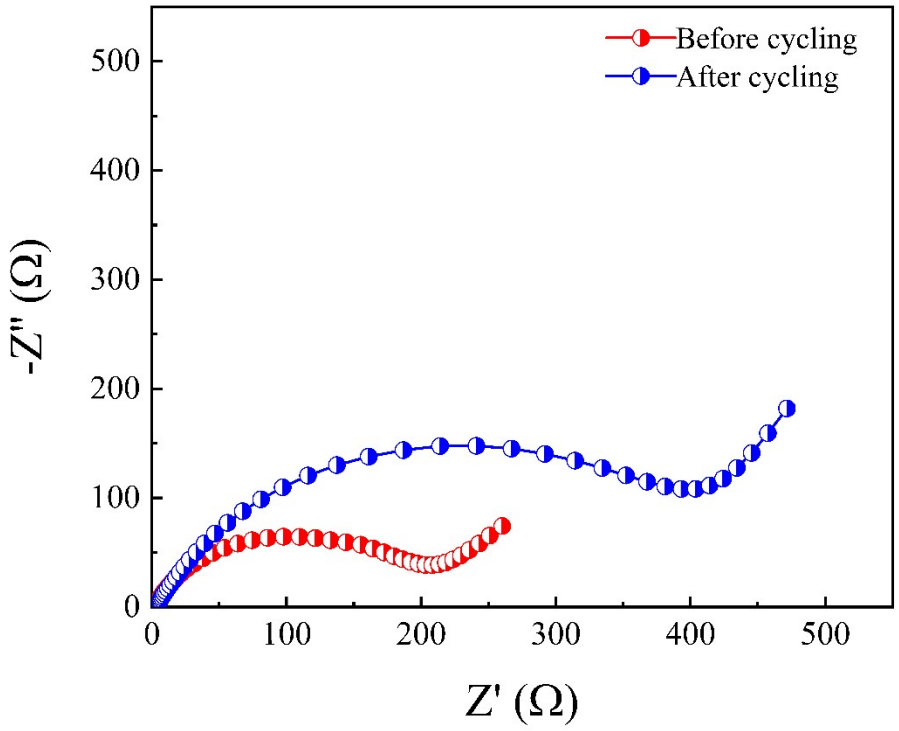

Figure S5. AC impedance spectra of the LFP|UIO@IL-CE II| Li cell before and after the galvanostatic charge/discharge cycling.

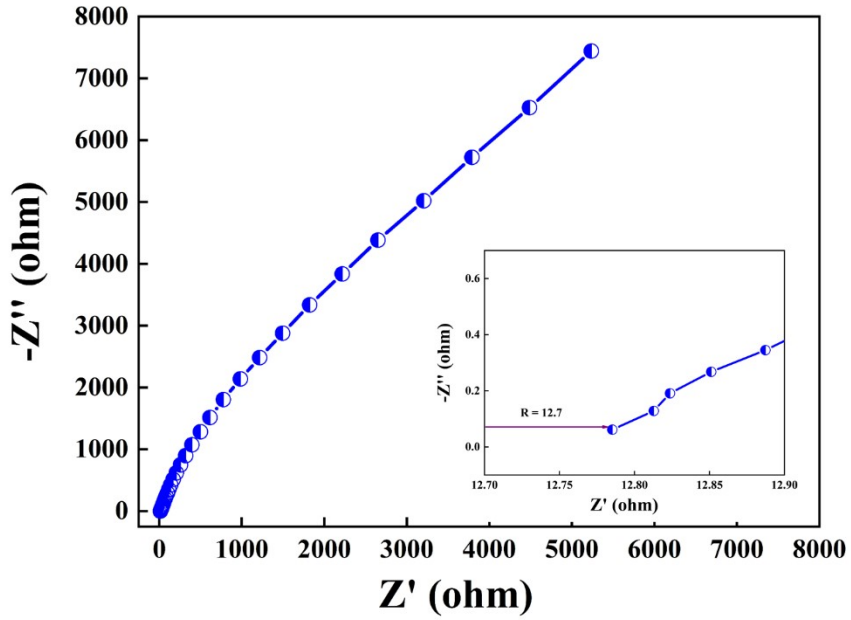

Figure S6. AC impedance spectra of the UIO@IL-CE II membrane

References

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