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Single-ion conducting and shear-thinning polymer electrolyte based on ionic liquid-decorated PMMA nanoparticles for lithium metal batteries

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Supplementary Information

Table S1: VFT fitting parameters of ionic conductivities and lithium ion transference number (t_{Li}^+) for PMMA-IL-TFSI/LiTFSI SIPEs.

Weight fraction (wt%)	**VFT Fitting Parameters**			$\mathbf{t_{Li}^+}$
	A (S cm^{-1})	B (K)	T_0 (K)	
PMMA-IL-TFSI/LiTFSI				
5	0.085	276	253	0.81
11	1.14	799	181	0.96
20	0.033	154	262	0.72
36	0.0088	205	277	0.66
50	0.00036	210	262	0.56

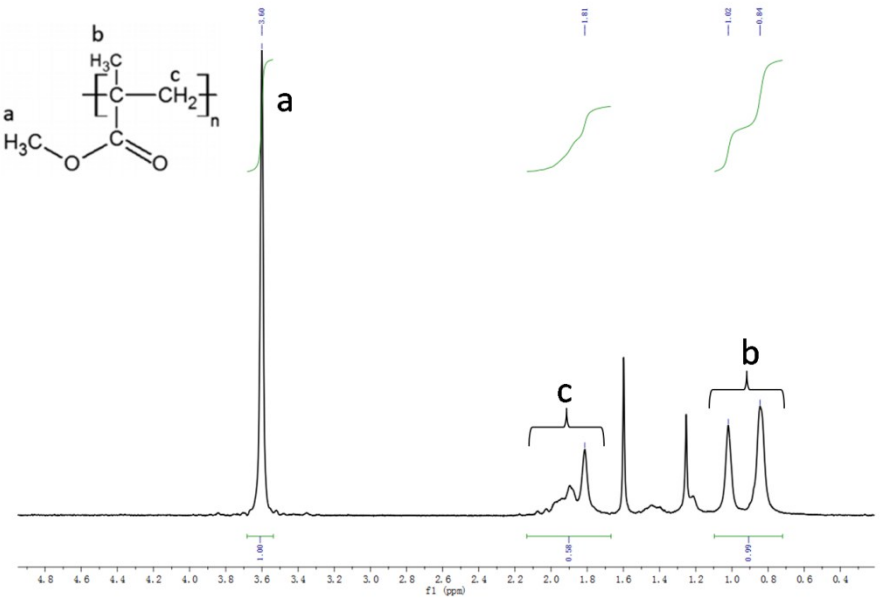

Figure S1. Proton NMR in $CDCl_3$ of Synthesized PMMA.

Peaks around 1.6 ppm and 1.25 ppm corespond to the trace water and impurity in $CDCl_3$[1,2] because with increasing of PMMA, the intensity of these peaks did not change.

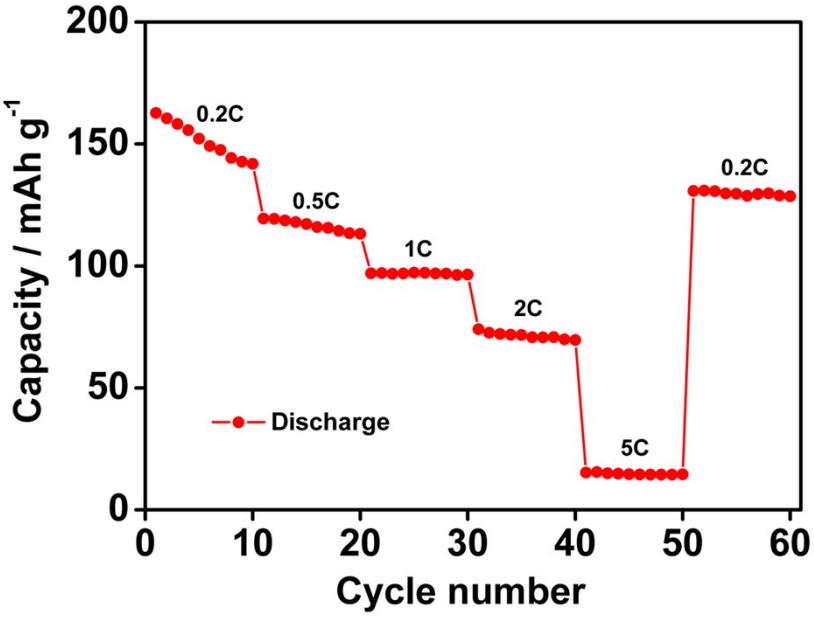

Figure S2. Rate capability at 0.2C, 0.5C, 1C, 2C and 5C of Li|1 M LiTFSI/PC|LTO cells.

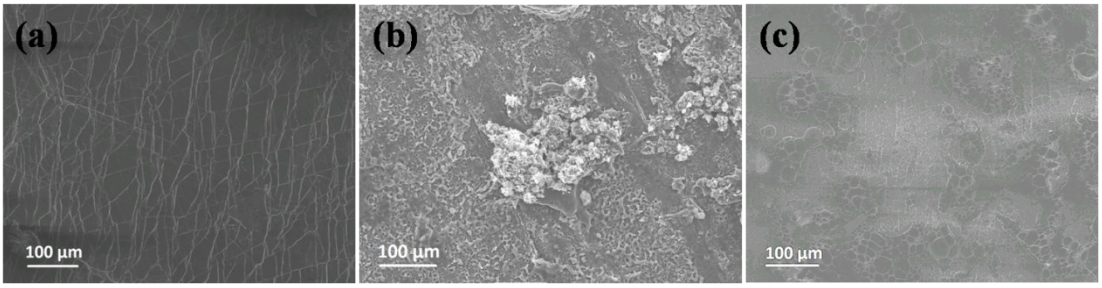

Figure S3. SEM photos of (a) Pristine lithium electrode before galvanostatic cycling. (b) Lithium electrode in contact with IL-TFSI/LiTFSI electrolyte after 80 h cycling at 0.2 mA cm^{-2}. (c) Lithium electrode in contact with 11 wt% PMMA-IL-TFSI/LiTFSI after 400 h cycling at 0.2 mA cm^{-2}.

References

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2. G. R. Fulmer, A. J. Miller, N. H. Sherden, H. E. Gottlieb, A. Nudelman, B. M. Stoltz, J. E. Bercaw and K. I. Goldberg, *Organometallics*, 2010, **29**, 2176–2179.