

Supporting Information

Flame-retardant single-ion conducting polymer electrolytes based on anion acceptors for high-safety lithium metal batteries

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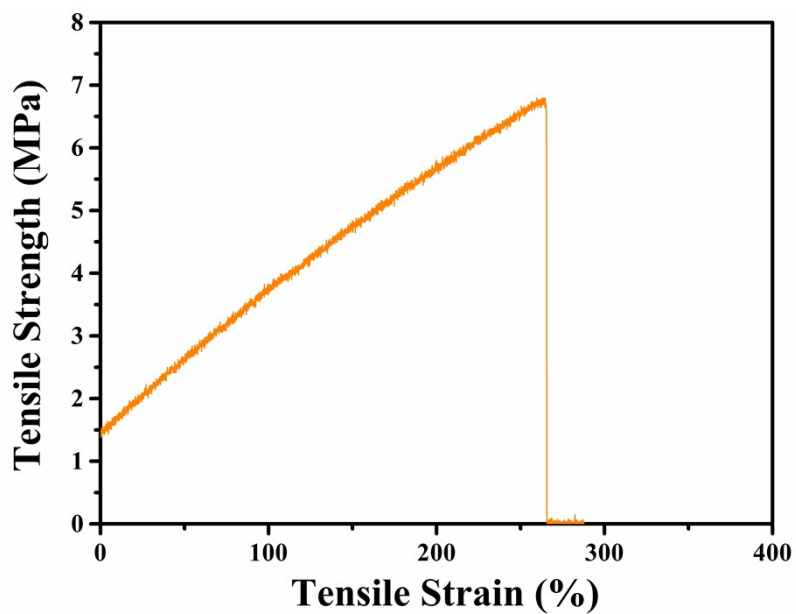


Fig. S1 Stress-strain curve of AEP membrane.

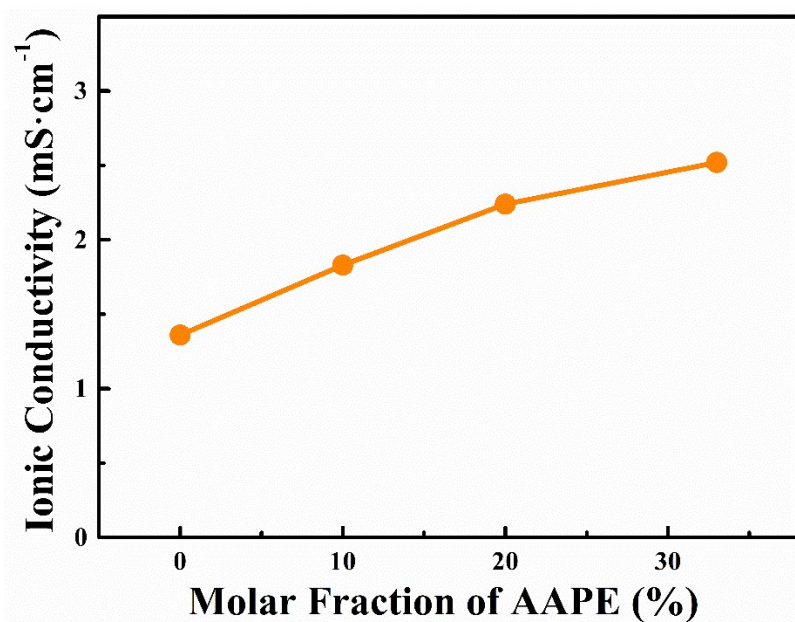


Fig. S2 Influence of molar fraction of AAPE in monomers (AAPE, ETT and PTM) on ionic conductivity of AEP at 25 °C.

Table S1 Summary of current single-ion conducting polymer electrolytes

Electrolyte	Flammability	σ^a (S cm ⁻¹)	Battery type	Cycles (capacity retention)
AEP (this work)	Nonflammable	2.52×10^{-3}	LFP/Li	500 (93.2%)
Po-PBSB ¹	Nonflammable ^b	6.2×10^{-4}	LFP/Li	200 (76.1%)
SICE ²	Nonflammable ^b	8.3×10^{-4}	LFP/Li	800 (92.9%)
es-LiPCE-s ³	Flammable	2.52×10^{-3}	LFP/Li	1500 (83.1%)
PSMA-g-LiATFSI ⁴	Flammable	1.6×10^{-4}	LFP/Li	1000 (-)
PEGDM-LiMTFSI ⁵	Flammable	1.2×10^{-4}	LFP/Li	100 (98%)
LPD@PVDF ⁶	Flammable	1.32×10^{-3}	LFP/Li	380 (91%)
PVDF-HFP/SG ⁷	Flammable	7.2×10^{-4}	LFP/Li	-
PLTB@PVDF-HFP ⁸	Flammable	1.8×10^{-4}	LMO/Li	100 (76.9%)
LiBAMB-PETMP/GBL ⁹	Flammable	1.47×10^{-3}	LFP/Li	500 (91.2%)
LiPBIE ¹⁰	Flammable	5.2×10^{-4}	LFP/Li	100 (100%)
PVDF-HFP/LiPSIPA ¹¹	Flammable	3.7×10^{-4}	LFP/Li	10 (84%)
PVDF-HFP/PTF-Li ¹²	Flammable	6.3×10^{-4}	LFP/Li	7 (95%)
MTF-Li/PVDF-HFP ¹³	Flammable	6×10^{-4}	LFP/Li	-

^a Ionic conductivity at room temperature. ^b The dry membranes without plasticizers can't be ignited.

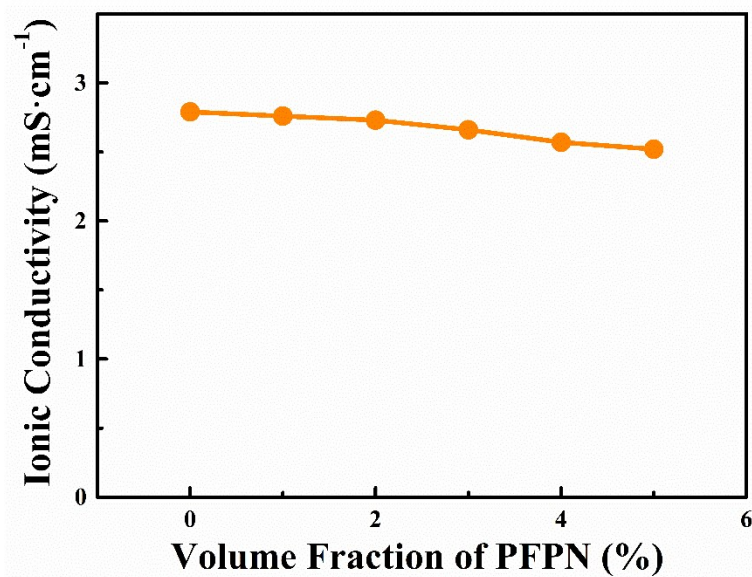


Fig. S3 Influence of volume fraction of PFPN in EC/FEC/PFPN on ionic conductivity of AEP at 25 °C.

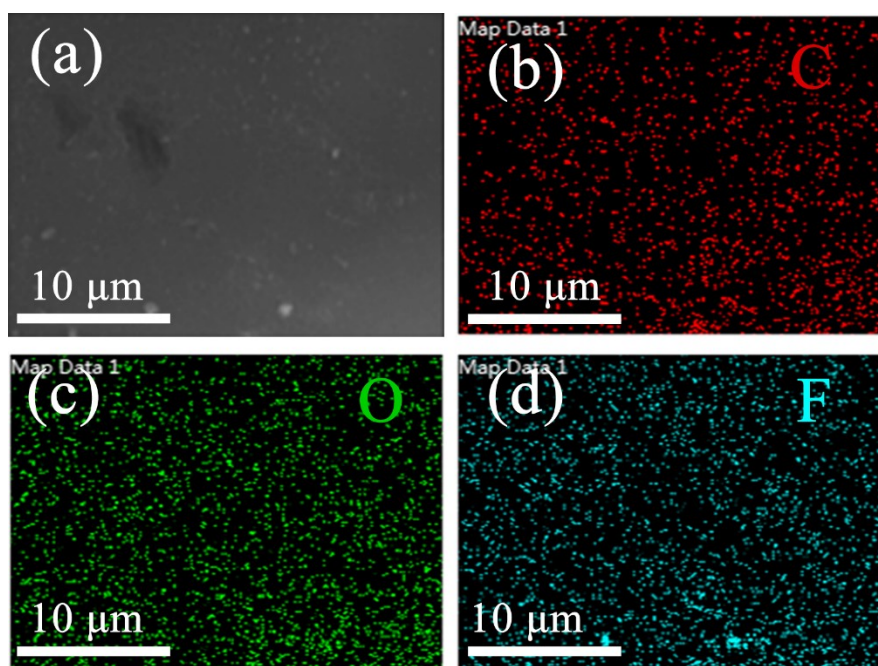


Fig. S4 (a) SEM image of Li electrodes after 5 cycles in Li|AEP|Li cells; (b) Corresponding EDS mapping of C element; (c) Corresponding EDS mapping of O element; (d) Corresponding EDS mapping of F element.

Table S2 Atomic ratio of elements on the surface of Li from Li|AEP|Li cell and Li|LE|Li cell after Li plating/stripping cycling test

Electrolyte	F 1s (at.%)	C 1s (at.%)	Li 1s (at.%)	O 1s (at.%)	P 2p (at.%)
AEP	27.37	21.80	32.76	17.28	0.78
LE	11.14	33.59	27.41	26.86	1.01

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