

A Thin and High Strength Composite Polymer Solid-State Electrolyte with Highly Efficient and Uniform Ion Transport Network

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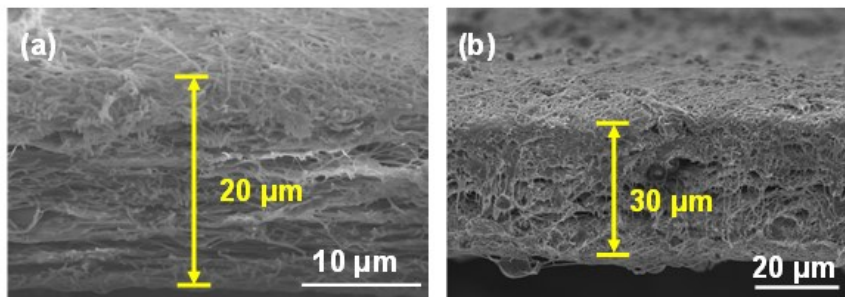


Fig. S1. Cross-section SEM images of (a, b) the PAN network

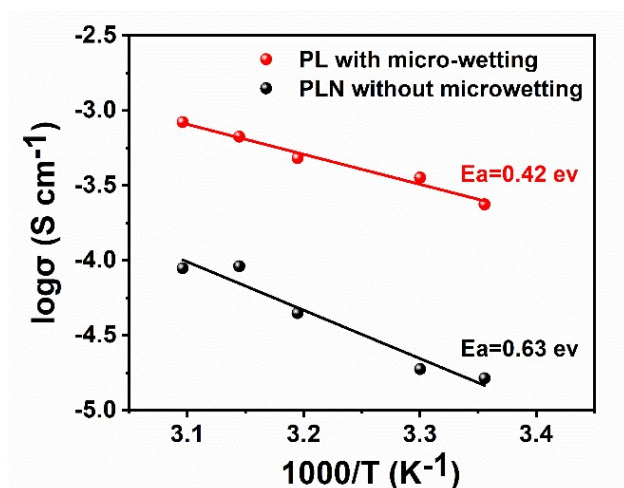


Fig. S2. E_a of PLN without micro-wetting and PL with micro-wetting.

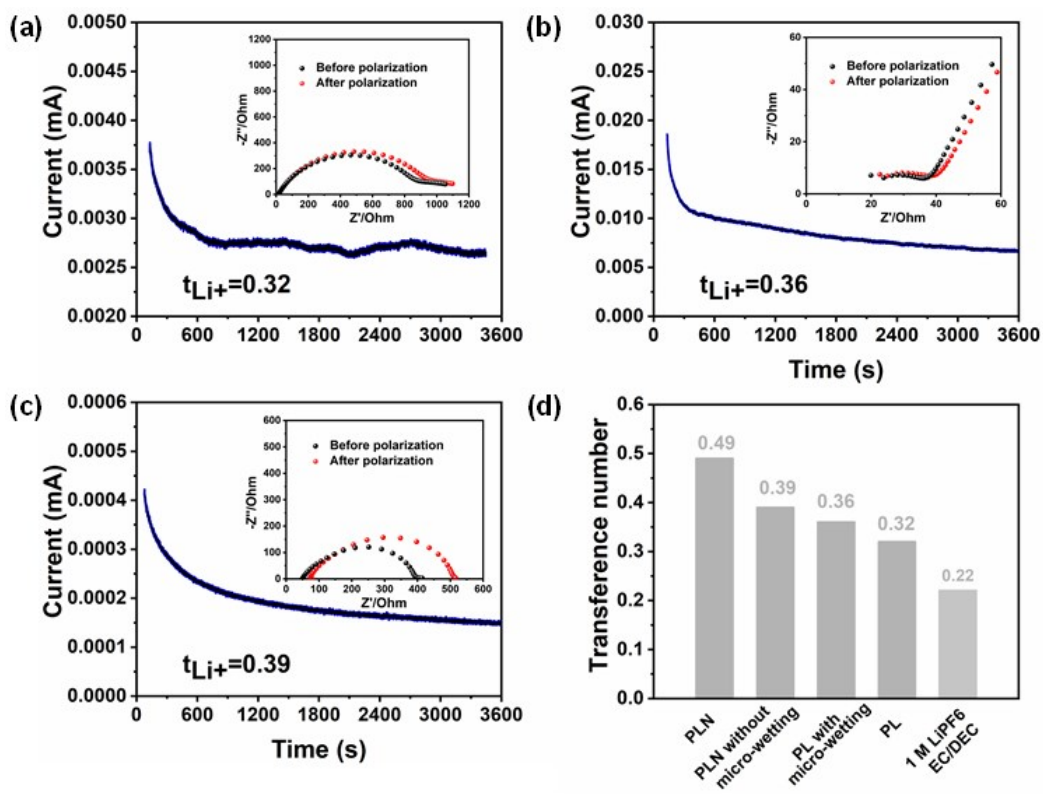


Fig. S3. Transference number of (a) PL, (b) PL with micro-wetting, (c) PLN without micro-wetting and (d) 1 M LiPF₆ EC and DEC liquid electrolyte

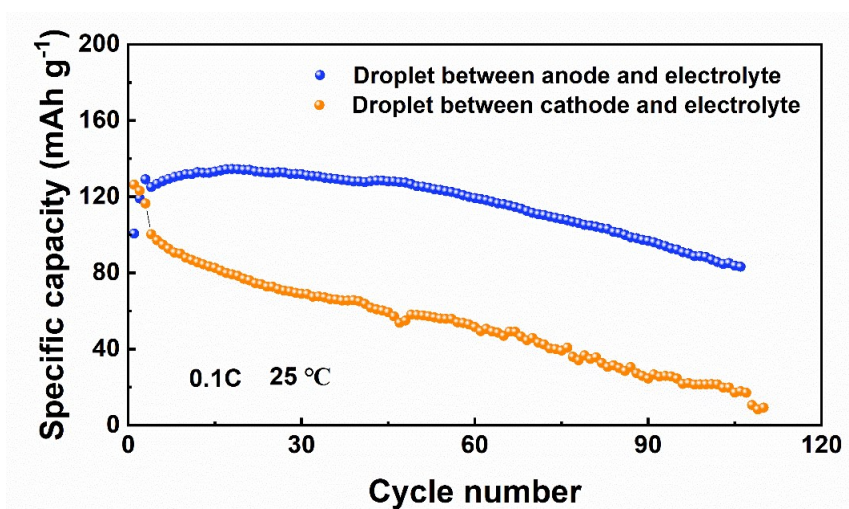


Fig. S4. Galvanostatic cycles of the PEO-based batteries operating at 0.1 C, 25 °C.

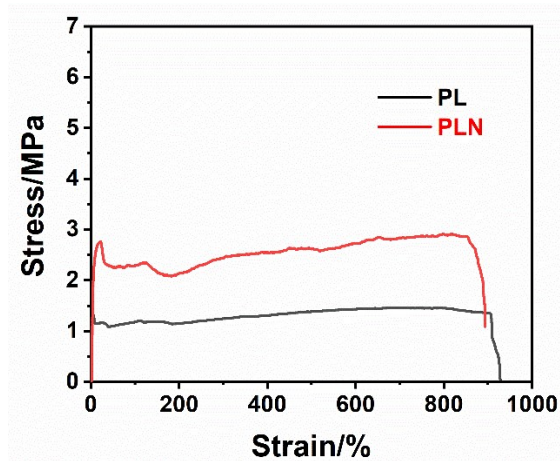


Fig. S5. Stress-strain curves of PL and PLN solid electrolytes.

The PLN electrolyte with rigid PAN network shows enhanced mechanical properties (2.73 MPa) than that of PL (1.28 MPa).

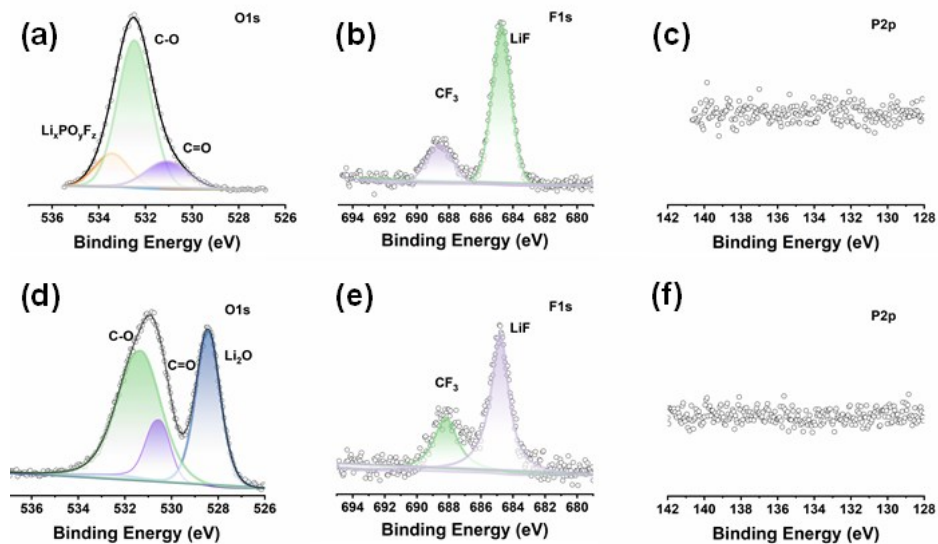


Fig. S6. XPS spectra of (a) O 1s (b) F 1s and (c) P 2p on the surface of Li anode from Li/PL with micro-wetting/Li after 40 cycles; XPS spectra of (d) O 1s (e) F 1s and (f) P 2p on the surface of Li anode from Li/PLN without micro-wetting/Li after 40 cycles.

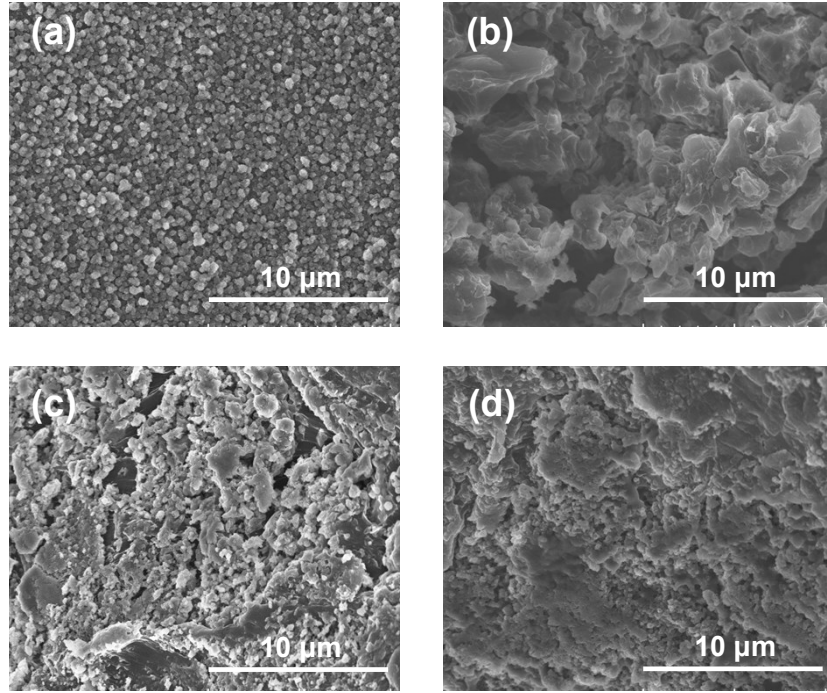


Fig. S7. Typical top-view SEM images of Li anode with (a) PLN, (b) PL, (c) PL with micro-wetting and (d) PLN without micro-wetting SSEs.

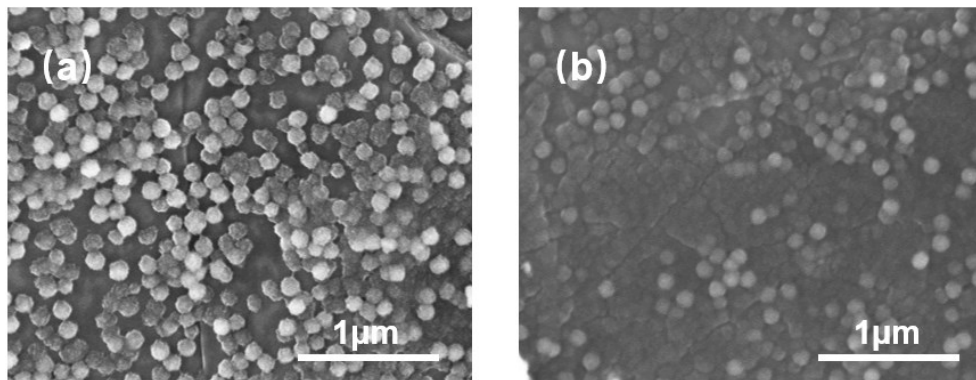


Fig. S8. High magnification SEM images of the Li anode with PLN electrolyte in the end of (a) charge and (b) discharge processes.

Table S1. Ionic conductivity of SSEs

	Resistance (Ω)	Thickness (μm)	Ionic conductivity ($\times 10^{-4}$ S/cm)
PL	1600	100	0.031
PLN with out micro-wetting	832	60	0.036
PL with micro- wetting	56	100	0.892
PLN	22	55	1.25