

## Supplementary Information

### **LLTO-containing heterogeneous composite electrolyte with a stable interface enabling solid-state lithium metal batteries**

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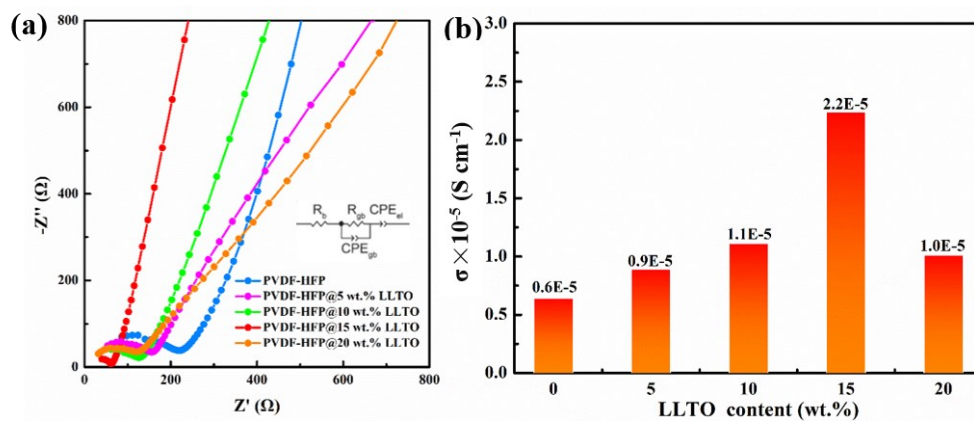
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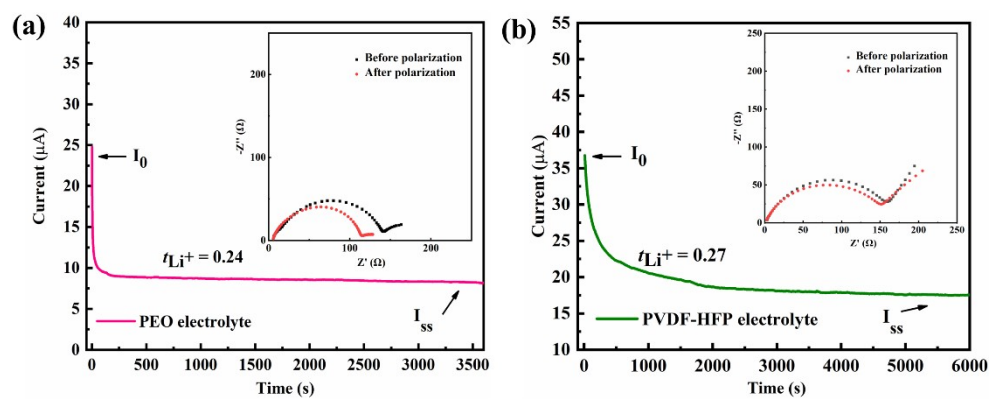
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**Fig. S1.** (a) EIS for the PLT electrolytes with different LLTO contents at room temperature. (b) Ionic conductivities of PLT electrolytes with different LLTO contents.



**Fig. S2.** The chronoamperometry curves of the (a) Li|PEO|Li and (b) Li|PVDF-HFP|Li cells under a polarization voltage of 10 mV (Insets are the EIS before and after the polarization).

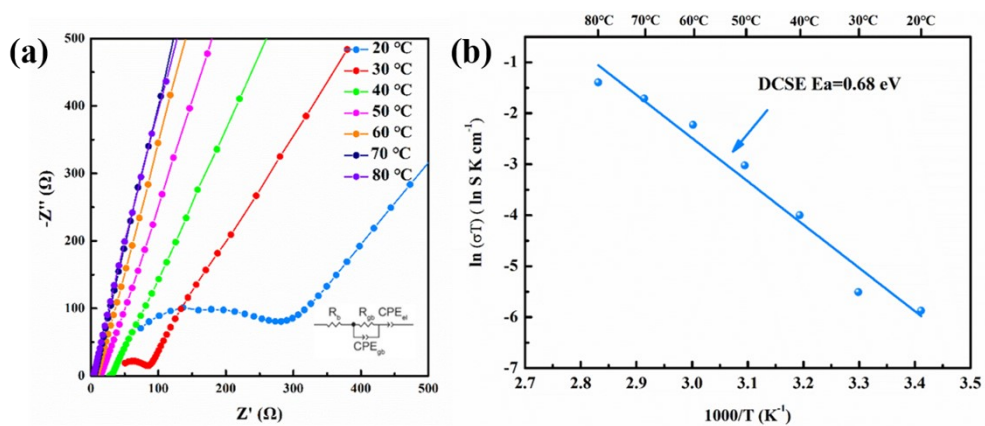


Fig. S3. (a) EIS for the PLTP from 20 to 80 °C. (b) Arrhenius plot of the PLTP.

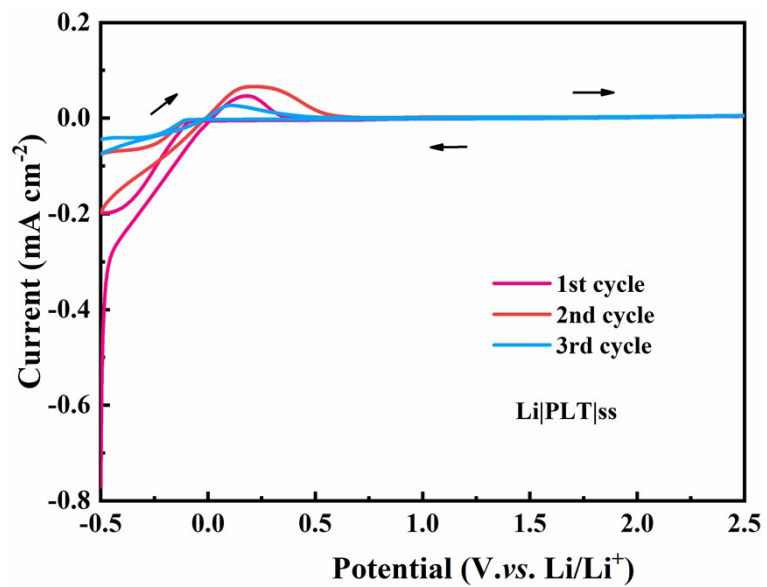
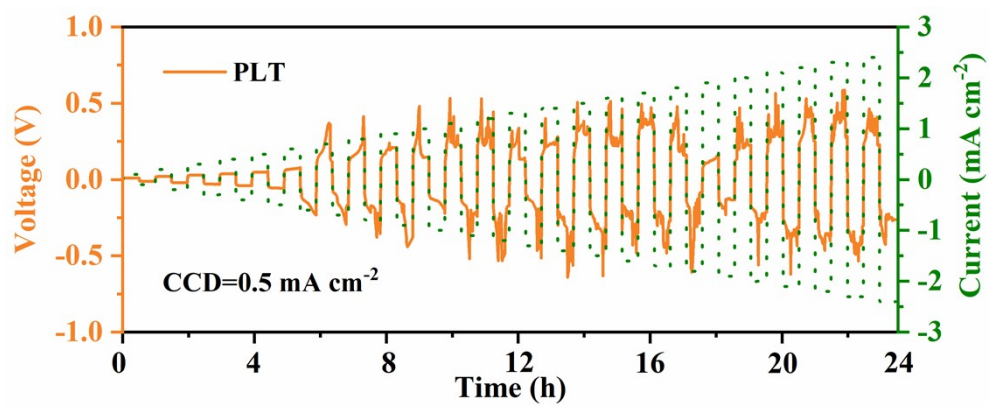


Fig. S4. CV curves of the Li|PLT|ss cell from -0.5 to 2.5 V at 60 °C.



**Fig. S5.** CCD test of the lithium metal symmetrical cell with PLT measured from 0.1 to 2.4 mA cm<sup>-2</sup> at 60 °C.