Supplementary Materials

Dry Approach Production of Garnet Solid Electrolyte Membrane for Lithium Batteries

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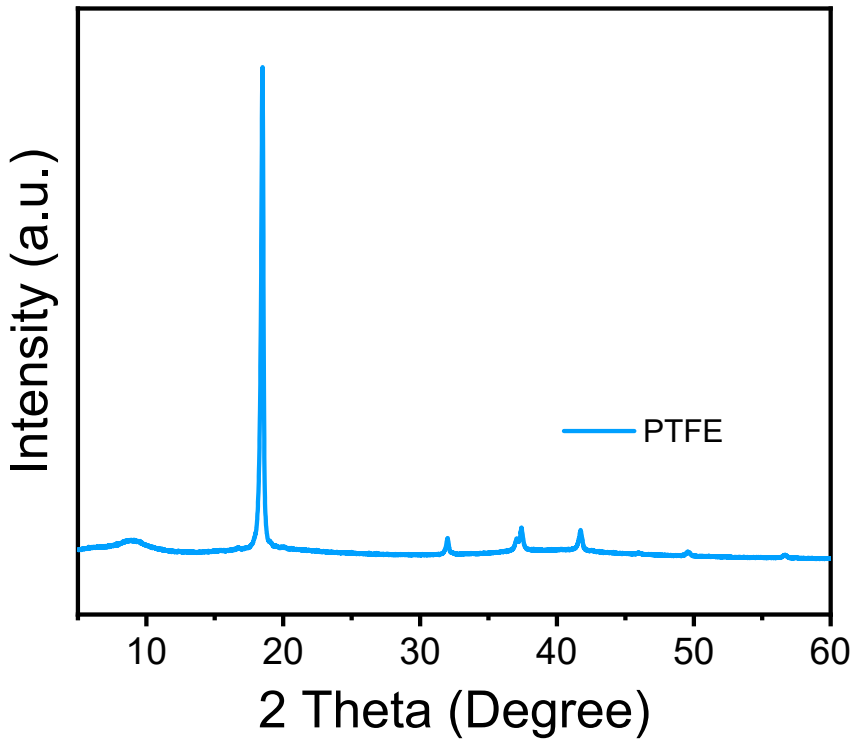

Fig. S1 The XRD of PTFE powder

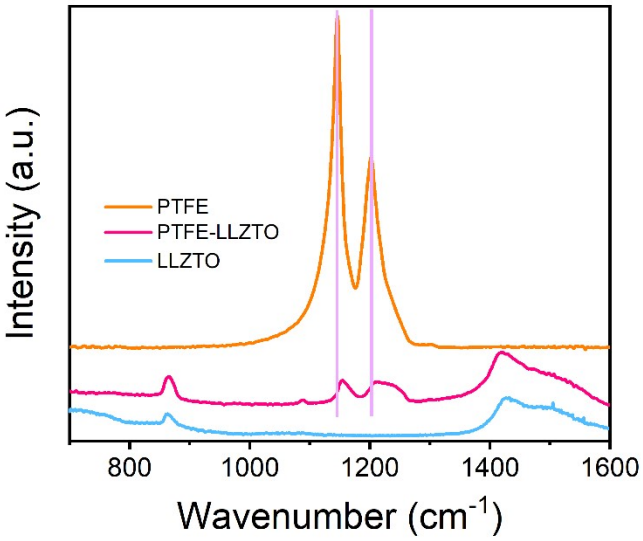

Fig. S2 Infrared spectroscopy of PTFE, LLZTO and PTFE-LLZTO membrane.

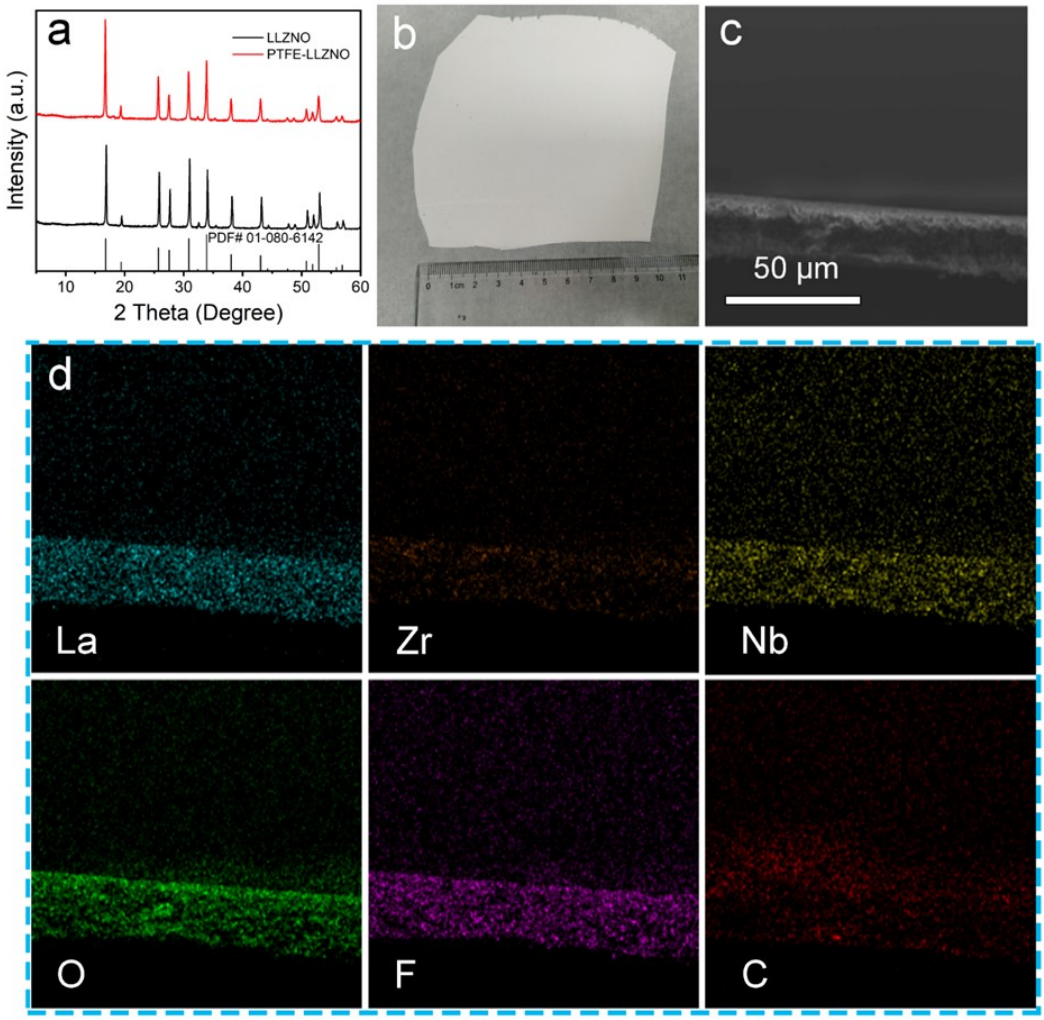

Fig. S3 a) The XRD of LLZNO and PTFE-LLZNO electrolyte membrane; b) The picture of LLZNO; c) The SEM of the cross-sectional of PTFE-LLZNO electrolyte membrane; d)The EDS mapping of Fig. c.

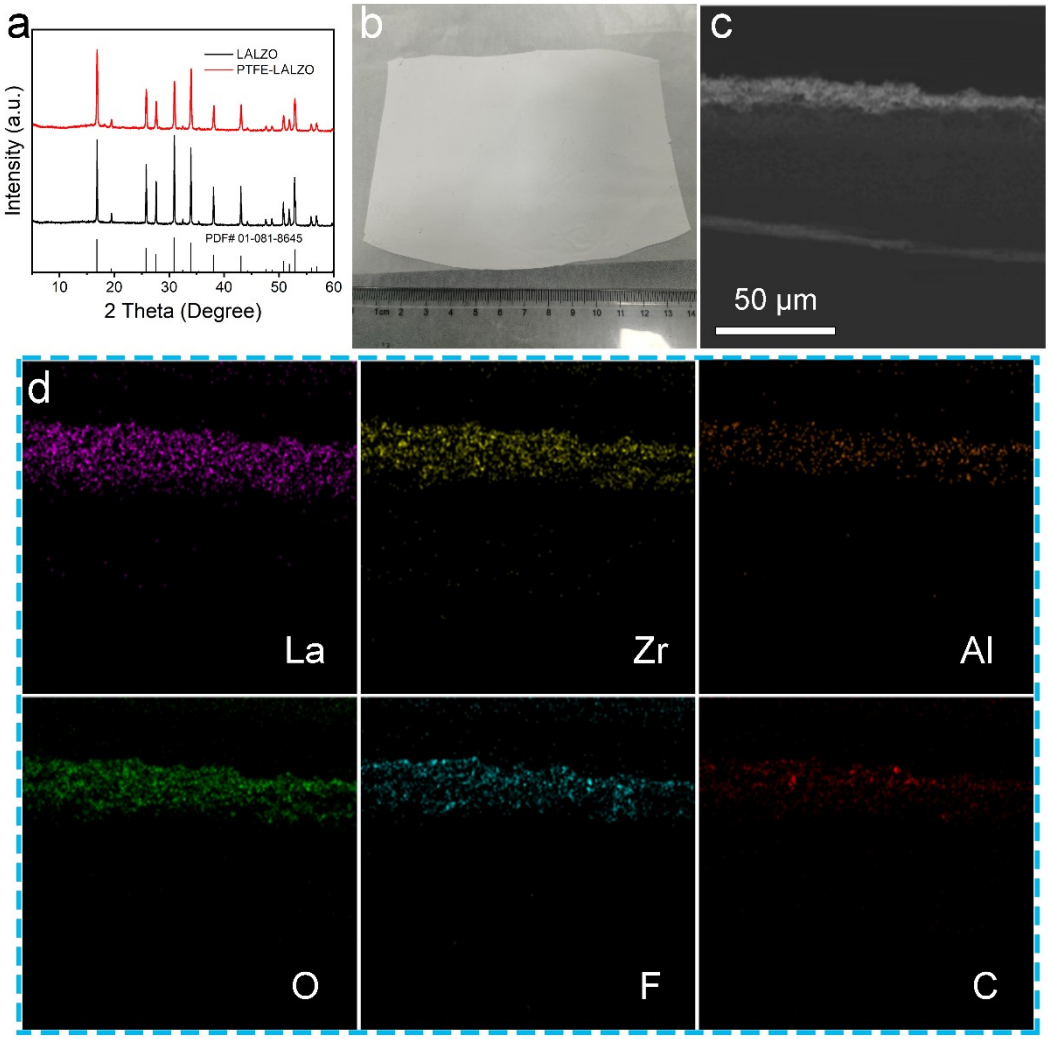

Fig. S4 a) The XRD of LALZO and PTFE-LALZO electrolyte membrane; b) The picture of LALZO; c) The SEM of the cross-sectional of PTFE- LALZO electrolyte membrane; d)The EDS mapping of Fig. c.

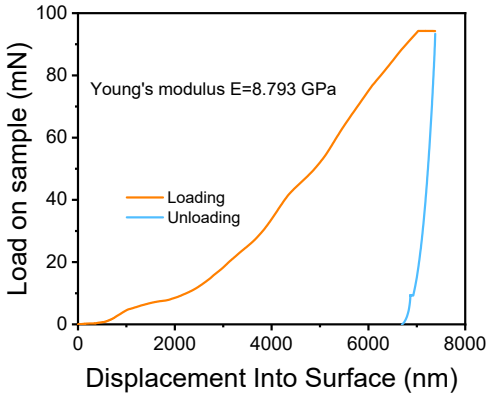

Fig. S5 Load Displacement Curve of PTFE-LLZTO Membrane

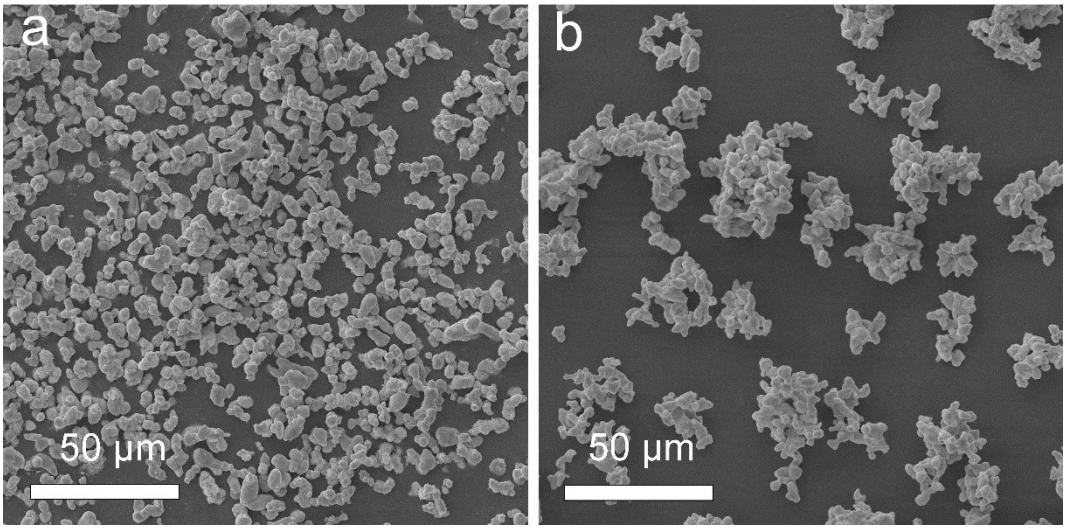

Fig. S6 The SEM of PTFE@LLZTO powder

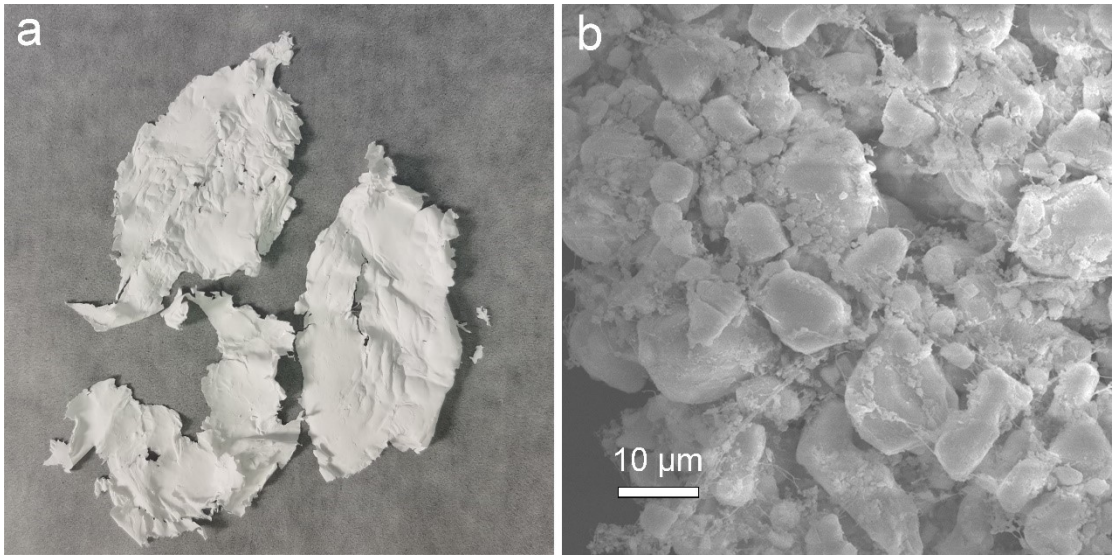

Fig. S7 a) The picture of PTFE-LLZTO electrolyte membrane by ball mill to obtain the PTFE-LLZTO matrix; b) the SEM of PTFE-LLZTO matrix by a ball mill

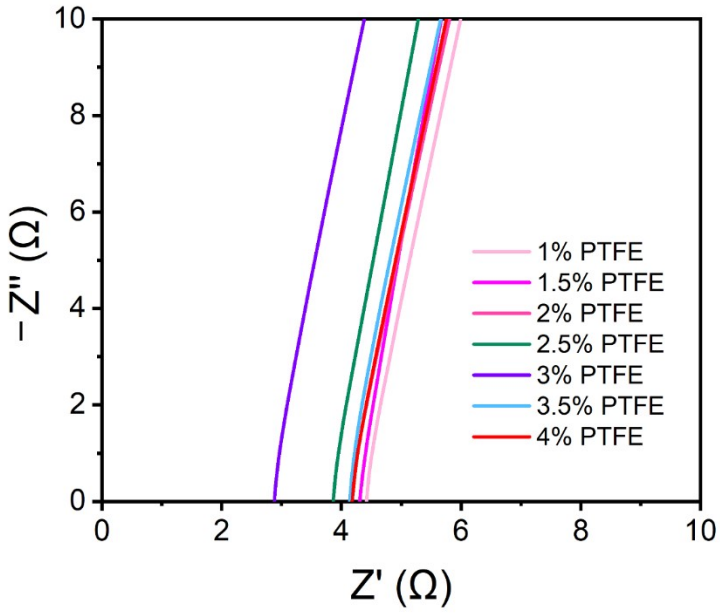

Fig. S8 The EIS of PTFE-LLZTO electrolyte membrane with different content PTFE.

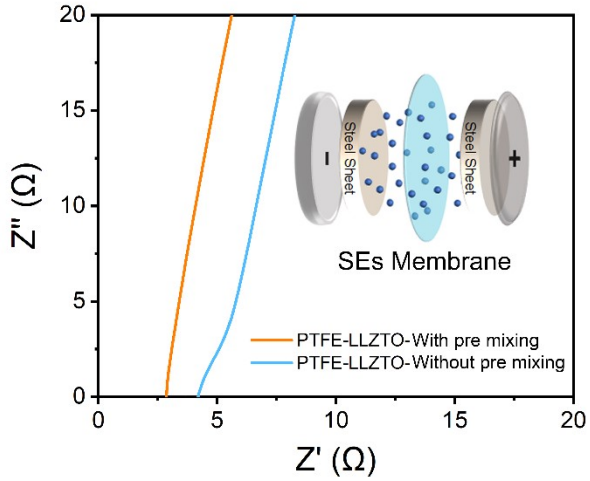

Fig. S9 The EIS of PTFE-LLZTO membrane with (a) and without (b) pre mixing at different locations on the same membrane.

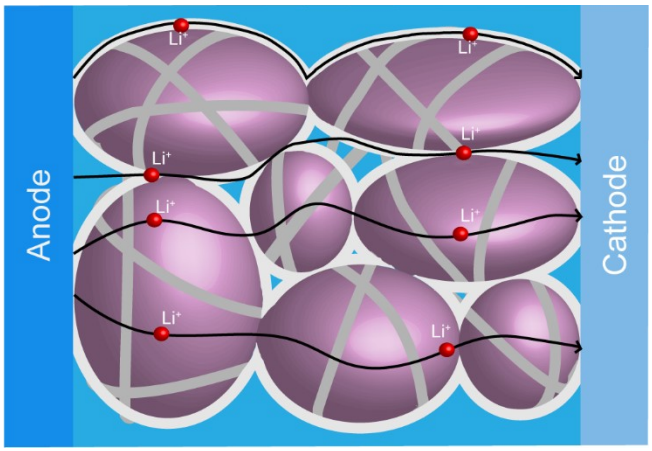

Fig. S10 Schematic diagram of Li+ transport channel for PTFE-LLZTO membrane at discharge. Li^+ is expected to have three transmission channels, LLZTO, Interface, LLZTO-Interface-LLZTO ("Interface" is the interface of liquid electrolytes (LEs) and LLZTO.

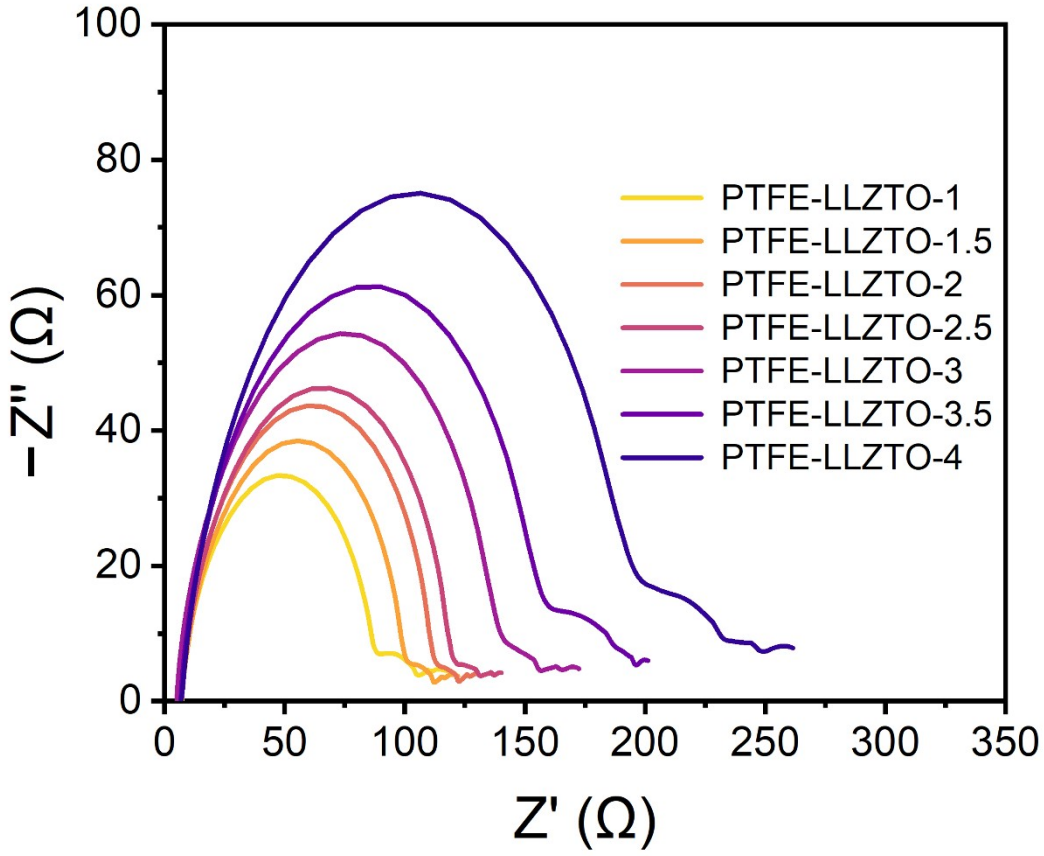

Fig. 11 The interfacial EIS of Li/PTFE-LLZTO with different content PTFE

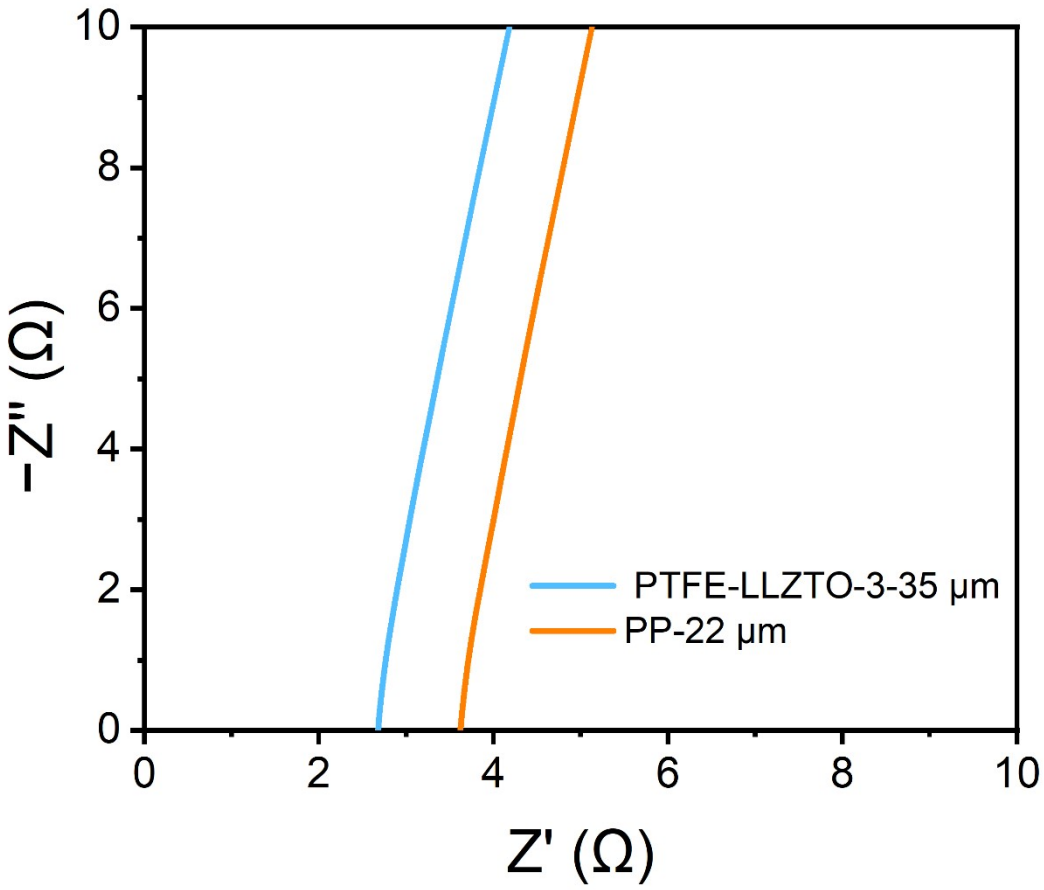

Fig. S12 The EIS of PTFE-LLZTO-3-35 μm and PP

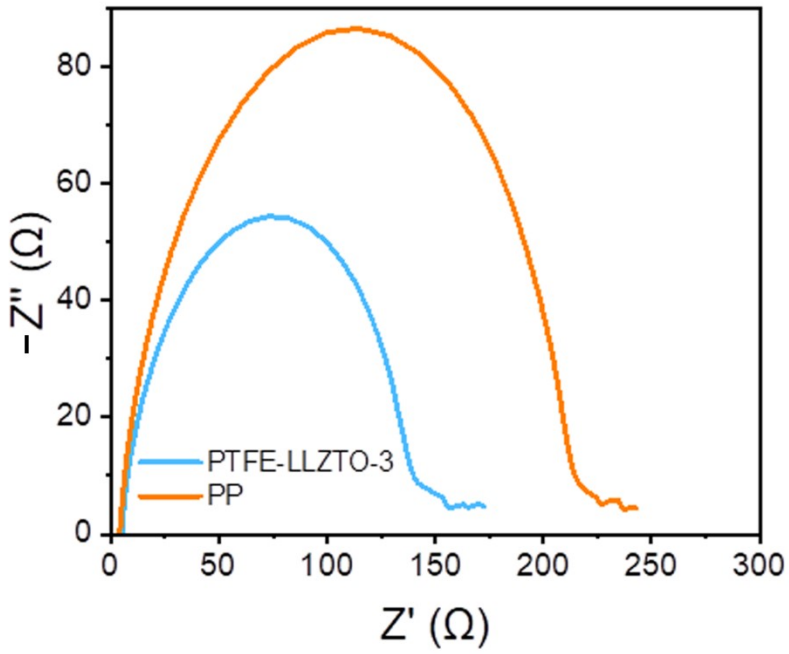

Fig. S12 The interfacial EIS of PTFE-LLZTO-3 and PP with Li

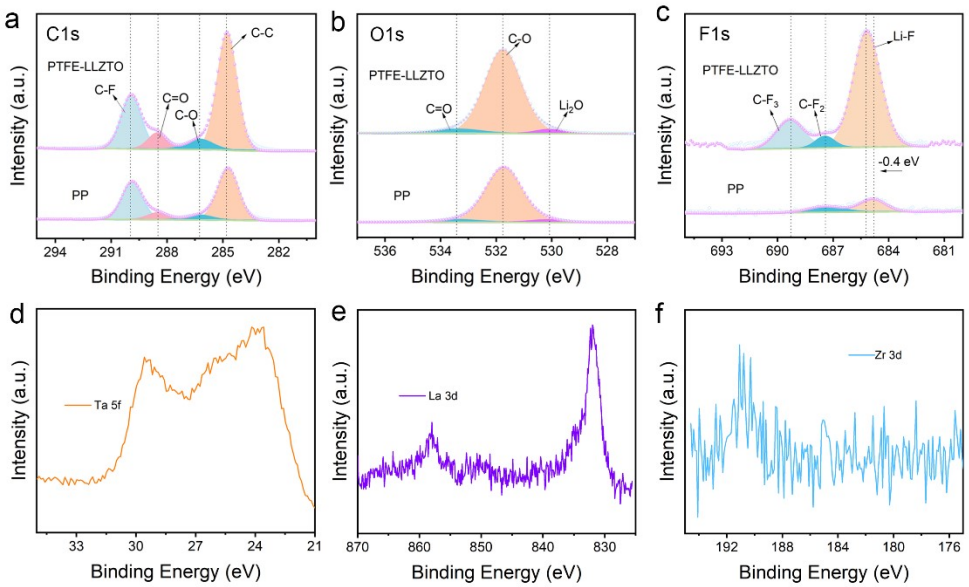

Fig. 13 XPS spectroscopy of a) C1s, b) O1s and c) F1s on Li anode of Li/PTFE-LLZTO/Li and Li/PP/Li after 20 hours of cycling, XPS spectroscopy of a) Ta5f, b) La3d and c) Zr3d on Li anode of Li/PTFE-LLZTO/Li after 20 hours cycling.

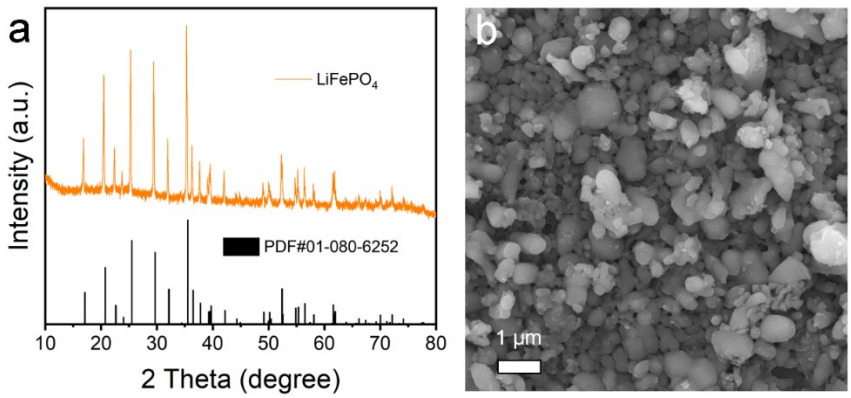

Fig. S14 a) The XRD pattern of $LiFePO_4$; b) The SEM image of $LiFePO_4$