

Supporting Information

Ion Transport Regulated Lithium Metal Batteries Achieved by Electrospun ZIF/PAN Composite Separator with Suitable Electrolyte Wettability

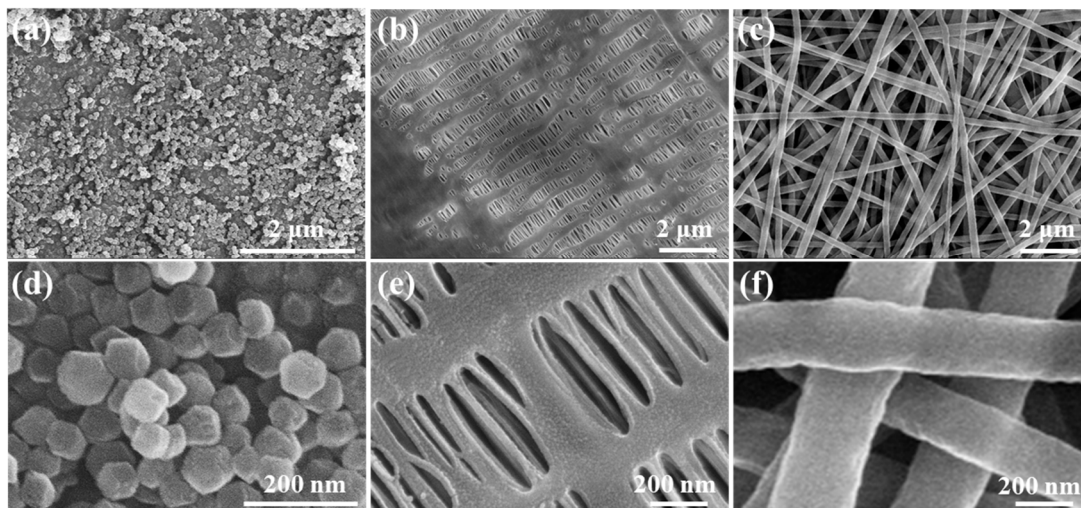


Figure S1. The SEM images of (a,d) ZIF-8 nanoparticles; (b,e) PP separator; (c,f) PAN separator under different magnification.

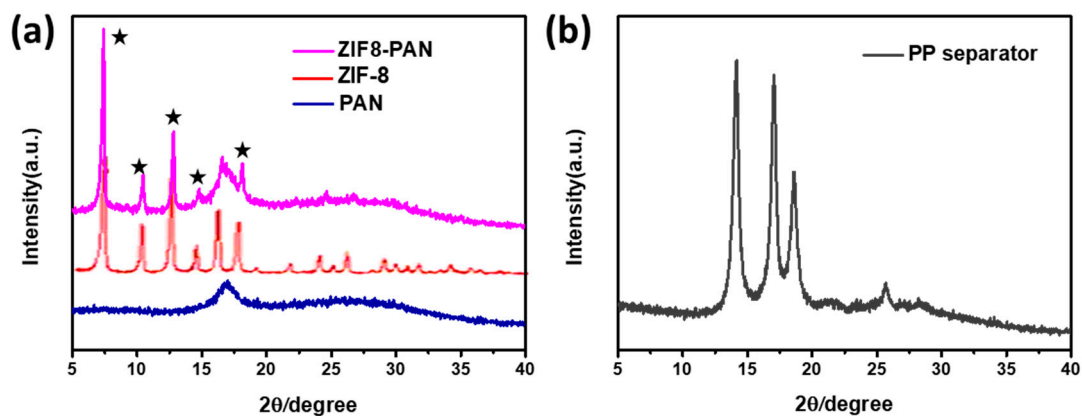


Figure S2. (a) The XRD results of ZIF-8 power, PAN nanofiber, and ZIF8-PAN composite separator (the black stars identify the characteristic peaks of ZIF-8 in ZIF8-PAN). (b) The XRD pattern of PP separator.

Table S1. The physical and electrochemical properties of PP, PAN and ZIF8-PAN separators.

Measurement	PP	PAN	ZIF8-PAN
Thickness (μm)	25	20-25	25-30
Porosity ^{a)} (%)	27.7	52.1	47.2
Electrolyte uptake ^{b)} (%)	127.1	194.7	176.5
σ (mS/cm)	0.507	0.634	1.176
t_{Li^+}	0.214	0.288	0.306
ESW (V)	4.75	4.73	5.04

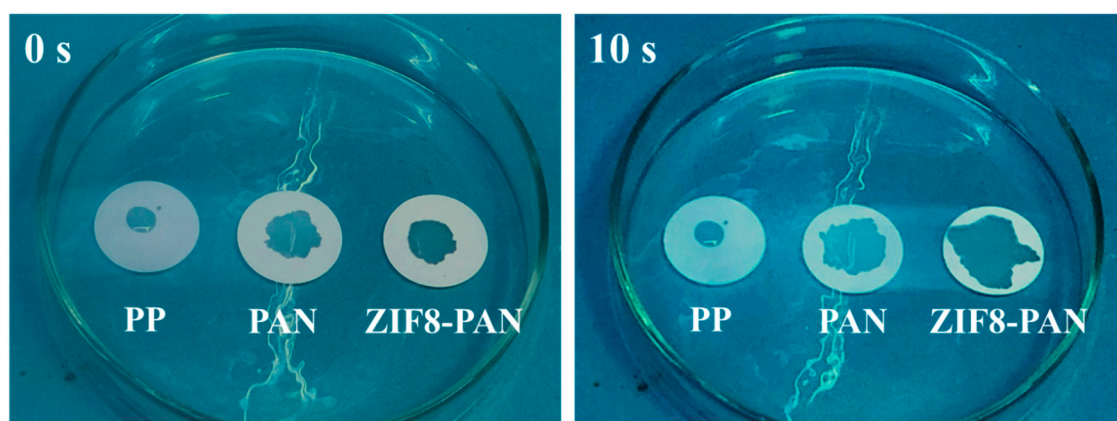


Figure S3. Optical photographs after pouring liquid electrolyte [1 M LiTFSI in DOL+DME (1:1, w/w) with 2% LiNO₃] onto different separators.

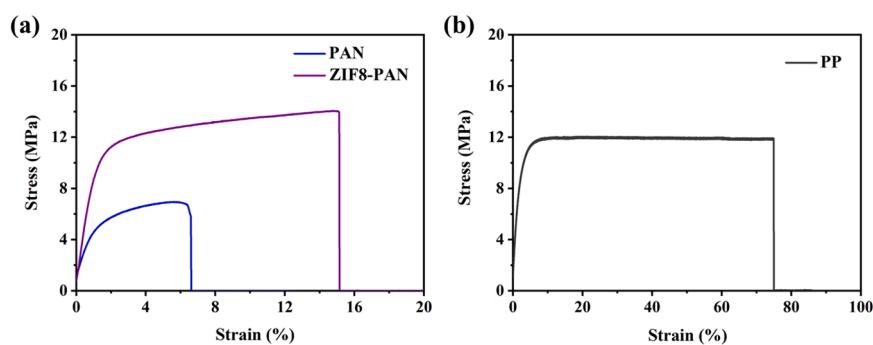


Figure S4. Stress-strain curves of (a) PAN, ZIF8-PAN separators and (b) PP separator.

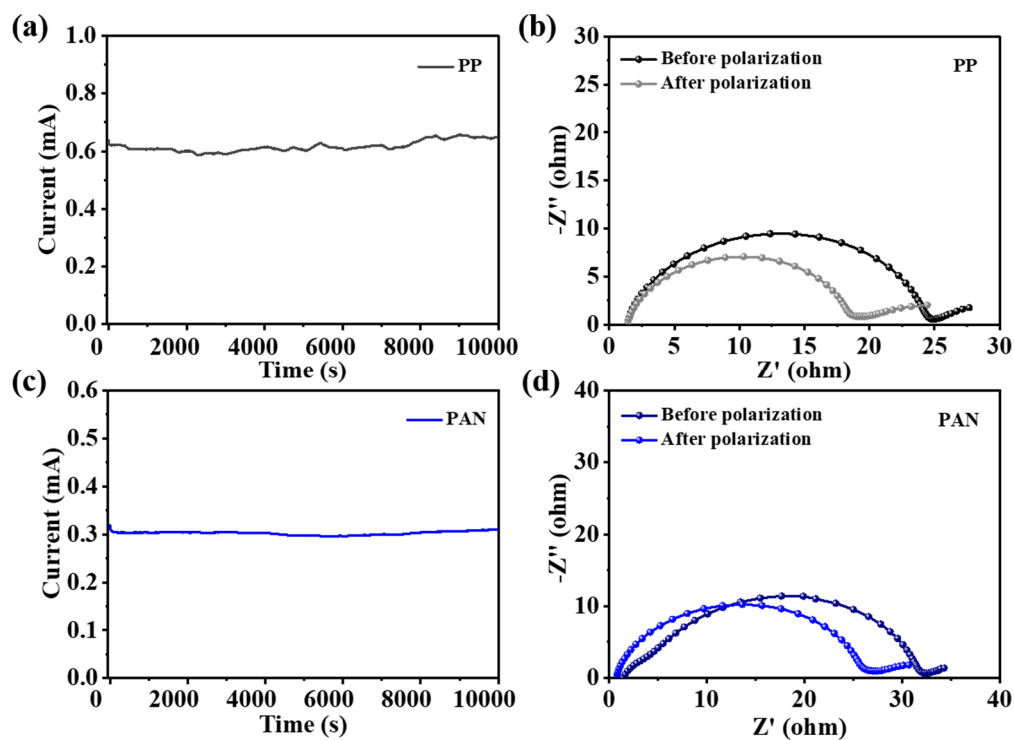


Figure S5. (a,c) Chronoamperometry profiles and (b,d) Nyquist plots before and after polarization for Li//Li symmetric cells with PP and PAN separators, respectively.

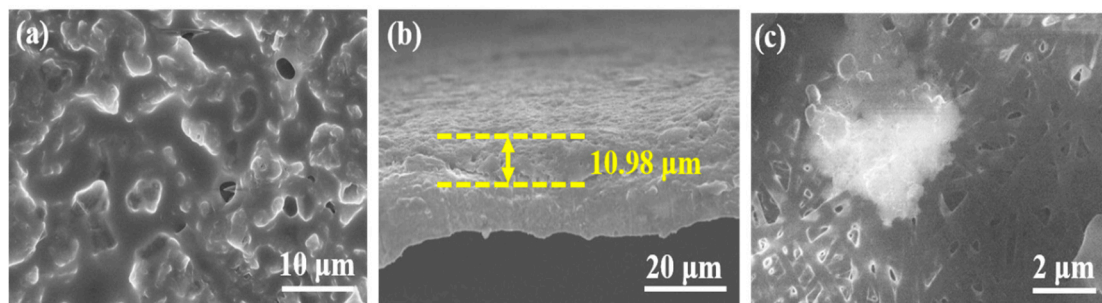


Figure S6. SEM images of (a) top-surface, (b) cross-section of Cu foils and (c) the surface of the PAN separator disassembled from Li/PAN/Cu half cells.

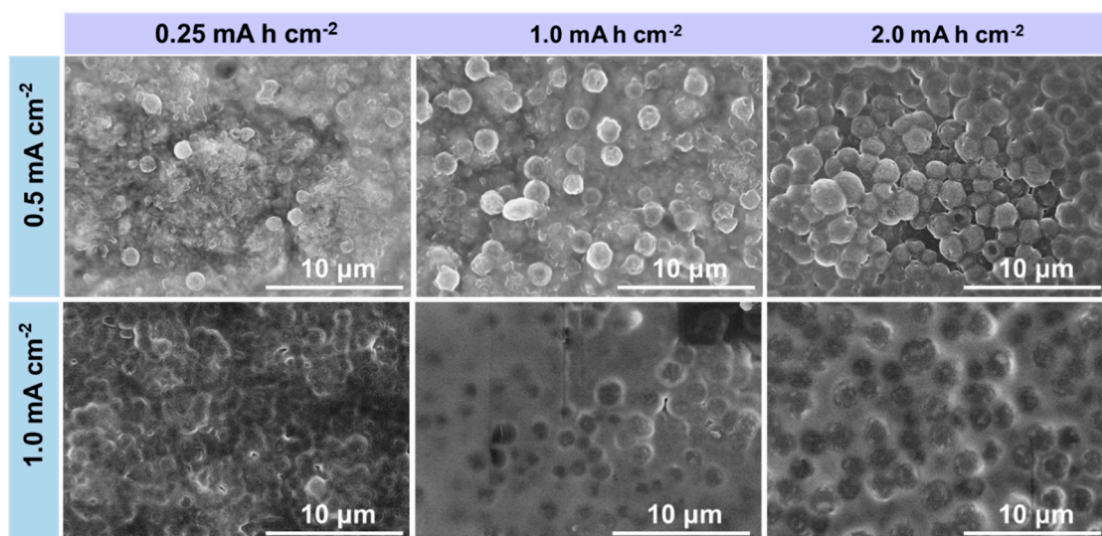


Figure S7. Morphologies of lithium deposited on the surface of Cu foils for 0.25 mA h cm⁻², 1.0 mA h cm⁻² and 2.0 mA h cm⁻² with Li//Cu half cells assembled with ZIF8-PAN separators at current densities of 0.5 mA cm⁻² and 1.0 mA cm⁻² after 50 cycles, respectively.

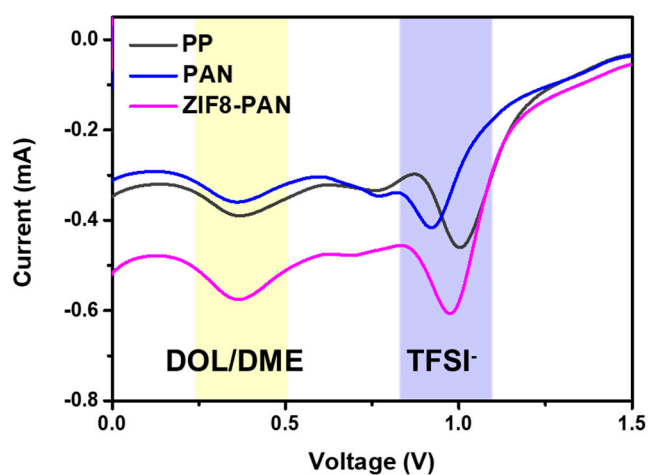


Figure S8. Initial discharge CV curves of cells assembled with different separators.

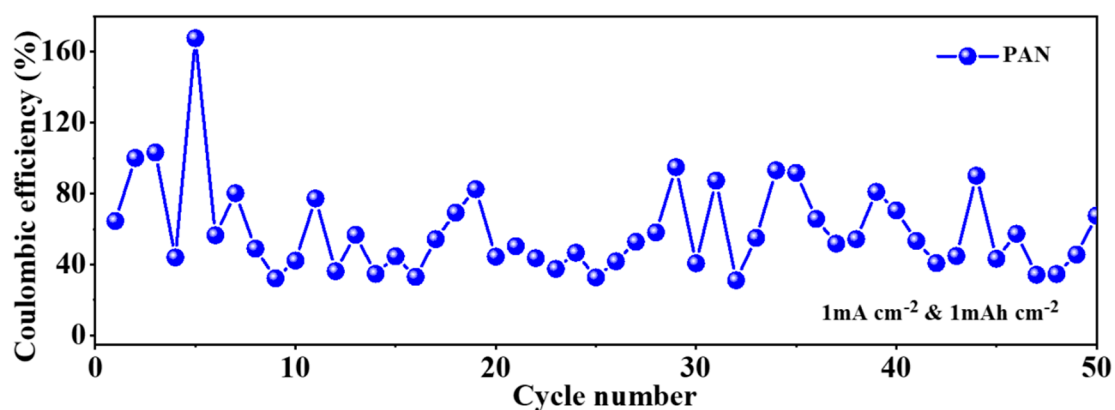


Figure S9. The Coulombic efficiency of Li//Cu half cells with the PAN separator for a current density of 1.0 mA/cm^2 with an area capacity of 1.0 mAh/cm^2 at 25°C .

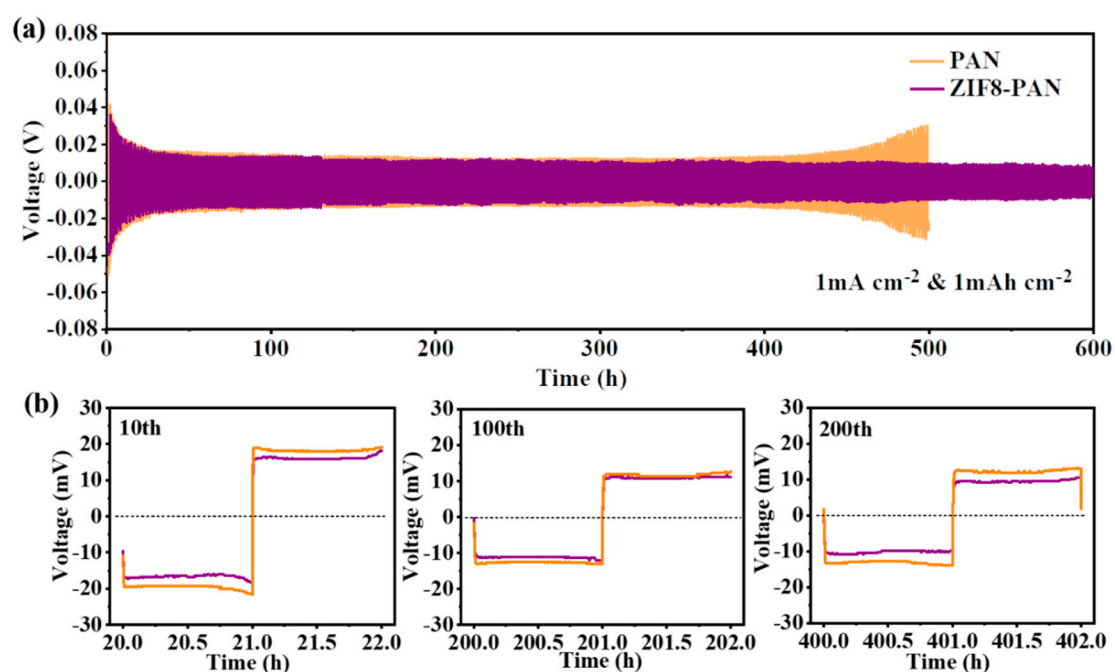


Figure S10. (a) The cycling stability of the Li//Li symmetric cells assembled with PAN separator at a current density of 1.0 mA cm^{-2} with an area capacity of 1.0 mA h cm^{-2} at 25°C (The contrast data of ZIF8-PAN is the same as Figure 6a). (b) Corresponding voltage profiles at the 10th, 100th and 200th cycle.

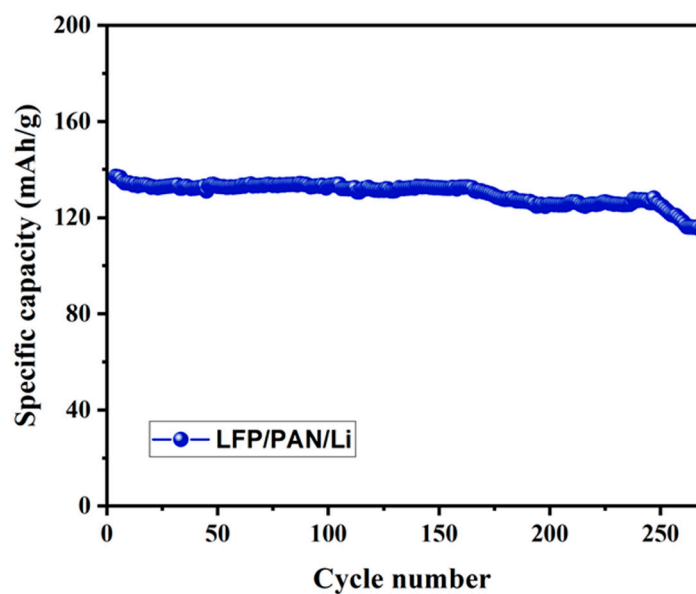


Figure S11. The cyclic performance of LiFePO₄//Li full batteries assembled with PAN separator at 0.5 C.

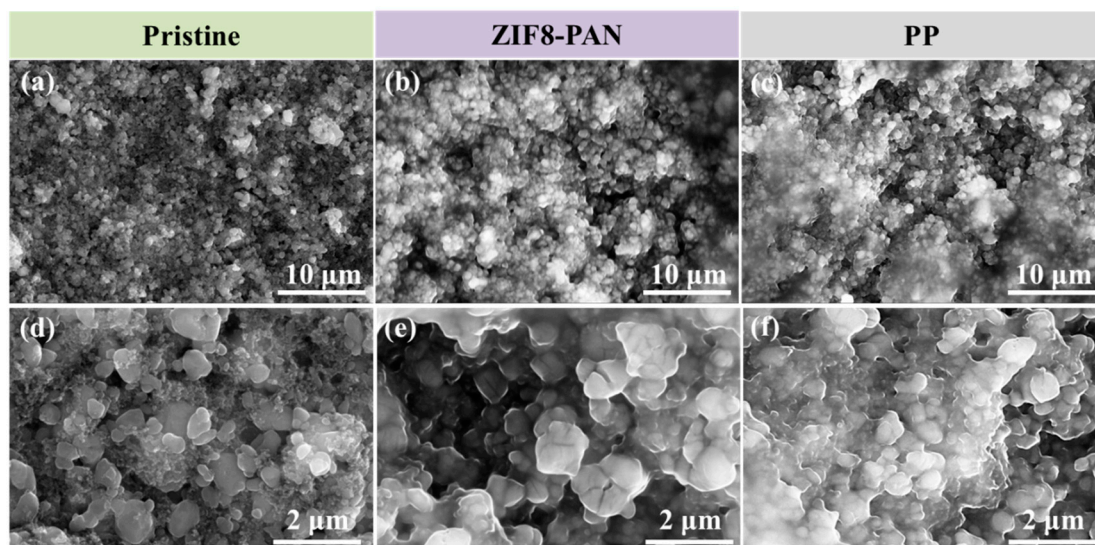


Figure S12. The SEM analysis of pristine and 270th cycled LiFePO₄ electrodes tested in full batteries using PP and ZIF8-PAN separator.