Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supplementary Information

The Role of Zwitterionic Crosslinks in Facilitating Ion Conduction, Lithium Deposition, and Stable Interface Formation for Polymer Electrolyte Based Lithium Metal Batteries

Liang Chai[abc], Zhiheng Zou[abc], Zhengsheng Yang[abc], and Guang Yang*[abc]

a. School of Electronic Science and Engineering, University of Electronic Science and Technology of China, Chengdu, 611731, China

b. National Engineering Research Center of Electromagnetic Radiation Control Materials, University of Electronic Science and Technology of China, Chengdu, 611731, China

c. Key Laboratory of Multi-spectral Absorbing Materials and Structures of Ministry of Education, University of Electronic Science and Technology of China, Chengdu, 611731, China

E-mail: yg028@uestc.edu.cn

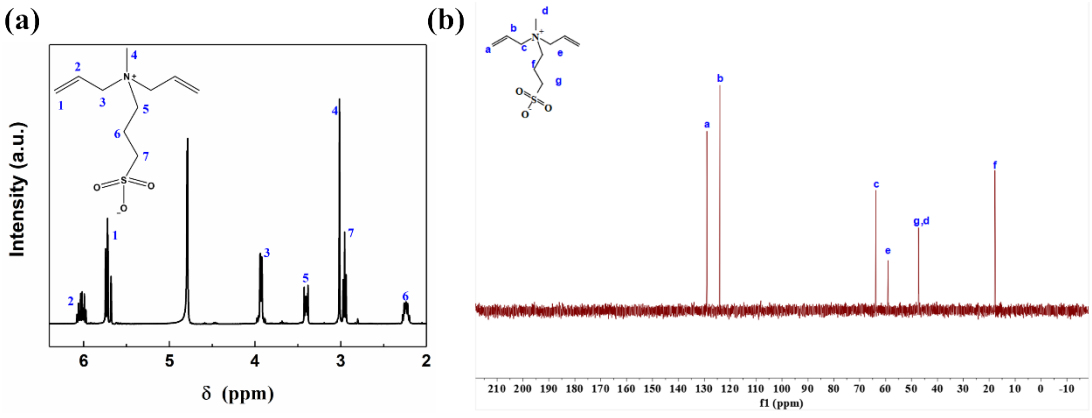

Fig. S1 (a) ^{1}H NMR and (b)^{13}C NMR spectrum of DMA-SO_3^- (solvent: D_2O).

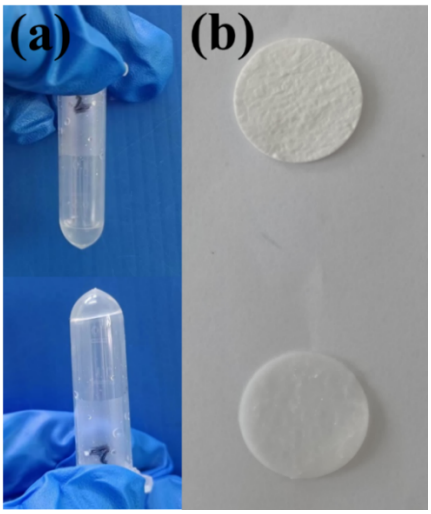

Fig. S2 (a) Photo images of the precursor solution (top image) and polymer gel after polymerization (bottom image); (b) photo images of glass fiber membrane (top image) and ZGE (bottom image).

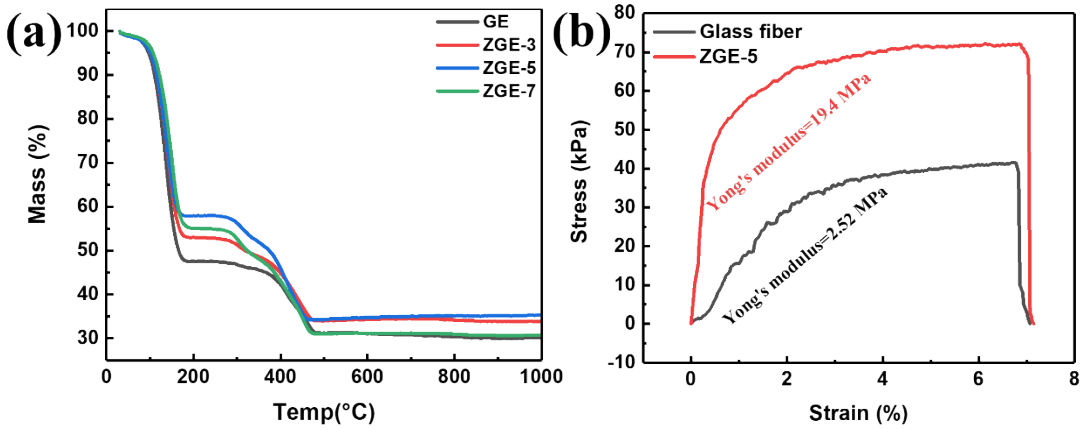

Fig. S3 (a) TG diagrams of GE, ZGE-3, 5 and 7; (b) stress-strain curves for glass fibers and ZGE-5.

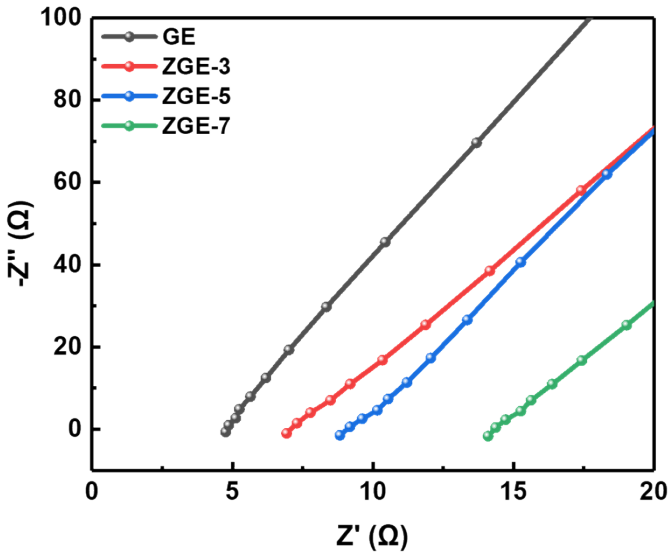

Fig. S4 Electrochemical impedance spectroscopy of the GE, ZGE-3, 5 and 7 at 30°C.

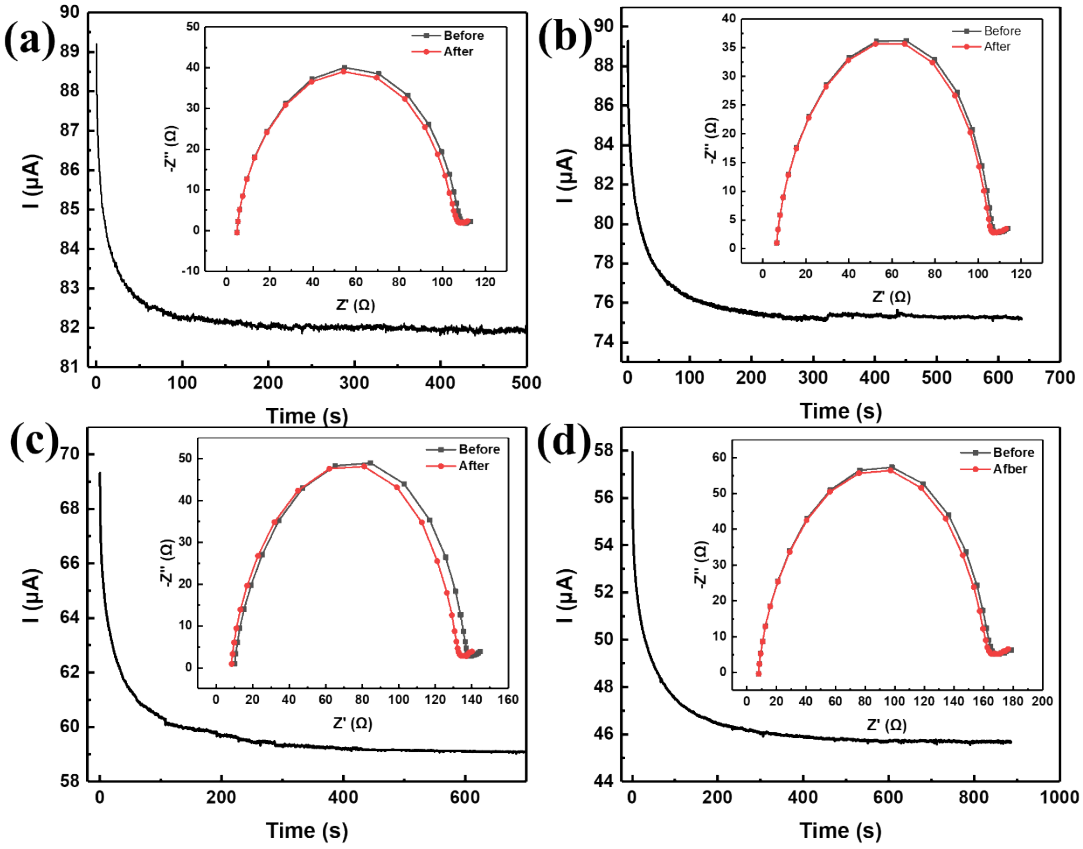

Fig. S5 Chronoamperometry before and after polarization for Li symmetric cells with electrolytes of (a) GE, (b) ZGE-3, (c) 5 and (d) 7 at 30°C.

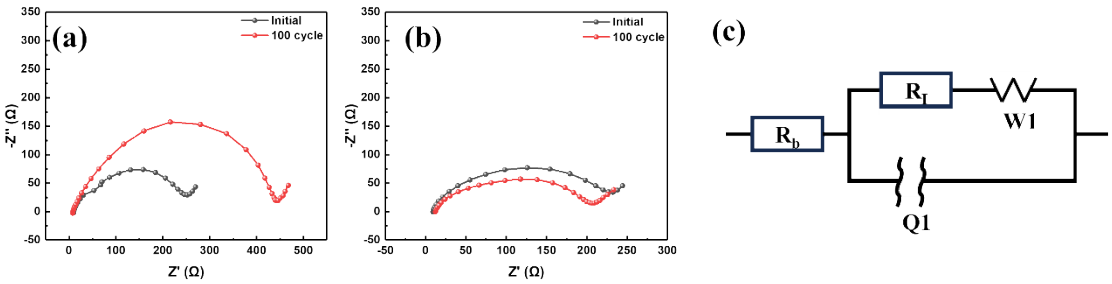

Fig. S6 The Nyquist plots of Li/Li cells with (a) GE and (b) ZGE-5 before and after 100 plating/stripping cycles; (c) the EIS fitted equivalent circuit (R_b is the body impedance, R_I is the interface impedance, W1 is the Warburg impedance and Q1 is the constant phase element).

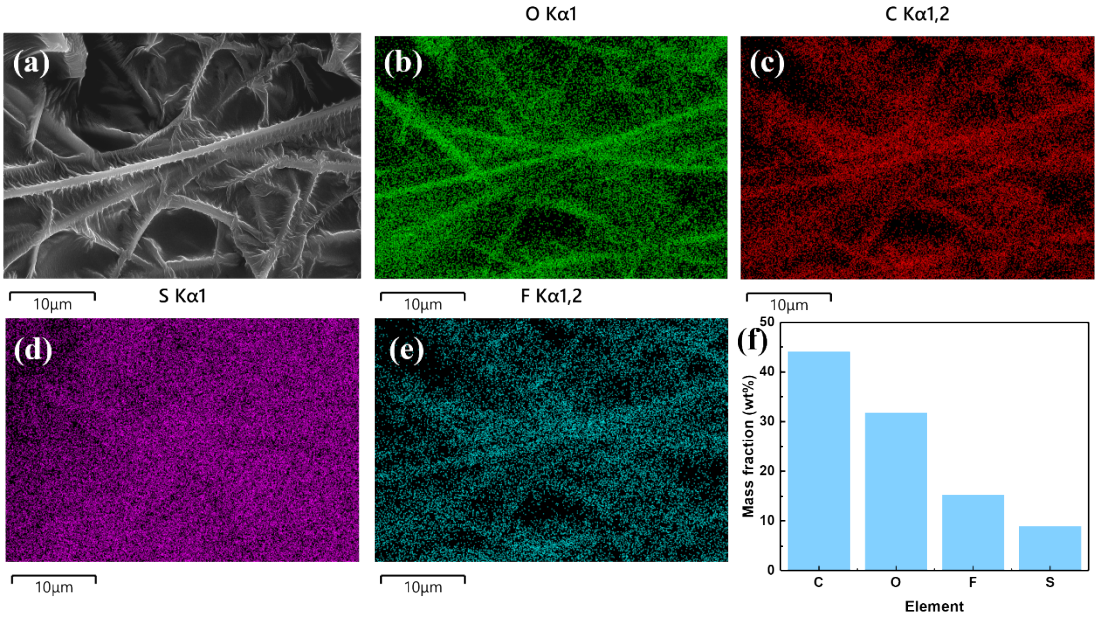

Fig. S7 (a) SEM image of ZGE-5. EDS mapping of (b)O, (c) C, (d) S, and (e)F on the surface of ZGE-5; (f)element content on the surface of ZGE-5.

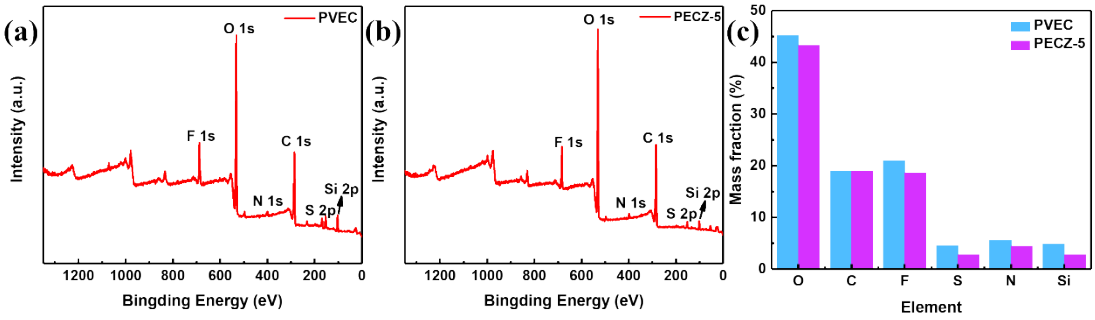

Fig. S8 XPS full spectra of lithium surface of (a) GE and (b) ZGE-5 lithium symmetric cell after 100 cycles of plating/stripping tests; (c) the proportion of each element on the lithium surface of the lithium symmetric cell of GE and ZGE-5 after 100 cycles of plating/stripping tests.

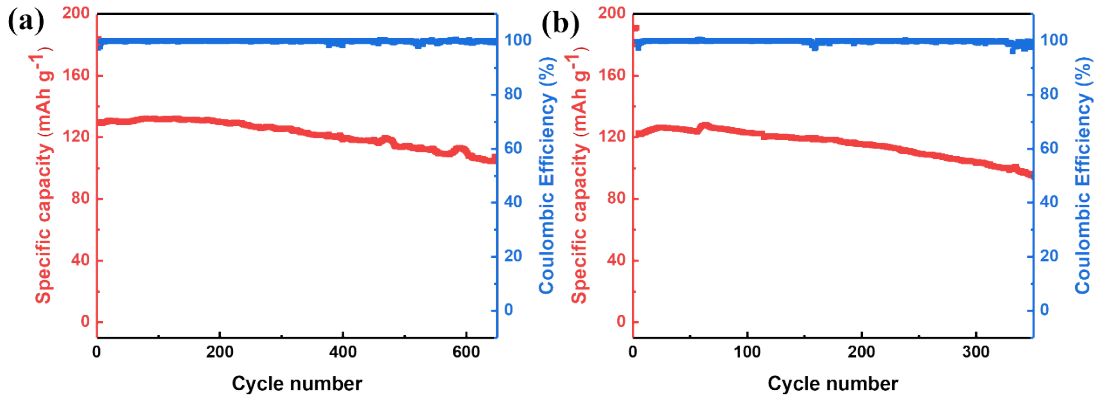

Fig. S9 Cycling performance of Li/ZGE-5/$LiFePO_4$ cell at (a) 2 C and (b) 3 C (Cycle performance tests were all done at 30°C).

	DMA-SO_3^- (wt%)	VEC (wt%)	PEGDMA (wt%)	HMPP (wt%)	1 M LiTFSI in FEC/DMC (1:4, v/v) (wt%)
GE	0	16	2	2	80
ZGE-3	3	16	2	2	77
ZGE-5	5	16	2	2	75
ZGE-7	7	16	2	2	73

Table S1. Content of each component in the polymerization precursor solution