Supporting Information

for

Skin-mimetic tough polyurethane ionogel for use as soft ionotronics

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Table S1. Composition of Samples.

Sample	Molar ratio				ILs (wt%)	Solvent
	HDI	PTMG-2000	SB-diol	BDO		
ZPU1-40%ILs	10	5	1	4	40	THF
ZPU2-40%ILs	10	5	2	3	40	THF
ZPU3-40%ILs	10	5	3	2	40	THF
ZPU4-40%ILs	10	5	4	1	40	THF

Table S2. Composition of Samples.

Sample	Molar ratio				ILs (wt%)	Solvent
	HDI	PTMG-2000	SB-diol	BDO		
ZPU1-40%ILs	10	5	1	4	40	THF/DMF
ZPU2-40%ILs	10	5	2	3	40	THF/DMF
ZPU3-40%ILs	10	5	3	2	40	THF/DMF
ZPU4-40%ILs	10	5	4	1	40	THF/DMF

Table S3. Composition of Samples.

Sample	Molar ratio				ILs (wt%)	Solvent
	HDI	PTMG-2000	SB-diol	BDO		
ZPU4-20%ILs	10	5	4	1	20	THF
ZPU4-60%ILs	10	5	4	1	60	THF
ZPU4-80%ILs	10	5	4	1	80	THF

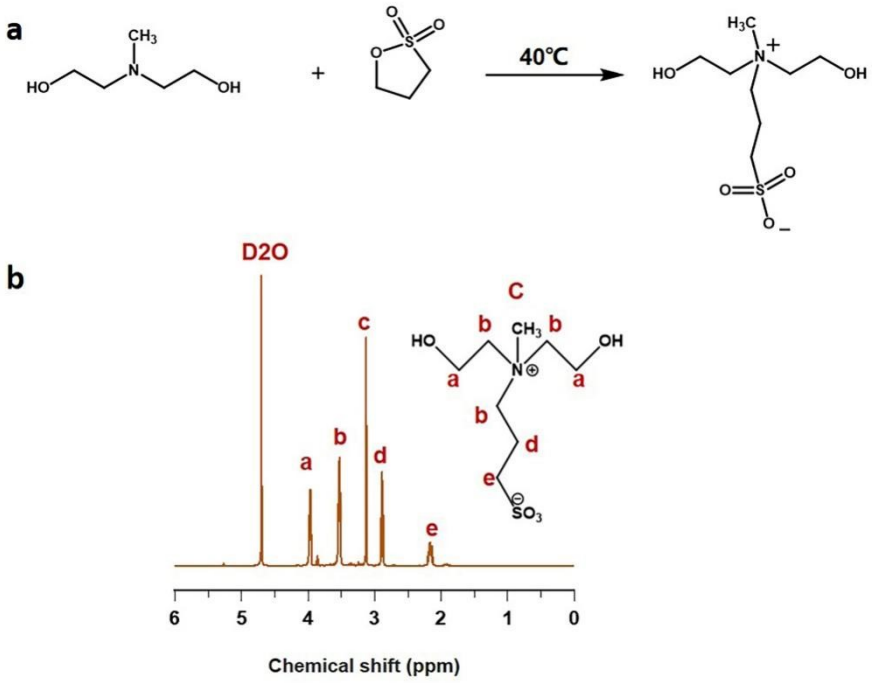

Figure S1. (a) Reaction routes for synthesis of SB-diol. (b) ^{1}H NMR spectra of SB-diol chain extender at 400 MHz, D_2O.

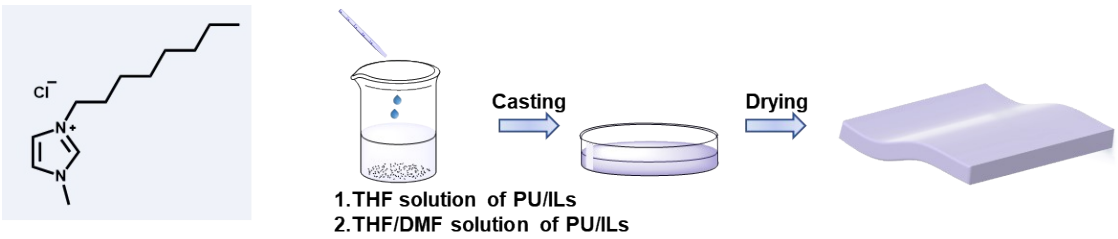

Figure S2. Schematic preparation process of the ZPU ionogel.

Figure S3. Optical appearance of the ILs dispersion by using pure THF as solvent (left) and using THF/DMF as solvent (right).

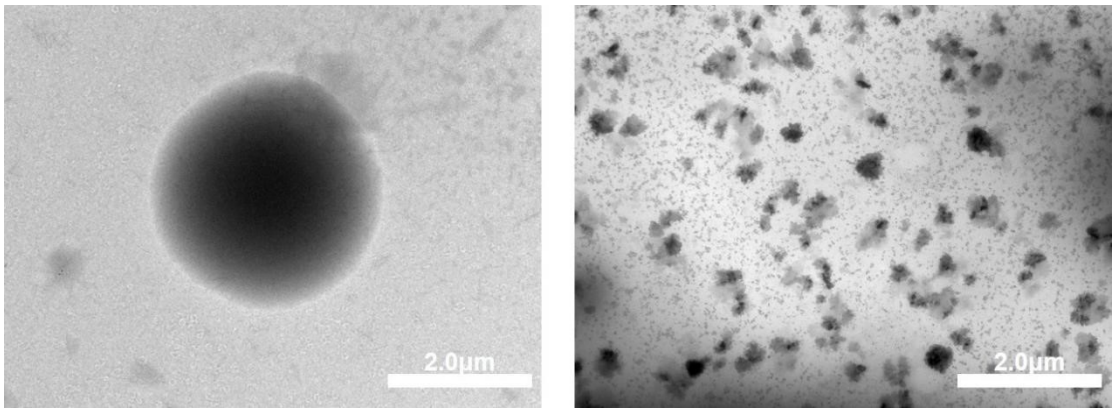

Figure S4. TEM images of the ZPU ionogel from casting ZPU emulsion (left) and solution (right).

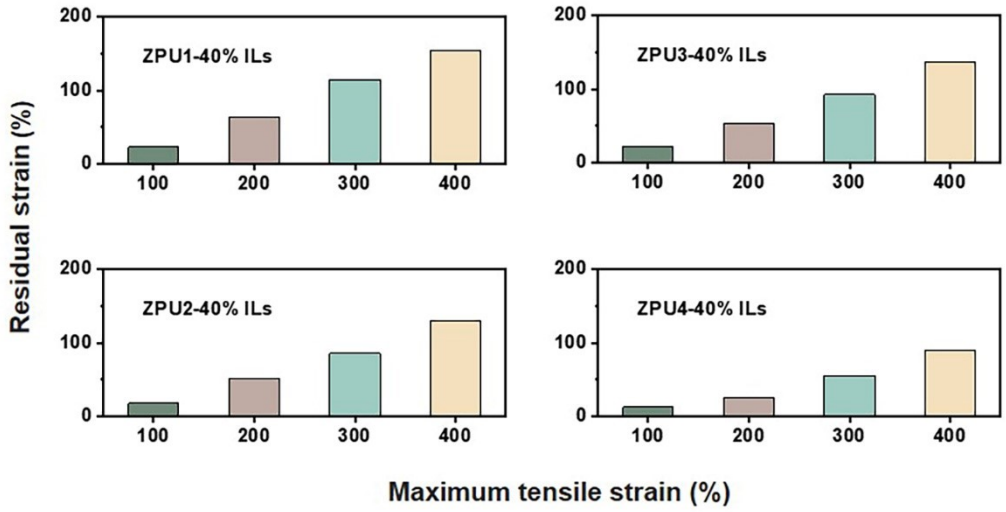

Figure S5. Residual strain of ZPU ionogels stretched to different strain.

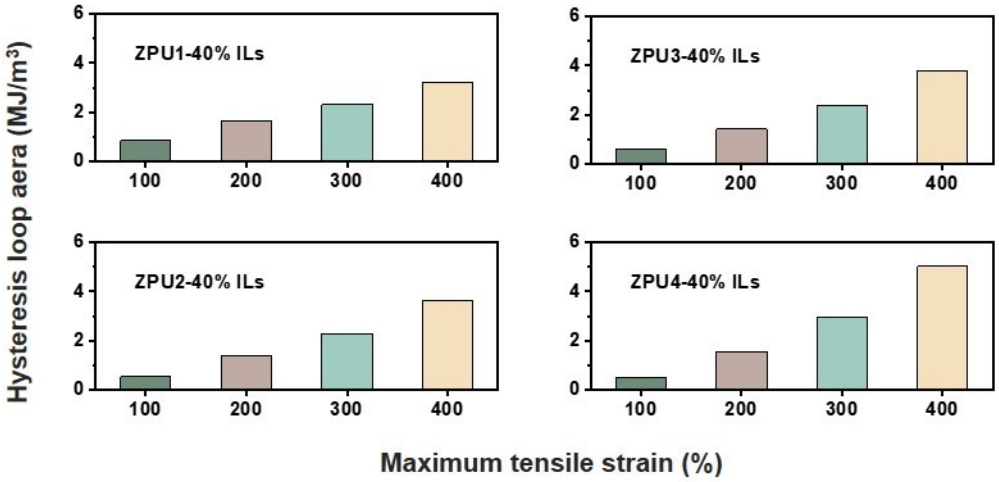

Figure S6. Hysteresis loop area of ZPU ionogels stretched to different strain.

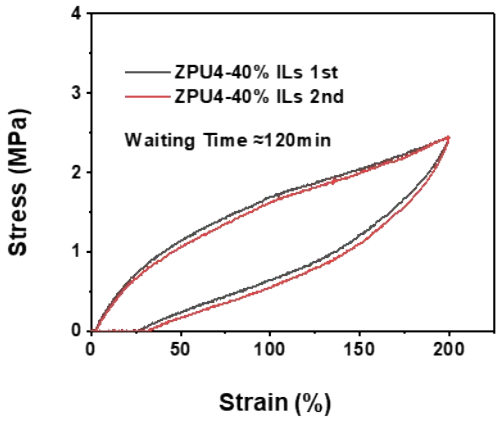

Figure S7. Self-recovery performance of the ZPU ionogels.

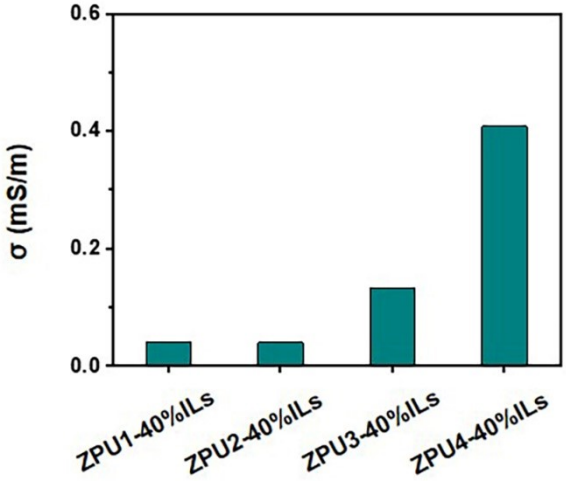

Figure S8. Conductivity of the ZPU ionogel with different zwitterionic content.

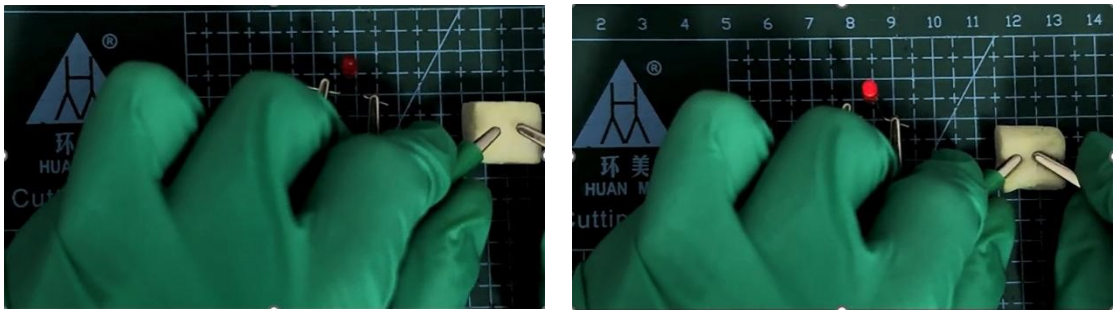

Figure S9. Digital photographs of the ZPU/IL@Sponge acting as a conductor and lighting an LED bulb.