Supplementary Information (SI) for New Journal of Chemistry.

High-Strength, Anti-Freezing and Recyclable Soy Protein isolate/Poly(vinyl alcohol) Gels Empowered by Deep Eutectic Solvent-Augmented Hofmeister Effect

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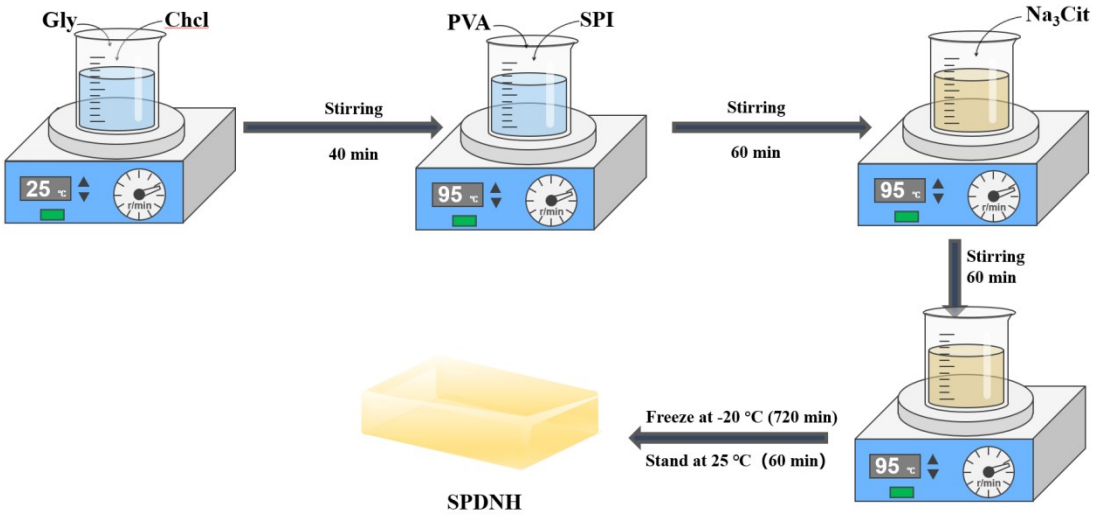

Fig. S1. The preparation process of SPDNH

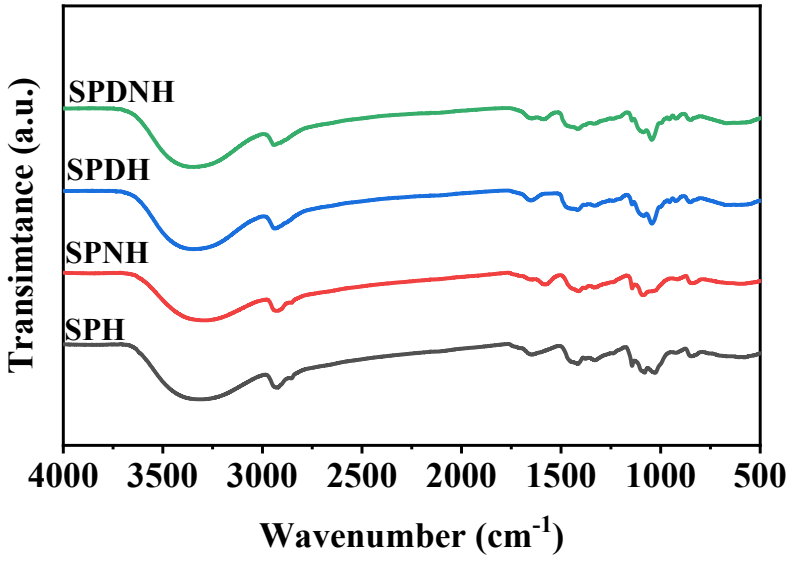

Fig. S2. FTIR spectra of SPH, SPNG, SPDH, and SPDNH

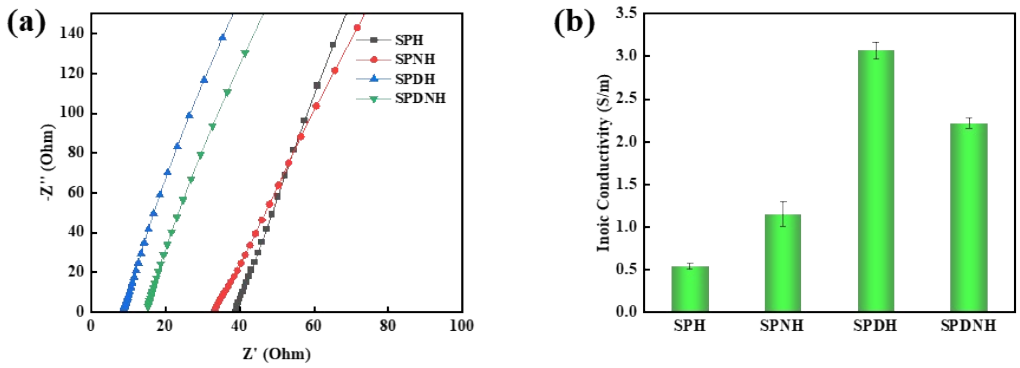

Fig. S3. (a) EIS plots and (b) conductivity of SPH, SPNG, SPDH, and SPDNH

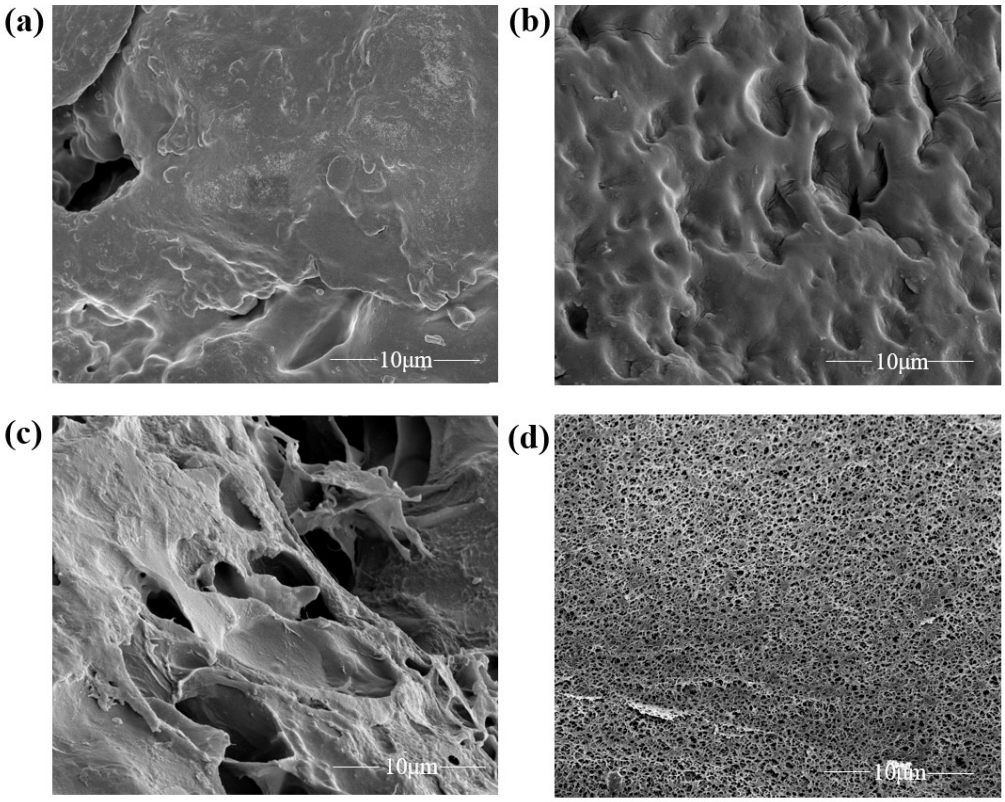

Fig. S4. SEM images of (a) SPH, (b)SPNH, (c) SPDH, and (d) SPDNH

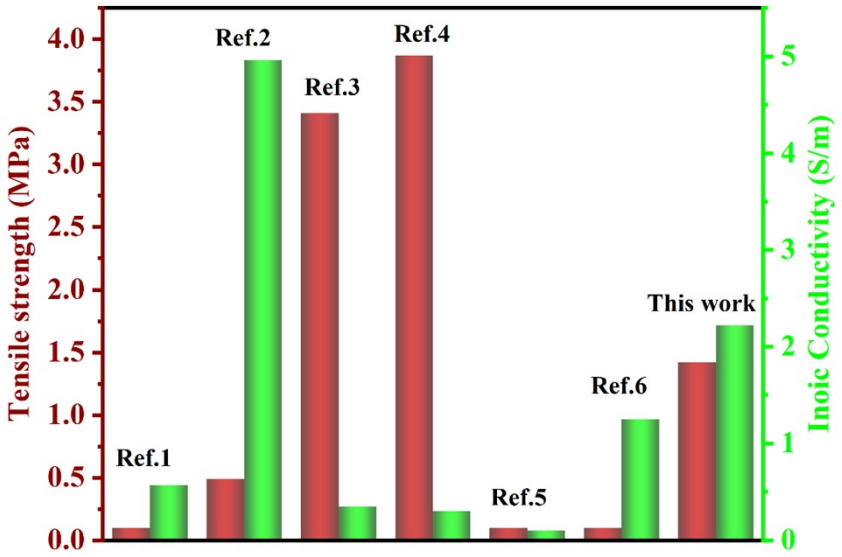

Fig. S5 Comparison of tensile strength and ionic conductivity of this work with those reported in the literature

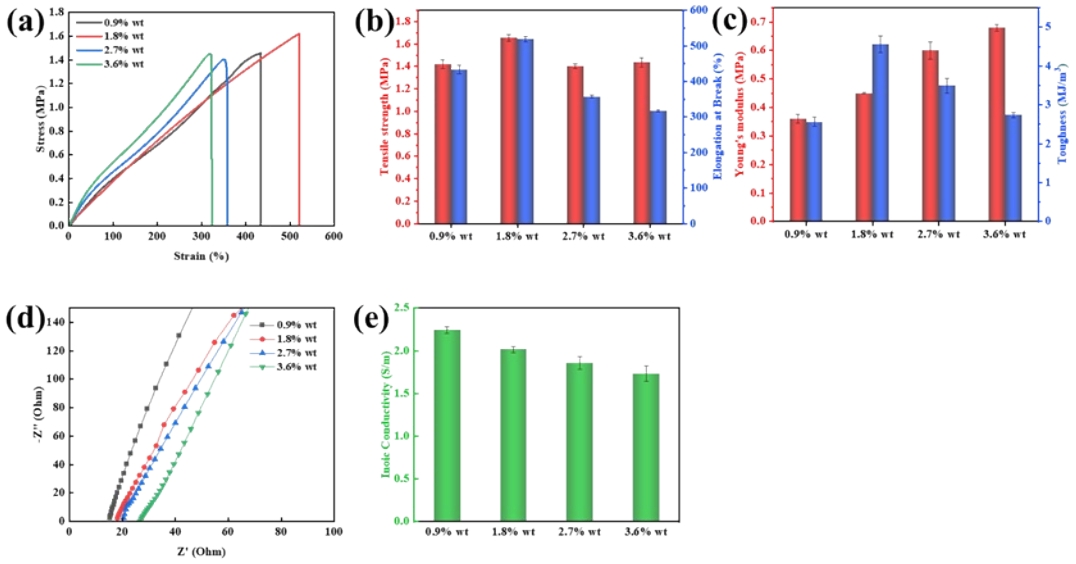

Fig. S6. Four different Na_3Cit addition amounts (The percentage of Na_3Cit in the system mass fraction) (a) Tensile stress-strain curves of hydrogels. (b) Tensile strength and elongation at break. (c) Young's modulus and toughness. (d) EIS plots and (e) conductivity

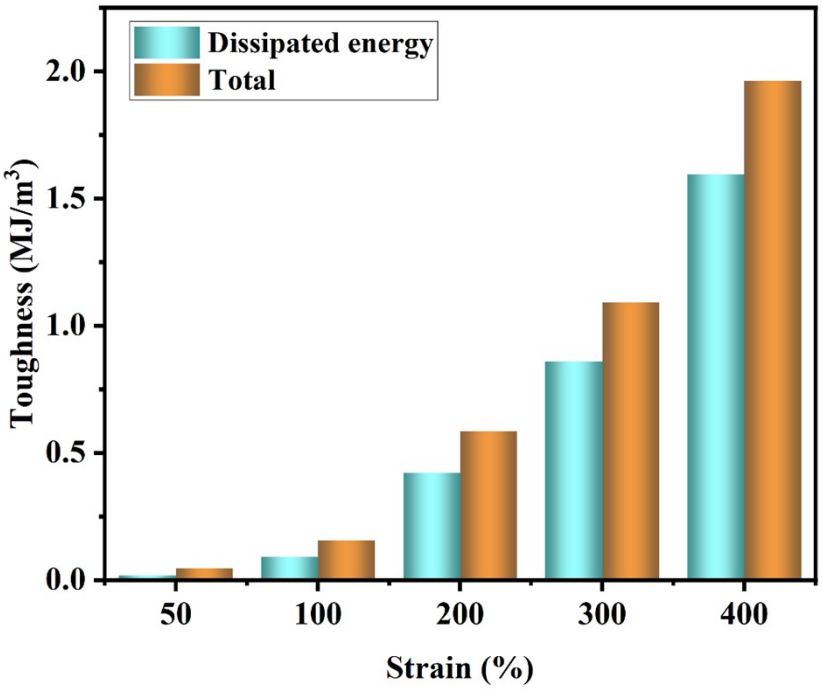

Fig. S7. Total energy and dissipated energy of SPDNH under different strains

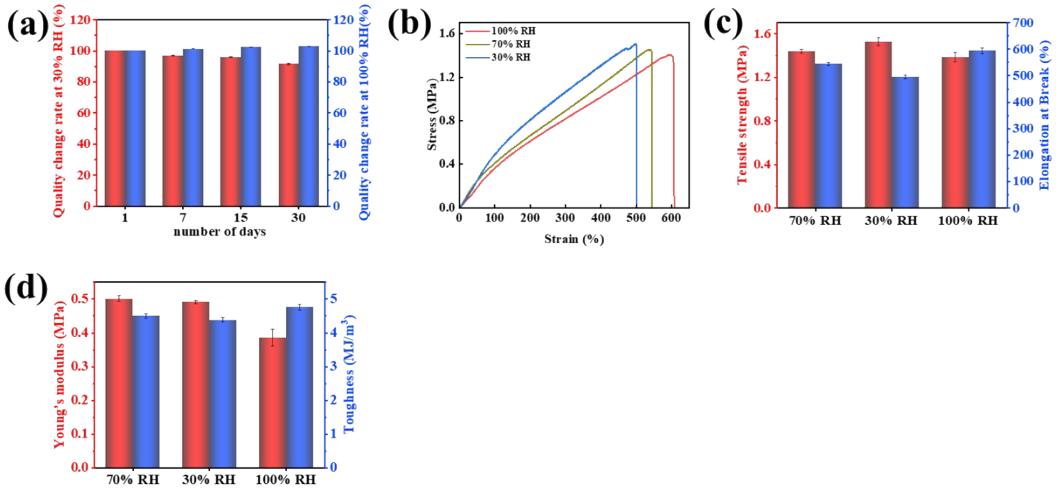

Fig. S8. (a) The quality changes of SPDNH 1.7.15 at 30%RH, 70%RH, and 100%RH over a period of 30 days. (b) Stress-strain curves, (c) tensile strength and elongation at break, (d) Young's modulus and toughness of SPDNH after being placed at 30%RH, 70%RH, and 100%RH for 30 days.

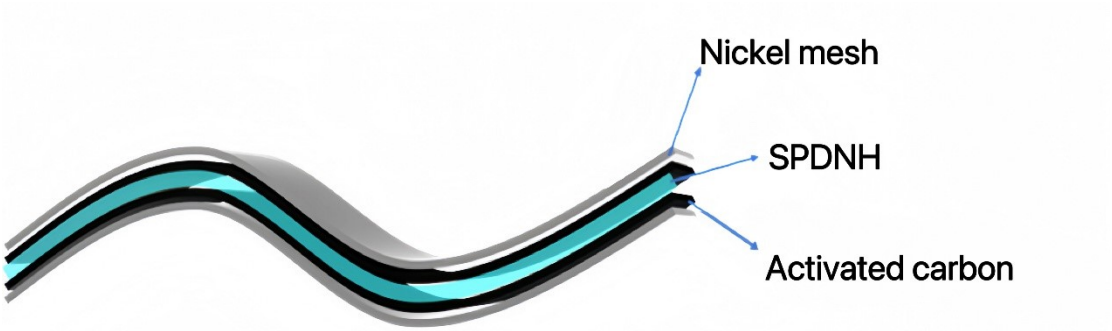

Fig. S9. Schematic diagram of the composition of the flexible all-solid-state supercapacitor

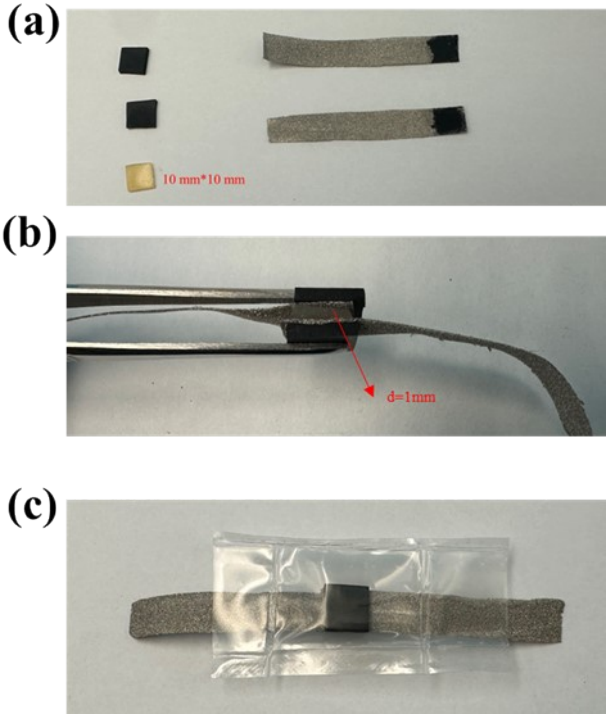

Fig. S10 (a) Composition of supercapacitors; gel, nickel mesh coated with electrode materials, and insulating sheet; (b) Side view diagram of supercapacitor; (c) Supercapacitor after planar plastic packaging

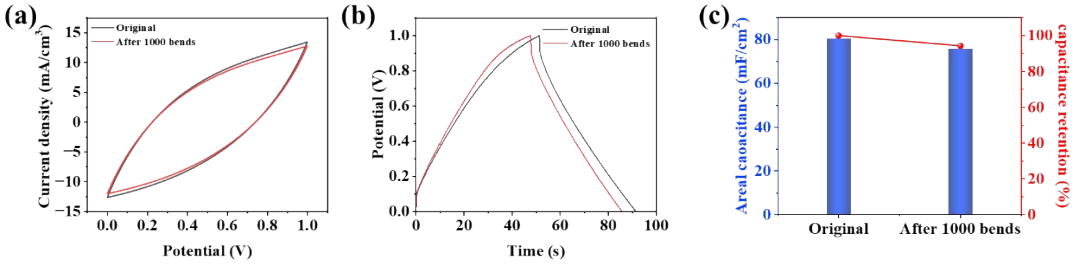

Fig. S11. Supercapacitor after being bent 1000 times: (a) CV curves (100 mV/s), (b) GCD curves (2 mA/cm^2), at different temperatures: (c) area-specific capacitance and capacitance retention.

Table. S1. Comparison of tensile strength and ionic conductivity with those reported in the

literature

Components of DES	Polymer matrix	Tensile strength(MPa)	Elongation at break(%)	Conductivity (S/m)	Freezing (℃)	Ref
ChCl/Gly	SPI/PVA	1.68	518.8	2.01	33	This work
ChCl/EG	PVA	0.85	320	1.85	-25	[7]
ChCl/Urea	PAAM	0.42	580	1.20	-20	[8]
Bet/Gly	PAA	1.20	450	1.60	-28	[9]
Bet/EG	PAA	0.246	712.9	0.741	-117.4	[10]
ChCl/Gly	HEAA	0.42	5000	0.42	-80	[11]
ChCl/AM	PAM	0.184	5063	0.43	\	[12]

Table. S2 Comparison of electrochemical performance data

Capacitance (mF/cm^2)	Operating temperature (°C)	Conductivity (S/m)	Energy density ($\mu Wh/cm^2$)	Cycling stability (%)	Ref
125.61	-20-80	2.01	17.45	80.20% (1000 cycles)	This work
103.6	15-25	6.54	14.39	81.90% (8000 cycles)	[13]
163.6	/	1.36	/	86.00% (10000 cycles)	[14]
136.9	25	4.84	17.9	83.40% (1000 cycles)	[15]
113.76	-15-80	1.72	15.80	81.62% (1000 cycles)	[16]
35	/	/	/	58-61% (3000 cycles)	[17]

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