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Highly Compressible Hydrogel Sensors with Synergistic Long-lasting Moisture, Extreme Temperature Tolerance and Strain-sensitivity Property

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Table S1. DFT calculation results of the interaction energy of different system

Model	Interaction energy (kcal/mol)
H_2O-H_2O	-6.35 [1]
glycerin-H_2O	-7.06 [1]
glycerin-glycerin	-5.97 [1]
TA-H_2O	-18.81
TA-glycerin/H_2O	-22.18
PVA-glycerin/H_2O	-42.86
PVA-TA	-41.59

Table S2. The compressive mechanical properties of hydrogels.

Sample Code	Fracture Stress [MPa]	Fracture Stain [%]	E [kPa]
PVA-W	0.16	82.5	6.69
PT0-GW	0.37	84.9	9.07
PT25-GW	0.69	81.5	9.37
PT50-GW	1.15	82.8	9.58
PT100-GW	2.32	86.8	9.99
PT200-GW	9.85	94.2	12.37

Table S3. The compressive mechanical properties of PVA-W and PT100-GW hydrogels at different temperatures.

Temperature [℃]	Sample Code	Fracture Stress [MPa]	Fracture Stain [%]
-20	PT100-GW	7.89	79.65
	PVA-W	--	--
-10	PT100-GW	4.03	76.74
	PVA-W	--	--
0	PT100-GW	2.4	75.3
	PVA-W	1.42	80.71
RT	PT100-GW	2.18	87.28

	PVA-W	0.21	74.89
40	PT100-GW	2.71	83.59
	PVA-W	0.12	61.38
50	PT100-GW	0.67	76.47
	PVA-W	0.03	61.04
60	PT100-GW	0.41	61.99
	PVA-W	0.004	25.12

Table S4. The gauge factor of PT100-GW hydrogel strain sensor at different temperatures in compressive strain test.

Gauge Factor / Temperature	Compressive Strain							
	10%	20%	30%	40%	50%	60%	70%	80%
RT	0.28	0.32	0.37	0.36	0.42	0.46	0.48	0.52
-20℃	0.11	0.23	0.32	0.38	0.40	0.44	0.50	0.54
60℃	0.61	0.47	0.51	0.64	0.93	--	--	--

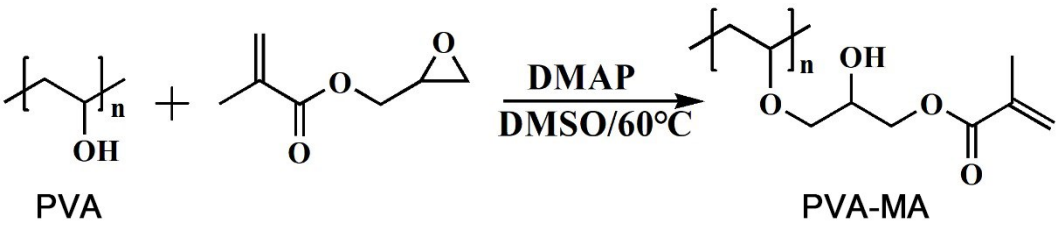

Figure S1. The synthesis route of PVA-MA.

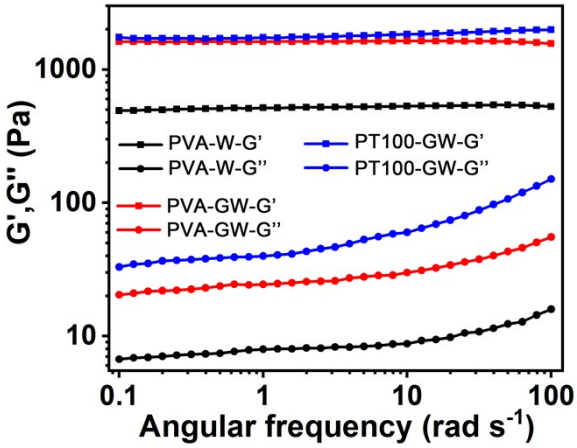

Figure S2. The storage modulus (G') and loss modulus (G'') of PVA-W, PVA-GW and PT100-GW hydrogels.

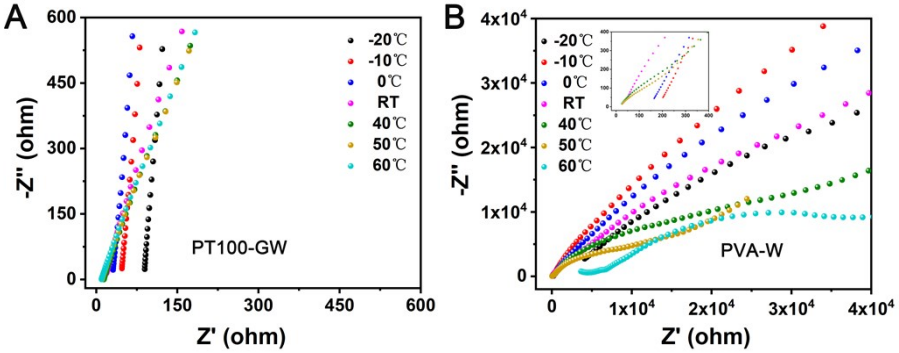

Figure S3. The Nyquist plot of PT100-GW (A) and PVA-W (B) hydrogel electrolytes under different temperatures.

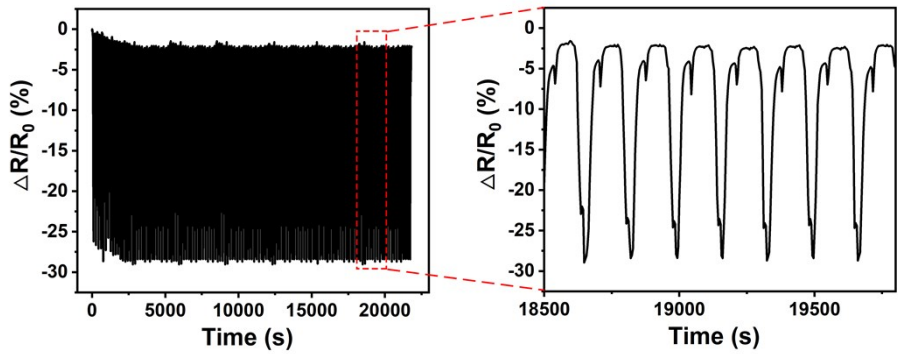

Figure S4. The durable strain-sensitive test under a 50% compressive strain for 150 loading/unloading cycles.

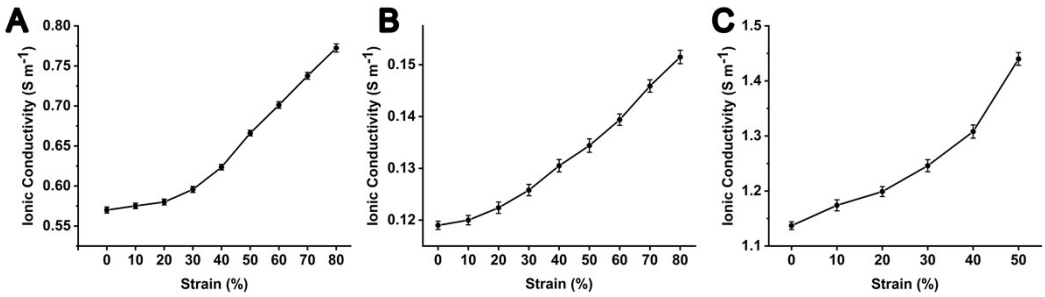

Figure S5. The ionic conductivity of PT100-GW hydrogel strain sensor at RT (A), -20℃ (B), and 60℃ (C) in the compressive test.

References

[1] L. Han, K. Liu, M. Wang, K. Wang, L. Fang, H. Chen, J. Zhou, X. Lu, Mussel-Inspired Adhesive and Conductive Hydrogel with Long-Lasting Moisture and Extreme Temperature Tolerance, Adv. Funct. Mater. 28 (2018) 1704195.