

Supporting Information

**Bio-inspired self-recoverable polyampholyte hydrogel with low
temperature sensing**

Xinyao Li, Lingshu Kong and Guanghui Gao

Polymeric and Soft Materials Laboratory, School of Chemical Engineering and
Advanced Institute of Materials Science, Changchun University of Technology,
Changchun, 130012, P. R. China

Corresponding Authors: Guanghui Gao

E-mail: ghgao@ccut.edu.cn

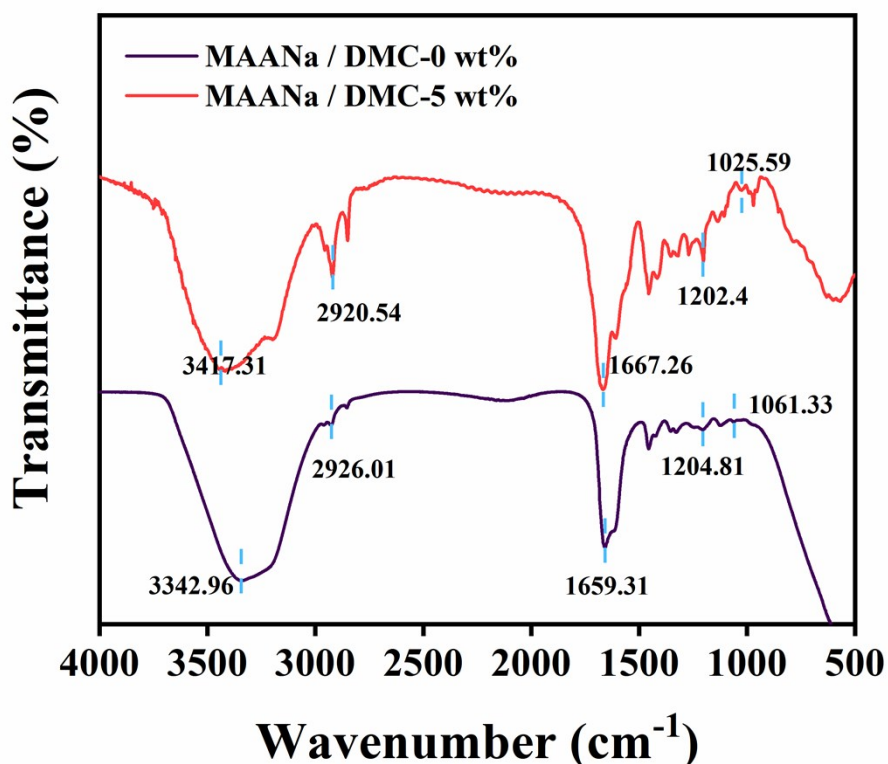


Figure S1. FTIR spectroscopy of MAANa/DMC-0 wt% and MAANa/DMC-5 wt% hydrogel

To characterize the crosslinking network of ions in the hydrogel system. The figure shows the FTIR spectral data of the MAANa/DMC-0 wt% and MAANa/DMC-5 wt% hydrogel. The C = O tensile vibration absorption peak of the carboxyl group moves from 1204.8 cm⁻¹ to 1202.4 cm⁻¹, and the peak value increases. This indicates that C-N in DMC may participate in the coordination reaction. At the same time, the C = O tensile vibration absorption peak of the carboxyl group moved to 1667.26 cm⁻¹ at 1659.31 cm⁻¹, indicating that the carboxyl group of MAANa also participated in the coordination reaction. The tensile vibration absorption peaks of methylene CH (2926.01 cm⁻¹), and primary hydroxyl group (1061.33 cm⁻¹) were moved to 2976.40 cm⁻¹ and 1025.59 cm⁻¹, respectively -1 further illustrates the coordination reaction between zwitterions.

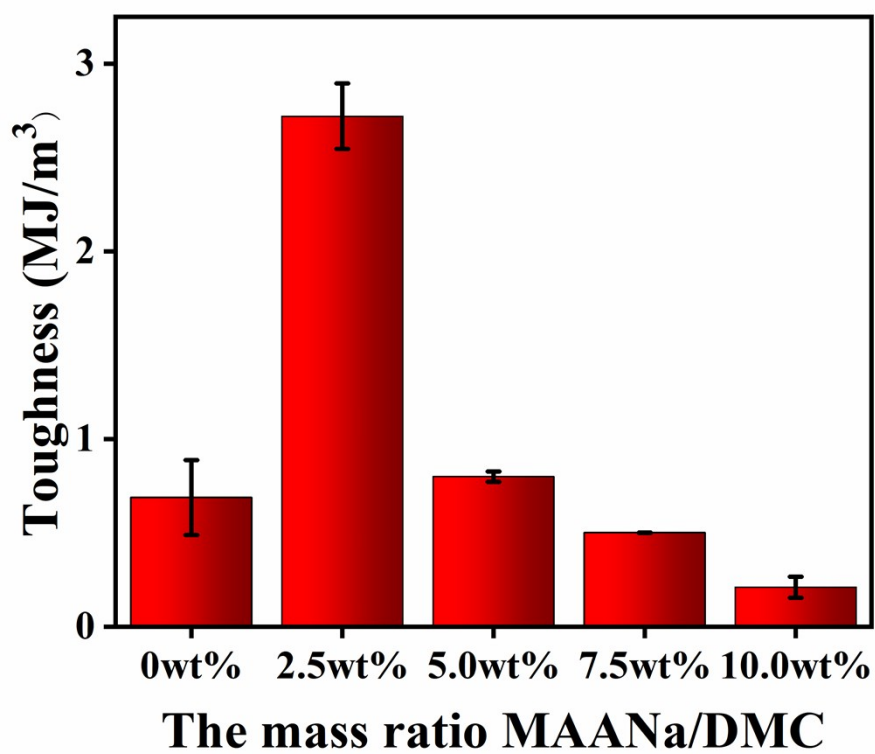


Figure S2. tensile curves of PA hydrogels having first cyclic stress-strain curves.

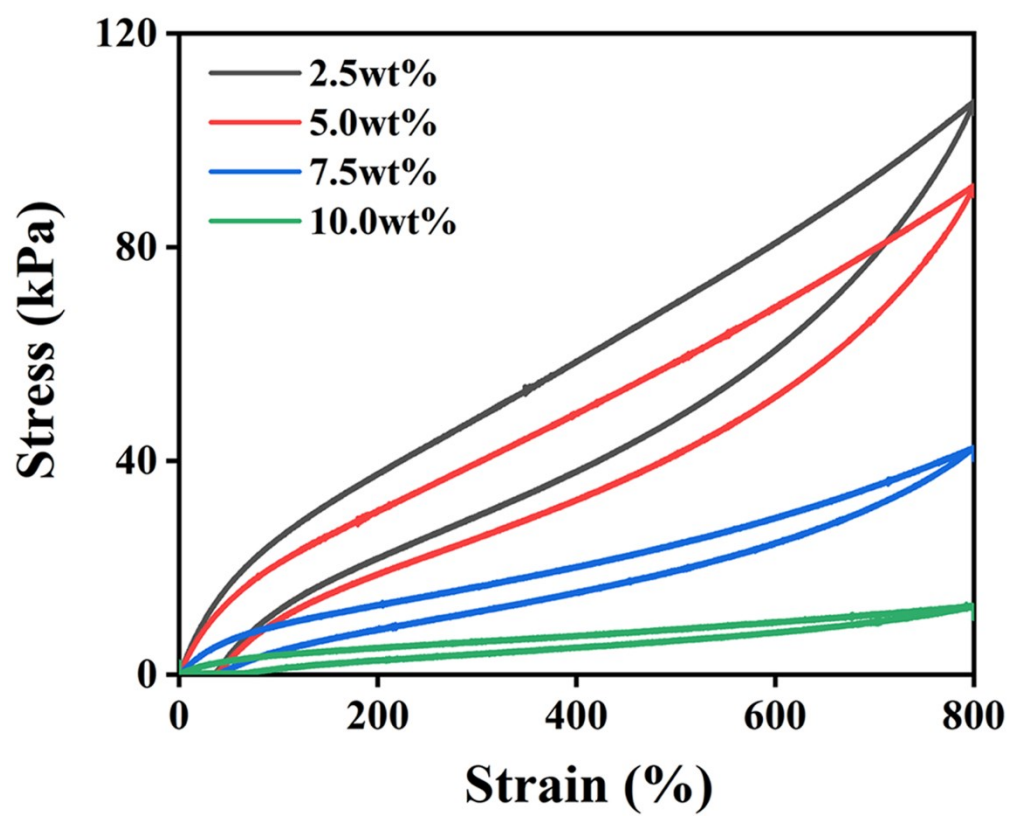


Figure S3. cyclic stress-strain tensile curves of MAANa/DMC-2.5 wt%-10wt% PA hydrogel

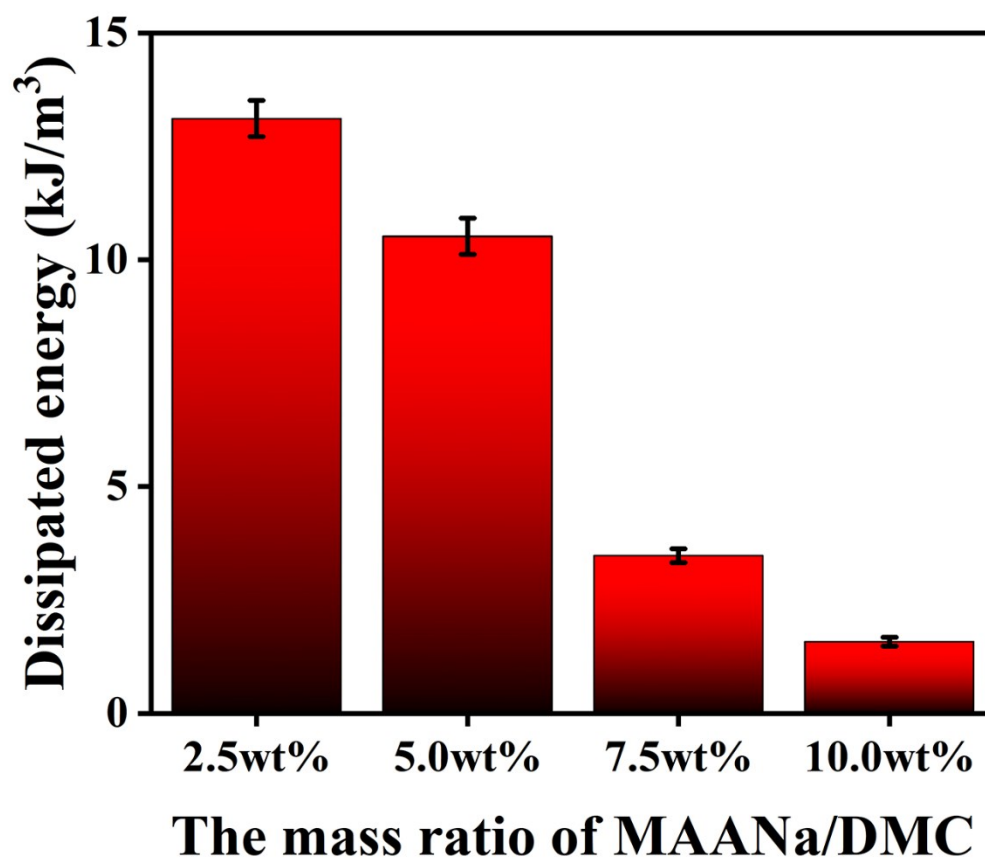


Figure S4 Dissipated energy corresponding to MAANa / DMC-2.5 wt%-10wt% PA hydrogel

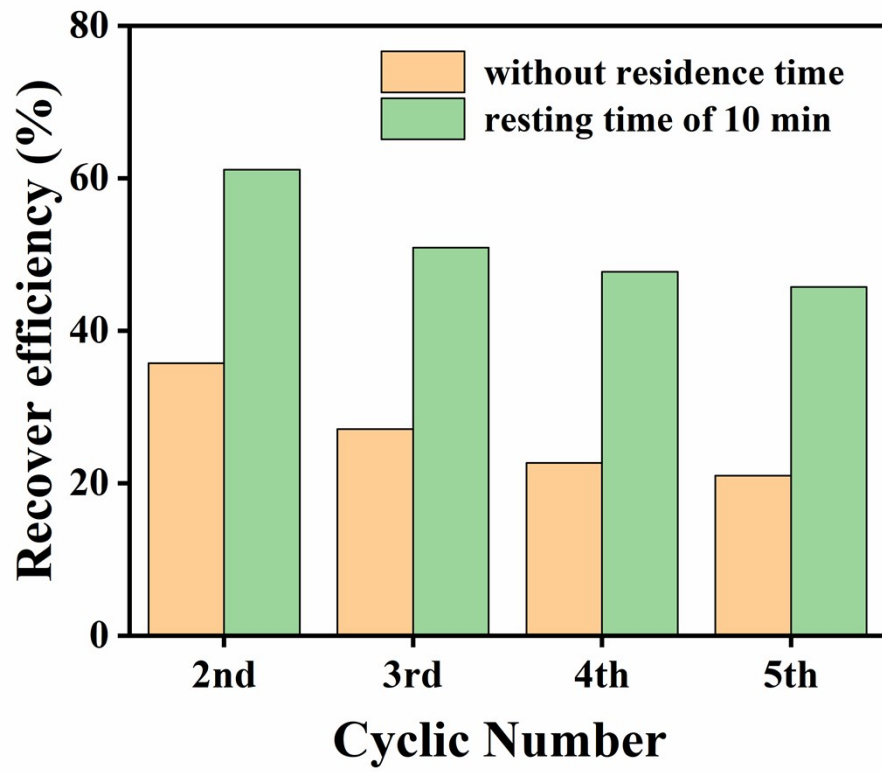


Figure S5. The corresponding recovery efficiency of stress and hysteresis energy

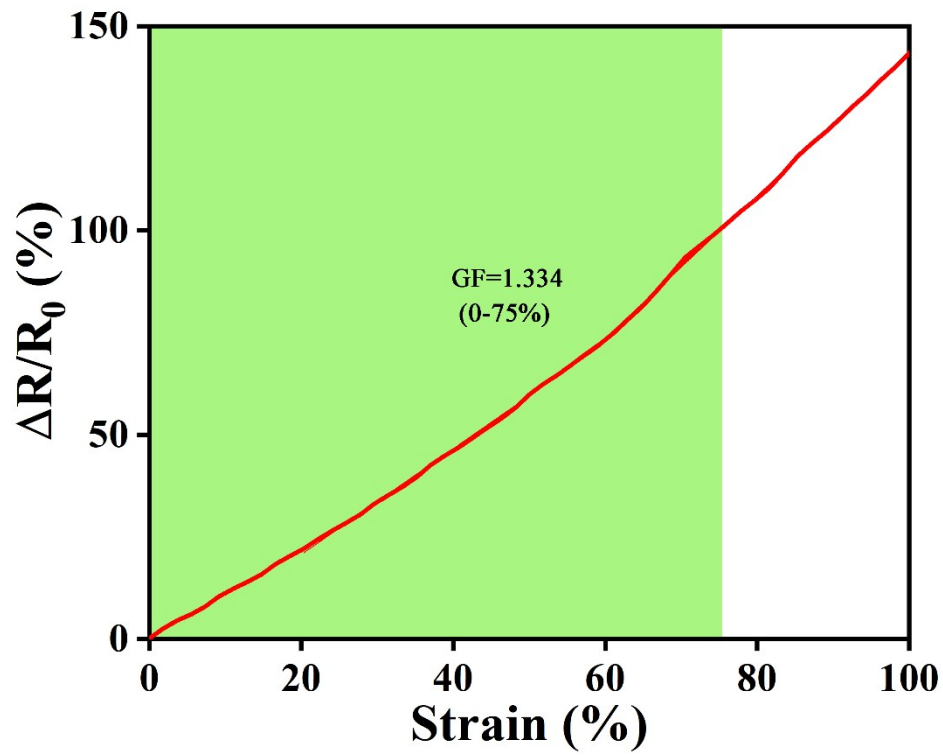


Figure S10

Figure S6 The relative resistance changes and gauge factor of the MAANa / DMC-5 wt% PA hydrogel as a function of strain (0-75%)

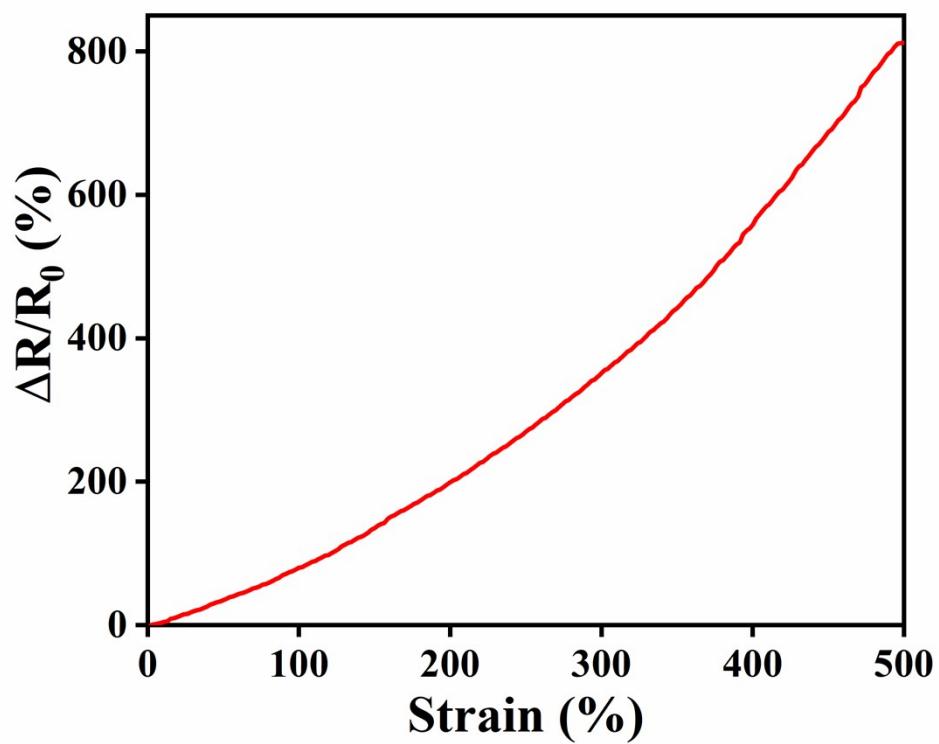


Figure S7. Strain sensitivity test of MAANa / DMC-5 wt% PA hydrogel at 0-500% tensile strain.

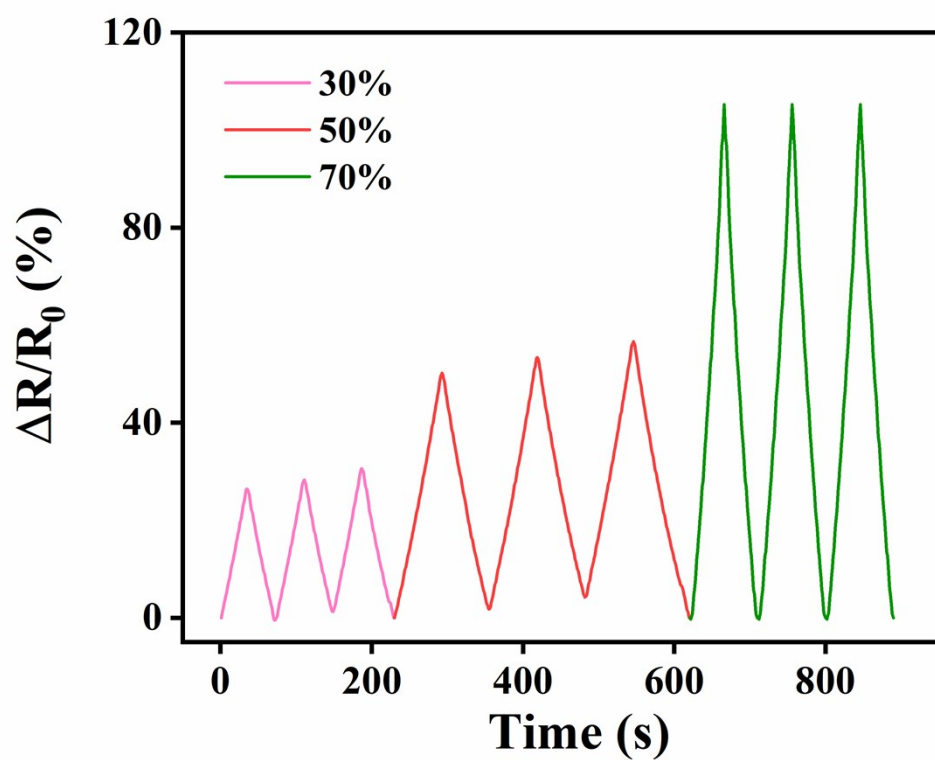


Figure S8. MAANa / DMC-5 wt% PA hydrogel during repeated stretching with small strains (30%, 50%, 70%).

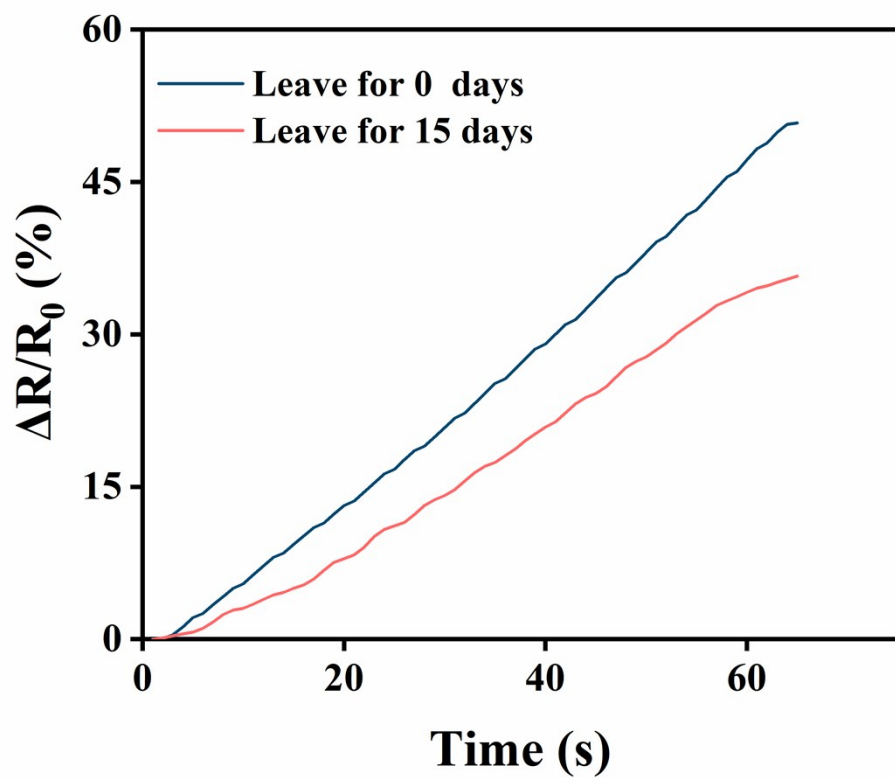


Figure S9. Strain sensitivity of the hydrogel sensor after 15 days.

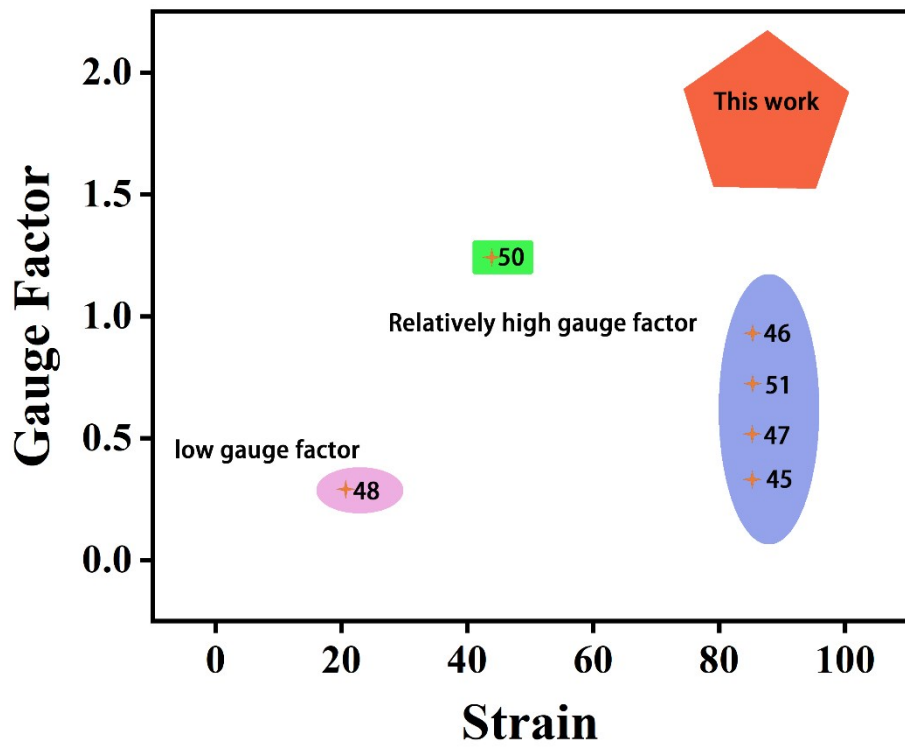


Figure S10 Comparison between this work and reported hydrogel strain sensors in terms of 0-100% strain and gauge factor

Table 1 Recipes for resigned PA hydrogel samples

Samples	AAM (g)	MDC (g)	MAANa (g)	SDS (g)	LiCl (g)	C ₁₆ (g)	MAB (μ L)	H ₂ O (mL)	TMEDA (μ L)	KPS (g)
1	6.0	0.5	0.5	0.8	2.0	200	80	20	40	0.04
2	5.0	1.0	1.0	0.8	2.0	200	80	20	40	0.04
3	4.0	1.5	1.5	0.8	2.0	200	80	20	40	0.04
4	3.0	2.0	2.0	0.8	2.0	200	80	20	40	0.04