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

Supplementary Information

A wet-resistant and low-temperature self-healing organohydrogel sensor towards direction-recognition and information transmission in extreme environment

Enke Feng,[‡]* Xiaoqin Li,[‡] Mengzhen Zhang, Ying Li and Dailian Wang*

College of Chemistry and Chemical Engineering, Ningxia Normal University, GuYuan 756000, China.

[‡]These authors contributed equally to this work. They should thus be considered co-first authors.

*Corresponding authors: NXSFEKF@126.com (E, Feng); wdl1731624323@163.com (D, Wang).

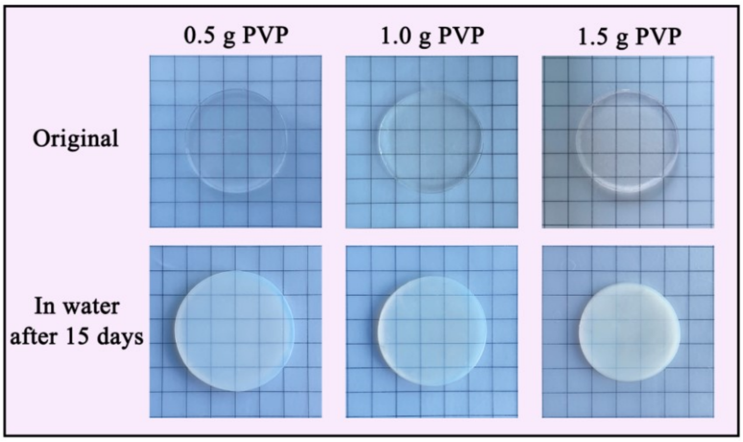

Fig. S1. The photographs of PHA organohydrogels with different PVP contents at the original state and after being immersed in water for 15 days.

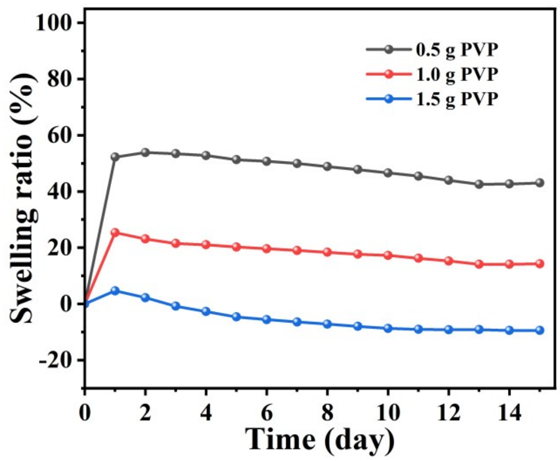

Fig. S2. Swelling ratio curves of PHA organohydrogels with different PVP contents as a function of swelling time in water.

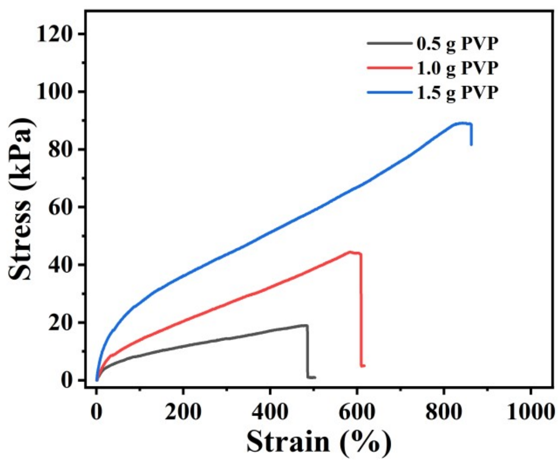

Fig. S3. Stress-strain curves of PHA organohydrogels with different PVP contents after being immersed in water for 15 days.

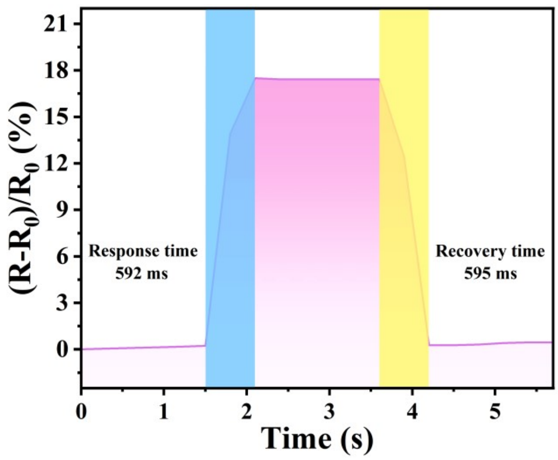

Fig. S4. The response time and recovery time of PHA organohydrogel-based sensor at 20 % strain.

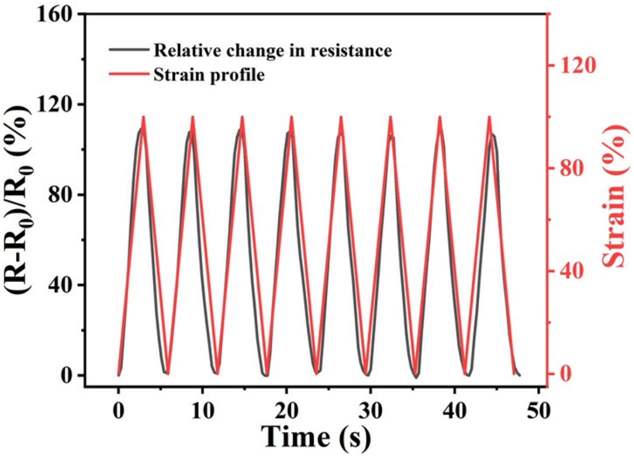

Fig. S5. Relative resistance changes of organohydrogel sensor during periodic stretching and releasing process at 100% strain.

Table S1 The comparison of the self-healing efficiency for our organohydrogel with other recently reported hydrogel/organohydrogels.

Hydrogel/Organohydrogel	Original strain (%)	Self-healing strain (%)	Self-healing time	Self-healing efficiency	References
SSS-[BMIM]Cl hydrogel	1000	830	48 h	83%	1
PCG organohydrogel	936	873	72 h	93.2%	2
APG2 hydrogel	1179	1049	12 h	89%	3
MAGP hydrogel	500	425	16 h	85%	4
PSBMA-LM@PDA-5 hydrogel	555.5	500	12 h	90%	5
PVA/PA/Fe^{3+} hydrogel	924	667	36 h	72%	6
PAAN hydrogel	2590	1866	72 h	72%	7
PCOBE organohydrogel	880	706	24 h	80.3%	8
PNAGA/PNIPAm/AgNW-4 hydrogel	~1800	1324	24 h	73.89%	9
PHA organohydrogel	942	889	12 h	94%	This work

1 X. Zhang, G. Zhang, X. Huang, J. He, Y. Bai and L. Zhang, *ACS Appl. Mater. Interfaces*, 2022, **14**, 30256-30267.

2 Z. Zhou, K. Liu, Z. Ban and W. Yuan, *Compos. Part A,* 2022, **154**, 106806.

3 Y. Li, X. Xie, Q. Zhu, S. Lu and Y. Bai, *J. Mater. Chem. A*, 2022, **10**, 22205-22213.

4 L. Dong, M. Wang, J. Wu, C. Zhu, J. Shi and H. Morikawa, *ACS Appl. Mater. Interfaces*, 2022, **14**, 9126-9137.

5 Y. Chen, C. Zhang, R. Yin, M. Yu, Y. Liu, Y. Liu, H. Wang, F. Liu, F. Cao, G. Chen and W. Zhao, *Mater. Horiz.*, 2023, **10**, 3807-3820.

6 J. Lin and X. Du, *Chem. Eng. J.*, 2022, **446**, 137244.

7 G. Su, S. Yin, Y. Guo, F. Zhao, Q. Guo, X. Zhang, T. Zhou and G. Yu, *Mater. Horiz.*, 2021, **8**, 1795-1804.

8 B. Song, X. Fan, J. Shen and H. Gu, *Chem. Eng. J.*, 2023, **474**, 145780.

9 S. J. Ge, S. N. Liu, Z. Z. Gu and H. Xu, *Small Methods*, 2023, DOI: 10.1002/smtd.202300749.