Supporting information

Fully Biobased Tough Hydrogel Derived from Guar Gum and Gelatin as Flexible Sensor

Zixuan Wei [a, §], *Hongxin Zhou* [b, §], *Yingying Meng* [a], *Ting Wu* [c*], *Junjie Li* [d, e, *], *Yuping Wei* [a, e, *]

a Department of Chemistry, School of Science, Tianjin University, Tianjin 300350, P. R. China.

b Department of Pharmaceutical Engineering, School of chemical engineering and technology, Tianjin University, Tianjin 300350, P. R. China.

c Department of Perfusion, Tianjin Chest Hospital, Tianjin, P. R. China.

d School of Chemical Engineering and Technology, Tianjin University, Tianjin 300350, P. R. China.

e Frontiers Science Center for Synthetic Biology and Key Laboratory of Systems Bioengineering (Ministry of Education), Tianjin University, Tianjin 300350, P. R. China.

KEYWORDS: Hydroxypropyl guar gum, Gelatin, Hydrogel, Conductivity, Flexible sensor

1. Tensile stress-strain curve of Gel-OHPG hydrogel with different AMS immersion time (Figure S1).
2. The stress-strain curves of the hydrogel before and after healing (Figure S2).
3. The swelling rate of Gel-OHPG hydrogel in deionized water (Figure S3).
4. The swelling rate of AMS-solution-soaked-hydrogel in PBS (Figure S4).
5. Comparison of reported hydrogel based on natural polymers with this work (Figure S5).

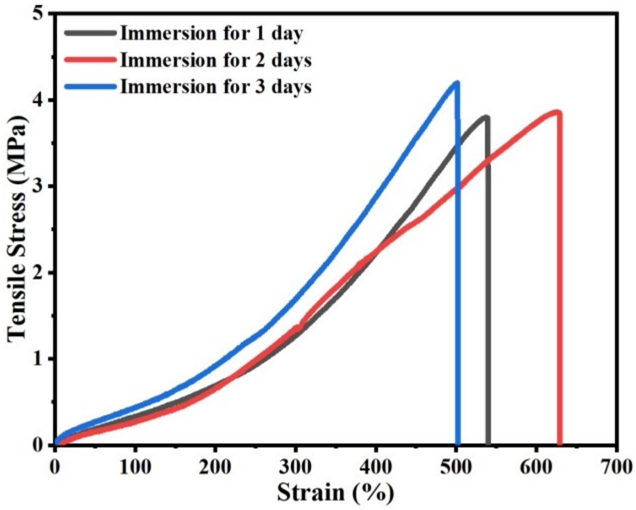

Figure. S1 Tensile stress-strain curve of Gel-OHPG hydrogel with different AMS immersion time.

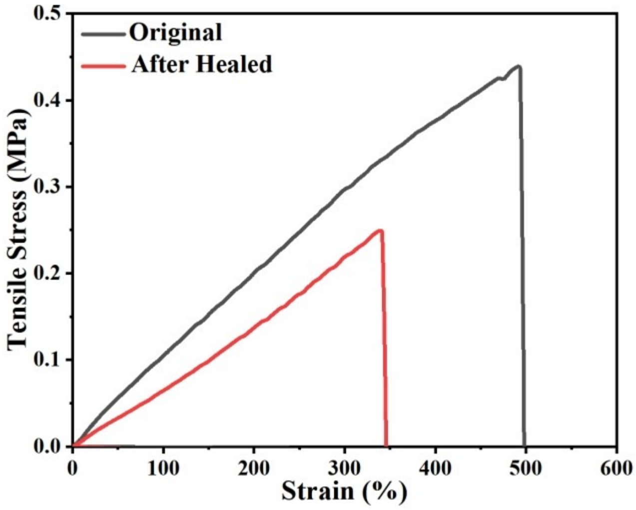

Figure S2. The stress-strain curves of the hydrogel before and after healing.

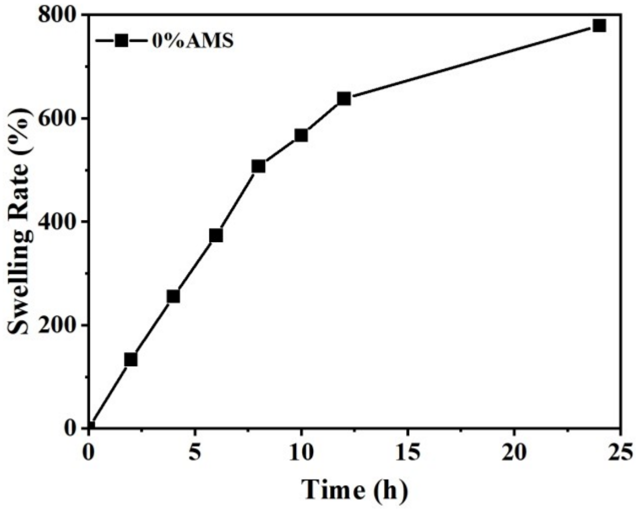

Figure S3. The swelling rate of Gel-OHPG hydrogel in deionized water.

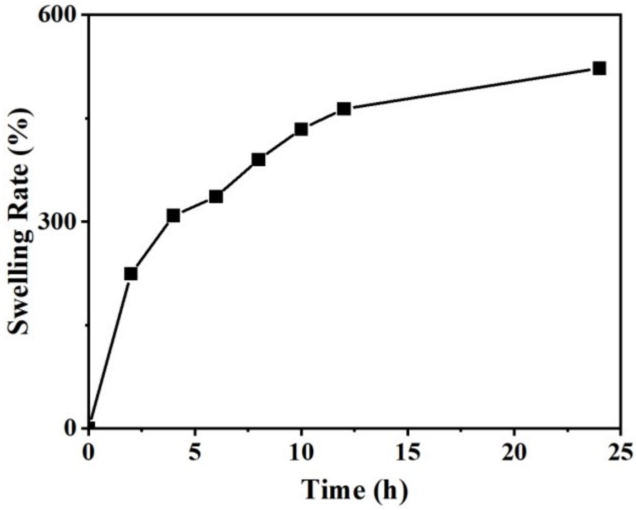

Figure S4. The swelling rate of AMS-solution-soaked-hydrogel in PBS.

Table S1. Comparison of reported natural polymer based hydrogel with this work

Materials	Tensile Strength	Elongation at break	Tensile Toughness	Compressive Strength	Compressive strain
Gel-OHPG (this work)	0.438MPa	493%	1.19 MJ/m^3	25.92MPa	——
Gel-OHPG/AMS (this work)	3.86MPa	629%	10.46 MJ/m^3	59.55MPa	——
Gelatin/oxidized dextran/AMS [1]	2.66 MPa	644%	7.67 MJ/m^3	40.4 MPa	90.4%
Gelatin/oxidized sodium carboxymethyl cellulose/AMS [2]	2.6MPa	614%	4.28 MJ/m^3	64MPa	88.7%
Guar gum/gellan gum/borax [3]	28.2 kPa	216%	——	——	——
Gelatin/sodium alginate/tannic acid/glycerol [4]	163.87 kPa	309.85%	1264.79 kJ/m^3	——	——
Gelatin/AMS [5]	3.26MPa	528%	——	11.99MPa	99%
Gelatin/oxidized sodium alginate/chitosan nanoparticles [6]	40.52 kPa	493.91%	89.54 kJ/m^3	2.43 MPa	——
Gelatin/glycerol [7]	1.98MPa	475%	——	9.68MPa	88%
Gelatin/oxidized starch [8]	120kPa	279%	——	14.28kPa	——

References:

1 X. Qin, Z. Zhao, J. Deng, Y. Zhao, S. Liang, Y. Yi, J. Li and Y. Wei, Carbohydr. Polym., 2024, 335, 121920.

2 L. Cao, Z. Zhao, X. Wang, X. Huang, J. Li and Y. Wei, Adv. Mater. Technol., 2022, 7, 2101382.

3 D. Cao, Y. Lv, Q. Zhou, Y. Chen and X. Qian, Eur. Polym. J., 2021, 151, 110371.

4 X. Zhang, K. Liu, M. Qin, W. Lan, L. Wang, Z. Liang, X. Li, Y. Wei, Y. Hu, L. Zhao, X. Lian and D. Huang, Carbohydr. Polym., 2023, 309, 120702.

5 Q. He, Y. Huang and S. Wang, Adv. Funct. Mater., 2018, 28, 1705069.

6 L. T. Gao, Y. M. Chen, Y. Aziz, W. Wei, X. Y. Zhao, Y. He, J. Li, H. Li, H. Miyatake and Y. Ito, Carbohydr. Polym., 2024, 330, 121812.

7 D. Zhou, F. Chen, J. Wang, T. Li, B. Li, J. Zhang, X. Zhou, T. Gan, S. Handschuh-Wang and X. Zhou, J. Mater. Chem. B, 2018, 6, 7366–7372.

8 Q. Mao, O. Hoffmann, K. Yu, F. Lu, G. Lan, F. Dai, S. Shang and R. Xie, Mater. & Design, 2020, 194, 108916.