**Supporting information**

# Hierarchical hybrid crosslinking multifunctional gelatin-based hydrogel: ideal platforms for flexible wearable devices, brain-computer interfaces and biomedical applications

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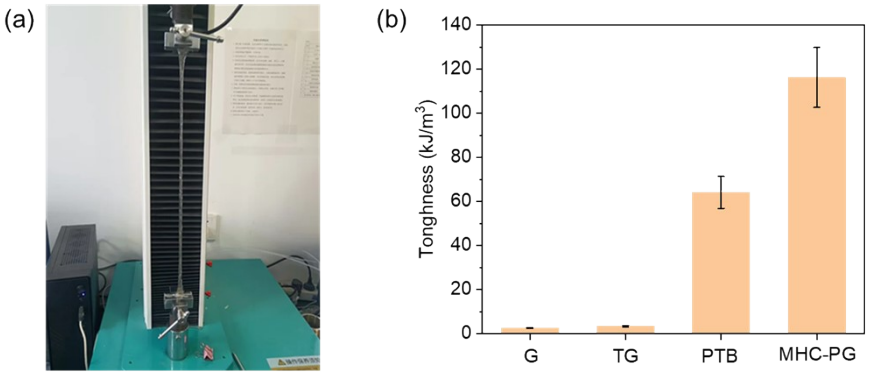


**Fig. S1** (a) Digital photograph of MHC-PG hydrogel under extreme stretching. (b) Toughness of G, TG, PTB and MHC-PG hydrogels.

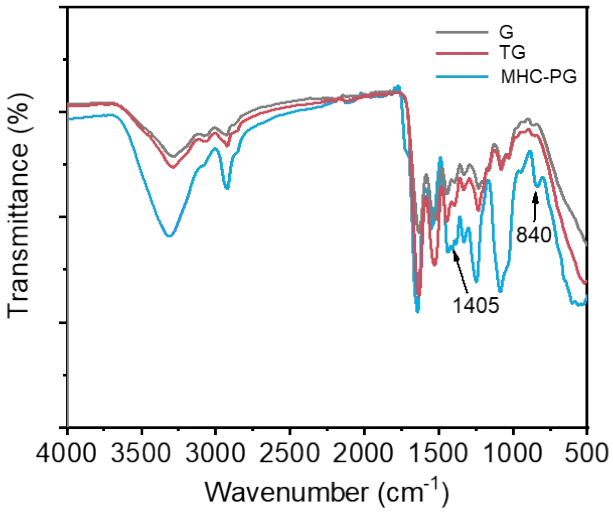


**Fig. S2** FT-IR profiles of G, TG, and MHC-PG hydrogels.

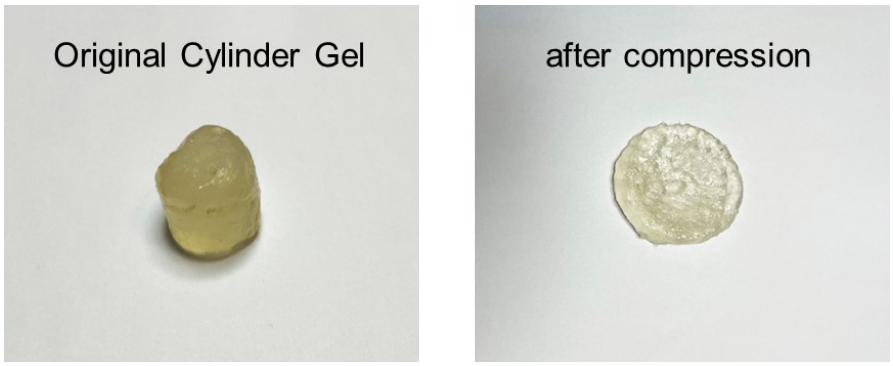


**Fig. S3** Digital photographs of MHC-PG hydrogels subjected to 90% compression deformation.


**Fig. S4** Digital photographs of the healing process of MHC-PG hydrogel

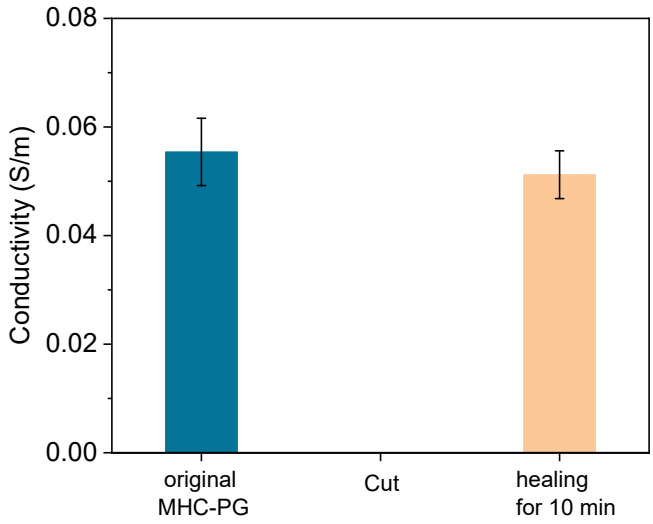


**Fig. S5** Conductivity of hydrogel MHC-PG hydrogels before and after self-healing.

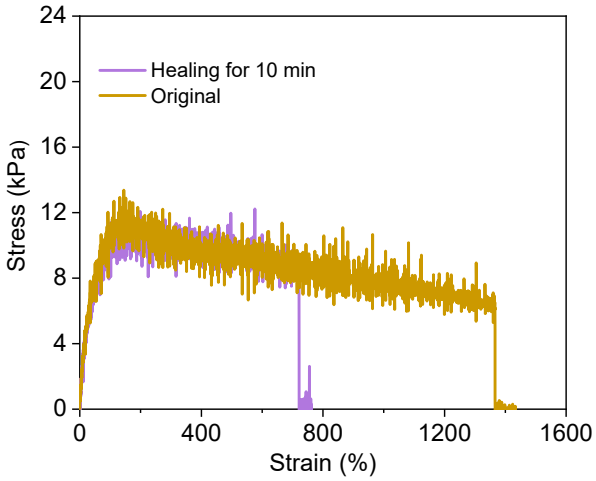


**Fig. S6** Stress-strain curves of MHC-PG hydrogels before and after self-healing.

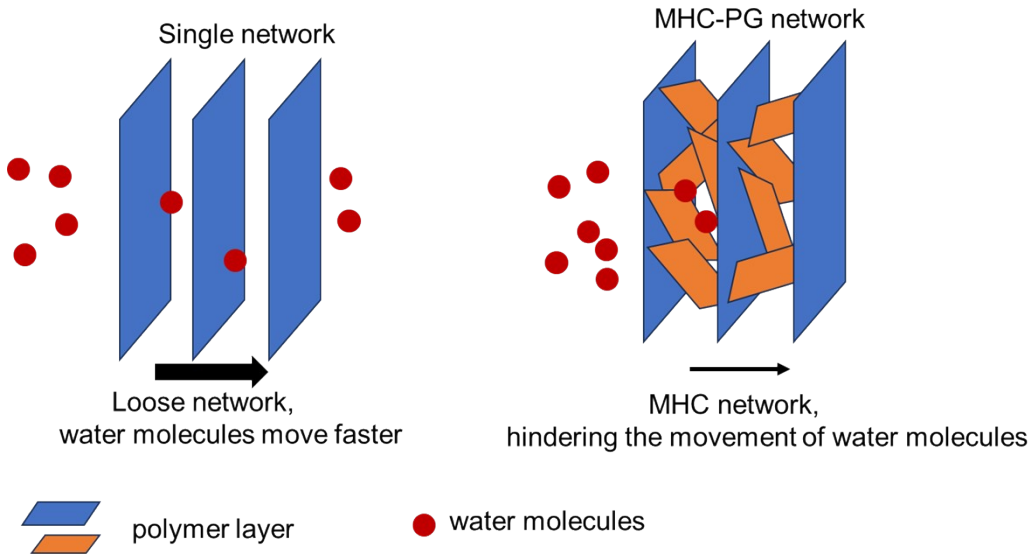


**Fig. S7** Schematic of water molecule diffusion in hydrogels with different network structures.

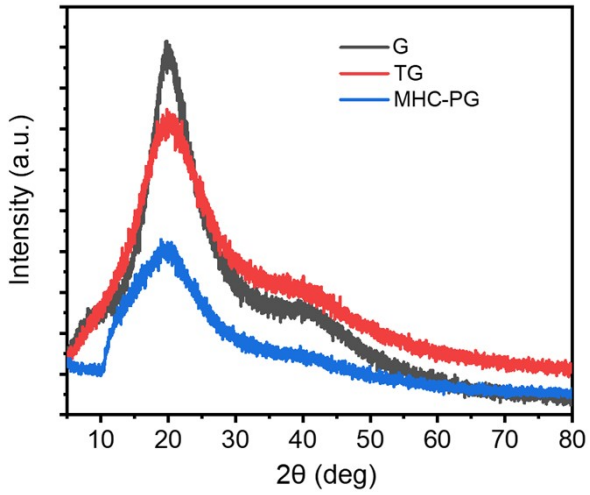


**Fig. S8** XRD profiles of G, TG, and MHC-PG hydrogels.

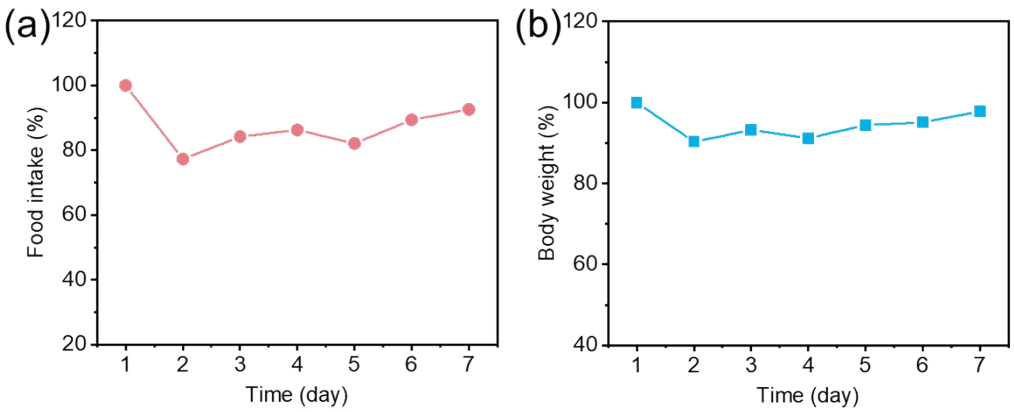


**Fig. S9** (a) Changes in food intake of mice after MHC-PG hydrogel implantation. (b) Changes in body weight of mice after MHC-PG hydrogel implantation.

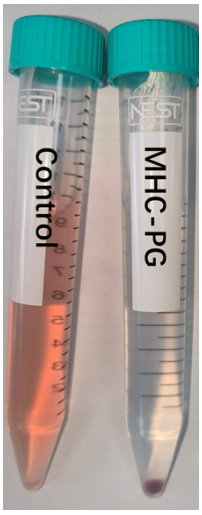


**Fig. S10** Blood compatibility of MHC-PG hydrogel.

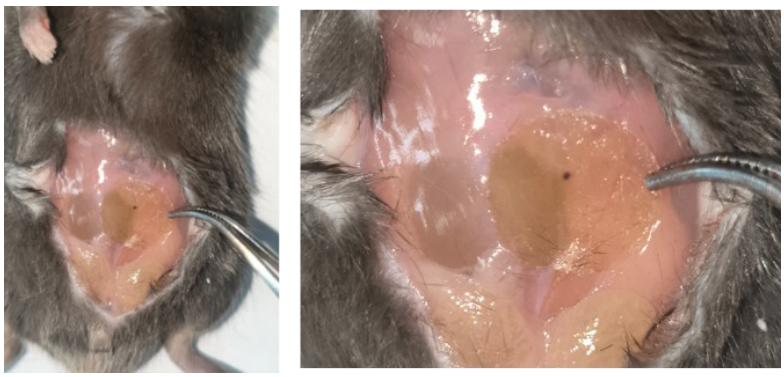

**Fig. S11** Adhesion behavior of MHC-PG hydrogel to skin tissue.

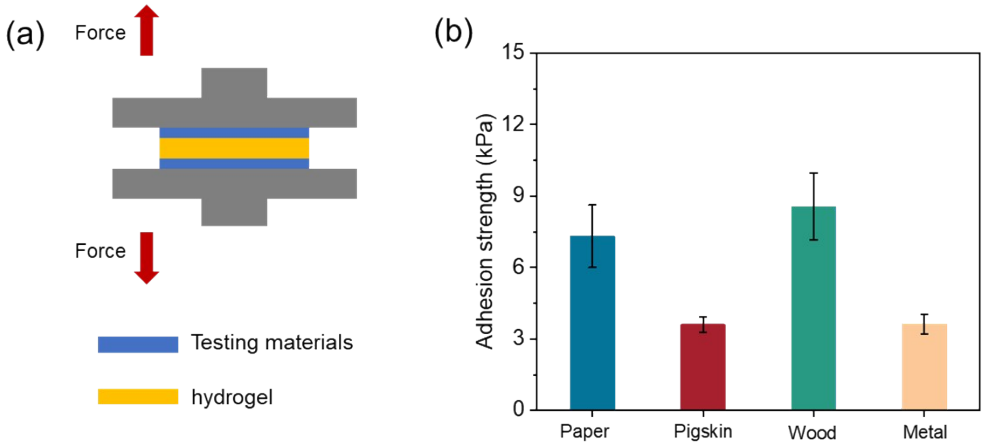


**Fig. S12** (a) Schematic diagram of adhesion test, (b) Adhesion of MHC-PG hydrogel to different materials.

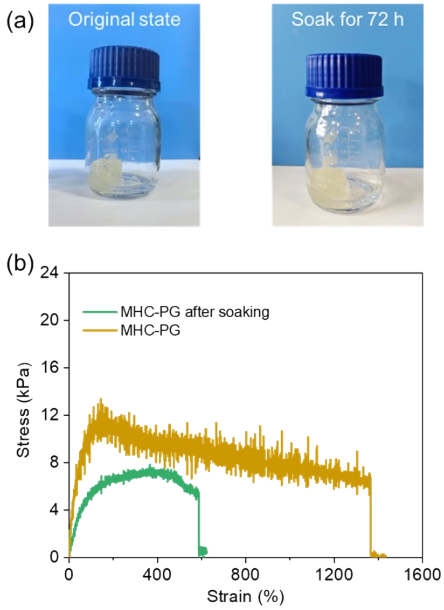


**Fig. S13** (a) Digital photographs of hydrogels after soaking in simulated body fluids for 72 h. (b) Stress-strain curves of MHC-PG hydrogels after soaking in simulated body fluids for 72 h.

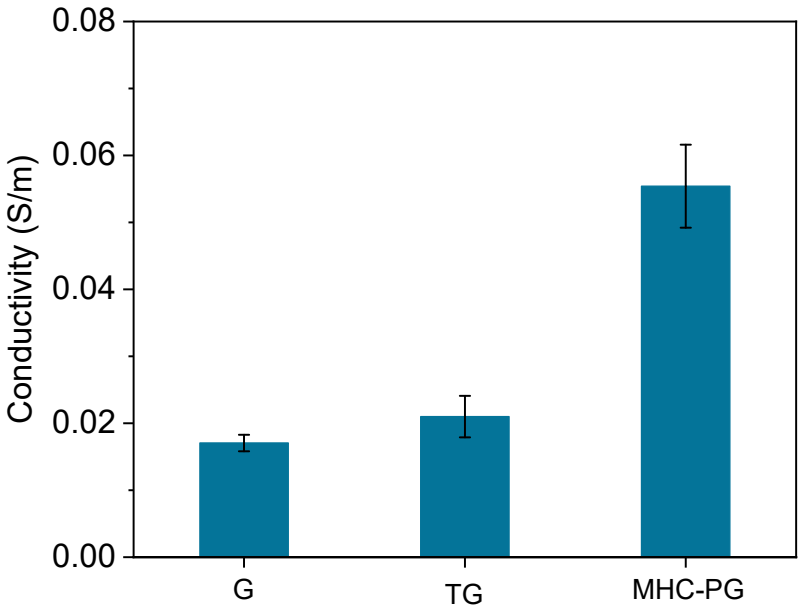


**Fig. S14** Conductivity of G, TG, and MHC-PG hydrogels.

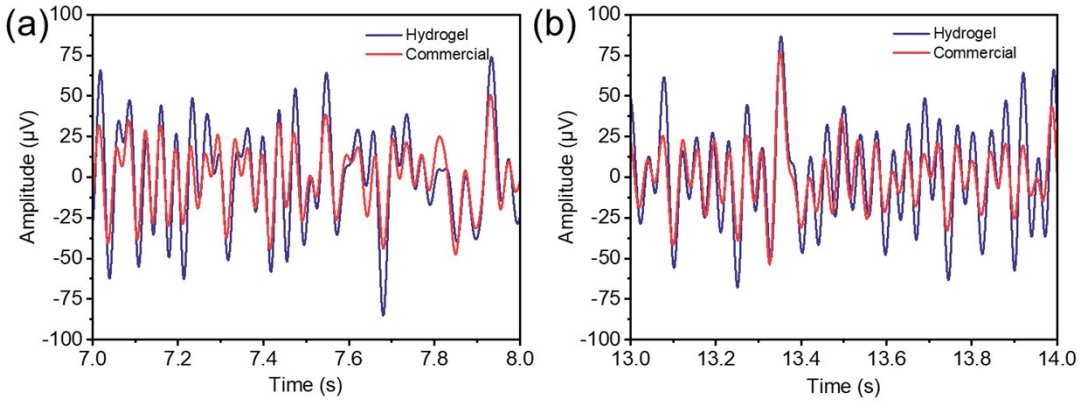


**Fig. S15** (a) Randomly selected segments of 7~8s EEG signal recordings. (b) randomly selected segments of 13~14s EEG signal recordings.