Electronic Supplementary Material (ESI) for Soft Matter.

Supplementary Information

A double-network strategy for tough tissue adhesion of hydrogel with long term stability under physiological environment

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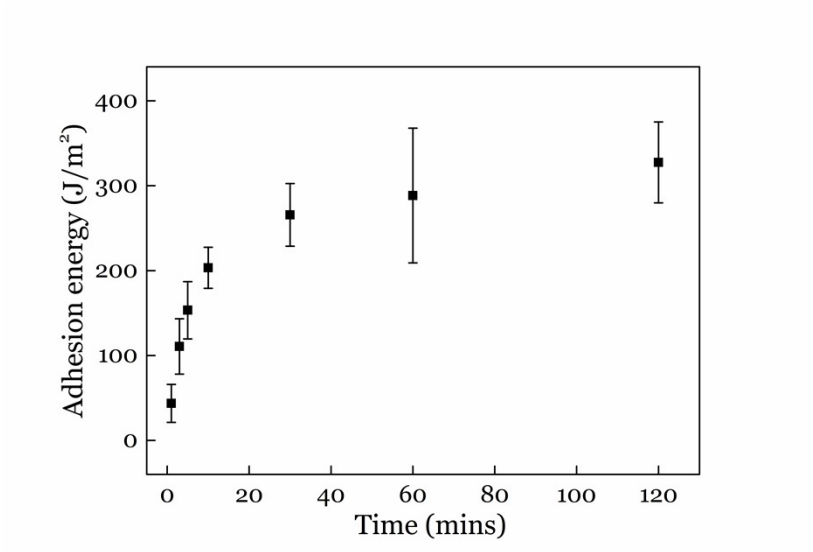

Figure S1. The adhesion energy between the PNIPAM/Ca-Alginate hydrogel and porcine liver increased with pressing time.

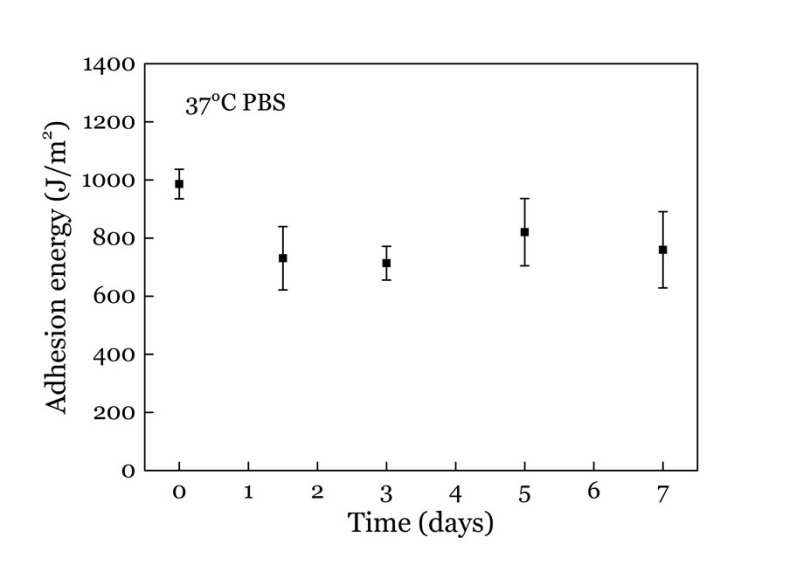

Figure S2. The adhesion energy between two pieces of PNIPAM/Ca-Alginate hydrogel after being submerged in PBS solution at 37℃ for different time.

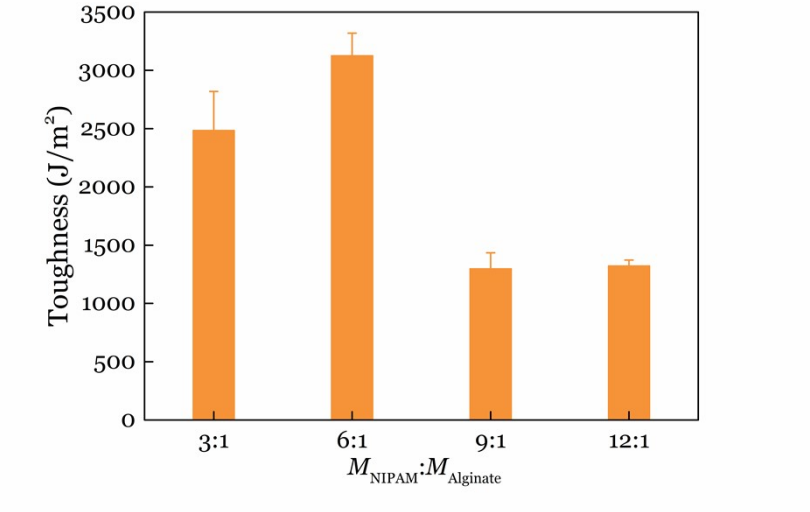

Figure S3. The toughness of PNIPAM/Ca-Alginate hydrogels with different proportions.

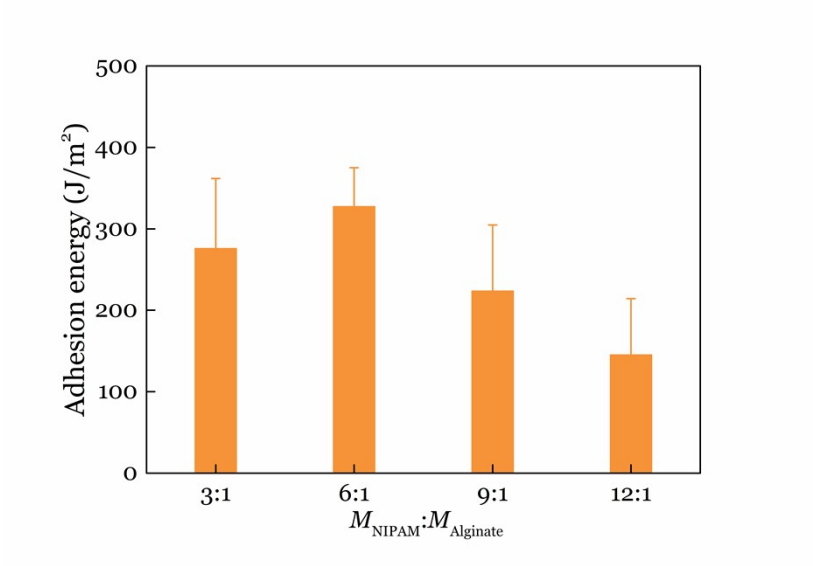

Figure S4. The adhesion energy between the PNIPAM/Ca-Alginate hydrogel with different proportions and porcine liver.

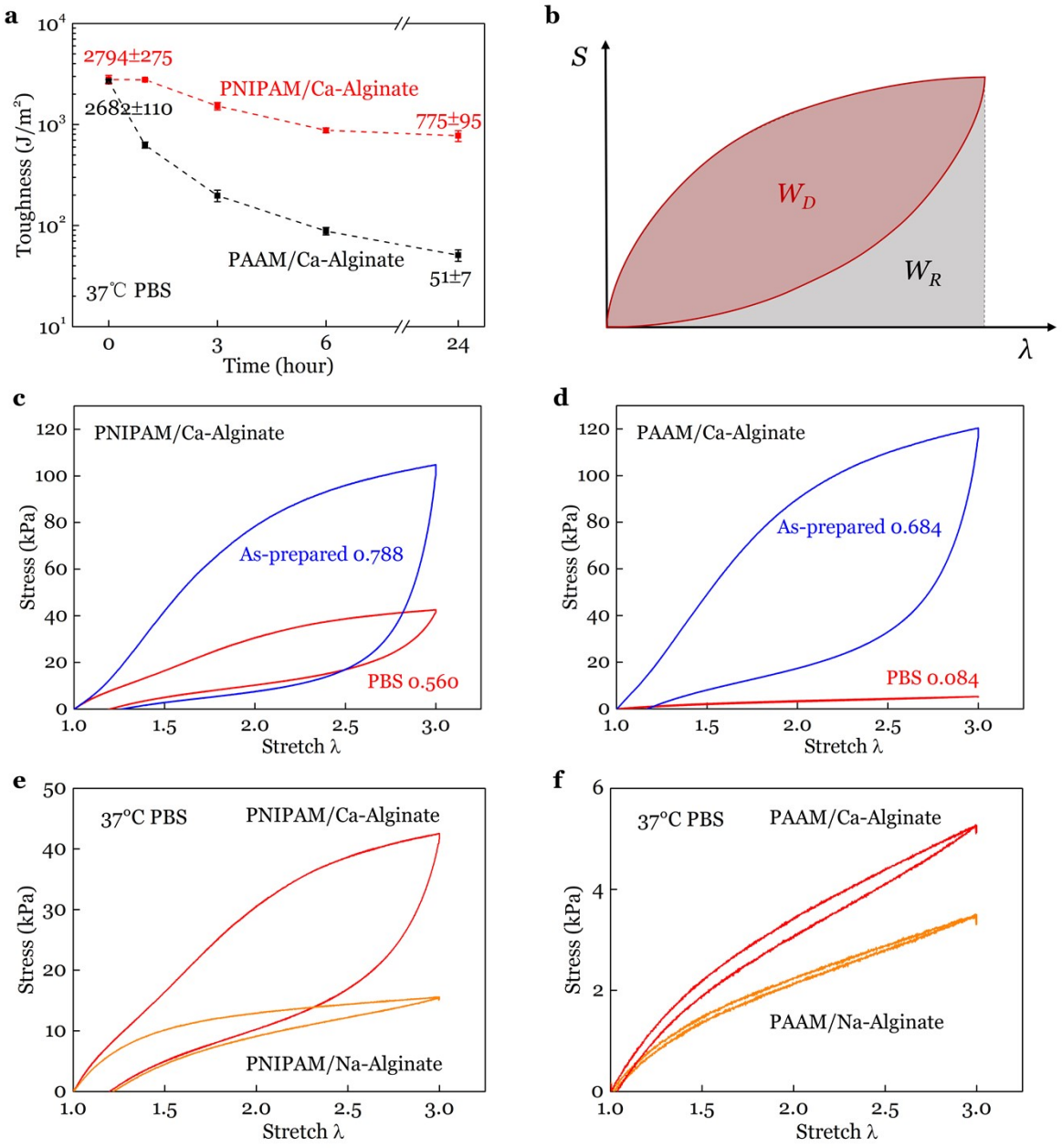

Figure S5. Mechanical characterization of hydrogels after immersing in PBS solution. **a** Fracture toughness of PNIPAM/Ca-Alginate hydrogel and PAAM/Ca-Alginate hydrogel after being submerged in PBS solution. **b** Hysteresis ratio is defined as the ratio $D = W_D / (W_D + W_R)$ and measured it through loading-unloading cycle experiment. The curves of a loading-unloading cycle for **c** PNIPAM/Ca-Alginate hydrogel and **d** PAAM/Ca-Alginate hydrogel in as-prepared state and after being submerged in PBS solution at 37℃. The curves of

a loading-unloading cycle for **e** PNIPAM/Ca-Alginate hydrogel and PAAM/Na-Alginate hydrogel and **f** PAAM/Ca-Alginate hydrogel and PNIPAM/Na-Alginate hydrogel after being submerged in PBS.

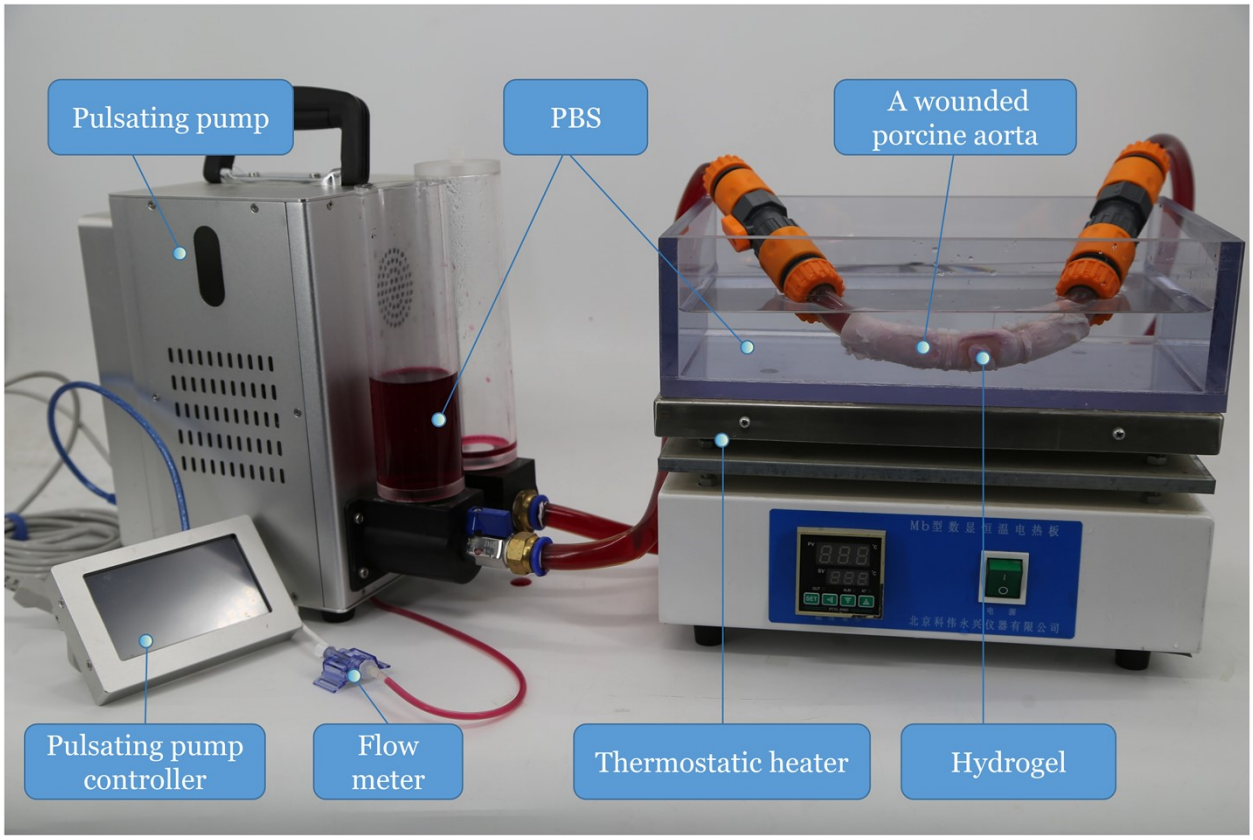

Figure S6. Photo of the experimental setup.