

Supporting Information

Self-Healing, Robust Adhesion, Multiple Stimuli-Response Hydrogel towards Flexible Sensors

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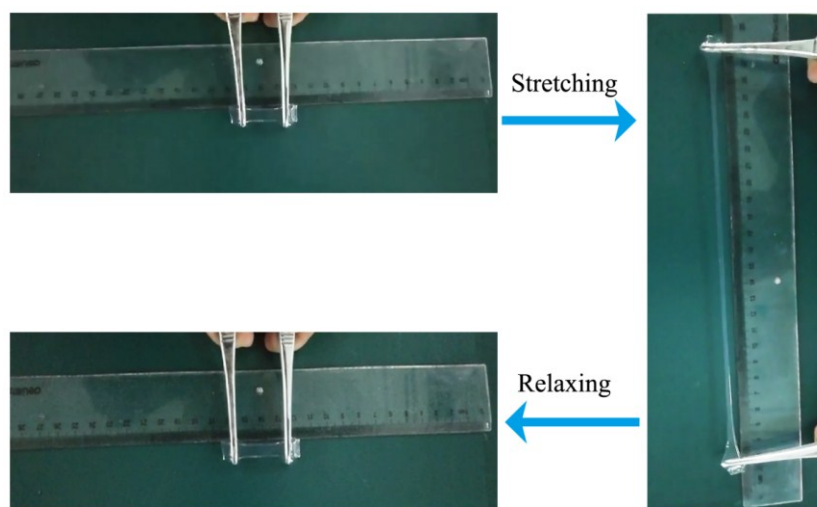


Figure S1. The GPNs gel exhibits excellent elasticity even being stretched for 1500% and rapid recovery to their original state in a short time when the force unloading.

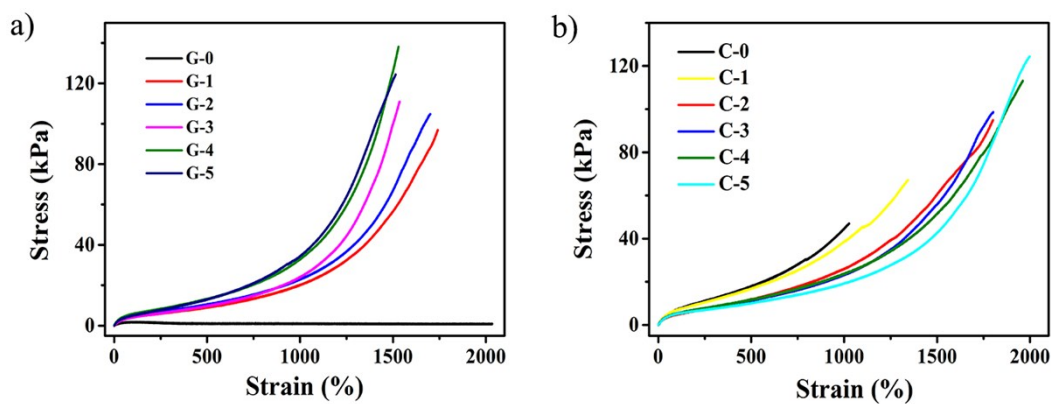


Figure S2. a) Stress-strain curves of the GPNs gels with different gelatin contents (G0~G5: 0 wt%, 0.5 wt%, 1 wt%, 2 wt%, 3 wt%, 4 wt%). The concentration of AAm was 0.2 g/mL, clay was 0.1 g/mL in H₂O. b) Stress-strain curves of the GPNs gels with different clay contents (C-1n: hydrogel containing 0.05n g/mL clay). The concentration of gelatin was 1 wt%.

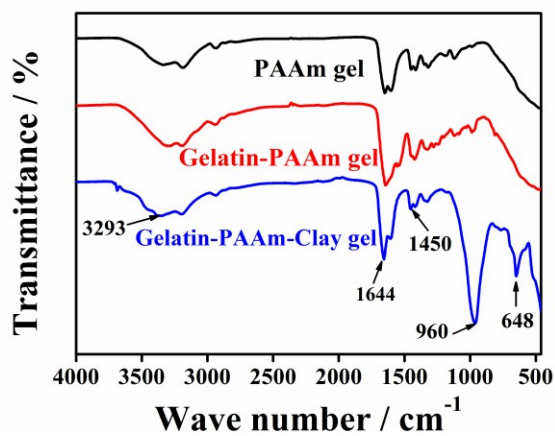


Figure S3. FT-IR test results of PAAm gel, Gelatin-PAAm gel and GPNs gel.

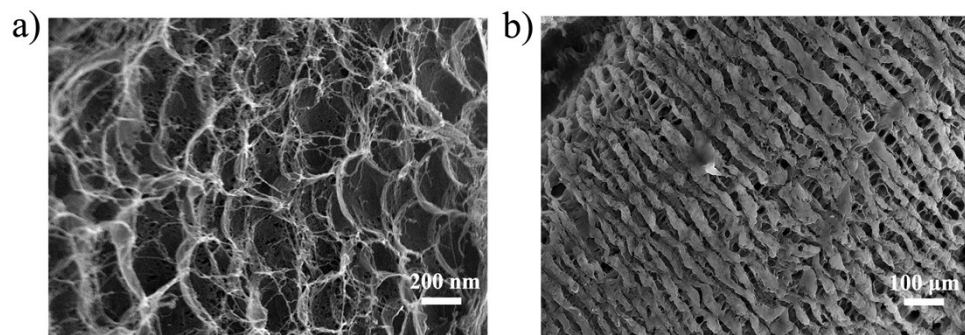


Figure S4. a) The cross section of the GPNs gel with 3D network structure (magnification is 20 k). b) The surface of the GPNs gels with fence structure during the stretching process.

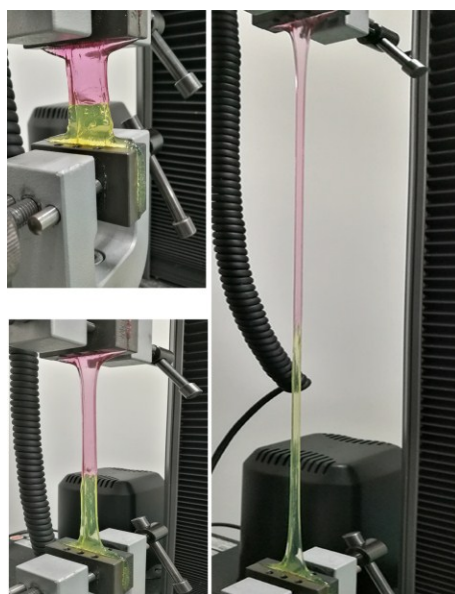


Figure S5. Photographs of the stretching process of the two pieces gels after touching for 10 min.

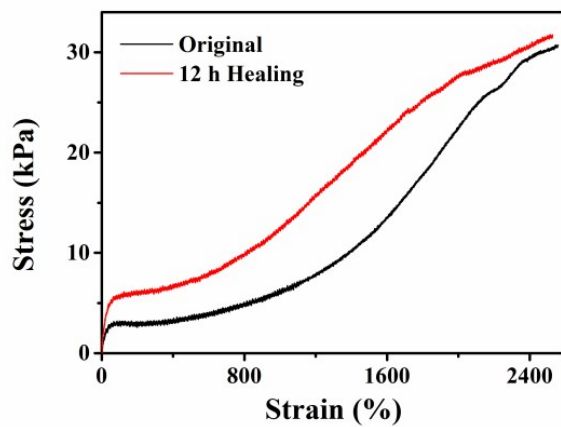


Figure S6. Stress-strain curves of the healed gels after healing for 12 h in a Humidity Chamber, the healed gel presents slightly stronger tensile strength than the original one due to the water volatilization during the healing process.

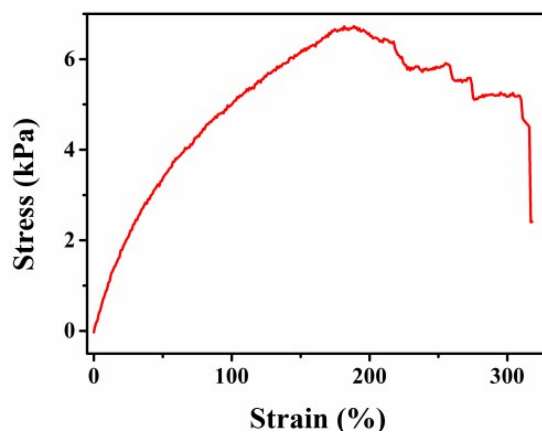


Figure S7. Tensile Stress-strain curves of the GPNs gels after self-healing underwater for 30 min.

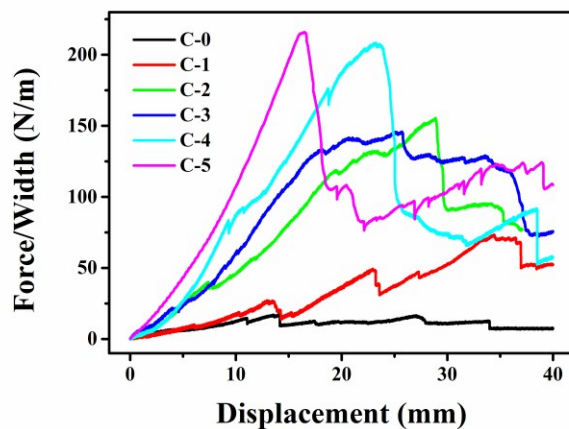


Figure S8. Peeling force of GPNs gels with different contents of clay nanosheets onto the PET substrate.

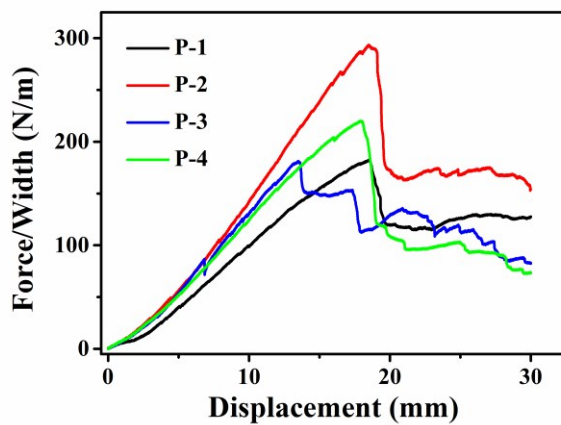


Figure S9. Peeling force of GPNs gels with different pH of the pre-polymer solution onto the PET substrate. P1~P4: 6.0, 6.5 (original), 8.0, 10.0.

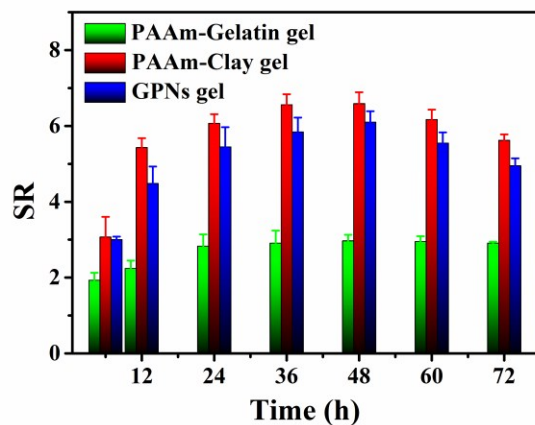


Figure S10. The swelling ratios in weight of the gels after immersed in ultrapure water for 72 hours at room temperature.

The swelling properties of the GPNs gels were also conducted by volumetric method at room temperature. The swelling ratio (SR_v) was calculated from the following equation:

$$SR_v = (V_a - V_b)/V_b \quad (E1)$$

Where V_a and V_b stand for the volume of the swollen hydrogel and the volume of the initial hydrogel, respectively.

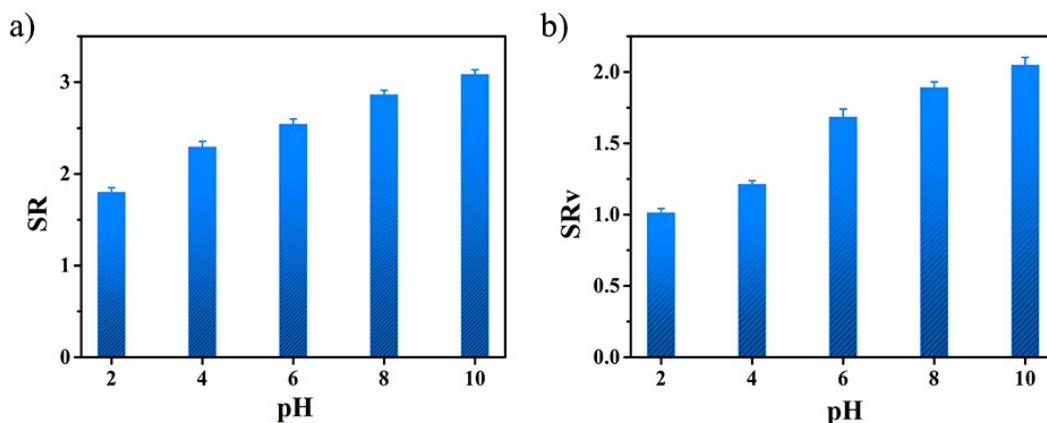


Figure S11. The swelling ratios in weight (a) and in volume (b) of the gels after immersed in different pH (2, 4, 6, 8, 10) physiological saline for 12 h at room temperature.