

Supporting Information for

A Self-adhesive Wearable Strain Sensor Based on Highly stretchable, Tough, Self-healing and ultra-sensitive ionic hydrogel

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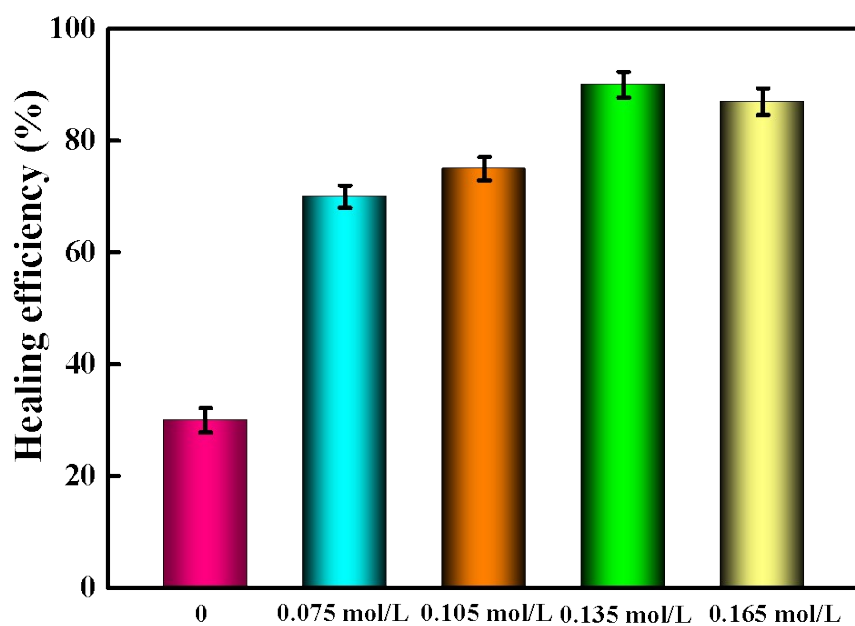


Fig. S1. Healing efficiency of the original and the self-healed hydrogels with different concentration of Al³⁺.

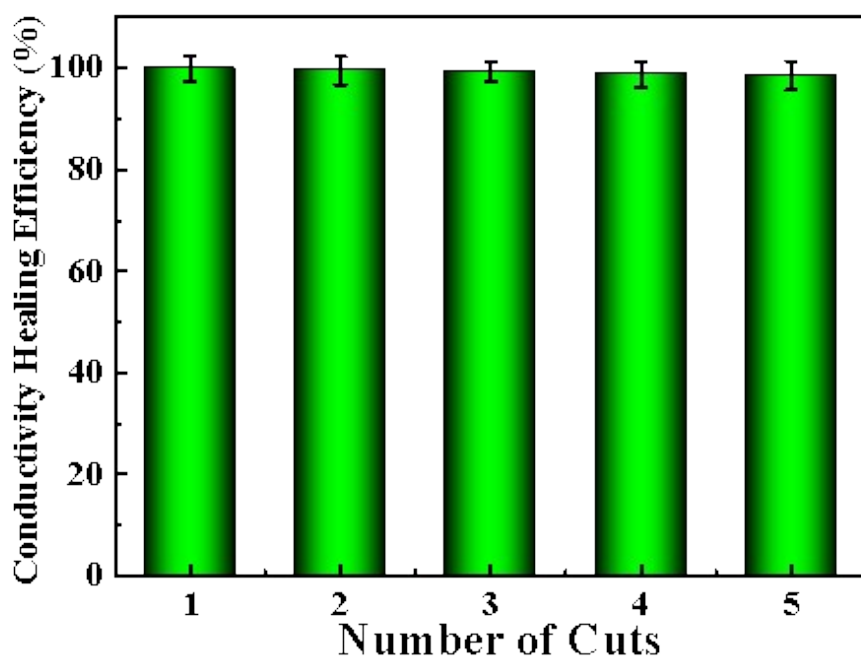


Fig. S2. The electrical healing efficiencies of the CTPA-0.135 hydrogel during five cutting-healing cycles.

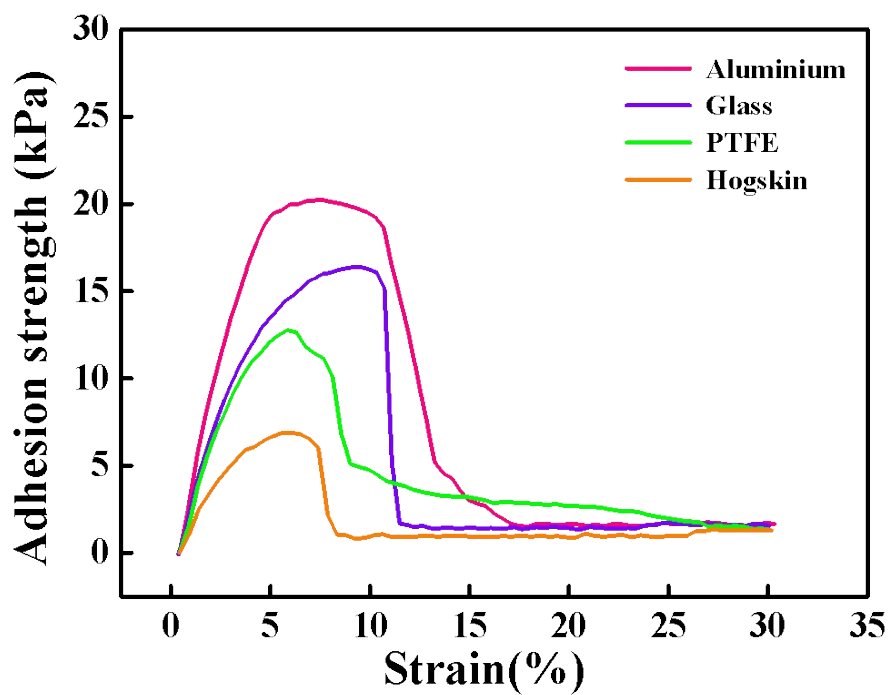


Fig. S3. Adhesive strength of the CTPA-0.135 hydrogels(CTA= 0.10 wt %) to aluminium, glass, PTFE and hogskin.

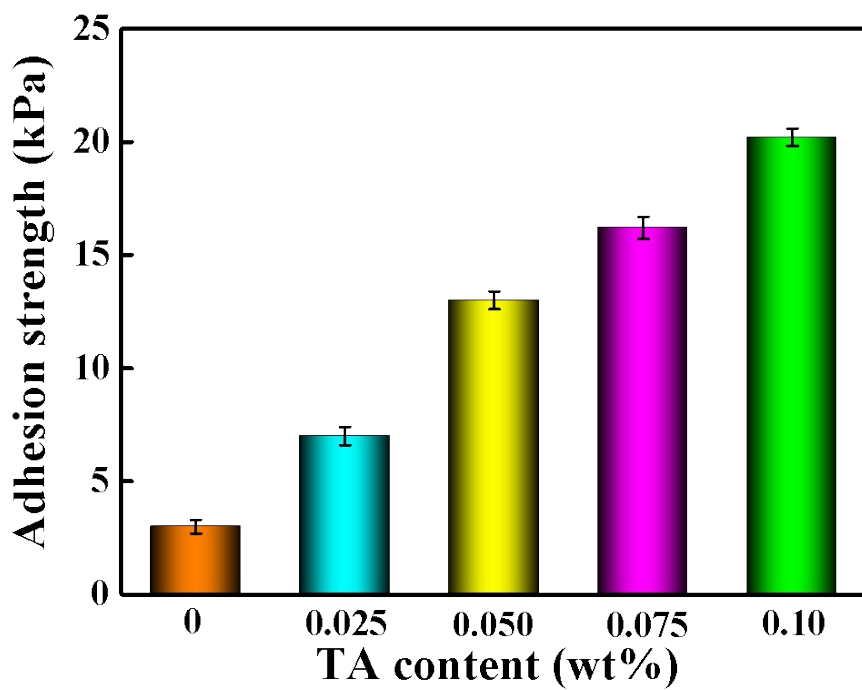


Fig. S4. The adhesion strength of the hydrogel with different concentration of TA to the aluminum substrate.

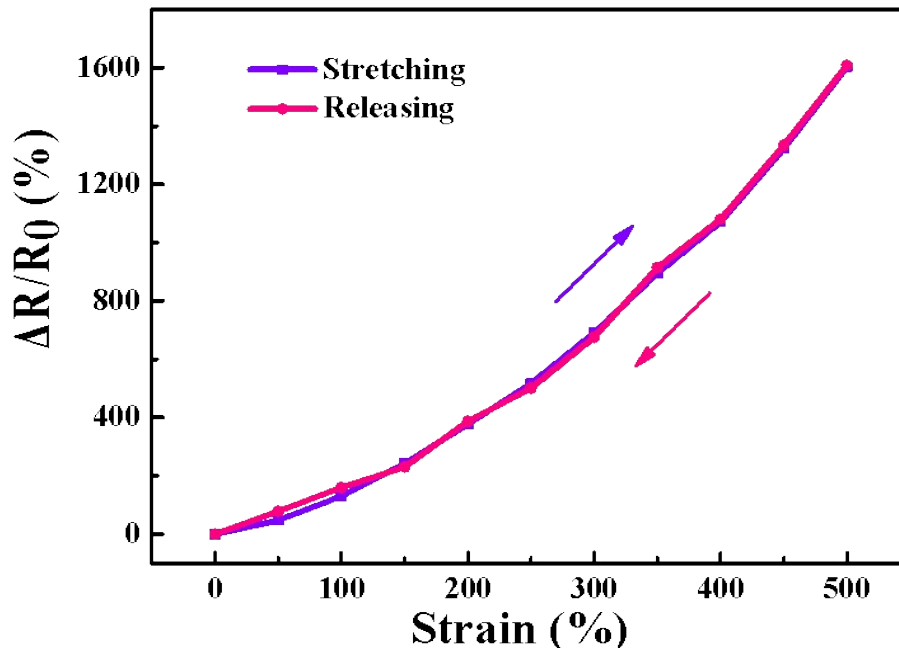


Fig. S5. Hysteresis of the CTPA hydrogel strain sensor.

Table S1. Comparison of the hydrogel strain sensors based on self-healing properties, self-adhesiveness, detection strain and gauge factor.

| Materials | Self-healing time | Self-healing efficiency | Adhesion strength | Detection strain | Gauge factor | Ref. |
|----------------------------------|-------------------|-------------------------|-------------------|------------------|--------------|-------------|
| CS/PAA/TA@CNC/NaCl | / | / | 19 KPa | 0.5-300% | 3.0 | [1] |
| HTPB/IPDI/DBTDL/APDS | 24 h | 85% | / | / | / | [2] |
| Gel/TA/Ag NW | / | 95% | / | / | / | [3] |
| PDA/talc/PAM-KCl | 2 h | / | 15.2 KPa | 50-1000% | 0.69 | [4] |
| PVA/PSBMA | / | / | 7.2 KPa | 300% | 1.5 | [5] |
| PAA/TA@CNCs/PANI | 24 h | 90% | 440 N/m | 545% | 11.2 | [6] |
| Ga/HbPAAmc/Dopa-Fe ³⁺ | 24 h | 78% | 23 N/m | 0-100% | 2.814 | [7] |
| P(SBMA-co-AAc)/CS-Cit | 6 h 100°C | 95.4% | 66.32 N/m | 400% | 2.93 | [8] |
| PEG-Glay/PAMAA/Fe ³⁺ | 12 h | 97.1% | / | LED | / | [9] |
| PDA/rGO/PAA/Fe ³⁺ | 4 h | 75% | / | 500% | 1.32 | [10] |
| CS/TA/PAA/Al³⁺ | 2 h | 90% | 20.21 KPa | 0.5-1400% | 12.2 | Ours |

Note: '/' means not mentioned.

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Video S1. The fast self-healing behavior of the CTPA-0.135 hydrogel(The healing time is about 12 seconds).