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# Electronic Supplementary Information

# Design and performance of an ultra-sensitive and super-stretchable hydrogel for artificial skin

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**Table S1.** The experimental ingredients and nomenclatures of FMCH-n hydrogels.

| Sample | AM(g) | KPS (g) | MBAA (g) | NaCl (g) | flowerlike micelles (g) | Water (g) |
|---|---|---|---|---|---|---|
| FMCH-0 | 3.5 | 0.035 | 0.035 | 0 | 0.035 | 8.16 |
| FMCH-8.2 | 3.5 | 0.035 | 0.035 | 0.669 | 0.035 | 8.16 |
| FMCH-15.4 | 3.5 | 0.035 | 0.035 | 1.257 | 0.035 | 8.16 |
| FMCH-26.5 | 3.5 | 0.035 | 0.035 | 2.162 | 0.035 | 8.16 |

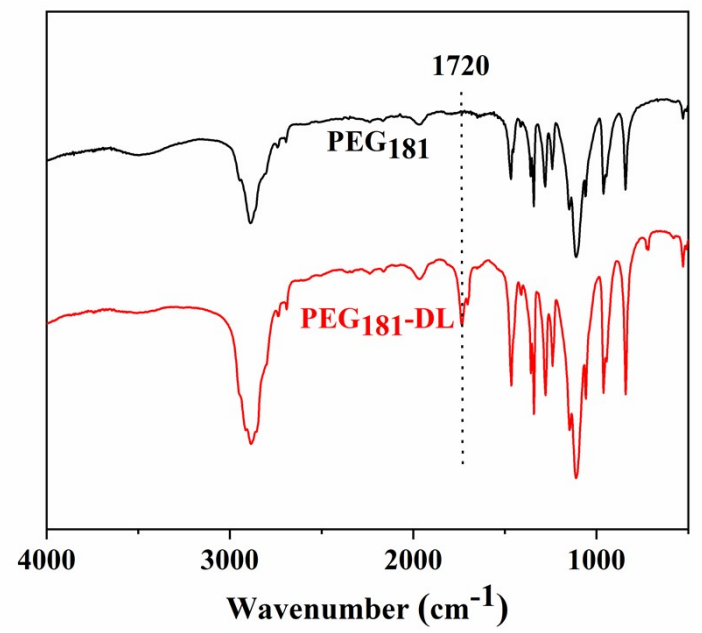


**Fig. S1** FT-IR spectra of $PEG_{181}$ and $PEG_{181}$-DL.

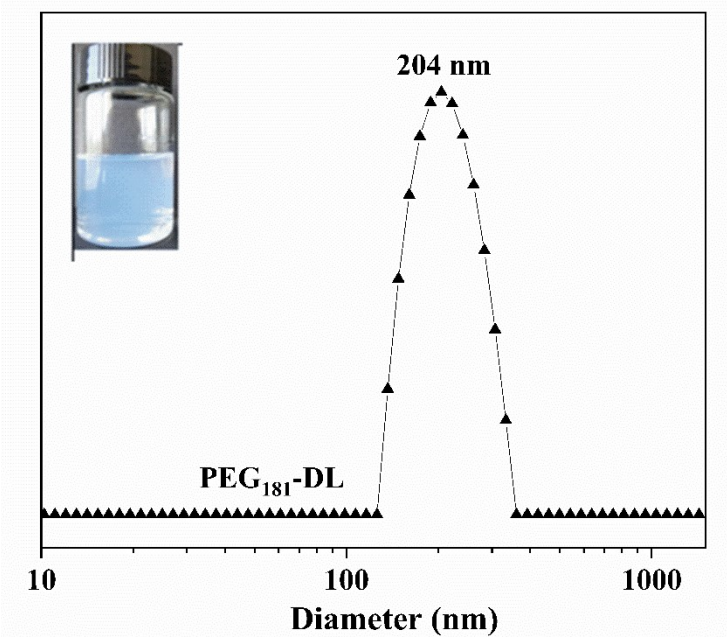


**Fig. S2** Diameter and photo image of the flowerlike micelle.

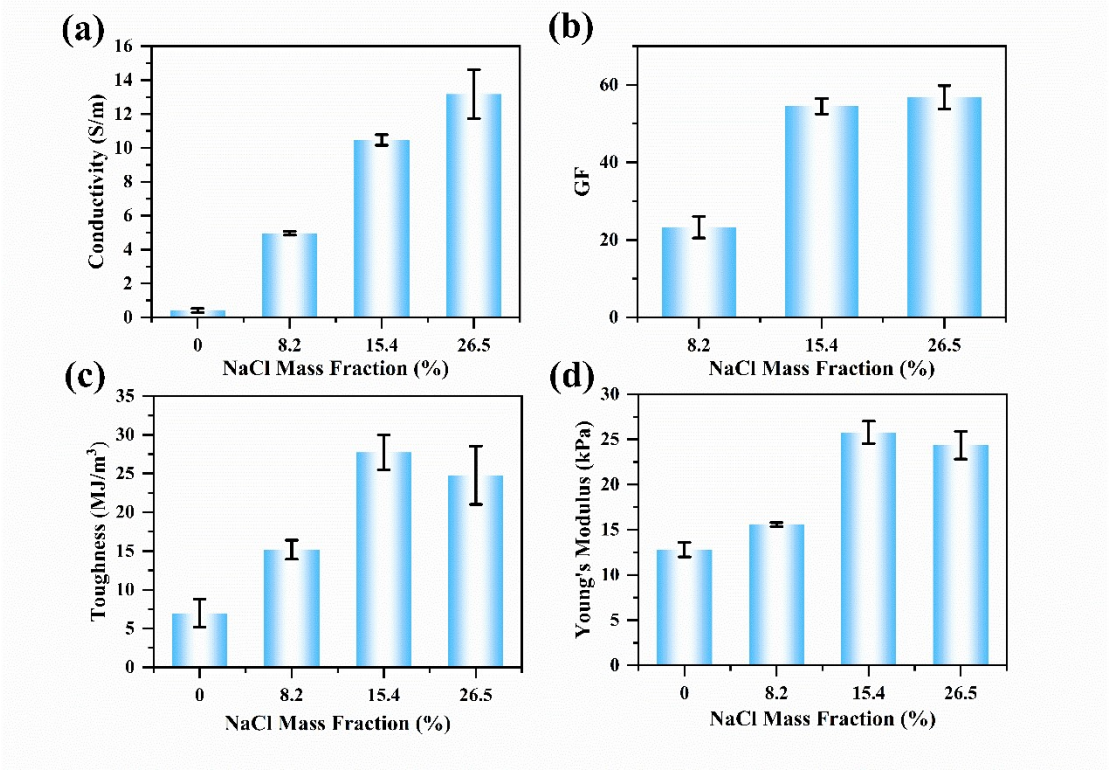


**Fig. S3** The (a) conductive, (b) GF, (c) toughness and (d) Young's Modulus of the FMCH-n hydrogels prepared with various mass fraction of NaCl.

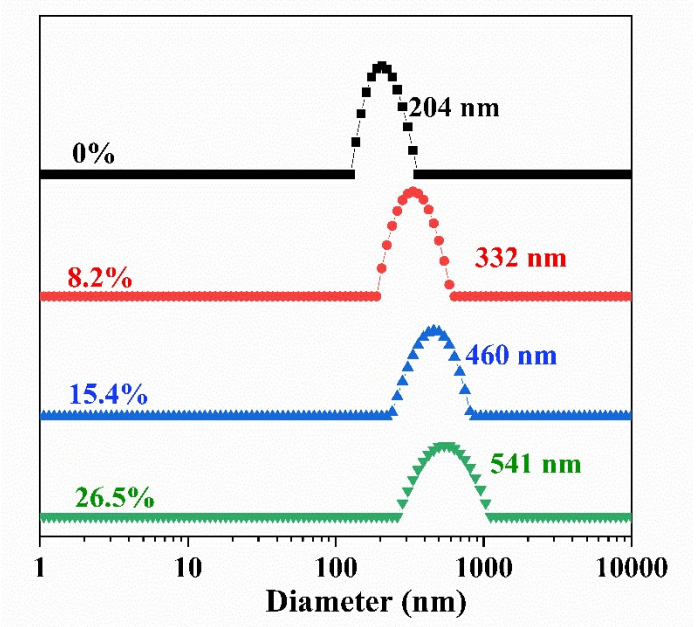


**Fig. S4** Diameter of the flowerlike micelle with various mass fraction of NaCl.


**Fig. S5** The phote of FMCH-26.5 hydrogel.

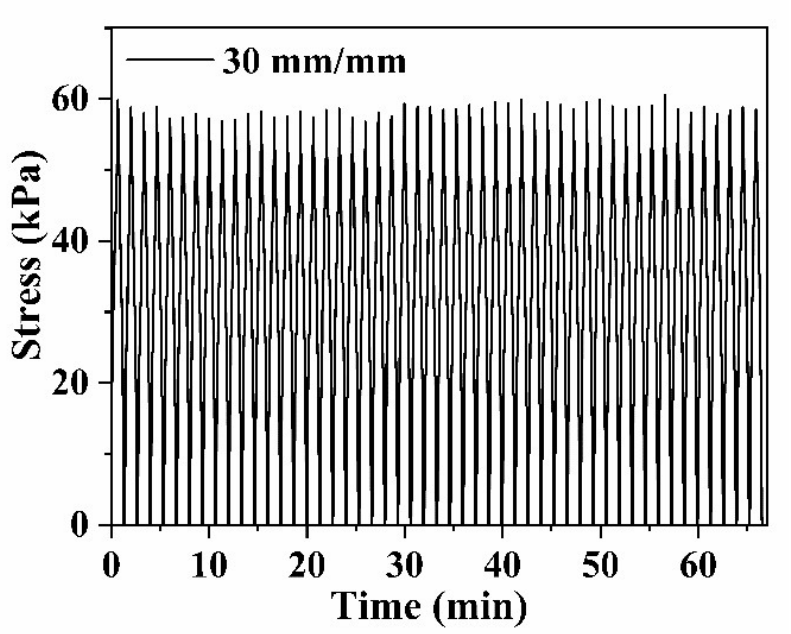


**Fig. S6** 50 cyclic loading-unloading tensile tests of the FMCH-15.4 hydrogel.

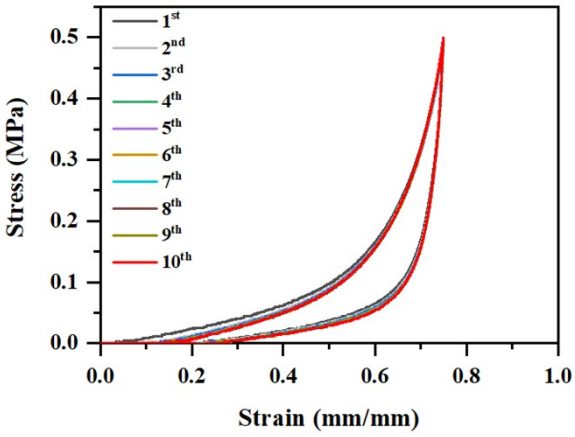


**Fig. S7** Compression-relaxation cycles with maximum strain of 75%.

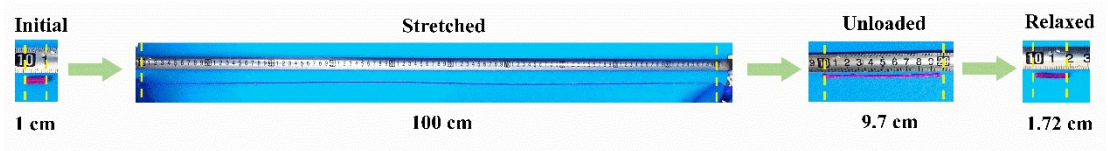


**Fig. S8** Photographs of the FMCH-0 hydrogel after stretching 100 times its original length and relaxing at room temperature overnight.

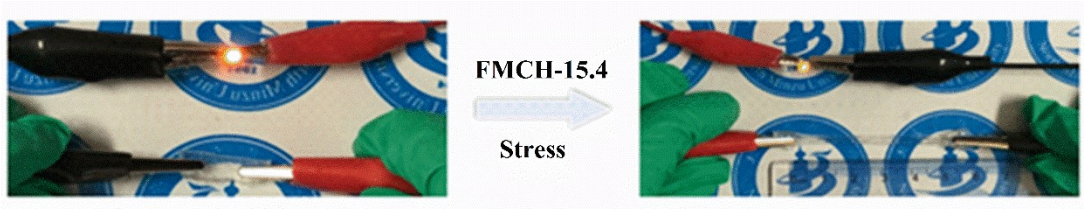


**Fig. S9** The LED light became dim after stretching.

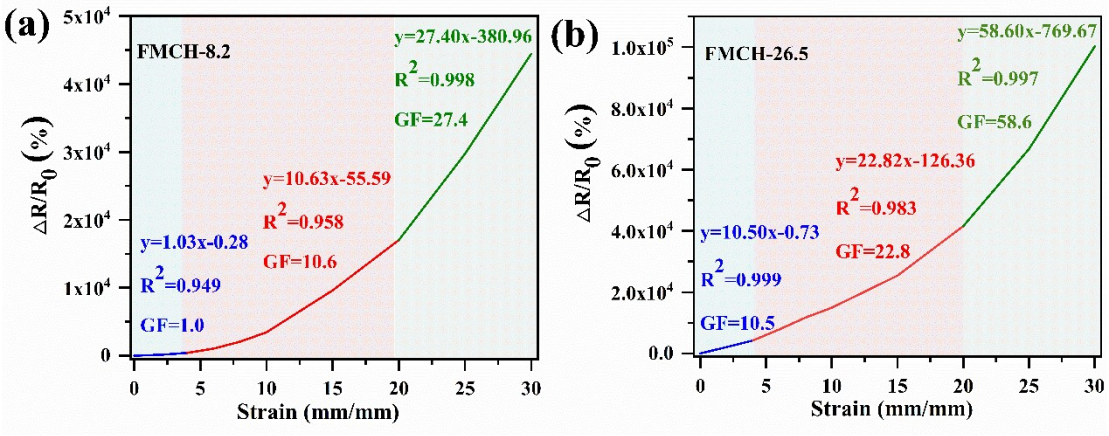


**Fig. S10** The relative resistance changes of the (a) FMCH-8.2 hydrogel and (b) FMCH-26.5 hydrogel sensor during stretching process.

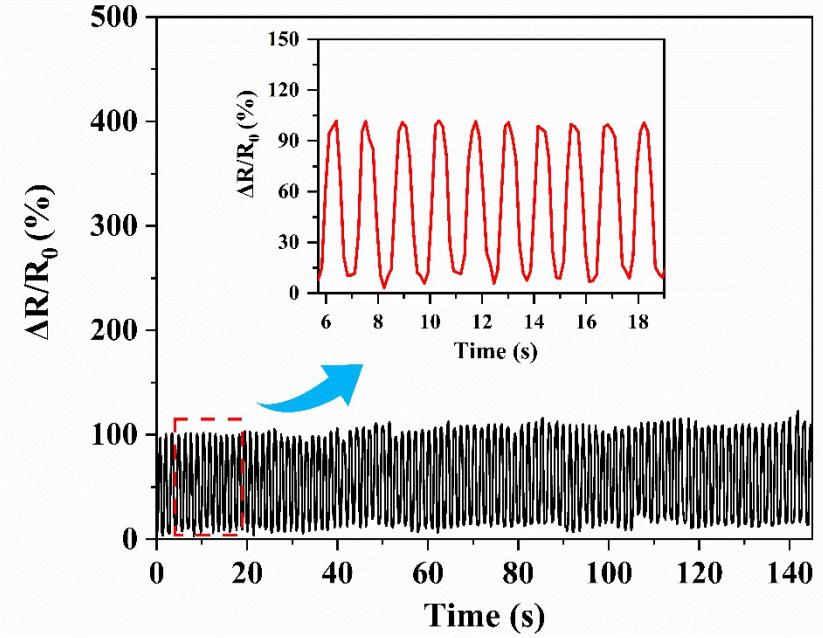


**Fig. S11** The cycling stability test of the FMCH-15.4 hydrogel to the tensile stress for 100 cycles.

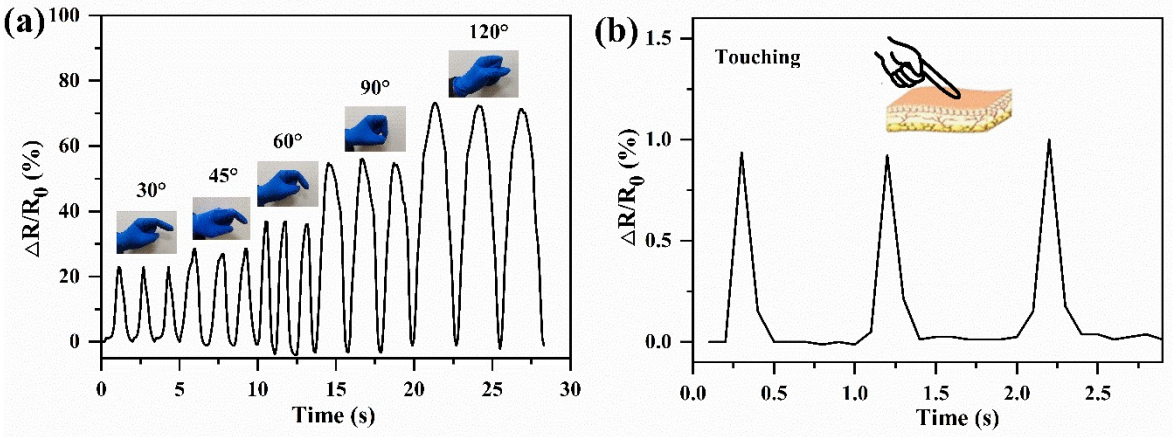


**Fig. S12** The relative resistance changes of the FMCH-15.4 gel to monitor various human motions: (a) finger bending at different angles (0°, 30°, 45°, 60°, 90° and 120°); (b) touching.

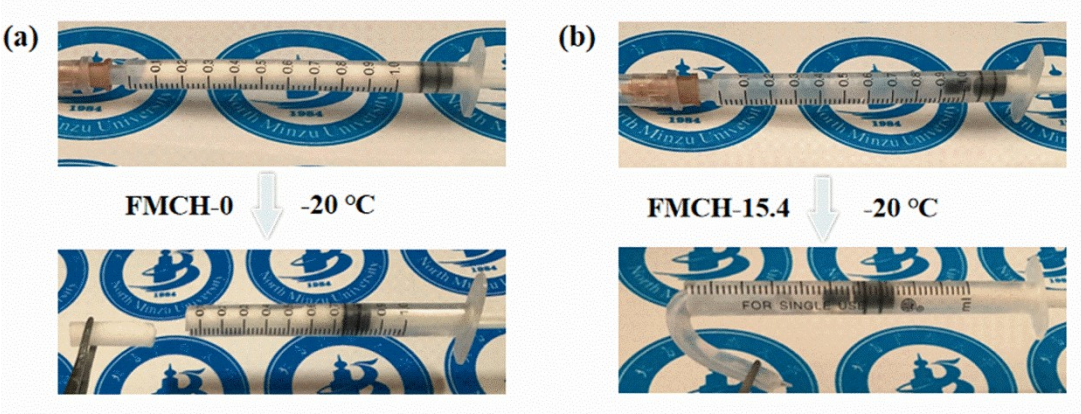


**Fig. S13** The photos of FMCH-0 and FMCH-15.4 hydrogels at -20 °C.

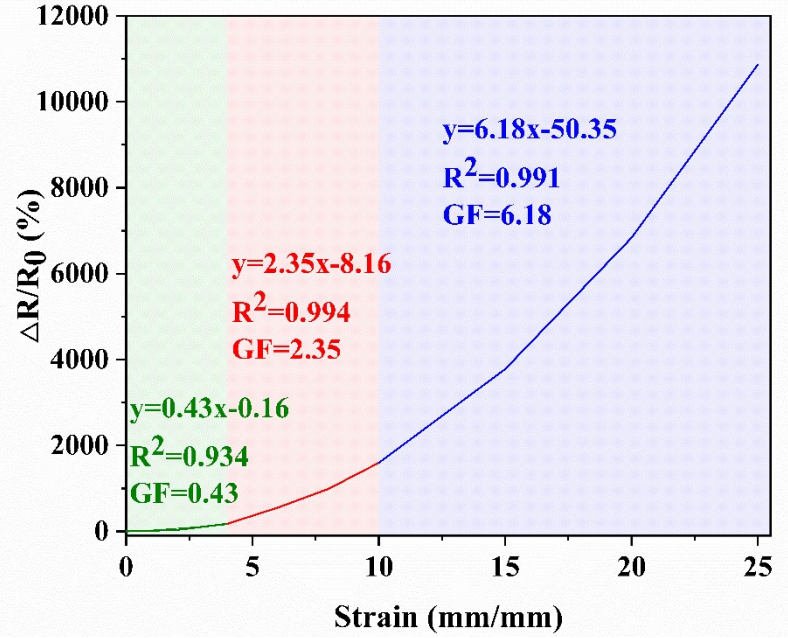


**Fig. S14** The variations in relative resistance and the sensitivity of FMCH-15.4 hydrogel as a function of tensile strain at -20 ℃.

**Table S2.** The water content and gauge factor of FMCH-15.4 hydrogel for different time at room temperature.

| Time (h) | Water content (%) | GF |
|---|---|---|
| 0.5 | 57.71 | 8.93 |
| 1 | 54.37 | 6.09 |
| 2 | 51.06 | 4.69 |
| 3 | 49.75 | 1.99 |
| 24 | 26.34 | N.A. |