

Supporting Information

**Stiff and Strong Hydrogel Tube with Great
Mechanical Properties and High Stability in
Various Solutions**

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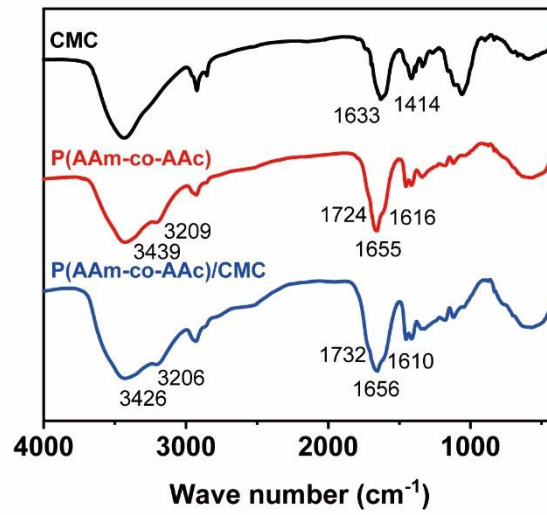


Fig.S1. FT-IR spectra of CMC SN hydrogel, P(AAm-co-AAc) SN hydrogel, and P(AAm-co-AAc)/CMC DN hydrogel.

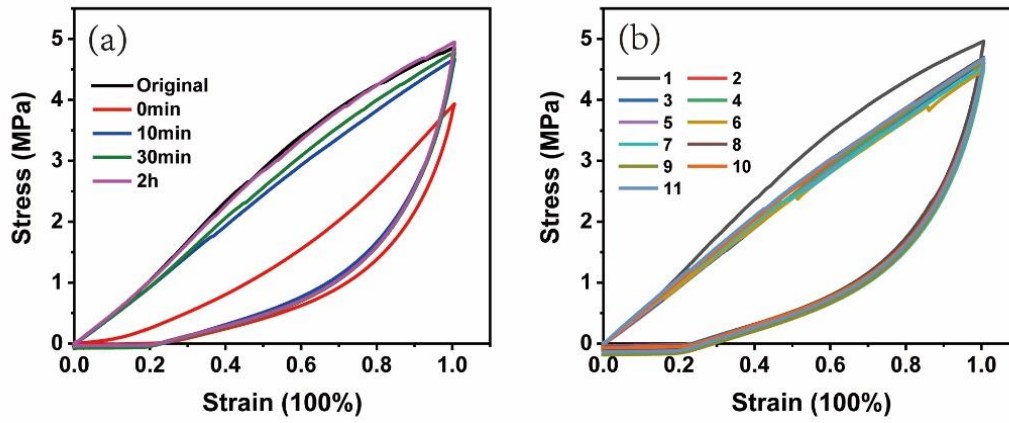


Fig.S2. (a) Recovery curves of DN-Fe hydrogels stored at room temperature for different durations. (b) Ten successive recovery curves of DN-Fe hydrogels stored at room temperature for 10 min resting time

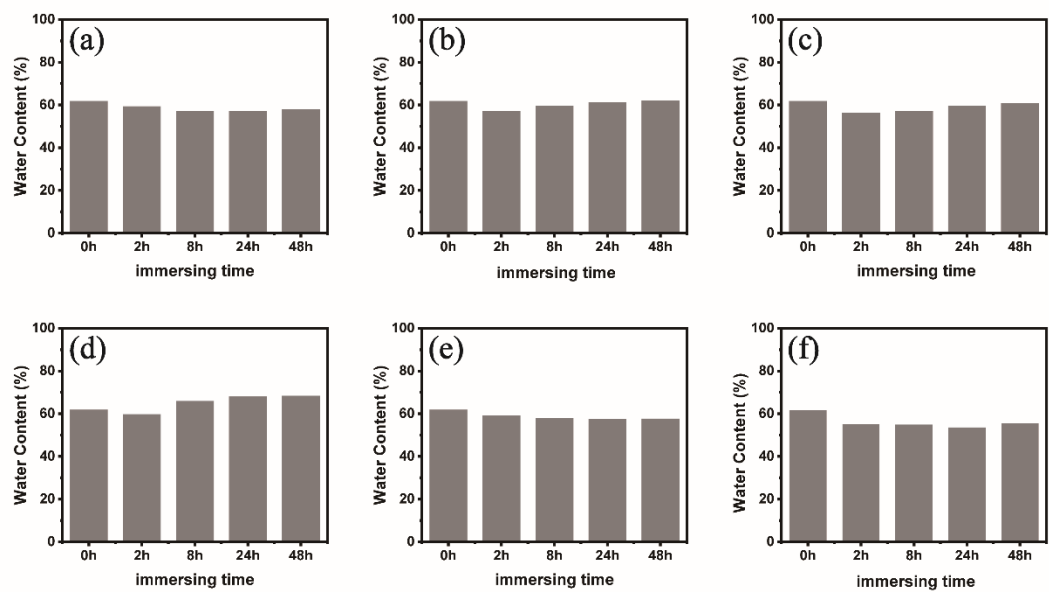


Fig. S3 The water content of DN-Fe hydrogels immersed in (a) H₂O, (b) PBS, (c) pH=4.01, (d) pH=10, (e) physiological saline (NS) and, (f) 2M NaCl for different time.

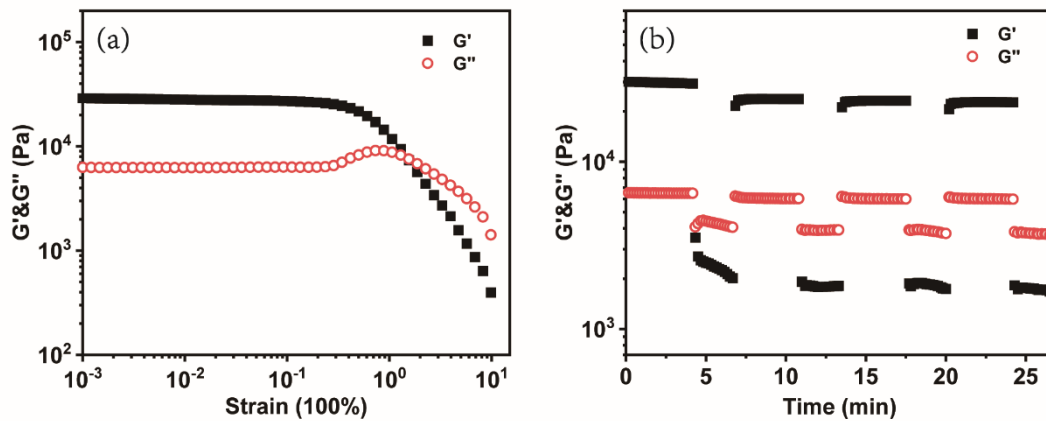


Fig.S4 (a) The rheological experiment of the DN hydrogel. Elastic moduli G' (black square) and viscous moduli G'' (red circle) as a function of strain amplitude for the DN hydrogel. (b) Elastic moduli G' (solid black square) and viscous moduli G'' (open red circle) of DN hydrogel in continuous step strain measurement.

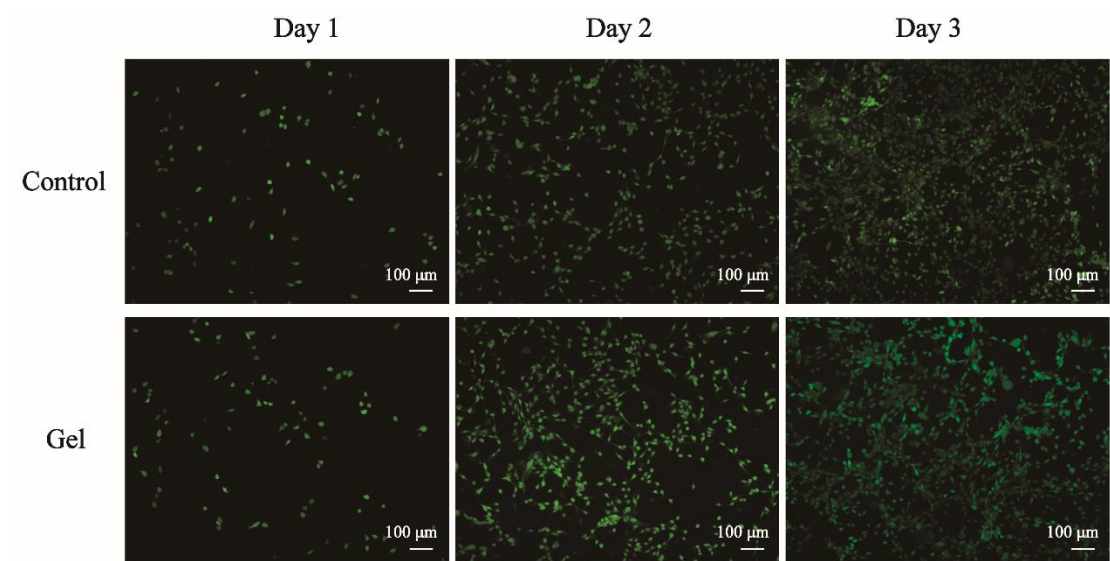


Fig.S5 Merge images of the live/dead cells after culturing with leaching solution of DN-Fe hydrogel tube. Cells cultured with DMEM are used as the control.

Table S1. Mechanical properties of P(AAm-co-AAc)/CMC/ Fe³⁺ DN hydrogels with different concentration of AAc, CMC and Fe³⁺.

Hydrogel AAc-CMC-Fe³⁺ (mol%-wt%-M)	Fracture Stress (MPa)	Elastic Modulus (MPa)	Fracture Energy (kJ/m²)	Water Content (%)
0.15-0-0.1	2.87±0.34	0.46±0.03	3.5±0.5	74.8±0.5
0.175-0-0.1	3.59±0.39	0.75±0.06	3.6±0.4	71.2±0.4
0.2-0-0.1	5.26±0.84	1.56±0.23	4.6±0.4	67.3±0.6
0.225-0-0.1	7.35±0.79	2.67±0.21	6.2±0.3	62.2±1.2
0.25-0-0.1	8.91±1.42	8.42±0.20	5.0±0.2	59.8±2.0
0.225-1-0.1	7.04±0.53	3.19±0.41	14.3±2.0	61.7±1.1
0.225-2-0.1	7.81±0.36	4.51±0.31	10.5±0.6	59.8±0.4
0.225-3-0.1	7.08±0.34	5.72±0.49	10.1±0.3	58.1±2.9
0.225-4-0.1	6.79±0.31	6.96±1.05	6.2±0.6	59.3±2.4
0.225-1-0.05	5.73±0.60	1.84±0.18	6.5±0.7	67.1±0.2
0.225-1-0.15	7.75±0.49	3.71±0.58	15.4±1.2	61.7±0.1
0.225-1-0.2	8.09±0.61	3.88±0.54	15.2±1.1	58.3±0.9
0.225-1-0.25	7.14±0.29	4.02±0.72	15.1±1.2	56.1±0.5

Table S2. Mechanical properties of P(AAm-co-AAc)/CMC/ Fe³⁺ DN hydrogels soaking in different solutions.

Solutions	Fracture (MPa)	Stress Elastic Modulus (MPa)	Fracture energy (kJ/m²)	Water Content (%)
Water	9.92±0.49	9.99±0.66	5.5±1.2	56.4±0.7
PBS	11.35±1.03	12.89±1.33	6.3±0.8	60.0±0.1
pH=4.01	9.52±0.48	8.49±0.77	5.0±1.4	58.7±0.1
pH=10	8.74±0.47	11.72±0.76	3.3±0.7	66.1±2.0
NS	11.36±0.34	13.18±1.18	4.3±0.9	56.8±2.9
2M NaCl	10.12±1.30	9.84±1.47	4.6±0.9	52.6±0.9