Supporting Information

Extremely Tough and Ionic Conductive Natural-polymer-Based Double Network Hydrogel

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Supplementary Tables

Gelatin (wt%)	Gellan gum (wt%)	SO_4^{2-} (M)	Na^+ (M)	Elongation	Tensile Strength (MPa)	Elastic Modulus (MPa)	Fracture Energy (kJ/m^2)	Water Content (%)
9	1	0	0	1.4	0.05	0.08	0.07	90
10	0	2.5	0	7.1	2.1	1.8	6.2	57
9.5	0.5	2.5	0	5.1	2.3	2.0	5.9	60
9	1	2.5	0	3.8	1.9	2.0	7.8	61
8	2	2.5	0	2.9	2.0	2.0	6.0	66
7	3	2.5	0	2.0	1.9	2.0	4.7	67
7.2	0.8	2.5	0	3.7	1.6	1.2	5.6	66
10.8	1.2	2.5	0	3.9	2.4	1.9	10.2	61
13.5	1.5	2.5	0	3.7	2.7	2.0	12.2	60
9	1	1.9	0	3.8	1.4	0.4	5.2	68
9	1	3.2	0	3.9	2.7	2.9	9.6	57
9	1	4.1	0	2.8	4.3	9.7	9.6	50
9	1	3.2	1	3.8	3.9	6.8	6.2	58
9	1	3.2	2	2.9	4.4	10.3	11.8	55
9	1	3.2	3	2.7	5.5	15.9	23.2	54
9	1	3.2	4	2.1	7.5	42.6	27.7	49

Table S1. Mechanical properties and water content of DN-Sul_m-Na_n hydrogel.

Supplementary Figures

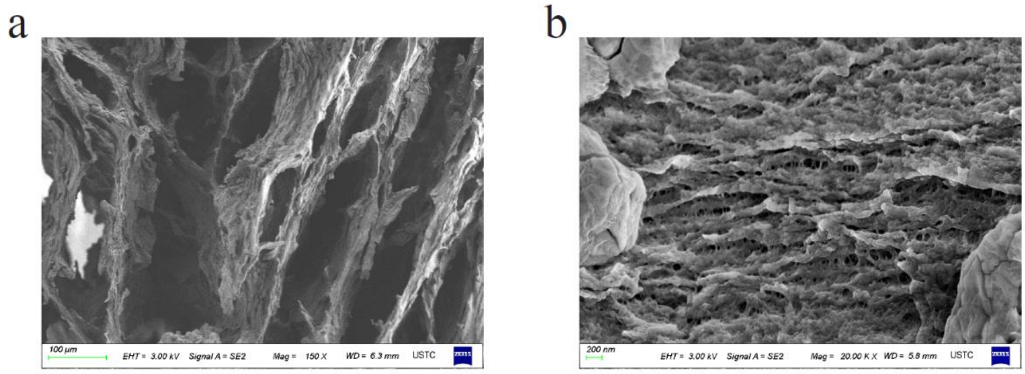

Fig. S1 SEM images of a) DN hydrogel, and b) DN-Sul-Na hydrogel.

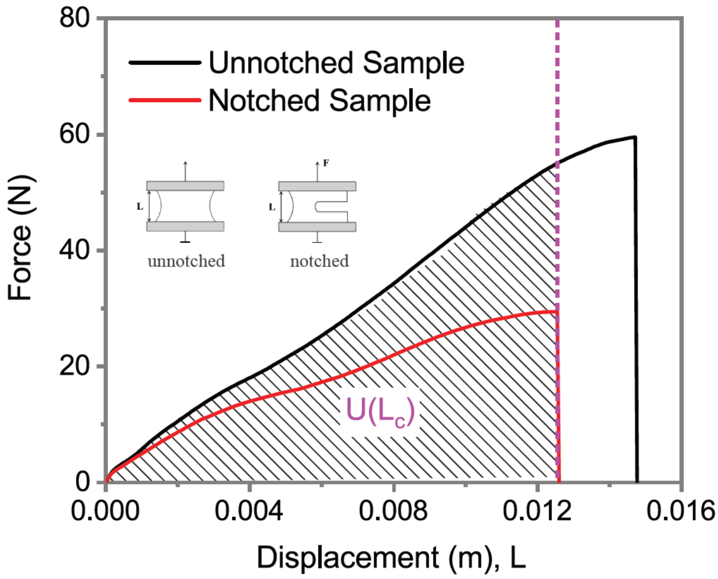

Fig. S2 The force-displacement curve of the unnotched and notched DN-Sul-Na hydrogel.

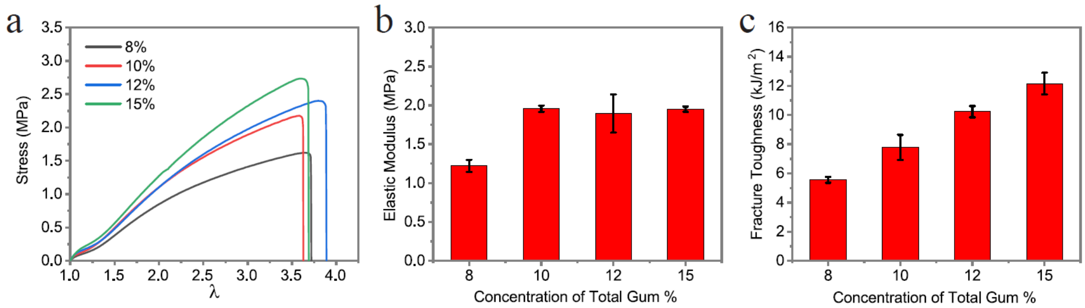

Fig. S3 a) Tensile curves, b) elastic modulus, and c) fracture toughness of DN-$Sul_{2.5}$ hydrogel with different concentration of total gum.

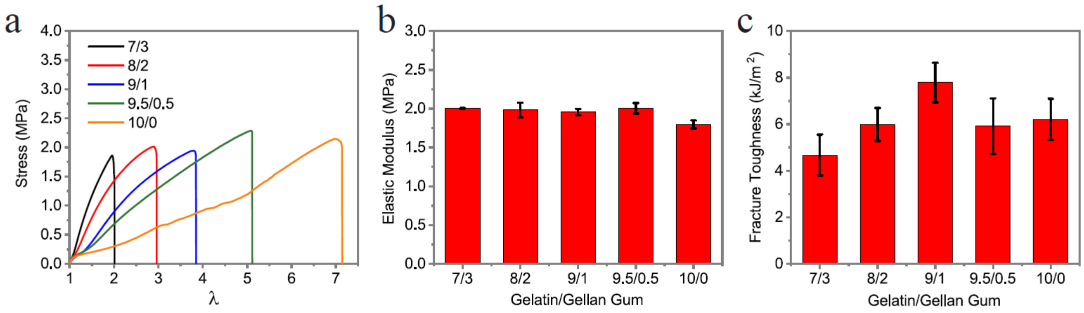

Fig. S4 a) Tensile curves, b) elastic modulus, and c) fracture toughness of DN-Sul$_{2.5}$ hydrogel with different mass ratio of gelatin/gellan gum.

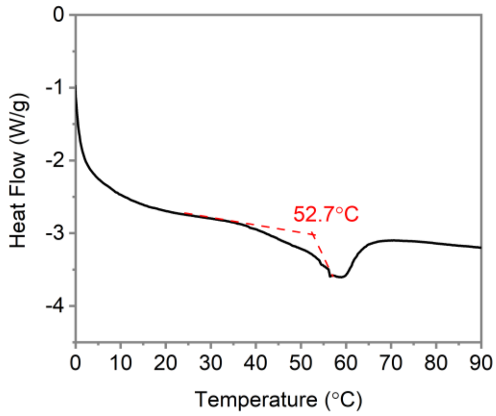

Fig. S5 DSC curve of DN-Sul-Na gel.

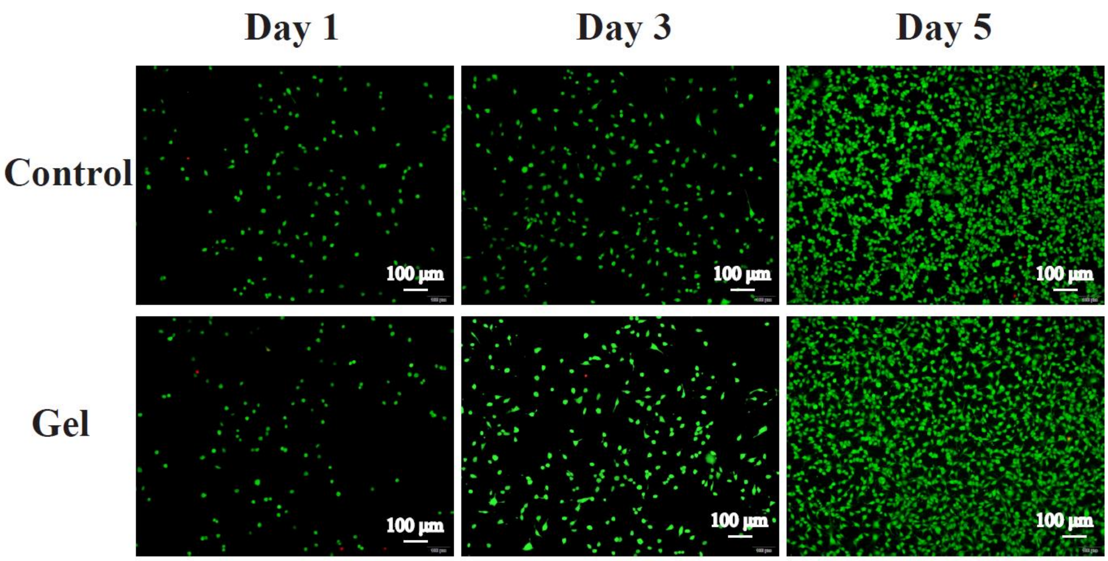

Fig. S6 Merge images of the live/dead cells after culturing with DN-Sul-Na gel. Cells cultured with DMEM were used as the control

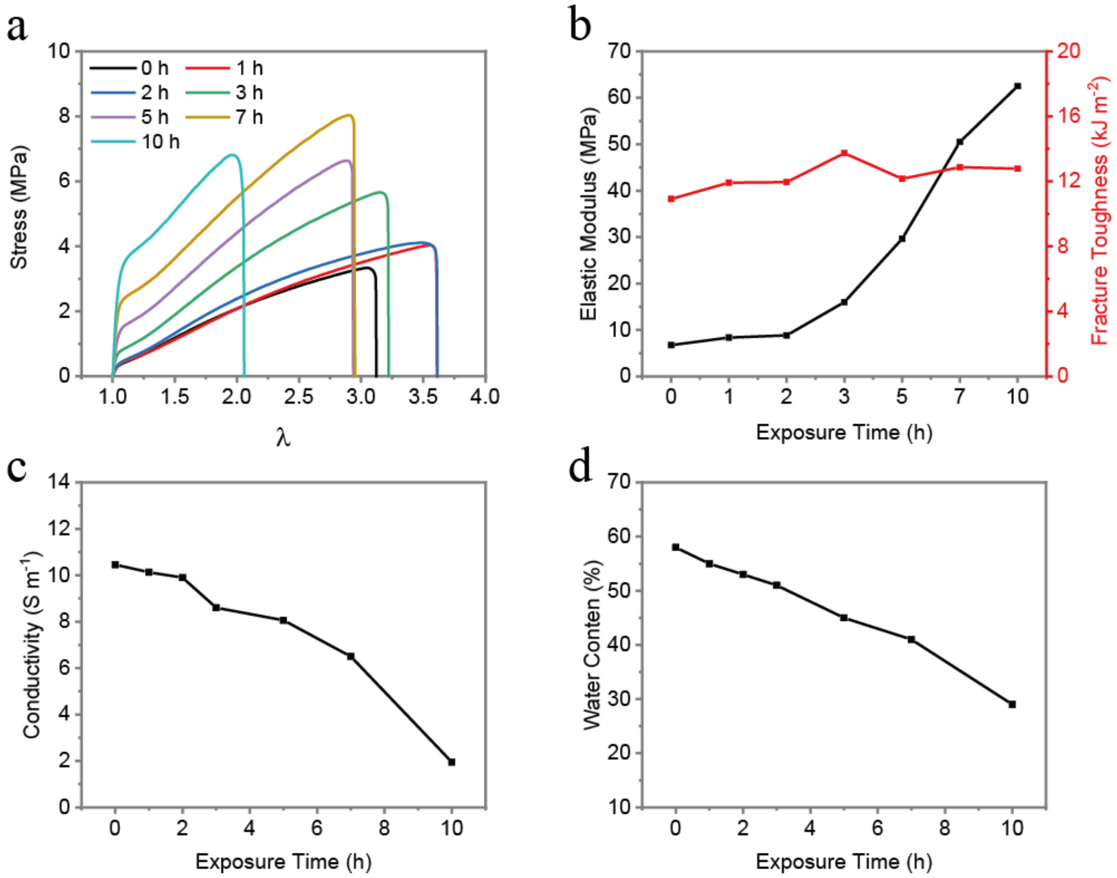

Fig. S7 a) Tensile curves, b) elastic modulus and fracture toughness, c) conductivity and d) water content of DN-Sul3.2-Na1 gel exposed in air for 1h, 2h, 3h, 5h, 7h and 10h.

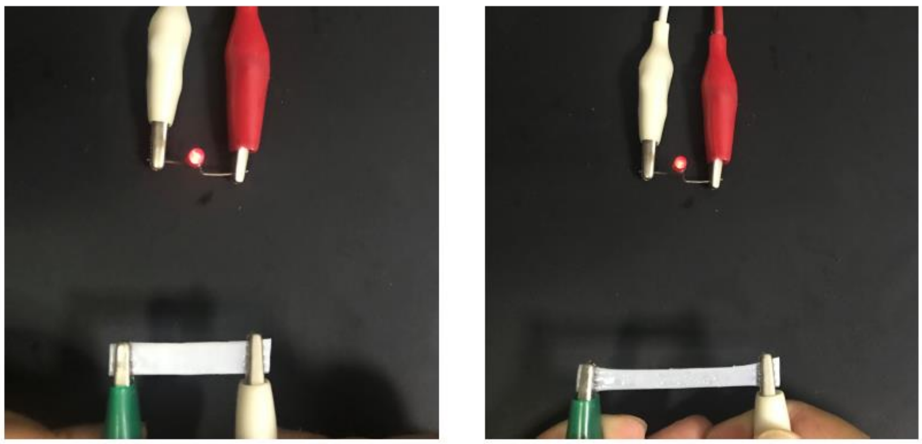

Fig. S8 Photograph of hydrogel used as electrical wire.