Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Self-healing conductive and stretchable aligned carbon nanotube/hydrogel composite with a sandwich structure

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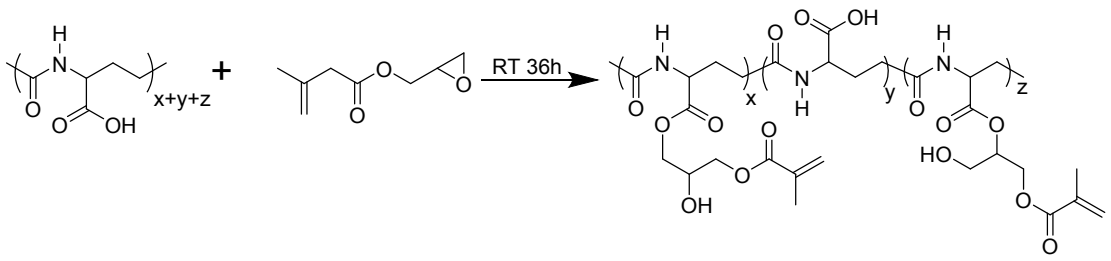

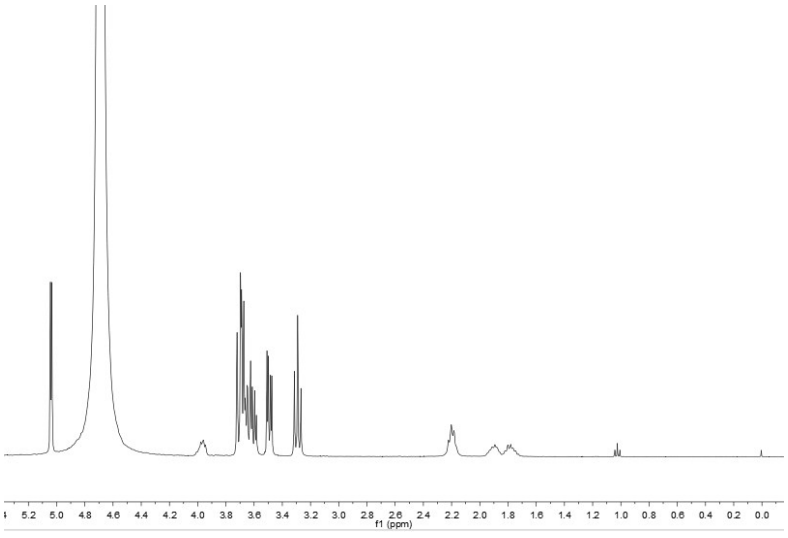

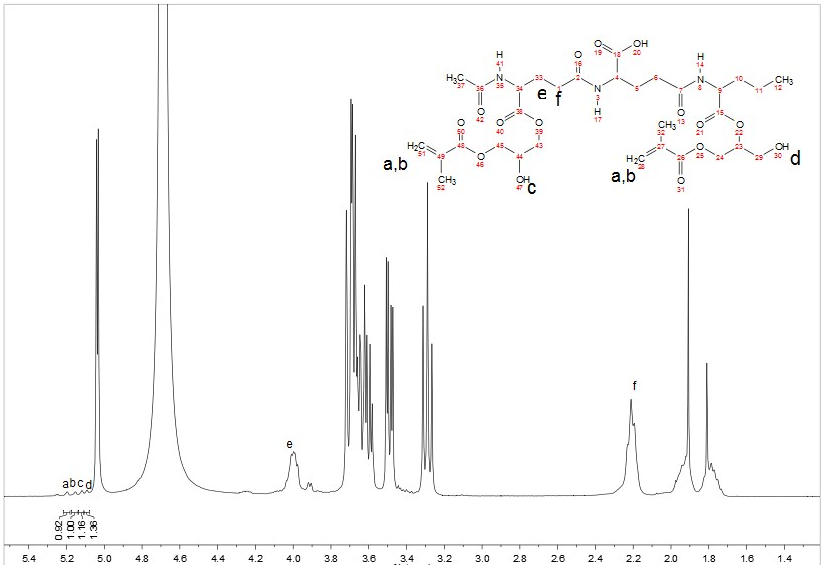

Figure S1. Synthetic scheme and ^{1}H NMR spectra of γ-PGA and γ-PGAA in D_2O.

Table S1. Varied glycerol, γ-PGAA volume and MBAA contents in the hydrogel.

Serial number	AA (g)	MBAA (mg)	$FeCl_3.6H_2O$ (g)	APS (mg)	TEMED (uL)	γ-PGAA (mL)	GC (vol %)	H_2O (mL)
0 wt%	2	2	0.054	40	0.25	4	50	1
0.1 wt%	2	4	0.054	40	0.25	4	50	1
0.2 wt%	2	6	0.054	40	0.25	4	50	1
0.3 wt%	2	8	0.054	40	0.25	4	50	1
0.4 wt%	2	10	0.054	40	0.25	4	50	1
0 Vol%	2	2	0.054	40	0.25	0	50	5
20 Vol%	2	4	0.054	40	0.25	2	50	3
40 Vol%	2	6	0.054	40	0.25	4	50	1
50 Vol%	2	8	0.054	40	0.25	5	50	0
PAA/H_2O	2	2	0	40	0.25	0	0	10
PAA-Fe^{3+}/H_2O	2	2	0.054	40	0.25	0	0	10
PAA-PGAA/H_2O	2	2	0	40	0.25	5	0	5
PAA-PGAA-Fe^{3+}/ H_2O	2	2	0.054	40	0.25	5	0	5
PAA–PGAA-Fe^{3+}/ GC+H_2O	2	2	0.054	40	0.25	5	50	0

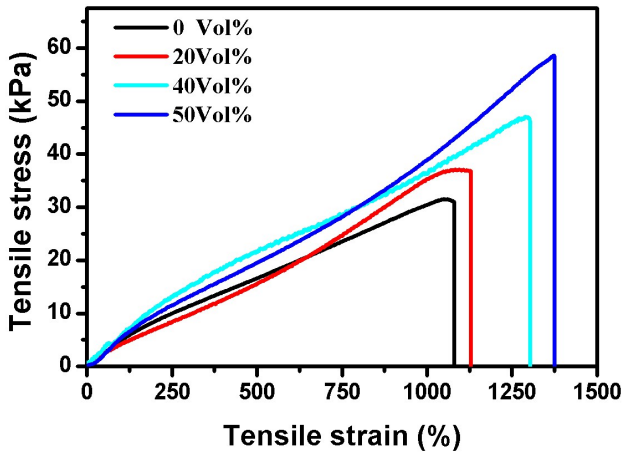

Figure S2. Tensile stress–strain curves for different γ-PGAA concentrations

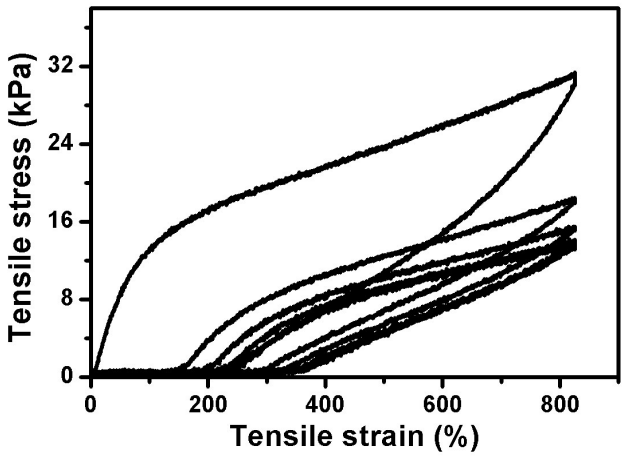

Figure S3. cyclic tensile loading-unloading curves at 825% strain with five successive measurements.

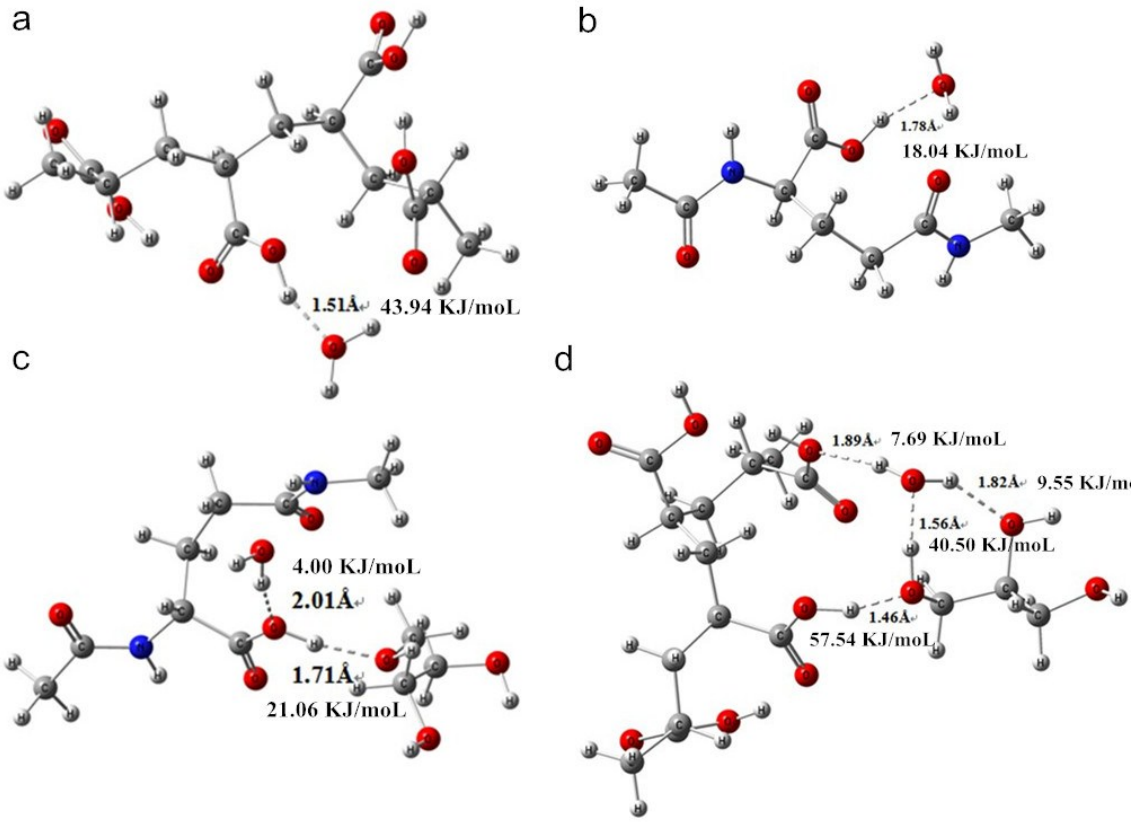

Figure S4. Optimized structures of polymer chains with glycerol and water via multiple nonbond interactions in the hydrogel. (a) Water and PAA; (b) Water and γ-PGAA; (c) Glycerol-water and γ-PGAA; (d) Glycerol-water and PAA.

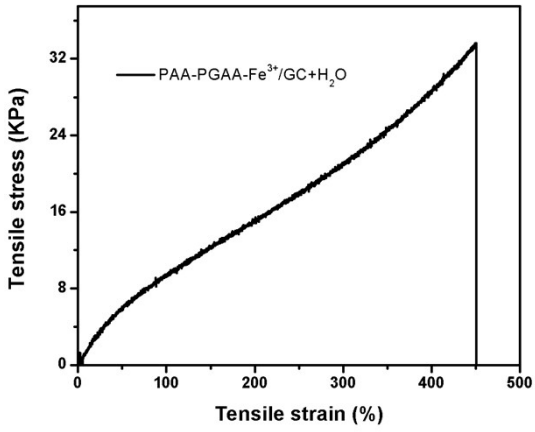

Figure S5. Tensile stress-strain curves of PAA-PGAA-Fe^{3+}/GC+H_2O hydrogel after half a year.

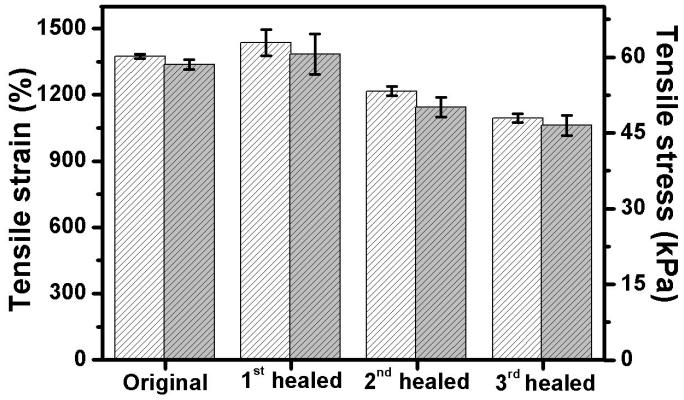

Figure S6. Tensile strain and stress of the hydrogel after multiple cutting/healing cycles at the same location. White column represent tensile strain (%) and brown column represent tensile stress (kPa) (Error bars are based on maximum and minimum values from five different measurements.)

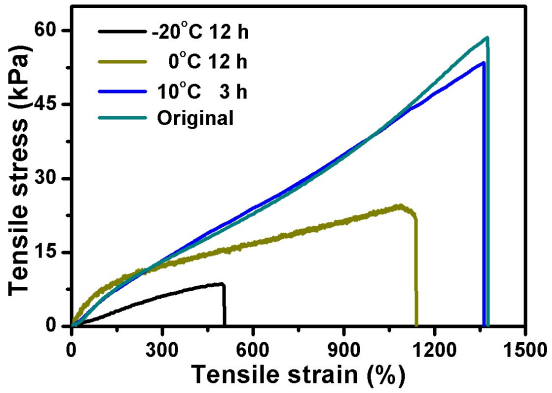

Figure S7. Tensile stress–strain curves of the original and healed hydrogel samples at different storage temperatures during 12 h.

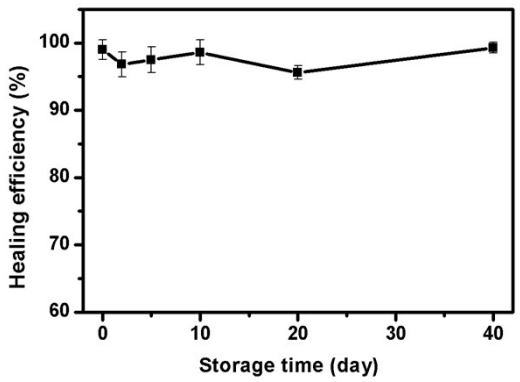

Figure S8. The healing efficiency during different storage time. The error bar are the standard

deviations in the mean values.

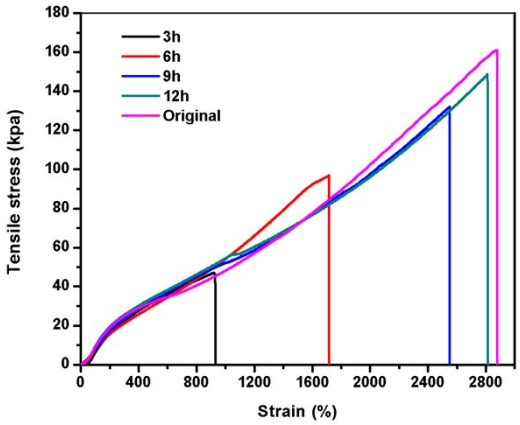

Figure S9. The self-healed at various healing time of PAA-PGAA-Fe^{3+}/H_2O hydrogel.