Supporting Information

A tough, injectable, naturally-derived, and cost-effective composite hydrogel for tissue sealing

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Table S1. Formulation of hybrid hydrogels.

VC% (w/v) = 0.05 × [GelMA+AlgMA]% (w/v)

TEA% (w/v) = 0.075 × [GelMA+AlgMA]% (w/v)

Eosin Y% (w/v) = 0.0003 × [GelMA+AlgMA]% (w/v)

$CaCl_2$% (w/v) = 0.13 × AlgMA% (w/v)

Sample	**AlgMA % (w/v)**	**GelMA % (w/v)**	**VC % (w/v)**	**TEA % (w/v)**	**Eosin Y % (w/v)**	**DPBS (µl)**	**$CaCl_2$ % (w/v)**
1	0%	20%	1	1.5	0.006	600	0
2	1%	20%	1.05	1.575	0.0063	580	0.13
3	2%	20%	1.1	1.65	0.0066	560	0.27
4	3%	20%	1.15	1.725	0.0069	540	0.4
5	4%	20%	1.2	1.8	0.0072	520	0.53
6	5%	20%	1.25	1.875	0.0075	500	0.67
7	20%	0%	1	1.5	0.006	600	2.667
8	0%	25%	1.25	1.25	0.0075	500	0

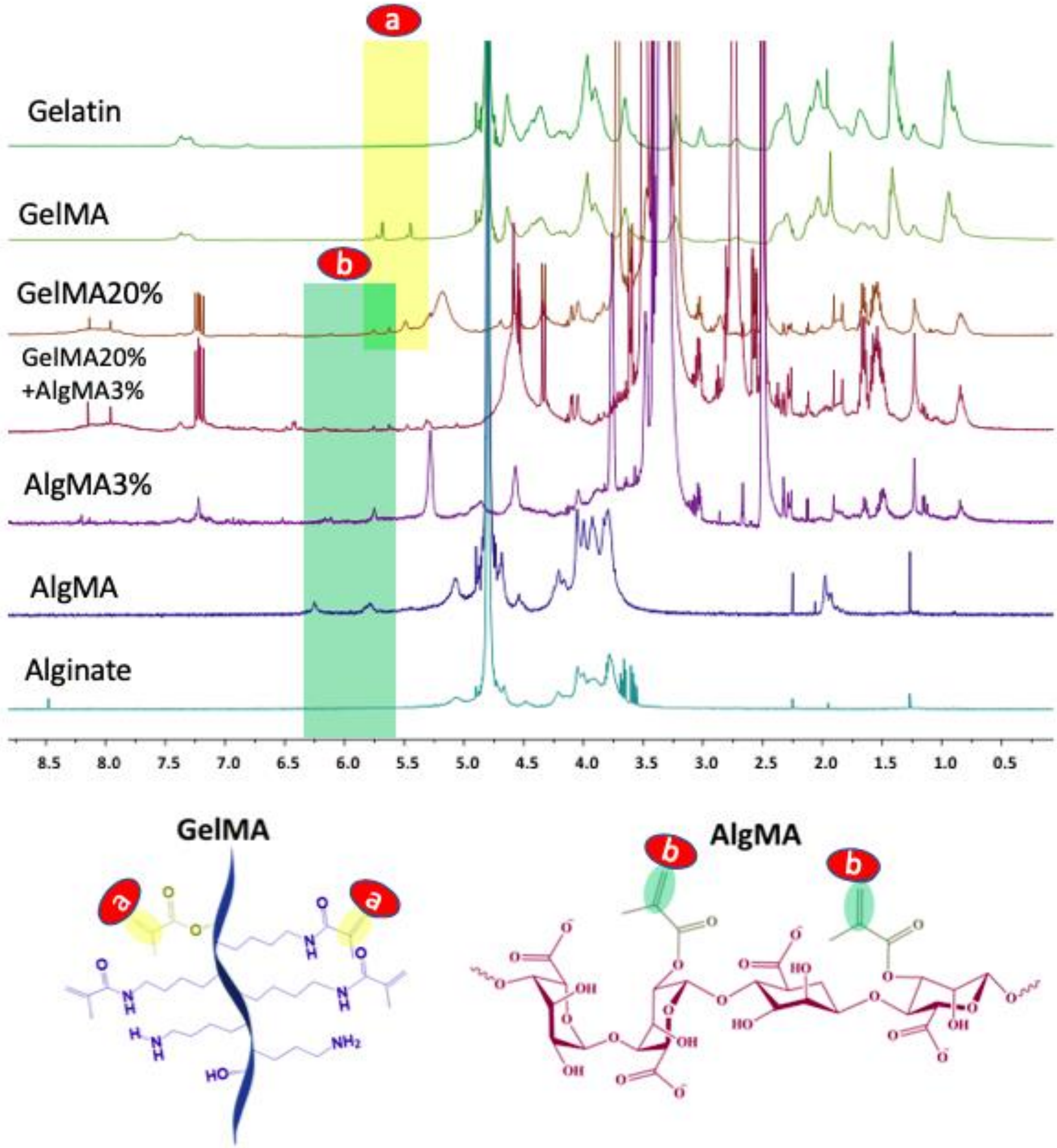

Figure S1. [1]HNMR spectra of pre-gel solutions and crosslinked hydrogels. Biopolymers include gelatin, GelMA, crosslinked GelMA (20%), alginate, AlgMA, crosslinked AlgMA (3%), and crosslinked GelMA (20%)-AlgMA (3%) hybrid hydrogels.

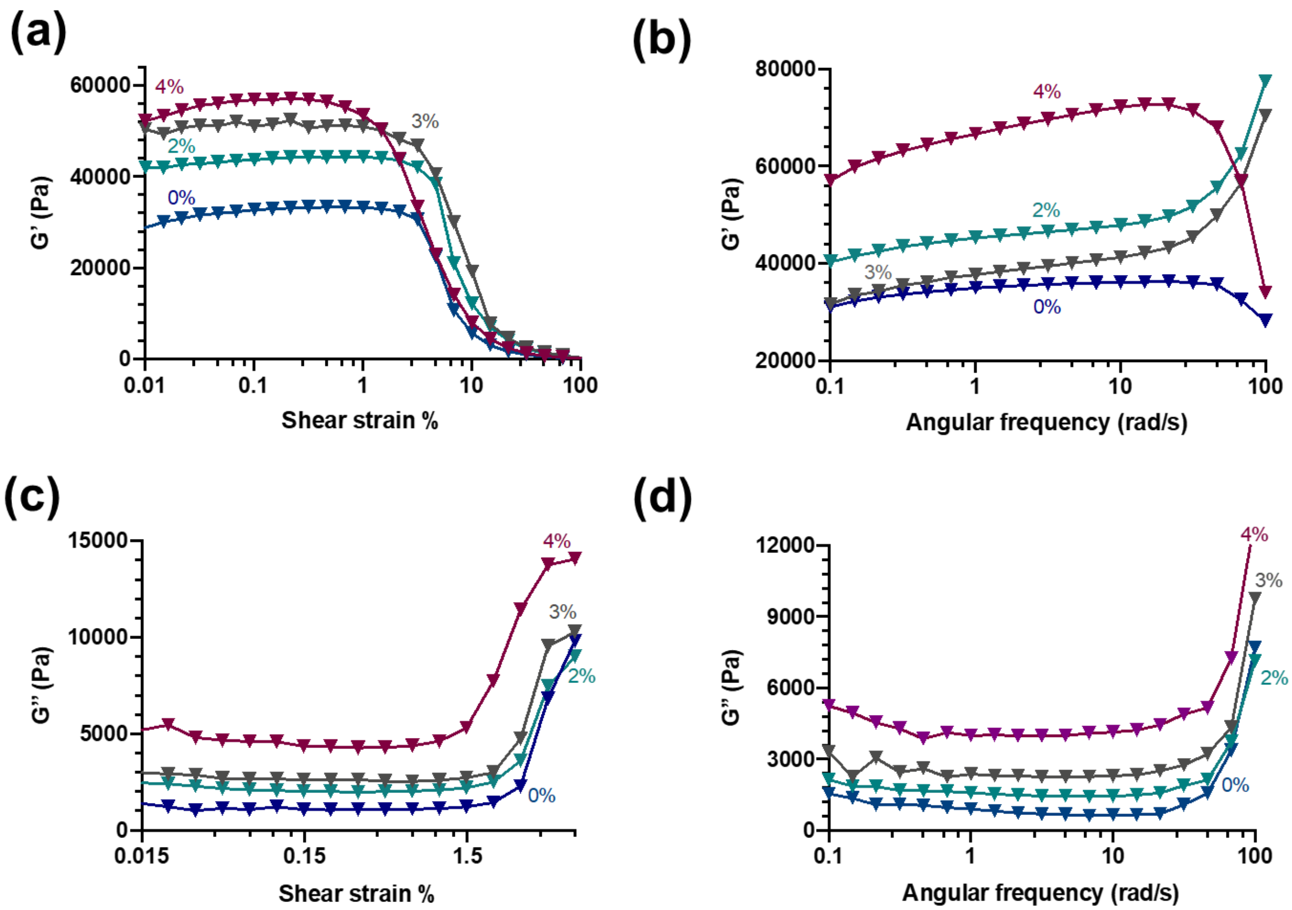

Figure S2. Viscoelastic properties of GelMA-AlgMA hybrid hydrogels. (**a**) Storage modulus and (**b**) loss modulus versus oscillatory shear strain (at angular frequency ~ 1 rad s^{-1}) and angular frequency (at oscillatory shear strain ~ 0.1%) for the hybrid hydrogels composed of GelMA (20% w/v) and varying concentrations of AlgMA.

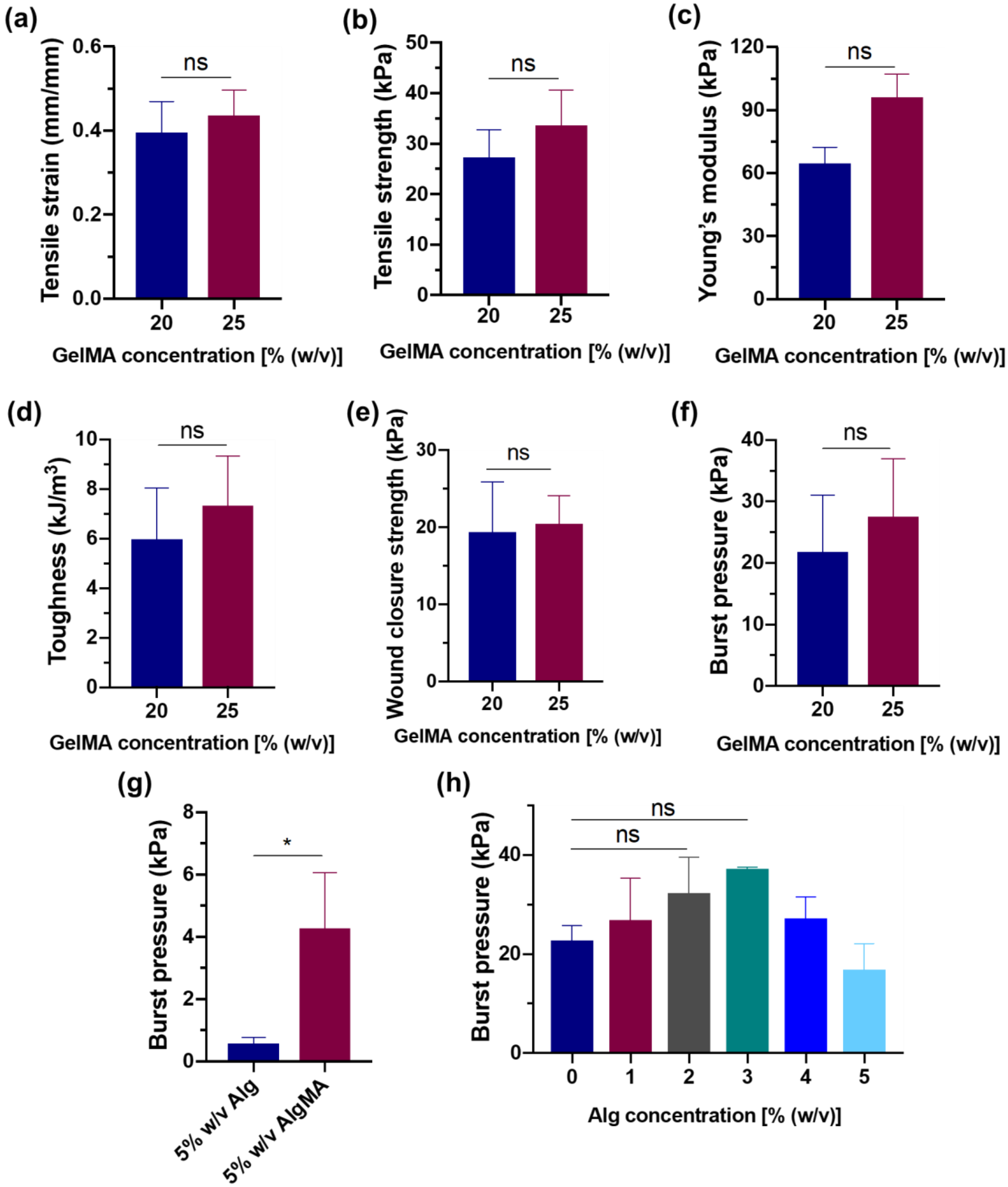

Figure S3. Mechanical and adhesive properties of various biopolymeric systems. (**a**) Tensile strain at break (**b**) tensile strength at break, (**c**) Young's modulus, (**d**) toughness, (**e**) wound closure strength, and (**f**) burst pressure of GelMA 20% compared to GelMA 25% showing no significant difference. (**g**)

Burst pressure of alginate (5%) compared to crosslinked AlgMA (5%). (**h**) Burst pressure of hybrid hydrogels made up of GelMA (25%) and varying concentrations of alginate. Data are reported as the mean values of at least 5 experiments ± their standard deviation. The statistical analysis was done according to the methods explained in "Statistical analysis" section. Asterisks show the results that are statically significant with p-values less than 0.05 (*).