

Electronic Supplementary Information

Linear and Nonlinear Rheology of Liberase-Treated Breast Cancer Tumors

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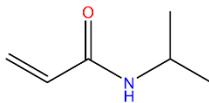
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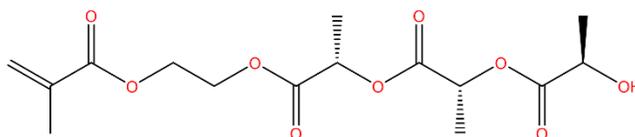
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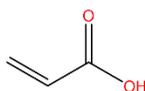
(a) NIPAM



(b) HEMA-PLA



(c) AAc



(d) HPG-MA

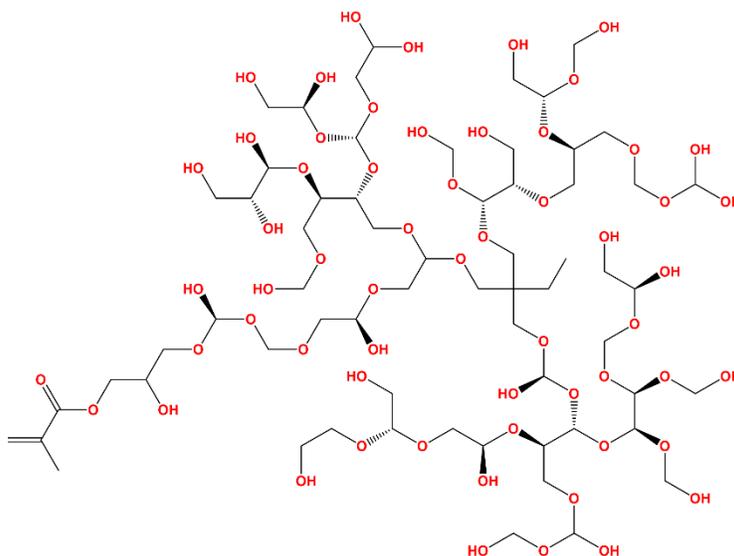


Figure S1. Structures of monomers used to synthesize the LQG copolymer used in this work: (a) *N*-isopropylacrylamide (NIPAM), (b) 2-hydroxyethyl methacrylate-poly (lactic acid) (HEMA-PLA), (c) acrylic acid (AAc), and (d) hyperbranched polyglycerol-methacrylate (HPG-MA). Adapted from Ref. 1.

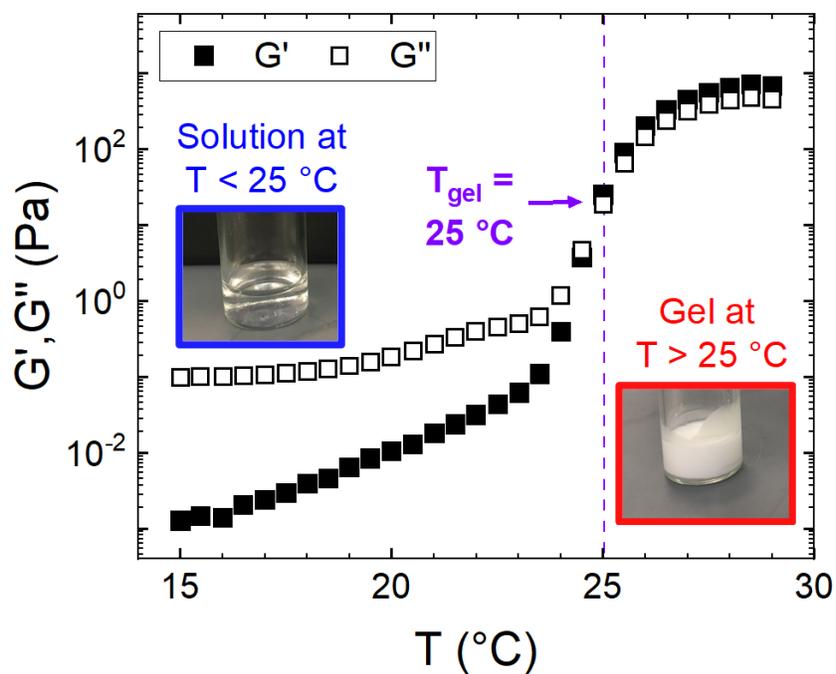


Figure S2. Temperature sweep results for LQG heated from 15-29 $^{\circ}\text{C}$. The approximate gelation temperature (T_{gel}) is identified as 25 $^{\circ}\text{C}$, as evidenced by a modulus crossover from a temperature sweep rheological experiment. Inset pictures at 15 $^{\circ}\text{C}$ (blue border, left) and 29 $^{\circ}\text{C}$ (red border, right) illustrate the sol-gel transition. Adapted from Ref. 1.

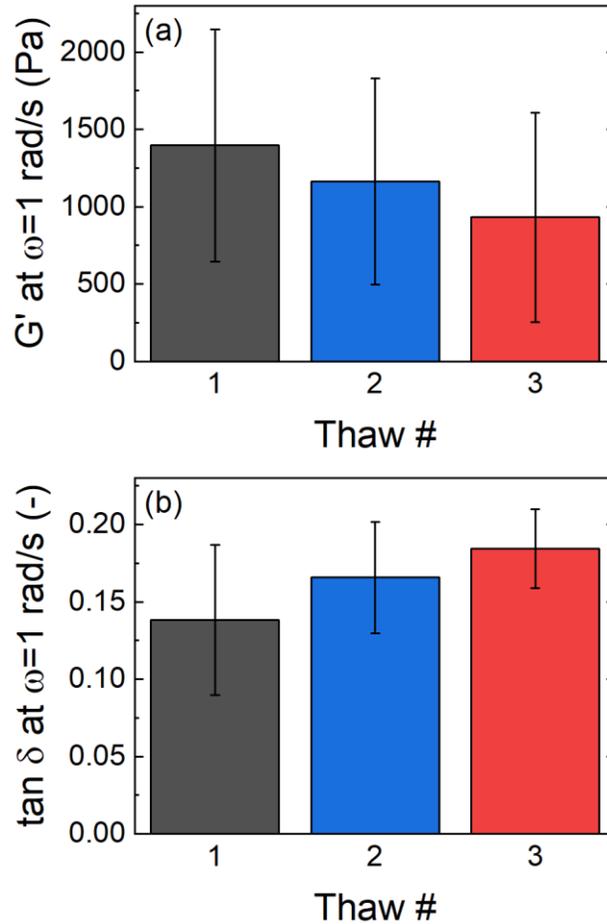


Figure S3. Effects of repeated freeze/thaw cycling on the (a) tissue modulus (G' at $\omega = 1$ rad/s) and (b) tissue viscoelasticity ($\tan \delta$ at $\omega = 1$ rad/s) of healthy human mammary tissue. Frozen human mammary tissue originating from a single healthy individual was procured from the National Institutes of Health (NCCU IRB #1201027, de-identified and IRB X4 exempt). Three samples were obtained and measured following the frequency sweep protocol provided in the Experimental Section. After measurement (referred to as thaw #1), each sample was individually immersed in 1 mL of PBS, flash frozen, and stored on dry ice overnight. The next day, the samples were thawed in an incubator at 37 °C and measured again on the rheometer (denoted as thaw #2). The freezing and thawing process was repeated one additional time for a total of three thaws per sample. Adapted from Ref. 1.

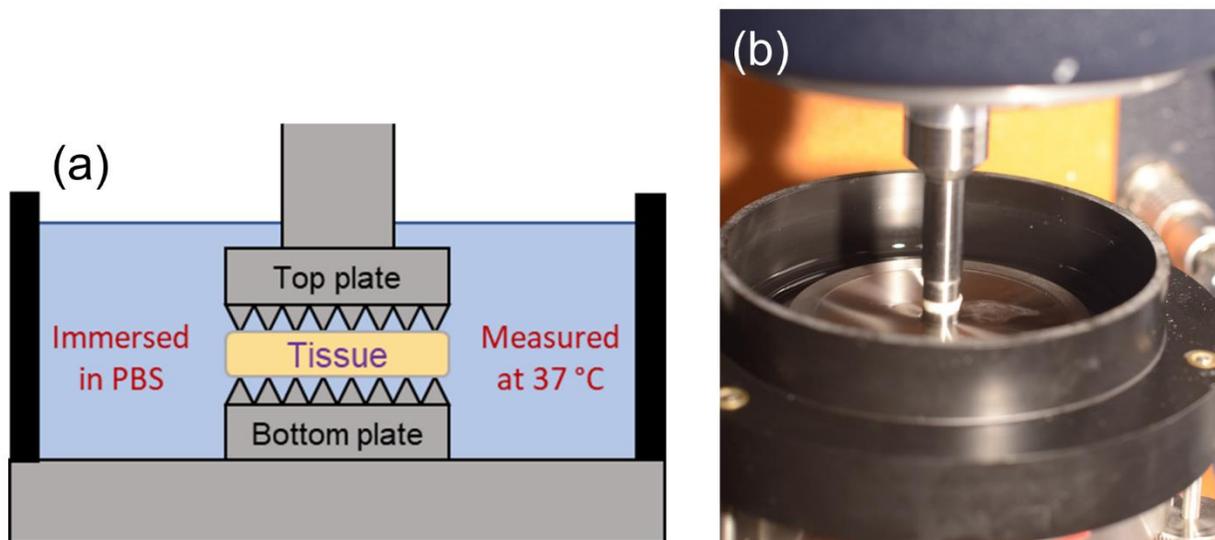


Figure S4. (a) Schematic and (b) picture of a tissue disk loaded between 8 mm crosshatched parallel plates on a DHR-3 rheometer equipped with an immersion cell. The picture in (b) was taken prior to addition of PBS to the immersion cell.

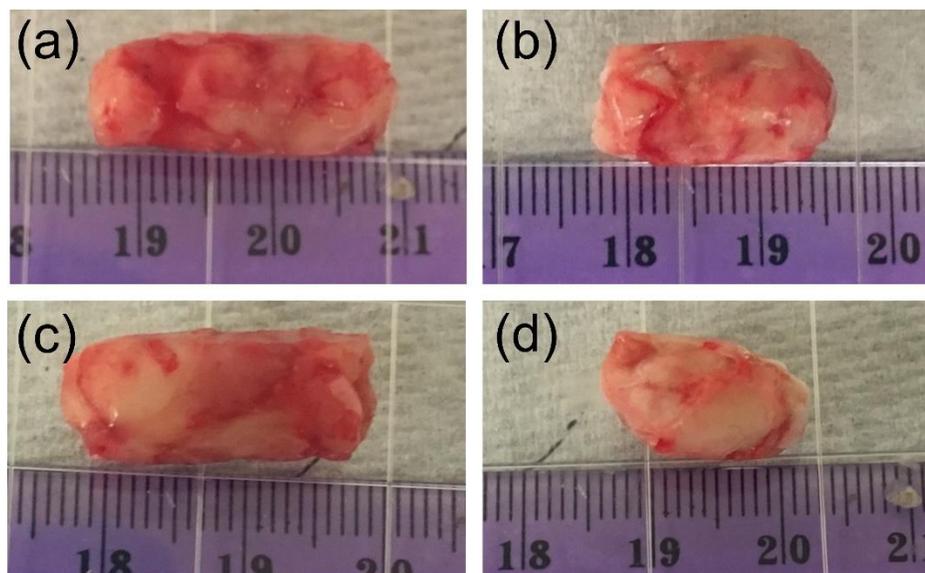


Figure S5. Representative images of 4T1 mouse mammary tumors treated with a single injection of (a) TRIS, (b) TRIS+Lib, (c) LQG, and (d) LQG+Lib.

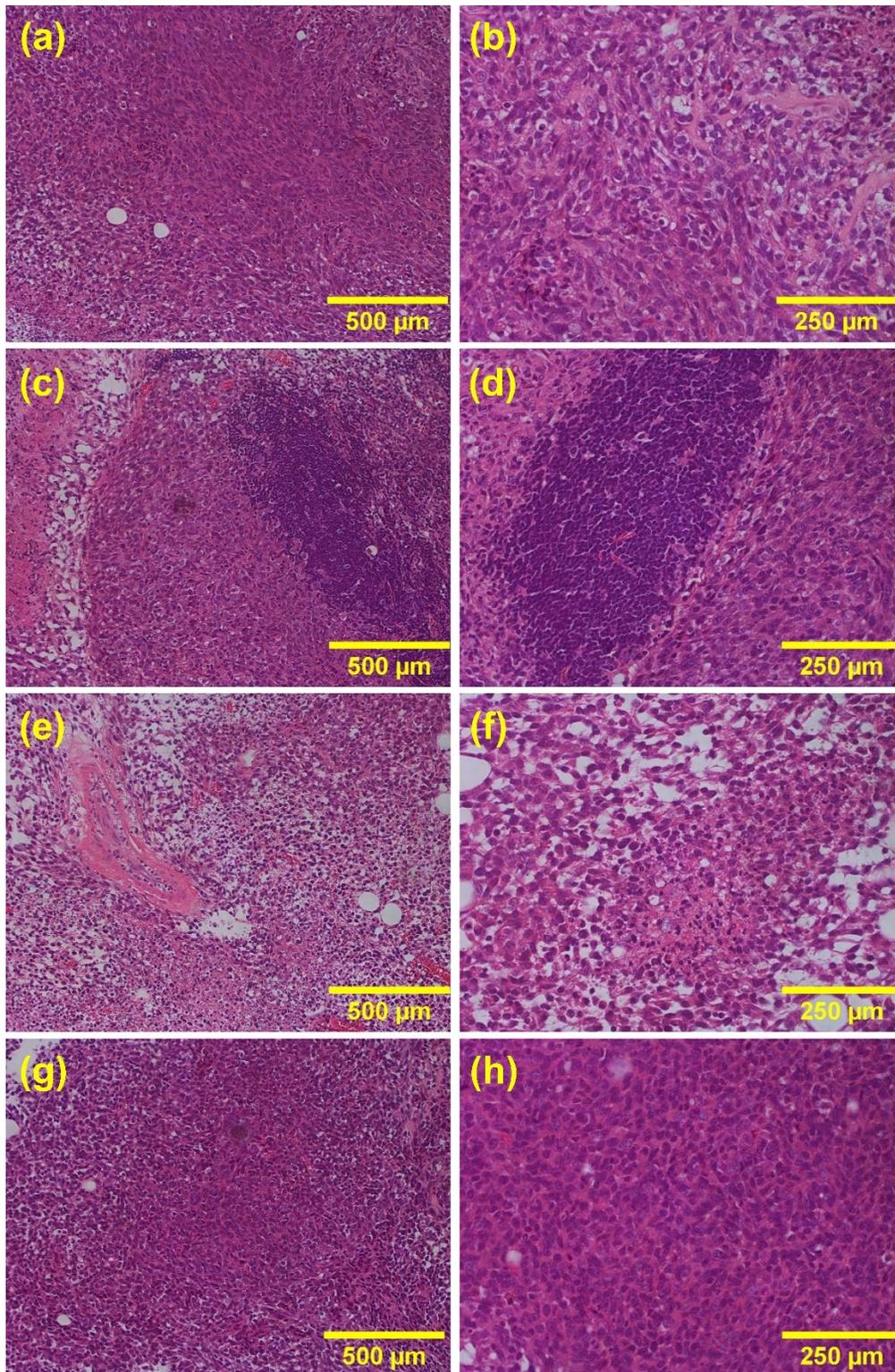


Figure S6. Representative hematoxylin and eosin (H&E) stains of 4T1 mouse mammary tumors treated with multiple injections of (a-b) PBS, (c-d) PBS+Lib, (e-f) LQG, and (g-h) LQG+Lib.

References

- 1 R. D. Corder, S. V. Gadi, R. B. Vachieri, F. L. Jayes, J. M. Cullen, S. A. Khan and D. K. Taylor, *Acta Biomater.*, 2021, **134**, 443–452.