Electronic Supplementary Material (ESI) for Soft Matter.

Supporting Information

Quantitative relationship between cavitation and shear rheology

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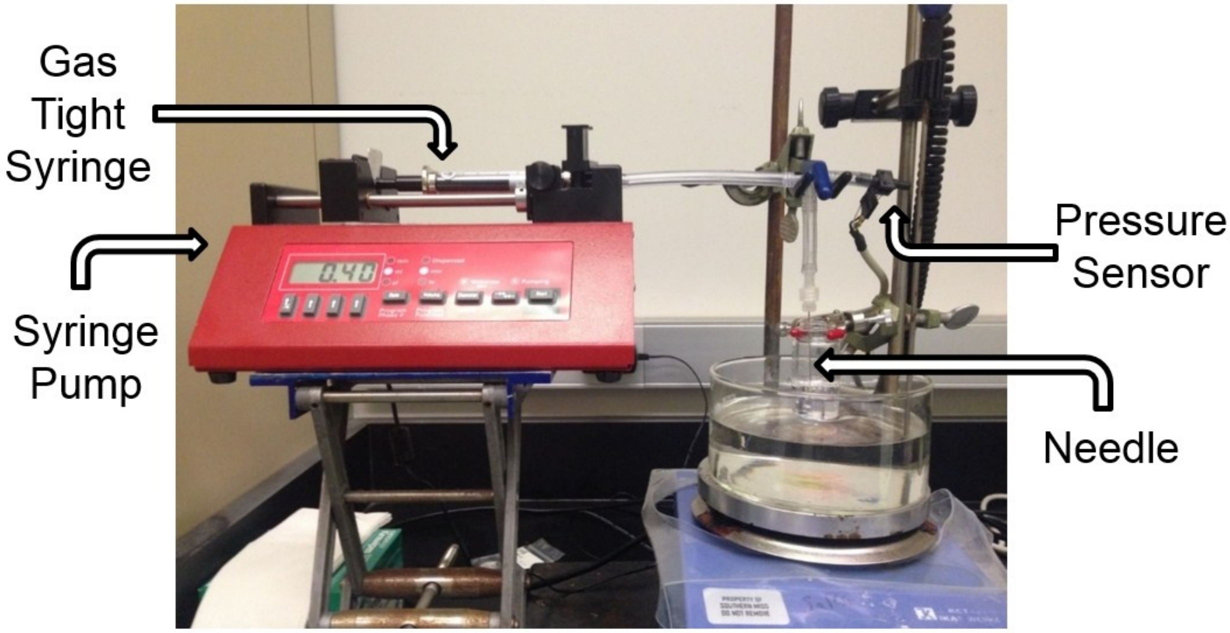

Figure S1. Cavitation rheometer experimental setup.

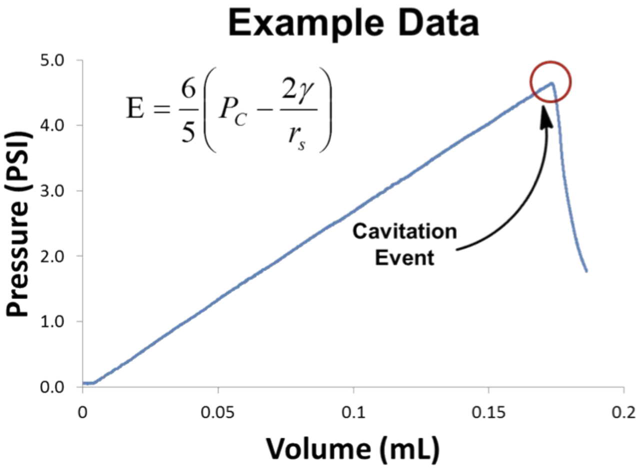

Figure S2. Example data for typical cavitation experiment. Critical pressure, *P*c, is given as the maximum in the pressure vs. volume curve.

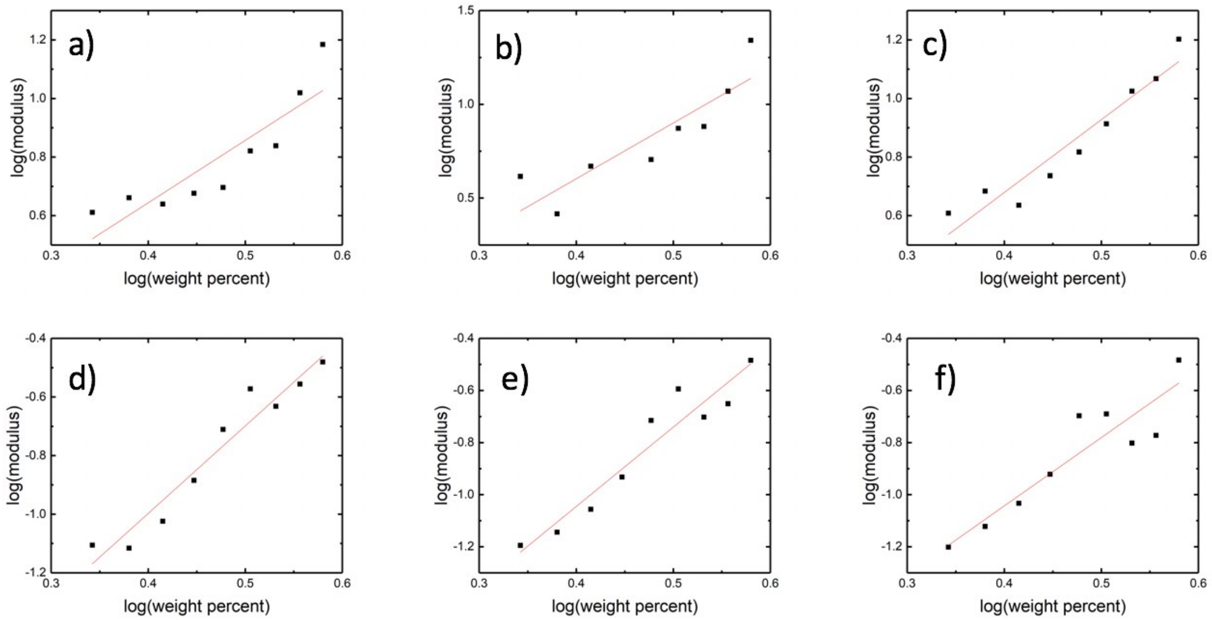

Figure S3a. Log-log plots for determination of scaling exponent a, of the relationship *modulus = (weight percent)*^{a}. (a) Permanently covalent, cavitation, 25 °C, $a = 2.13 \pm 0.42$, $R^2 = 0.78$; (b) Permanently covalent, cavitation, 35 °C, $a = 2.97 \pm 0.63$, $R^2 = 0.79$; (c) Permanently covalent, cavitation, 45 °C, $a = 2.49 \pm 0.28$, $R^2 = 0.92$; (d) Permanently covalent, shear, 25 °C, $a = 2.99 \pm 0.29$, $R^2 = 0.94$; (e) Permanently covalent, shear, 35 °C, $a = 3.05 \pm 0.34$, $R^2 = 0.92$; (f) Permanently covalent, shear, 45 °C, $a = 2.62 \pm 0.42$, $R^2 = 0.84$.

Figure S3b. Log-log plots for determination of scaling exponent a, of the relationship $\mathit{modulus} = (\mathit{weight\ percent})^a$. (g) Dynamic covalent, cavitation, 25 °C, $a = 2.26 \pm 0.51$, $R^2 = 0.71$; (h) Dynamic covalent, cavitation, 35 °C, $a = 1.12 \pm 0.27$, $R^2 = 0.68$; (i) Dynamic covalent, cavitation, 45 °C, $a = 1.10 \pm 0.45$, $R^2 = 0.42$; (j) Dynamic covalent, shear, 25 °C, $a = 9.58 \pm 0.73$, $R^2 = 0.96$; (k) Dynamic covalent, shear, 35 °C, $a = 7.35 \pm 0.41$, $R^2 = 0.98$; (l) Dynamic covalent, shear, 45 °C, $a = 5.67 \pm 0.45$, $R^2 = 0.95$; (m) Physical, cavitation, 25 °C, $a = 2.61 \pm 0.28$, $R^2 = 0.94$; (n) Physical, shear, 25 °C, $a = 3.43 \pm 0.22$, $R^2 = 0.98$

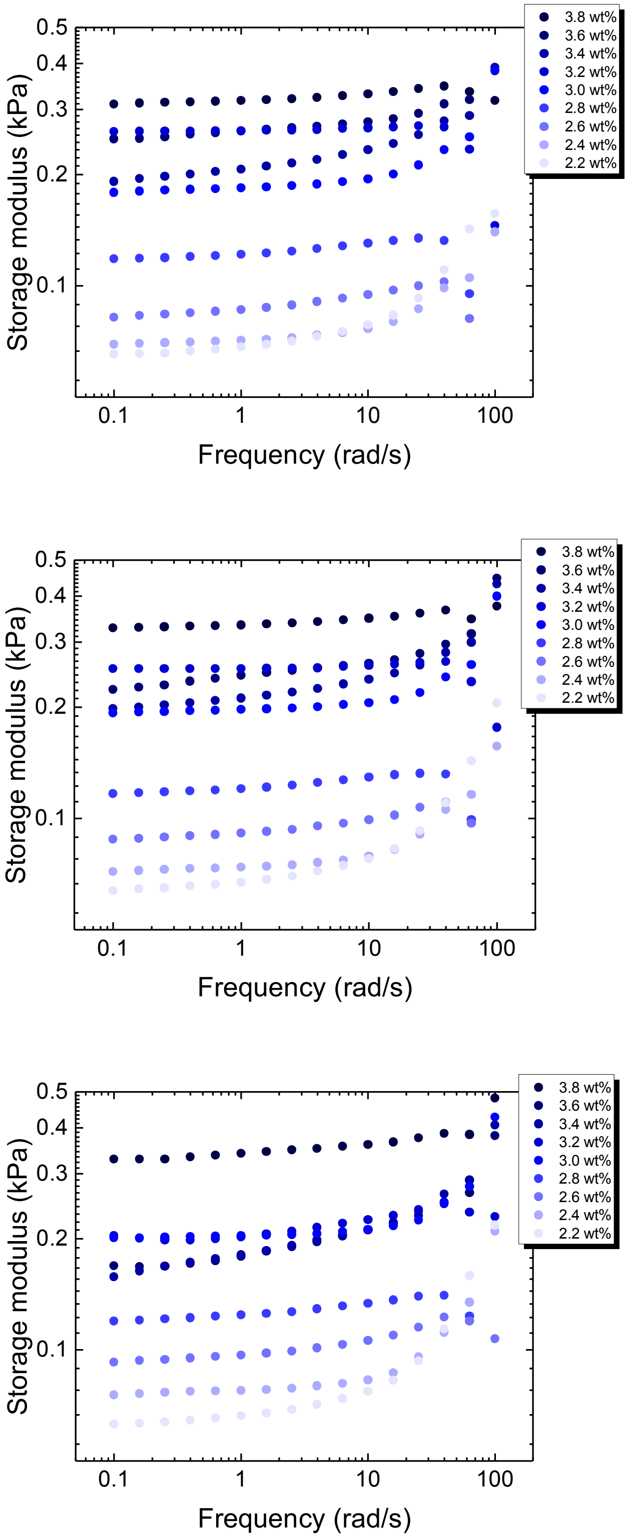

Figure S4. Frequency sweeps for poly[acrylamide-*s*-bis(acrylamide)] permanently covalent gels at 25 °C (top), 35 °C (middle), and 45 °C (bottom). Concentrations are given in the legends.

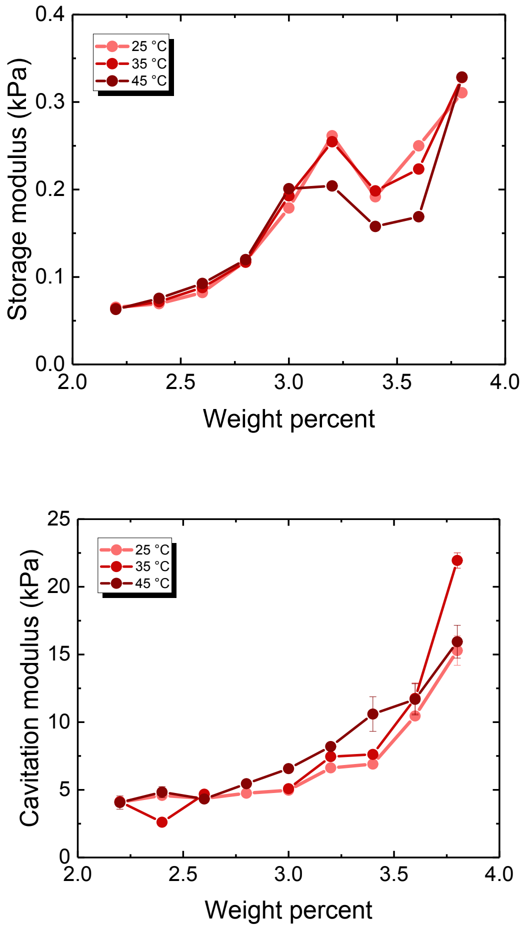

Figure S5. Concentration dependence for the shear storage (top) and cavitation moduli (bottom) for poly[acrylamide-*s*-bis(acrylamide)] permanently covalent gels at varying temperature.

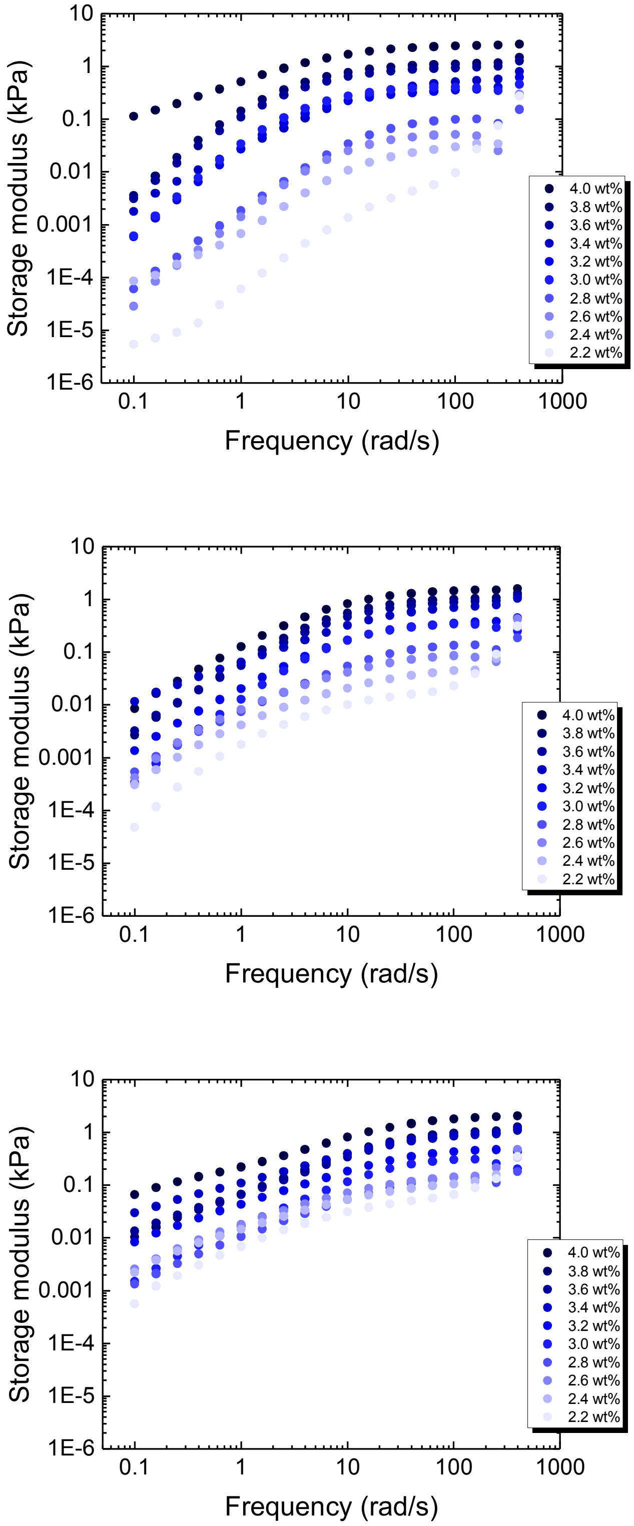

Figure S6. Frequency sweeps for poly(vinyl alcohol)/sodium borate dynamic covalent hydrogels at 25 °C (top), 35 °C (middle), and 45 °C (bottom). Concentrations are given in the legends.

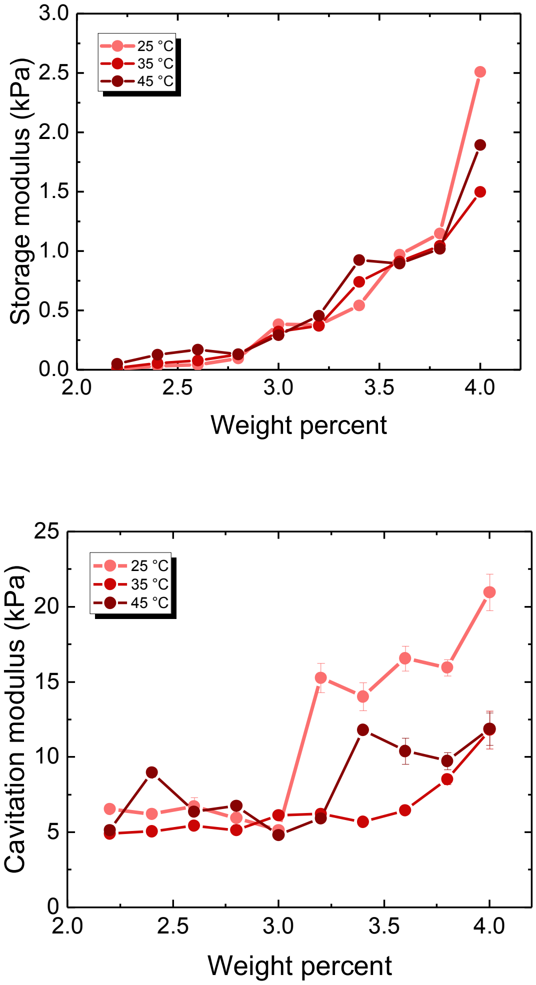

Figure S7. Concentration dependence for the shear storage (top) and cavitation moduli (bottom) for poly(vinyl alcohol)/sodium borate dynamic covalent hydrogels at varying temperature.

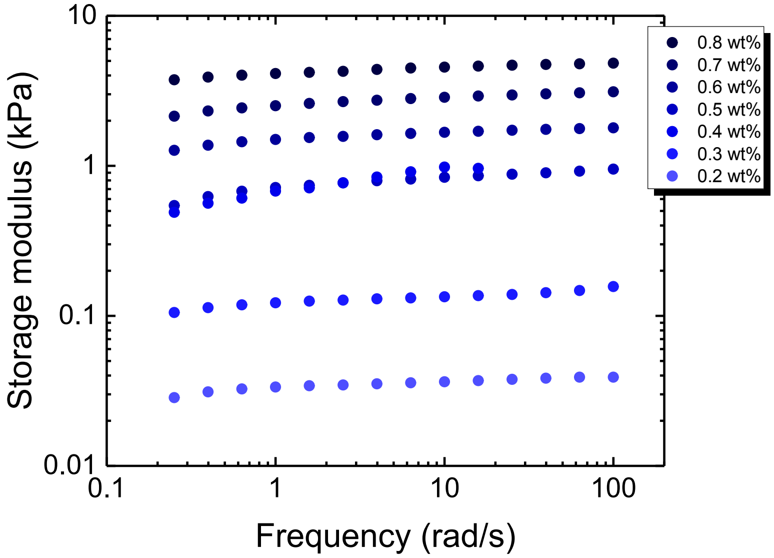

Figure S8. Frequency sweeps for urea-functional poly(propylene oxide) organogels in toluene at 25 °C. Concentrations are given in the legends.

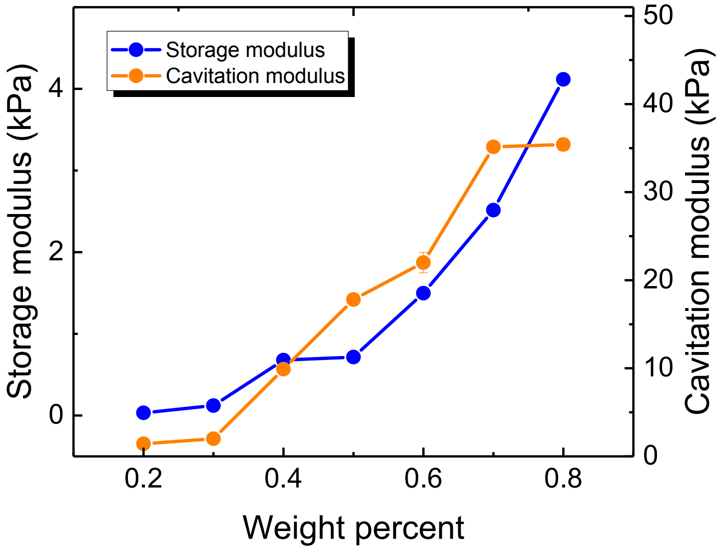

Figure S9. Concentration dependence for the shear storage (blue) and cavitation moduli (orange) for poly(propylene oxide) organogels in toluene at 25 °C.

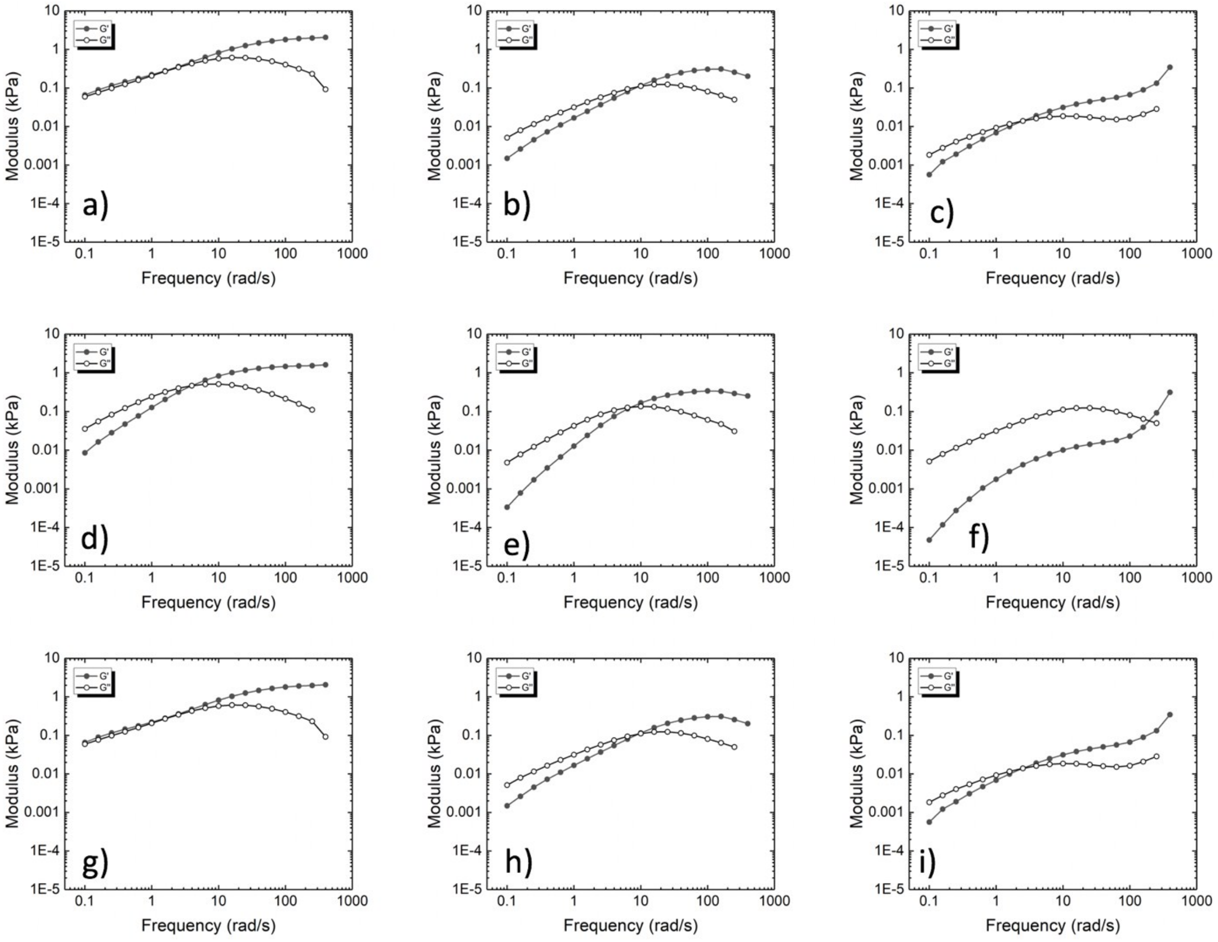

Figure S10. Storage (closed symbols) and loss (open symbols) moduli for dynamic covalent gels at (a) 25 °C, 4 wt%; (b) 25 °C, 3 wt%; (c) 25 °C, 2.2 wt%; (d) 35 °C, 4 wt%; (e) 35 °C, 3 wt%; (f) 35 °C, 2.2 wt%; (g) 25 °C, 4 wt%; (h) 25 °C, 3 wt%; (i) 25 °C, 2.2 wt%.