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Support Information

Effect of Structure Heterogeneity on Mechanical Performance of Physical Polyampholytes Hydrogels

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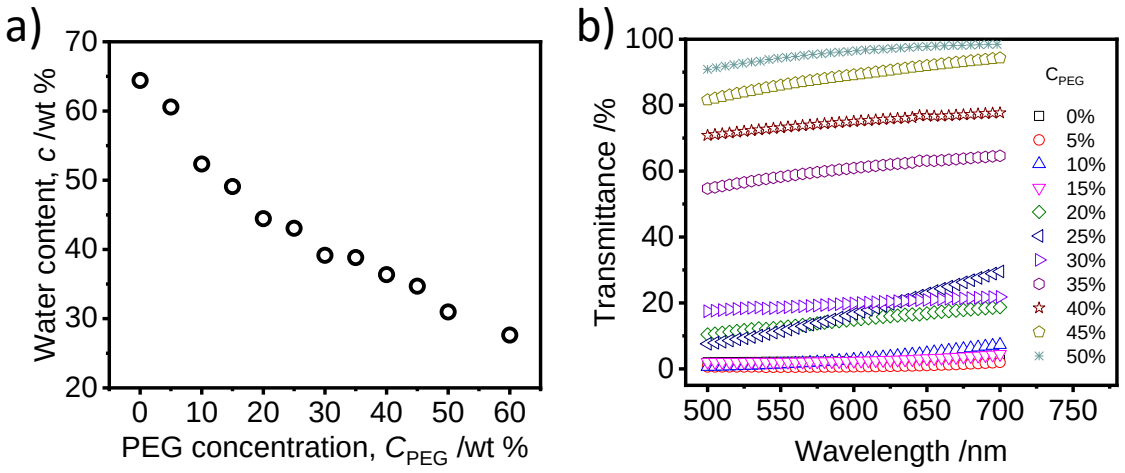


Figure S1. (a) Water content and (b) transmittance as a function of wavelength for polyampholytes hydrogels re-equilibrated at different PEO aqueous solutions. The water content decreases from 64.4 to 27.6 wt% by increasing PEG concentration.

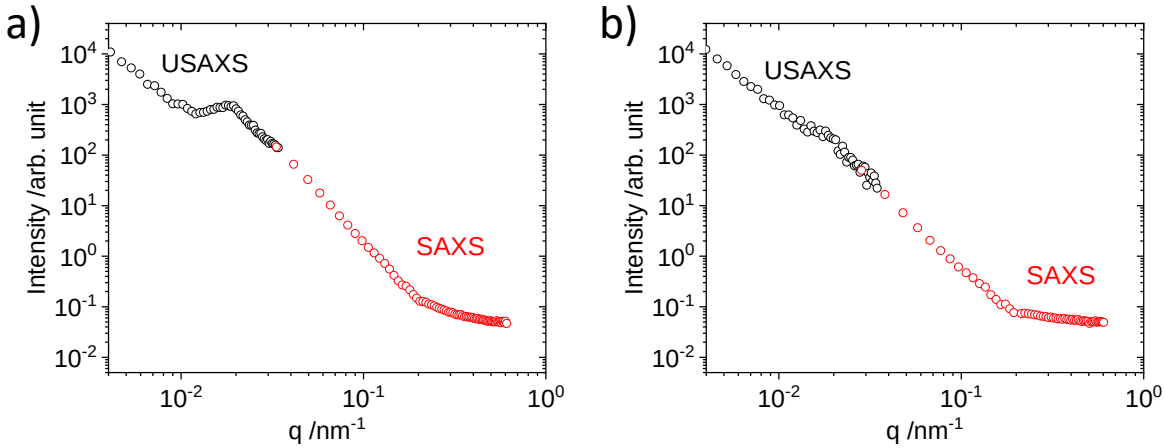


Figure S2. Overlaying ultra-small-angle and small-angle X-ray scattering profiles (USAXS and SAXS) for PA gels with (a) $\phi_p = 31.7$ % and (b) $\phi_p = 65.1$ %. The SAXS profiles were shifted along Y axis for overlaying. USAXS and SAXS data were corrected by background scattering. In the correction, background scattering multiplying with a factor of $I_{sample}/I_{background}$ was subtracted from sample scattering. Here I_{sample} and $I_{background}$ are transmitted X-ray beam intensity after the sample and background, respectively. One assumption for this correction is that the beam intensity of incident X-ray for sample and background measurements are the same, which is reasonable as the synchrotron radiation source was running under top-up mode (constant current mode).

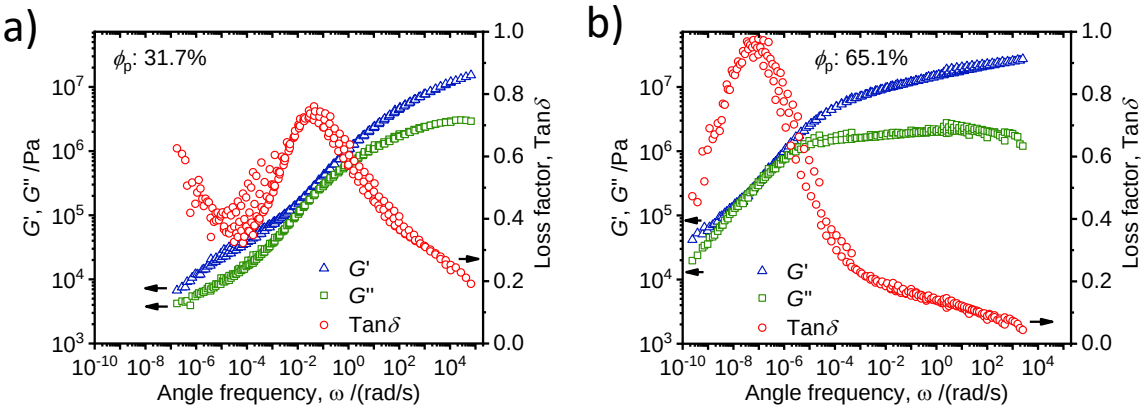


Figure S3. Linear dynamic behavior of physical polyampholyte hydrogels. Master curves of storage modulus (G'), loss modulus (G'') and loss factor (tanδ) against frequency (ω) at two selected polymer volume fractions of PA hydrogels: (a) $\phi_p = 31.7$ % and (b) $\phi_p = 65.1$ %. The rheology measurements were performed at different temperatures from 0 to 95 °C with 8 °C a step. At each temperature, the frequency was changed from 0.1 to 100 rad/s with a constant strain of 0.1 %. The master curves were obtained at a reference temperature of 24 °C by means of time-temperature superposition procedure.

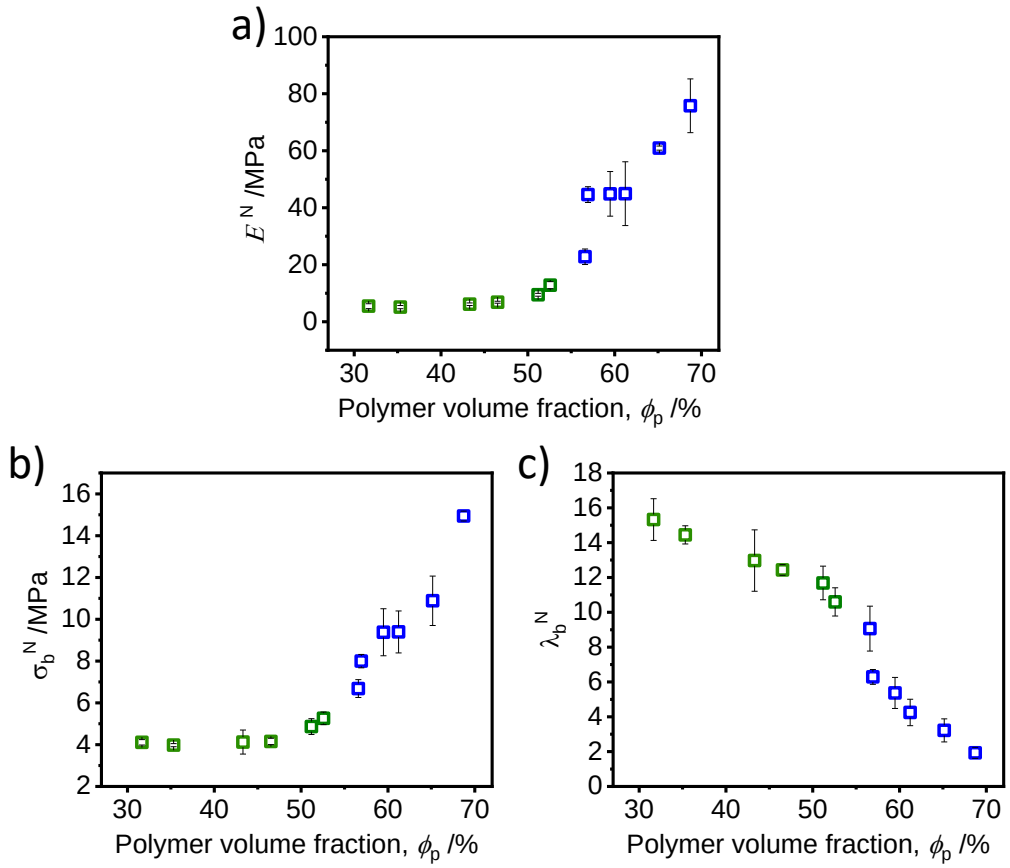


Figure S4. (a) Young's modulus E^{N}, (b) fracture stress $\sigma_{\mathrm{b}}^{\mathrm{N}}$ and (c) fracture stretch ratio $\lambda_{\mathrm{b}}^{\mathrm{N}}$ at the virtual reference state ($\phi_{\mathrm{p}} = 1$) as a function of polymer volume fraction ϕ_{p}.

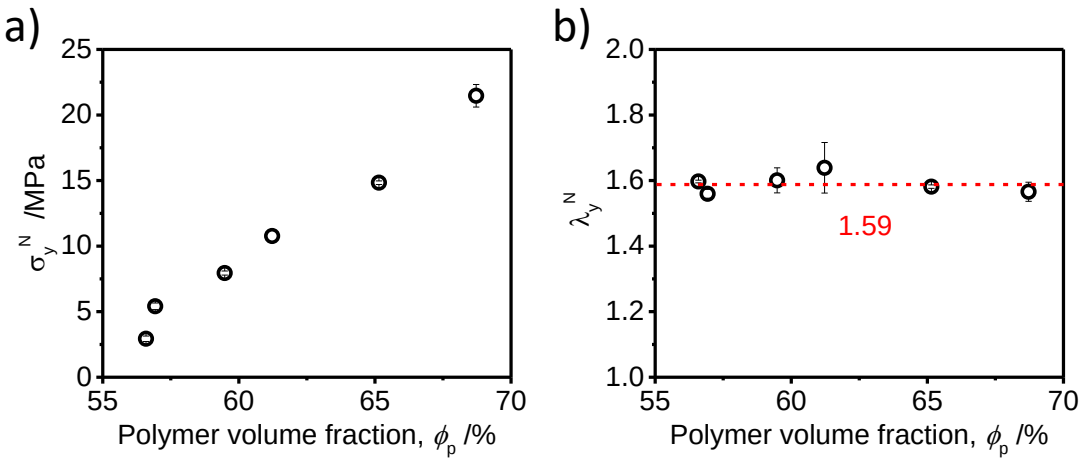


Figure S5. (a) Yielding stress $\sigma_{\mathrm{y}}^{\mathrm{N}}$ and (b) yielding stretch ratio $\lambda_{\mathrm{y}}^{\mathrm{N}}$ at the virtual reference state ($\phi_{\mathrm{p}} = 1$) as a function of polymer volume fraction ϕ_{p}.