Design, Synthesis, and Characterization of Lightly Sulfonated Multigraft Acrylate-based Copolymer Superelastomers

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Molecular Characterization

\textbf{Figure S1}: MALDI-TOF of PS macromonomer.
**Thermal Analysis**

![Figure S2: DSC for a) PSm-PnBA-1 and b) PSSm-PnBA-1 multigraft copolymers.](image)

**Extentional Rheometry**

![Figure S3: Non-linear viscoelastic data for a) PSm-PnBA-1 and b) PSSm-PnBA-1 for 0.1, 1 and 10 s⁻¹.](image)
Figure S4: Non-linear viscoelastic data for a) PSm-PnBA-2 and b) PSSm-PnBA-2 for 0.1, 1 and 10 s$^{-1}$.

True strain $\varepsilon$ is equal to Hencky strain $\varepsilon$ which can be related to the stretching ratio $\lambda$ using the following equation: $\varepsilon = \ln \lambda$. Consequently, stretching ratio will be: $\lambda = e^\varepsilon$ and for $\varepsilon = 3$ we get $\lambda = 20.08$, which means 2008% elongation (since $\lambda = L/L_0$ with $L$ = length of the specimen at break and $L_0$ = initial length of the specimen) which is pretty close to our experimental value of 2060% for PSm-PnBA-1 (non-sulfonated) and strain rates 1 s$^{-1}$ and 10 s$^{-1}$.

Figure S5: Storage and loss modulus of a) PSm-PnBA-2 and b) PSSm-PnBA-2 for -100 to 20°C.
Figure S6: Storage and loss modulus of a) PSm-PnBA-2 and b) PSSm-PnBA-2 for 20 to 160°C.