

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

Konstantinos Misichronis<sup>a,b</sup>, Weiyu Wang<sup>c</sup>, Shiwang Cheng<sup>b</sup>, Yangyang Wang<sup>c</sup>, Umesh Shrestha<sup>a</sup>, Mark Dadmun<sup>a</sup>, Jimmy W. Mays<sup>a</sup>, Tomonori Saito<sup>b,\*</sup>

<sup>a</sup>Department of Chemistry, University of Tennessee, Knoxville, TN, 37996, USA

<sup>b</sup>Chemical Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN, 37831, USA

<sup>c</sup>Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, Oak Ridge, TN, 37831, USA

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## Molecular Characterization

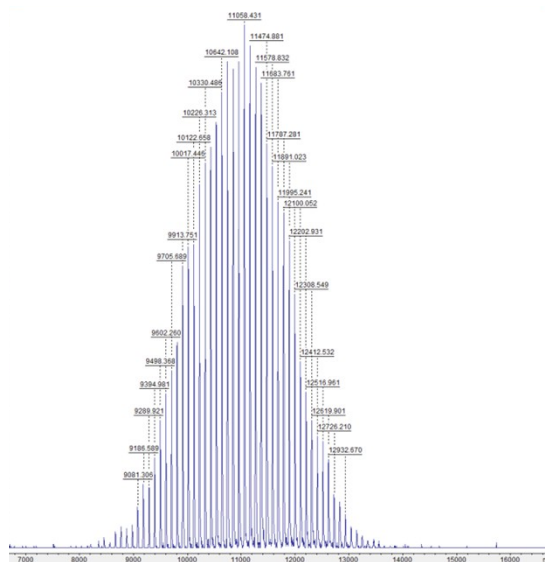


Figure S1: MALDI-TOF of PS macromonomer.

## Thermal Analysis

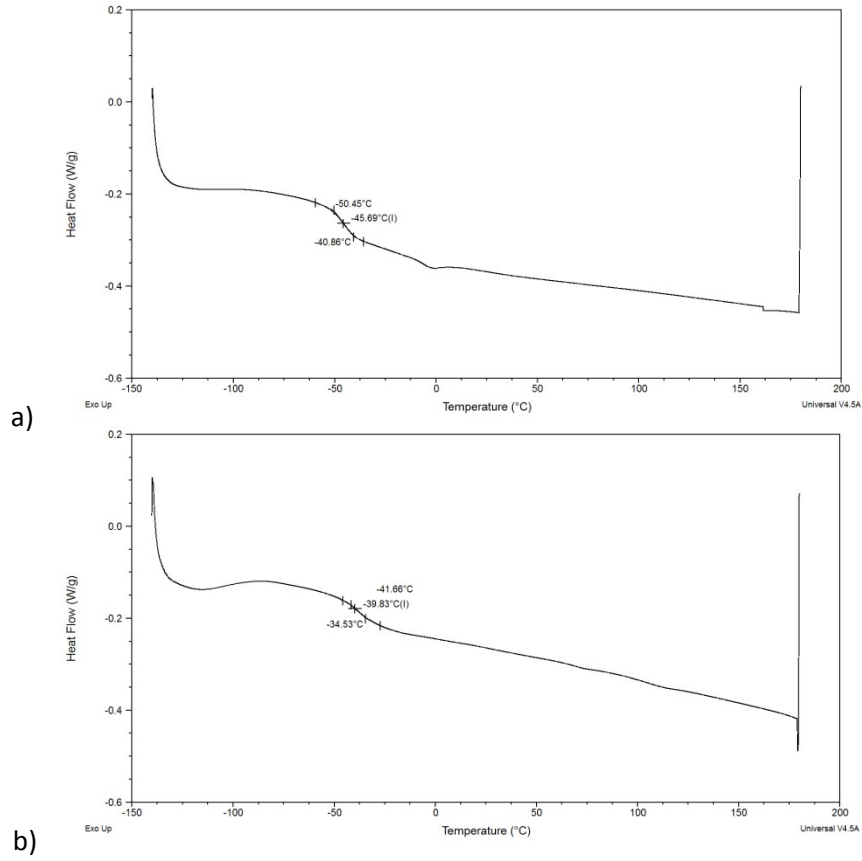


Figure S2: DSC for a) PSm-PnBA-1 and b) PSSm-PnBA-1 multigraft copolymers.

## Extentional Rheometry

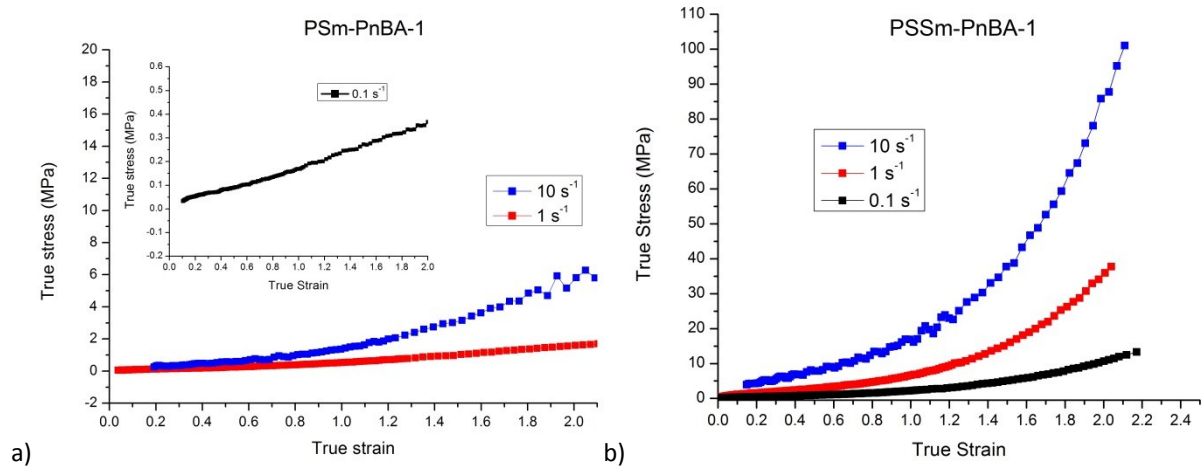
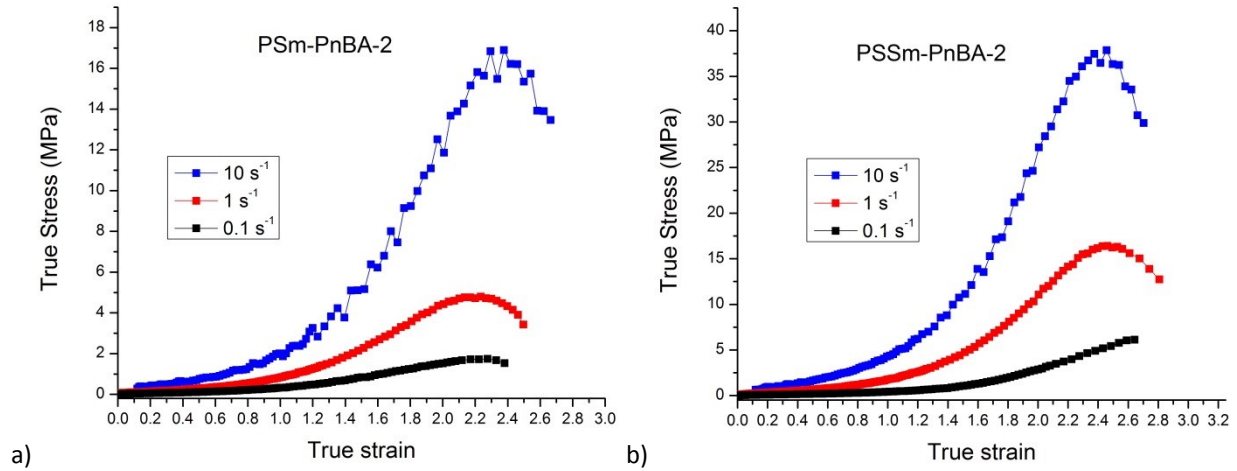
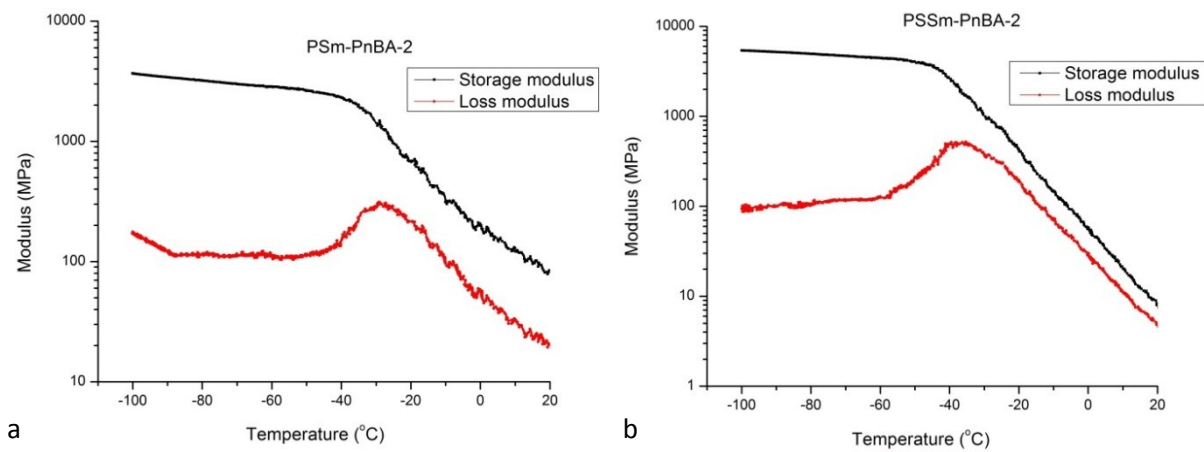


Figure S3: Non-linear viscoelastic data for a) PSm-PnBA-1 and b) PSSm-PnBA-1 for 0.1, 1 and 10 s<sup>-1</sup>.

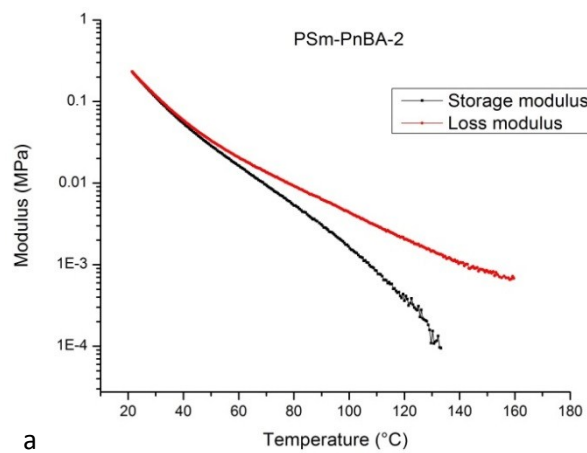


**Figure S4:** Non-linear viscoelastic data for a) PSm-PnBA-2 and b) PSSm-PnBA-2 for 0.1, 1 and 10 s<sup>-1</sup>.

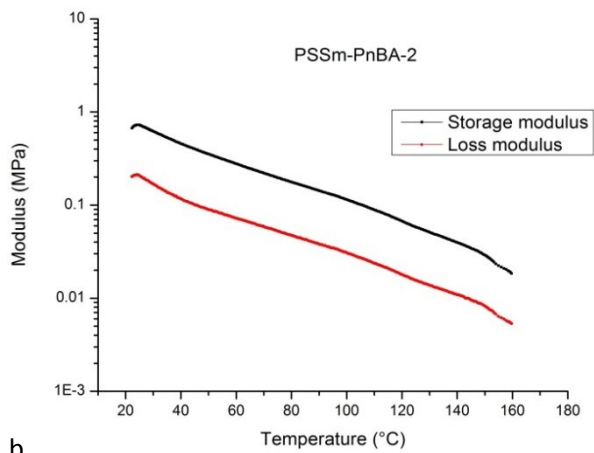
True strain  $\epsilon$  is equal to Hencky strain  $\epsilon$  which can be related to the stretching ratio  $\lambda$  using the following equation:  $\epsilon = \ln \lambda$ . Consequently, stretching ratio will be:  $\lambda = e^\epsilon$  and for  $\epsilon = 3$  we get  $\lambda = 20.08$ , which 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<sup>-1</sup> and 10 s<sup>-1</sup>.



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



a



b

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