Electronic Supplementary Material (ESI) for Polymer Chemistry.

Supporting Information

All-Acrylic Superelastomers: Facile Synthesis and Exceptional Mechanical Behavior

Wei Lu[a], Andrew Goodwin[a], Yangyang Wang[b], Panchao Yin[c], Weiyu Wang[b], Jiahua Zhu[b], Ting Wu[d], Xinyi Lu[a], Bin Hu[d], Kunlun Hong*[,b], Nam-Goo Kang*[,a], and Jimmy Mays*[,a]

[a]Department of Chemistry, University of Tennessee, Knoxville, Tennessee 37996, United States

[b]Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, United States

[c]Chemical and Engineering Materials Division, Neutron Sciences Directorate, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, United States

[d]Department of Materials Science and Engineering, University of Tennessee, Knoxville, Tennessee 37996, United States

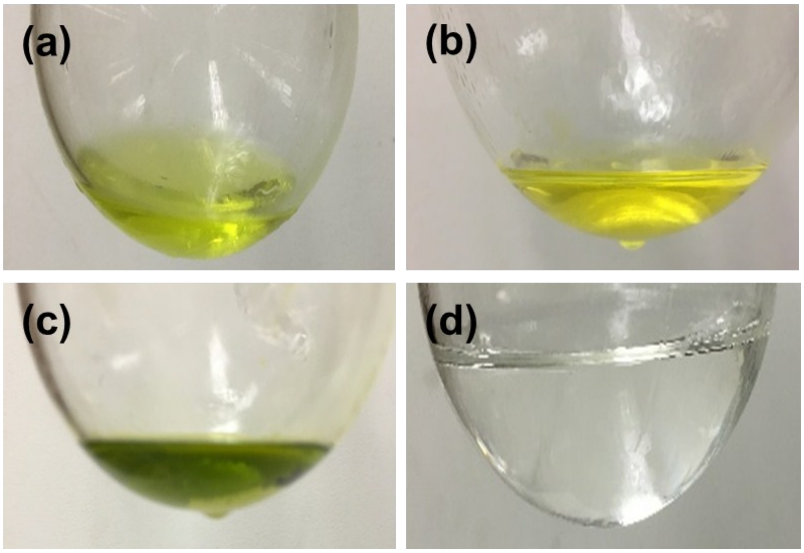

Figure S1. Reaction solutions on the synthesis of PMMA macromonomer: (a) activation of PVBA by *sec*-BuLi upon mixing; (b) the completion of the activation of PVBA by *sec*-BuLi; (c) formation of a complex between LiCl and nitrogen anion; (d) Solutions of living PMMA.

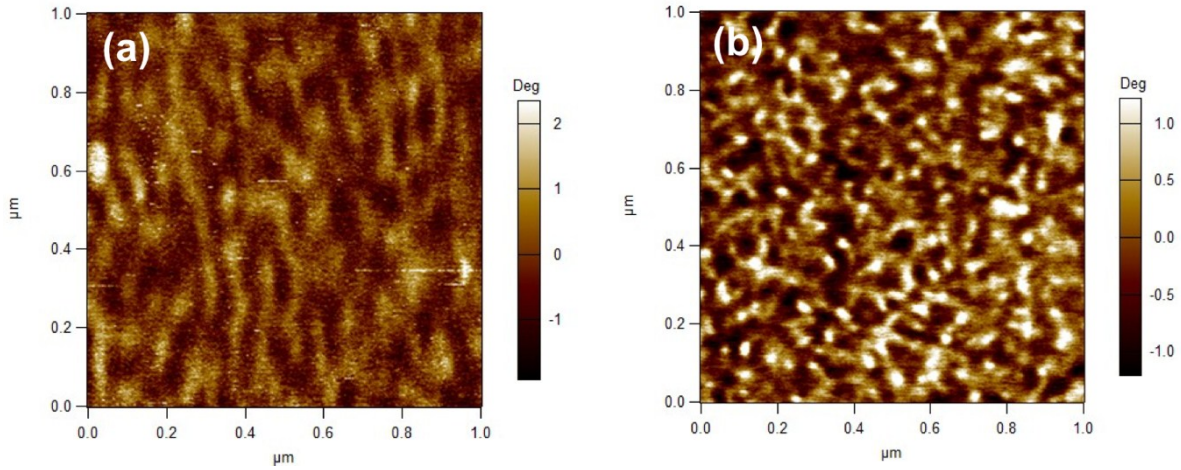

Figure S2. AFM phase images of (a) MG-8.4-3.3-8.6 and MG-18.1-2.8-18.4

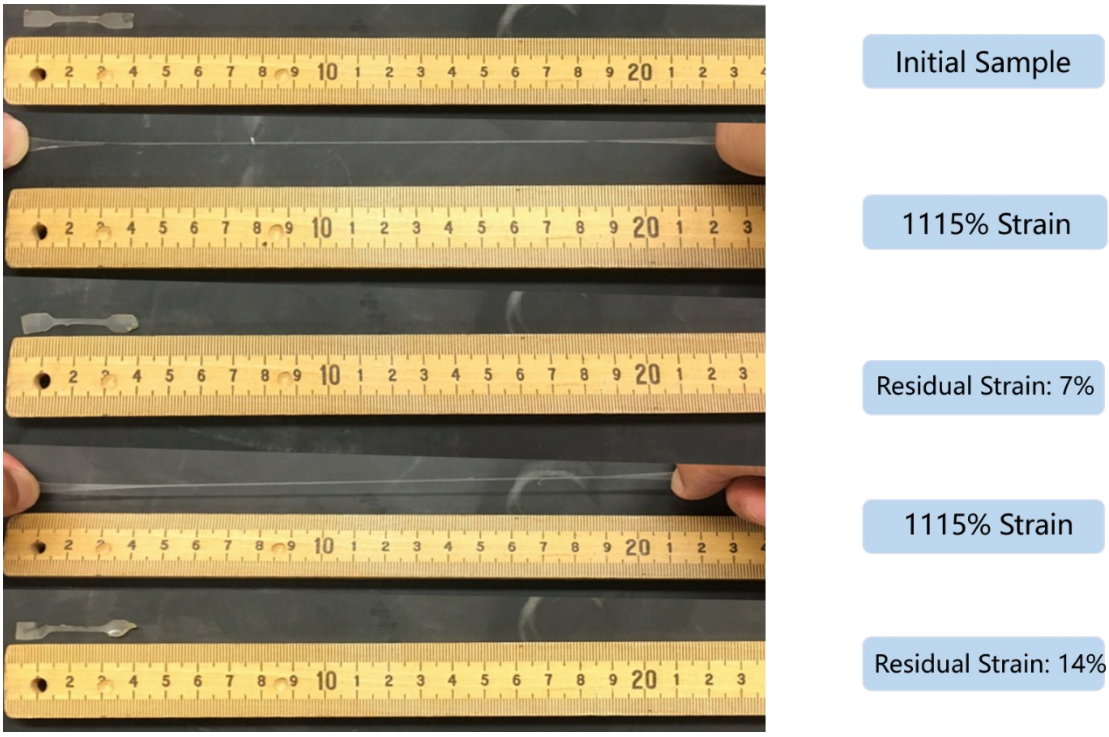

Figure S3. Photographs of the multiple hysteresis tests of MG-29.3-1.5-9.3. From top to bottom are: Initial sample with a gauge length of 14 mm; sample stretched to 170 mm with around 1115% strain; recovered sample with a gauge length of around 15 mm; sample stretched the second time to 170 mm with around 1115% strain; recovered sample with a gauge length of around 16 mm.

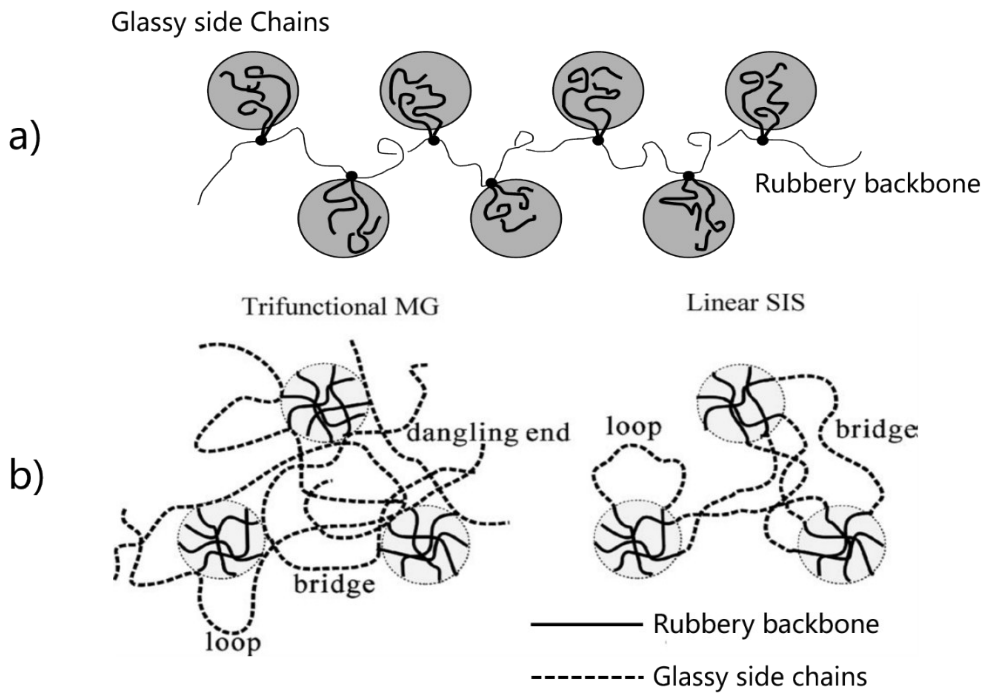

Figure S4. a) Schematic structure of multigraft copolymers.[1] b) Difference in molecular architecture and conformation between multigraft copolymers and linear triblock copolymers using SIS as an example.[2]

References

(1) Weidisch, R.; Gido, S.; Uhrig, D.; Iatrou, H.; Mays, J.; Hadjichristidis, N., *Macromolecules* **2001,** *34* (18), 6333-6337.

(2) Duan, Y.; Rettler, E.; Schneider, K.; Schlegel, R.; Thunga, M.; Weidisch, R.; Siesler, H. W.; Stamm, M.; Mays, J. W.; Hadjichristidis, N., *Macromolecules* **2008,** *41* (13), 4565-4568.