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Low Modulus Silicone Elastomer Networks with Desirable Viscoelastic Properties for Cell Mobility Studies JULIE N. L. ALBERT, JAN GENZER, North Carolina State University, Chemical and Biomolecular Engineering — Biocompatible silicone elastomer networks provide a versatile platform for studying the effect of compliance on cell movement. In conventional network formation schemes, poly(dimethylsiloxane) (PDMS) is cross-linked via reactive end groups, and the modulus of the material is controlled by the ratio of polymer to cross-linker. However, low modulus networks fabricated in this manner are imperfect and insufficiently cross-linked with high soluble fractions and reduced elasticity, especially as the network modulus approaches that of soft tissues (on the order of 10 kPa). In order to overcome these limitations, we synthesized PDMS chains in which vinylmethylsiloxane units were incorporated every ≈15-20 kDa along the polymer backbone. We then cross-linked the polymer through the vinyl groups using hydrosilylation chemistry. The resultant networks exhibited lower soluble fractions and lower viscous dissipation/greater elasticity as compared to equivalent-modulus networks fabricated by the conventional end-group cross-linking scheme. We attribute the mechanical properties of our networks to the presence of network-bound free chain ends that effectively plasticize the network to lower the modulus without compromising network elasticity.

Julie N. L. Albert
North Carolina State University, Chemical and Biomolecular Engineering

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