Electronic Supplementary Information

Investigation of Failure Behavior of a Thermoplastic Elastomer Gel

Satish Mishra,[a] Rosa Maria Badani Prado[a] Thomas E. Lacy,[b] and Santanu Kundu[a]*
[a]Dave C. Swalm School of Chemical Engineering, Mississippi State University, MS State, MS 39762
[b]Department of Mechanical Engineering, Texas A&M University, College Station, TX 77840
Corresponding author e-mail: santanukundu@che.msstate.edu

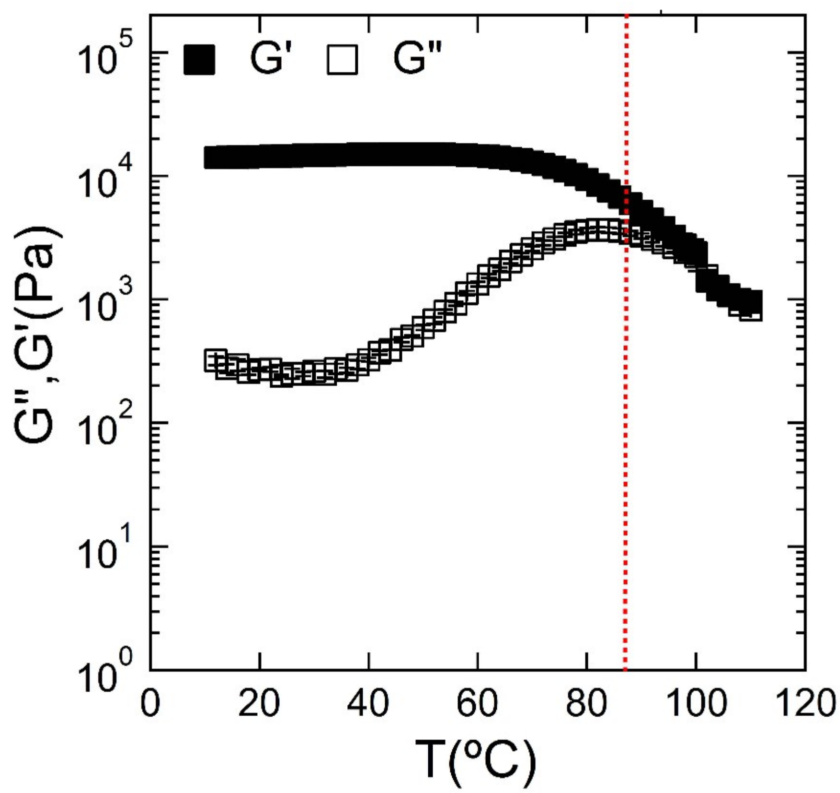

Figure S1. Temperature sweep experiment result performed at ω=100 rad/s and γ=0.01 over a temperature range of 12-110 °C.

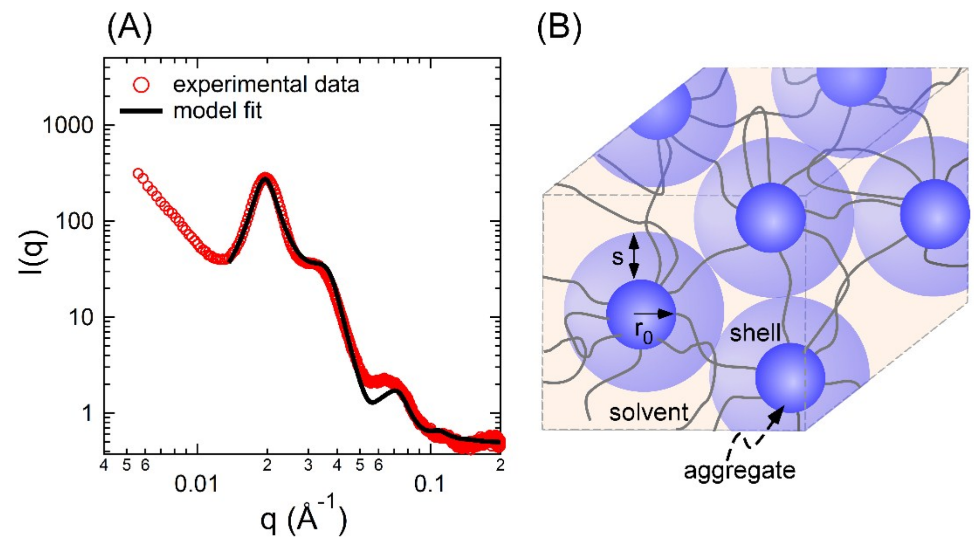

Figure S2. (A) SAXS data fitted with polydispersed core hard sphere model. (B) Schematic of the proposed model for the system. The aggregates consist of collapsed PS chains, the fictitious hard sphere shell consists of PI bridges and loops.

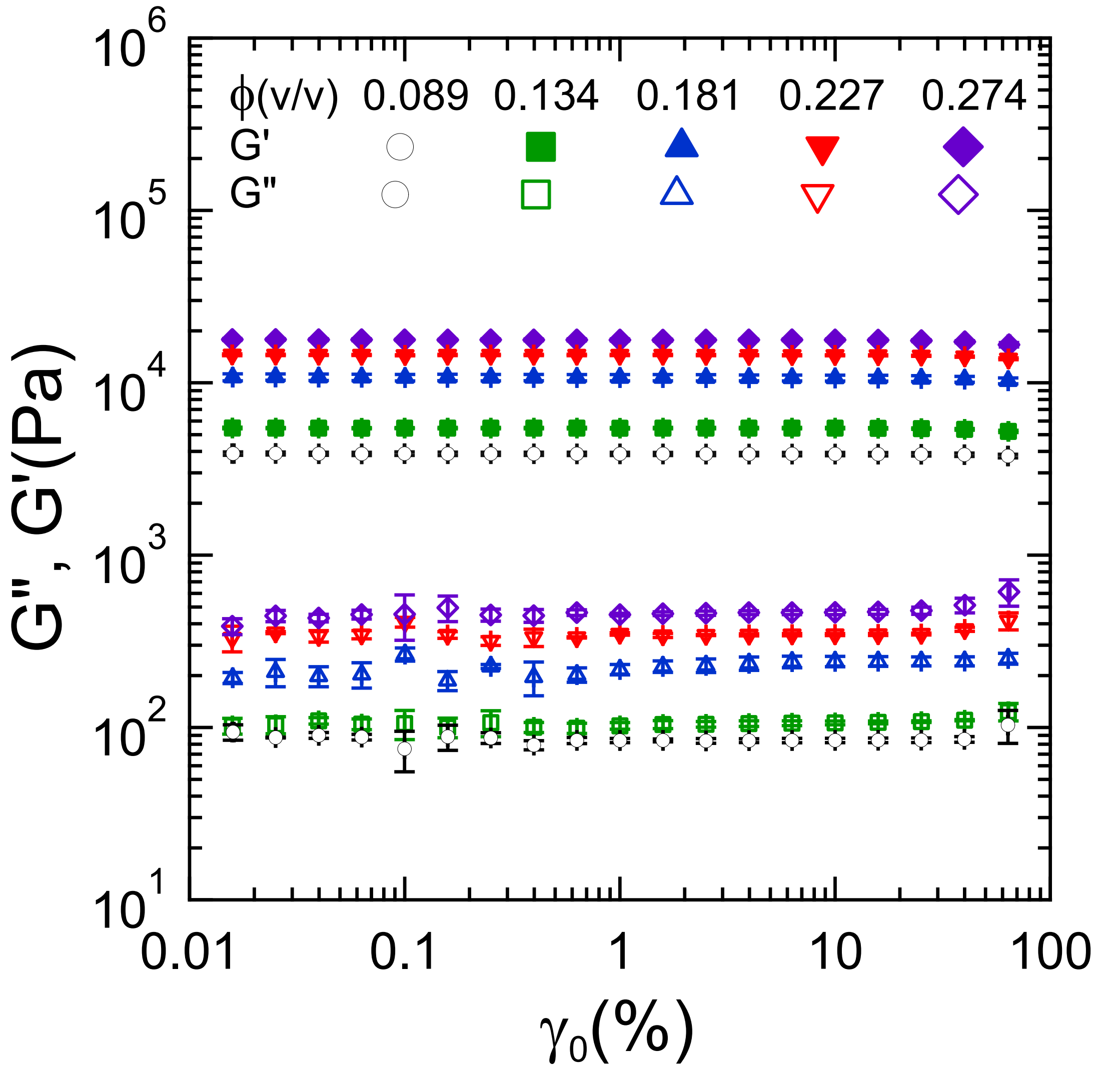

Figure S3: G′, G′′ as a function of strain amplitude (γ_0) for different polymer volume fractions, ϕ(v/v), in mineral oil. The error bars represent one standard deviation.

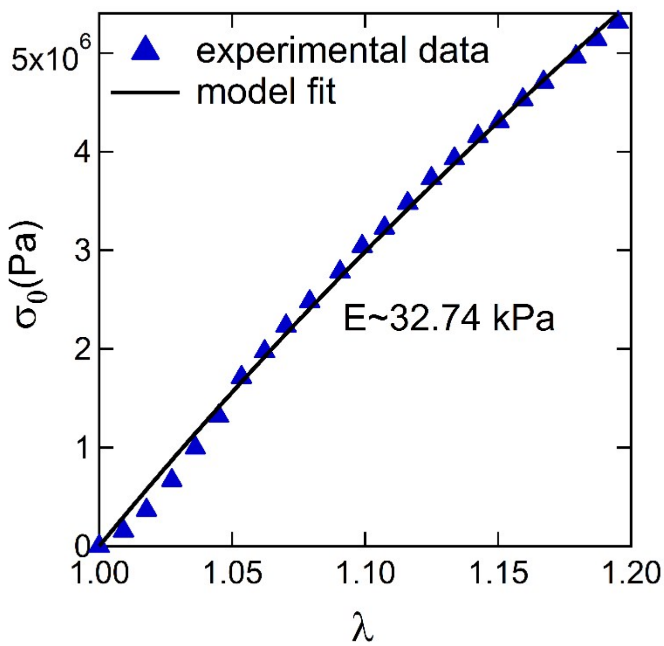

Figure S4. The symbols represent nominal stress (σ_0) vs stretch ratio (λ) obtained from the initial part of the fracture experiment. Here, the crack length did not increase. The line indicates a neo-Hookean model fit.

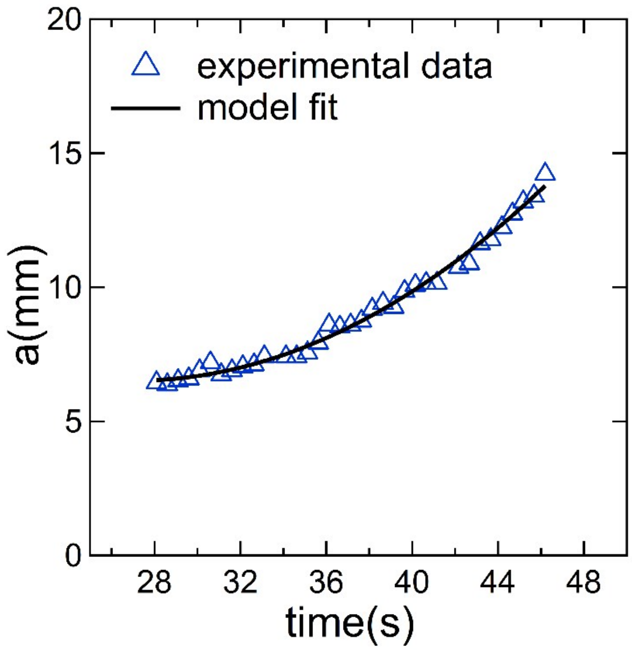

Figure S5. Crack length vs. time plot of a pure shear fracture experiment (MS). The crack length-time data fits well a 2nd order polynomial with $R^2 = 0.9912$. The obtained polynomial was differentiated for estimating the crack velocity.

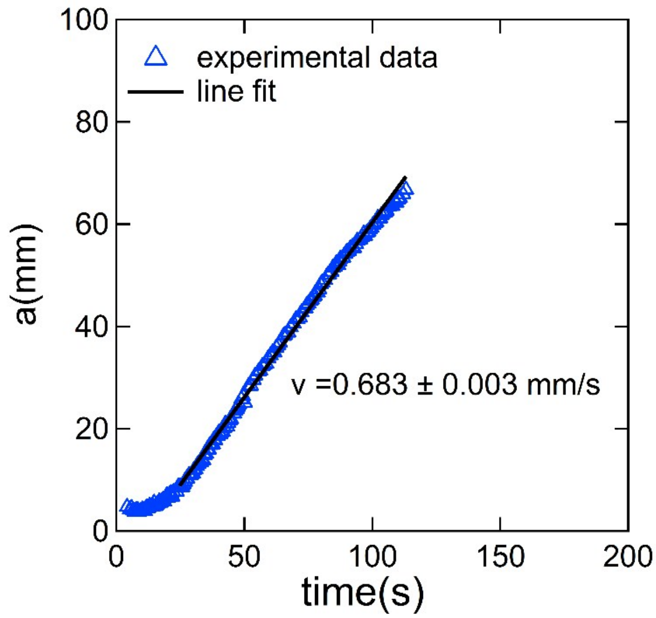

Figure S6. A case of QS experiment is shown for crack length, *a*, vs. experimental time. Once the crack starts to propagate, a linear line can be fitted (shown as a black line) to estimate the crack velocity.

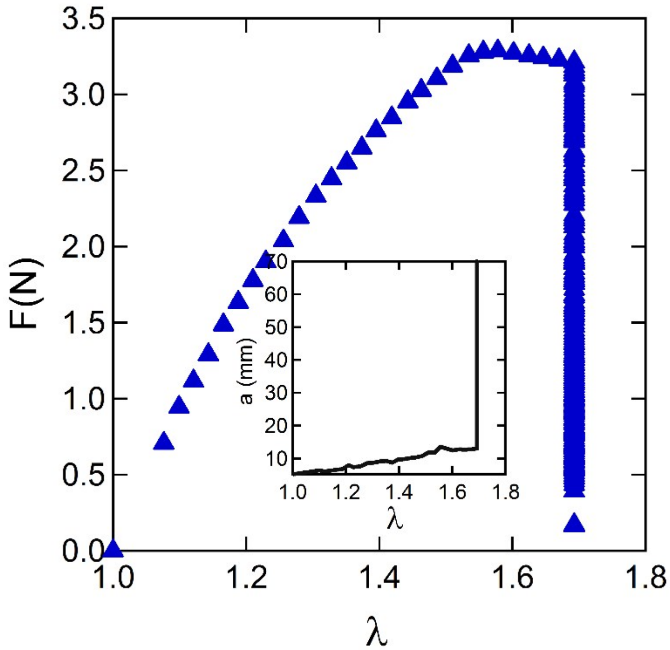

Figure S7. Fracture test results of F vs. λ is plotted for the QS experiment. In this experiment, the sample was stretched with a stretch rate of 5 mm/s to 28 mm and then let the crack propagate. The inset represents the crack length (*a*) variation with respect to stretch ratio (λ).