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Effect of Gel Microstructure on the Cavitation Instability[1]
SANTANU KUNDU, SATISH MISHRA, MAHLA ZABET, SEYEDMEYSAM HASHEMNEJAD, Mississippi State University, BRANDON YRLE, The University of Southern Mississippi, SOFT MATERIALS LABORATORY TEAM — Polymeric gels are widely used in many applications. Elastic modulus of a gel is directly related to its microstructure and the fracture behavior of a gel also depends on the microstructure. We report the non-linear rheology and cavitation rheology results for two self-assembled gels: pluronic gels consisting of poly(ethylene oxide)–poly(propylene oxide)–poly(ethylene oxide) in an end block selective solvent (water), and ABA triblock copolymer gels consisting of poly(methyl methacrylate)–poly(n-butyl acrylate)–poly(methyl methacrylate) in a mid-block selective solvent (2-ethyl-1-hexanol). For the gels with similar low-strain modulus, distinctly different non-linear rheological behavior was observed, as pluronic gel strain-softens, whereas, triblock gel strain- stiffens at large-strain. The cavitation rheology data indicate that the critical pressure for cavitation in triblock gel is higher than that observed in pluronic gels. These results will be linked to the gel microstructure.

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