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Viscoelastic Properties of Entangled DNA Solutions: Dependence on Molecular Length and Concentration[1] PATRICK SMITH, Univ of San Diego, VESELIN S. DOBREV, JEFF URBACH, Georgetown University, RAE ANDERSON, Univ of San Diego — We use macroscopic rheology to investigate the viscoelastic properties of solutions of monodisperse linear DNA, as a function of DNA length and concentration. We span from the unentangled to the entangled regime by using DNA lengths that vary from 11 to 115 kilobasepairs (3.7 to 39 μm) and solution concentrations that range between 0.5 and 4.0 mg/ml. We investigate the effects of oscillatory frequency on the linear elastic (G$'$) and viscous (G") moduli, with frequency values of 0.01 - 100 Hz. In addition, the dependence of viscosity on strain rate is studied with strain rates ranging from 0.01 to 100 Hz. Importantly, these studies are the first to examine the molecular length dependence of linear viscoelastic properties for concentrated DNA solutions. Results are compared to theoretical predictions based on the Rouse model and reptation model for unentangled and entangled polymer solutions, respectively.

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