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Application of laser tweezers to passive microrheology of collagen solutions MARJAN SHAYEGAN, Department of Chemistry, Simon Fraser University, NANCY R. FORDE, Department of Physics, Simon Fraser University, 8888 University Dr., Burnaby, BC, V5A 1S6 Canada — Rheology is the field that can describe both viscous and elastic properties of a material in response to applied force or deformation. Passive microrheology (PMR) is a technique in which motion of a particle arising from thermal fluctuations is measured on nanometer length scales. One experimental approach to PMR uses optical tweezers, which trap and probe μm-sized particles, located within the material, at a high bandwidth. In this study, viscoelastic properties of solutions of collagen are characterized. To do this, we have probed the power spectral density of fluctuations of 1-μm-diameter microspheres optically trapped in acidic solutions of varying concentration of collagen type I (0, 0.5, and 1 mg/ml). The results show evidence that the behaviour of the solutions becomes increasingly non-Newtonian at high protein concentration. We attribute this to the presence of the viscoelastic polymer. This introduces frequency dependence to the complex modulus of the solution which is used to characterize the elasticity and viscosity of these systems.

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