Abstract Submitted
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Microfluidic Rheology of Soft Colloidal Suspensions[1] KERSTIN NORDSTROM, PAULO ARRATIA, EMILIE VERNEUIL, University of Pennsylvania, JERRY GOLLUB, Haverford College, DOUGLAS DURIAN, University of Pennsylvania — The rheology of a suspension of soft colloidal particles is investigated using a pressure-driven flow in a deep 25 μm wide microchannel. The system is composed of N-isopropylacrylamide (NIPA), colloidal microgel particles, suspended in aqueous solution. NIPA is temperature-sensitive in that the hydrodynamic radius of a particle decreases as temperature increases [1]. Therefore, colloidal suspensions of different packing fraction can be obtained simply by varying the temperature using a temperature-controlled stage. We determine the velocity profile and the local shear rate of the suspension using particle image velocimetry (PIV). We have developed methods to accurately infer the suspension shear viscosity and shear stress as a function of shear rate. The dynamical range of shear rates probed is approximately 5 orders of magnitude, ranging from 10^{-3} to 10^{2} s^{-1}. Results show that as the packing fraction is increased towards the jamming point, the velocity profiles are markedly non-Newtonian. Further, near the jamming point, the stress versus shear rate curves show yield stress behavior. [1] Alsayed, A.M., Islam, M.F., Zhang, J., Collings, P.J., Yodh, A.J., *Science* **309**, 1207.-1210 (2005)

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