Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Active Microrheology Using Optical Tweezers to Characterize Viscoelastic Properties of Entangled DNA COLE D. CHAPMAN, UCSD, KENT LEE, DEAN HENZE, University of San Diego, DOUGLAS E. SMITH, UCSD, RAE M. ANDERSON, University of San Diego — We use active microrheology techniques to investigate the frequency-dependent linear elastic and viscous moduli (G', G") of entangled DNA. Utilizing optical tweezers, single microspheres, embedded within solutions of entangled DNA of varying molecular lengths and solution concentrations, are driven sinusoidally over a frequency range of 0.6 - 95 Hz, while fluorescence microscopy is used to simultaneously visualize the deformation of a sparse number of DNA molecules entangled in the solution. DNA lengths of 11 kbp – 115 kbp and solution concentrations of 1.0 – 2.5 mg/ml are probed to determine the dependence of the viscoelasticity of entangled DNA on solution concentration and, for the first time, molecular length. Results are compared to theoretical predictions for entangled polymers, as well as previously reported macrorheology results.

Cole D. Chapman
UCSD

Date submitted: 08 Nov 2012 Electronic form version 1.4