

Abstract Submitted
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Nanoscale structure and dynamics of colloid-semiflexible polymer solutions JI YEON HUH, ERIC M. FURST, University of Delaware — Interactions and structure in colloid-polymer solutions control the phase behavior, viscoelasticity, stability, and vitrification, which play significant roles in many industrial applications. Filled semiflexible networks demonstrate distinctive rheological properties due to their large persistence length. They are important in many biological and surfactant systems, and display additional complexity because of the alignment and isotropic-nematic transition. In this work, we report diffusing wave spectroscopy studies of the dynamics of colloidal particles suspended in F-actin solutions in time scales $10^{-6} < t < 10^{-2}$ s, and in the concentration of $14.7\mu\text{M}$. Monodisperse polystyrene spheres are coated using bovin serum albumin to reduce filament adsorption. By adjusting the actin filament length with the capping protein gelsolin, we observe the entanglement transition from dilute to semi-dilute regimes. Our data shows quantitative agreement with the theory of semiflexible polymer solutions in the dilute limit^[1]. However, we find discrepancies in the entangled limit which may indicate the difference between local and bulk properties. Using a shell model for the local viscoelastic response^[2], we find that the response is consistent with a depletion-like structure surrounding the embedded colloidal particles^[3]. [1]Shankar et al., *J. Rheol.* 46, 1111 (2002) [2]A. Levine and T. Lubensky, *Phys. Rev. E* 63, 041510 (2001) [3]Y. L. Chen and K. S. Schweizer, *J. Phys. Chem. B* 108, 6687 (2004)

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