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Microrheology of active actin networks TRAVIS H. LARSEN, University of Delaware, ERIC M. FURST, University of Delaware — To provide insight into the viscoelastic response of non-equilibrium, entangled semi-flexible polymeric networks, we study the model system of F-actin networks in the presence of active fragments of skeletal myosin. To characterize the microrheological response of this system, polystyrene microspheres of 1μm in diameter are suspended into the three-dimensional, entangled F-actin network and diffusing wave spectroscopy is used to measure the mean-squared displacement of the particles on timescales from 100ns to 10ms. Particle motion is a result of both random thermal forces and the dissipation of actin filament fluctuations caused by the interactions of the suspended motor proteins with the network. Upon addition of myosin, we observe an increase in the MSD of the tracer particles and a shift in the scaling–dependence with respect to lag time from $t^{3/4}$to t^{x}, where $3/4 < \mathrm{x} < 1$. This shift indicates that the random, parallel "tugs" on the filaments by the motor proteins cause the filaments to develop an apparent decreased persistence length at length scales longer than the crossover length. Finally, we demonstrate that the addition of the cross-linking protein, α-actinin, suppresses this "active" scaling behavior, while maintaining elevated probe particle diffusivity relative to the control.

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