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**Dual-Function Epi-fluorescence Optical Tweezers to Characterize Single Polymer Interactions in Complex Polymeric Fluids** KENT LEE, USD, COLE D. CHAPMAN, UCSD, RAE M. ROBERTSON-ANDERSON, USD, USD TEAM, UCSD TEAM — Intermolecular interactions within entangled polymeric fluids are highly complex and not well understood. Previously, we investigated these interactions on a single-molecule level by using optical tweezers and fluorescence microscopy to measure interaction forces between DNA molecules and self-diffusion of DNA, respectively. To better characterize these interactions, we have developed an epi-fluorescence optical tweezers which combines an epi-fluorescence microscope with a dual-trap, force-measuring optical tweezers. One of the optical traps is moveable enabling different DNA lengths to be stretched across the two traps. Forces on both traps are measured allowing us to probe the force exerted on a trapped DNA molecule by surrounding entangling DNA. Fluorescence capabilities allow us to directly visualize polymer interactions and dynamics while take force measurements. By fluorescently-labeling either the trapped DNA or a select number of surrounding DNA, we can determine both the conformational changes that the measured force induces on the DNA as well as the various molecular configurations that produce each force. These studies will provide a much needed link between single-molecule dynamics and conformations and intermolecular forces in complex polymeric fluids.

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