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**Dynamics of DNA-bridged particle dimers in well-entangled polymer solutions under large amplitude oscillatory shear (LAOS)**[1] SEUNGHWAN SHIN, KEVIN DORFMAN, XIANG CHENG, Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, MN 55455
— Although evidence for shear-banding flows in highly entangled polymer solutions has accumulated over the last two decades, the shear-induced microscopic conformational changes of individual chains that trigger shear banding remains unknown. Here, using a custom-built high-resolution rheo-confocal shear cell, we experimentally study the dynamics of DNA-bridged particle dimers in the shear-banding flow of well-entangled double-stranded DNA (dsDNA) solutions under LAOS to reveal the microscopic dynamics of entangled DNA chains in shear-banding flows. In our experiments, we first confirm that the velocity profiles of the entangled DNA solutions are inhomogeneous at high Weissenberg number (Wi) and develop into strong shear-banding flows with two distinct shear bands. Second, we investigate the dynamics of the particle dimers linked by long linear dsDNA chains and measure the distribution of dimer orientations in the high and low shear-rate bands. Quantitative analyses of the spatially distinct dynamics of such dsDNA-bridged dimers in the two co-existing bands provide important insights into the microscopic origin of the shear-banding flows in entangled polymer solutions.

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