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Microscopic Details of Plastically Sheared Colloidal Gels GARY L. HUNTER, TIFFANY SOO, DENIS SEMWOGERERE, ERIC R. WEEKS, Emory University — We use fast confocal microscopy to study effects of different shear rates on colloidal depletion gels. Our samples consist of PMMA spheres in a refractive index matched solvent, with polymer added to produce a depletion interaction. We subject these samples to different rates of oscillatory shear with similar strain amplitudes. By tracking the three-dimensional trajectories of several thousand particles, we directly observe how shear modifies the gel's structure at the particle-level and how differences in local structure affect shear-induced dynamics. We find that increasing shear rate significantly increases the rate of plastic bond rearrangement, but that large clusters remain mostly intact, even when the observed deformations are highly non-affine.

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