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Anisotropic Heterogeneous Dynamics in Confined Colloidal Liquids under Oscillatory Shear PRASAD SARANGAPANI, University of Notre Dame, ANDREW SCHOFIELD, University of Edinburgh , YINGXI ELAINE ZHU, University of Notre Dame — We have investigated the dynamics of confined amorphous "hard-sphere" colloidal suspensions under oscillatory shear using a home-designed micron-gap rheometer interfaced with a confocal microscope. We have focused on model hard-sphere colloidal suspensions of micron-sized poly-(methyl methacrylate) (PMMA) particles suspended in density and refractive index matched nonpolar solvents at particle volume fractions, $\phi = 0.40$ and 0.43. We simultaneously visualize the dynamical response of confined PMMA particles between two solid surfaces at narrow gap spacing of 10-28 particle layers to applied shear deformation and measure their viscoelasticity. Above a threshold strain of $\sim$6% where an applied deformation is sufficient to induce plastic behavior, we find that structural rearrangements are highly anisotropic. Non-affine motion, determined by subtracting the globally uniform strain from the bare particle coordinates, reveals that particles move as cooperatively rearranging groups with a preferred orientation along the flow direction. Metrics which probe cooperative dynamics all reveal a strong amplitude, thickness, and directional dependence on the characteristic sizes of the cooperatively rearranging regions.

Prasad Sarangapani
University of Notre Dame

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