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Structural Rearrangements in Confined Colloidal Liquids under Oscillatory Shear PRASAD SARANGAPANI, University of Notre Dame, ANDREW SCHOFIELD, University of Edinburgh, Y. ELAINE ZHU, University of Notre Dame — We have investigated the dynamics of confined suspensions under oscillatory shear using a micron-gap rheometer interfaced with confocal microscopy. Our system consists of sterically stabilized poly-(methyl methacrylate) (PMMA) particles suspended in density and refractive index matched solvents at particle volume fractions, $\phi = 0.40$-0.43, confined between two solid surfaces with gaps ranging from $\sim$10-30 particle layers. 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 transverse to the flow direction. Measures which probe cooperative dynamics all reveal a strong amplitude, thickness, and directional dependence on the characteristic sizes of cooperatively rearranging regions. Interestingly, we find that medium range orientational order has a significant influence on shear-induced dynamics, particularly the shapes of rearranging regions.

Prasad Sarangapani
University of Notre Dame

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