Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Cage Trapping and Melting of Colloidal Suspensions under Confinement and Shear Excitation PRASAD SARANGAPANI, Y. ELAINE ZHU, Dept of Chemical and Biomolecular Engineering, Univ.of Notre Dame — The details of the glass transition are still hotly debated. The unusual phenomenon where the viscosity of supercooled fluids diverges near the glass transition without marked structural change is often attributed to a growing length scale of cooperatively rearranging clusters (CRC) of molecules or particles. One way to probe the dynamics of CRC is through confinement, where a glass transition can be observed 'sooner' as film thickness approaches a critical value while temperature and volume fraction remain constant. We study a hard-sphere poly(methyl methacrylate) colloidal suspension to model glassy materials. Using a home-designed micro-rheometer interfaced with a confocal microscope, we visualize the structure and dynamics of confined colloidal thin films between two surfaces at narrow gap spacing ranging from 50 μm to 1-2 μm. Recent experimental evidence has shown that the size of CRC grows dramatically as film thickness approaches an apparent critical dimension of 10-15 particle layers. In preliminary experiments by *in situ* shear force measurements and microscopic characterization, we investigate the re-fluidization or 'melting' of glassy colloidal thin films by applying large shear amplitude and frequency. This phenomenon consequently causes the α and β relaxation regimes to occur sooner compared to un-sheared confined glassy thin films.

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Date submitted: 10 Nov 2006 Electronic form version 1.4