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Size Segregation in Sheared Jammed Colloids[1] ARMSTRONG MBI, DANIEL BLAIR, Georgetown University Department of Physics and Institute of Soft Matter and Metrology — It is well known that granular materials can spontaneously size segregate when continuously driven. However, in jammed colloidal suspensions, this phenomenon is not well understood. Colloidal dispersions provide a unique system to study the structure and dynamics of jammed matter. In this talk, we present results of size segregation of a continuously sheared binary colloidal suspension well above point J. Our colloidal system is comprised of indexed-matched bi-disperse silica particles with diameters $a = \{2.3\mu m$ and $3.2\mu m\}$ and at $\phi \approx 61\%$, well above the colloidal glass transition. We apply a highly controlled shear at a constant shear rate through the use of a rheometer. By coupling our rheometer with a high-speed laser scanning confocal microscope, we directly image the structure and flow profiles of the suspension as it un-jams. We observe migration of the small and large species; large particles move to the top while the small particles move toward the bottom conserving the total volume fraction in all regions. Moreover, we find that an associating feature of segregation is a sustained shear band. Our results are consistent with a recently proposed void filling and squeeze expulsion mechanism.

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