

Abstract Submitted
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Rotational and Translational Phonon Modes in Glasses Composed of Ellipsoidal Particles¹ PETER J. YUNKER, KE CHEN, University of Pennsylvania, ZEXIN ZHANG, Soochow University, WOUTER G. ELLENBROEK, Eindhoven University of Technology, ANDREA J. LIU, ARJUN G. YODH, University of Pennsylvania — The effects of particle shape on the vibrational properties of colloidal glasses are studied experimentally. ‘Ellipsoidal glasses’ are created by stretching polystyrene spheres to different aspect ratios and suspending the resulting ellipsoidal particles at high packing fraction. By measuring displacement correlations between particles, we extract vibrational properties of the ellipsoidal glass. Low frequency modes in glasses composed of ellipsoidal particles with major/minor axis aspect ratios ~ 1.1 are observed to have predominantly rotational character. By contrast, low frequency modes in glasses of ellipsoidal particles with larger aspect ratios (~ 3.0) exhibit a mix of rotational and translational character. All glass samples were characterized by a distribution of particles with different aspect ratios. Interestingly, even within the same sample it was found that small- aspect-ratio particles participate relatively more in rotational modes, while large-aspect-ratio particles tend to participate relatively more in translational modes.

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