

Abstract Submitted
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Phonon Spectra in Disordered Clusters of Colloidal Particles with Attractive Interactions¹ ARJUN G. YODH, PETER J. YUNKER, KE CHEN, University of Pennsylvania, ZEXIN ZHANG, Soochow University — The influence of size and morphology on the vibrational properties of disordered clusters of colloidal particles with attractive interactions is studied experimentally. Water- lutidine mixtures induce fluid mediated attraction between micron-sized polystyrene particles, leading to the formation of attractive glasses with high local packing fractions. By measuring displacement correlations between particles, we extract the vibrational properties of these disordered clusters. Surprisingly, the spectra and character of vibrational modes did not depend on the number of particles involved. Rather, it depended strongly on the average number of nearest neighbors. An increase in the number of nearest neighbors shifted the phonon spectrum to higher frequencies, independent of the total number of particles in in the cluster. Simulations of structureless random networks of springs support these results, and further suggest that the dependence of phonon spectrum on number of nearest neighbors is a generic property of disordered networks.

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