Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Rheological properties of Cubic colloidal suspensions. ARMAN BOROMAND, JOAO MAIA, Case Western Reserve University — Colloidal and non-colloidal suspensions are ubiquitous in many industrial application. There are numerous studies on these systems to understand and relate their complex rheological properties to their microstructural evolution under deformation. Although most of the experimental and simulation studies are centered on spherical particles, in most of the industrial applications the geometry of the colloidal particles deviate from the simple hard sphere and more complex geometries exist. Recent advances in microfabrication paved the way to fabricate colloidal particles with complex geometries for applications in different areas such as drug delivery where the fundamental understanding of their dynamics has remained unexplored. In this study, using dissipative particle dynamics, we investigate the rheological properties of cubic (superball) particles which are modeled as the cluster of core-modified DPD particles. Explicit representation of solvent particles in the DPD scheme will conserve the full hydrodynamic interactions between colloidal particles. Rheological properties of these cubic suspensions are investigated in the dilute and semi-dilute regimes. The Einstein and Huggins coefficients for these particles with different superball exponent will be calculate which represent the effect of single particle's geometry and multibody interactions on viscosity, respectively. The response of these suspensions is investigated under simple shear and oscillatory shear where it is shown that under oscillation these particles tend to form crystalline structure giving rise to stronger shear-thinning behavior recently measured experimentally.

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Date submitted: 01 Aug 2016 Electronic form version 1.4