Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Shear thickening and jamming in suspensions of different particle shapes ERIC BROWN, University of California, Merced, HANJUN ZHANG, NICOLE FORMAN, DOUGLAS BETTS, JOSEPH DESIMONE, University of North Carolina, Chapel Hill, BENJAMIN MAYNOR, Liquidia Technologies, HEINRICH JAEGER, The University of Chicago — We investigated the role of particle shape on shear thickening and jamming in densely packed suspensions. Various particle shapes were fabricated including rods of different aspect ratios and non-convex hooked rods. A rheometer was used to measure shear stress vs. shear rate for a wide range of packing fractions for each shape. Each suspensions exhibits qualitatively similar Discontinuous Shear Thickening, in which the logarithmic slope of the stress vs. shear rate has the same scaling for each convex shape and diverges at a critical packing fraction ϕ_c. The value of ϕ_c varies with particle shape, and coincides with the onset of a yield stress, a.k.a. the jamming transition. This suggests the jamming transition controls shear thickening, and the only effect of particle shape on steady state bulk rheology of convex particles is a shift of ϕ_c. Intriguingly, viscosity curves for non-convex particles do not collapse on the same set as convex particles, showing strong shear thickening over a wider range of packing fraction. Qualitative shape dependence was only found in steady state rheology when the system was confined to small gaps where large aspect ratio particle are forced to order.

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Date submitted: 10 Nov 2011 Electronic form version 1.4