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Role of Shape Anisotropy on the Glassy Dynamics of Colloidal Suspensions MUKTA TRIPATHY, KENNETH SCHWEIZER, University of Illinois, Urbana-Champaign — Center-of-mass ideal mode coupling theory (MCT), the nonlinear Langevin activated barrier hopping theory, and the Reference Interaction Site Model have been employed to investigate the structure and slow dynamics of suspensions composed of hard and rigid nonspherical particles. Objects of dimensionality one (rods, rings), two (discs), and three (polyhedra) have been studied. For non-compact particles the volume fraction of ideal kinetic arrest, corresponding to a crossover to activated dynamics, decreases with particle dimensionality and/or aspect ratio. On the other hand, the ideal vitrification volume fraction of compact 3-dimensional objects is a complex and subtle function of particle shape. Calculations of the entropic barrier for activated transport, mean relaxation time, transient localization length, diffusion constant, elastic modulus, and effective fragility have been performed. Deep in the ideal glassy region the barrier height and mean hopping time are controlled by the shape-dependent mean square confining force exerted on a particle by its surroundings. A nearly universal collapse of many dynamical properties is achieved based on a dimensionless difference variable that quantifies the magnitude of the mean square force compared to its critical value at the ideal MCT transition.

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