GLASSY DYNAMICS IN SUSPENSIONS OF NON-SPHERICAL COLLOIDS

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Glassy dynamics of isotropic fluids of hard symmetric dumbbells (diatomics), rods, cylinders and disks are studied using a simple form of mode coupling theory and its generalization to predict barriers and activated hopping transport. Orientational degrees of freedom dynamically enter in a pre-averaged manner, and structural correlations are quantified based on a center-of-mass version of the site-site Reference Interaction Site Model. A length-to-diameter (aspect) ratio serves as a principal parameter describing shape anisotropy. The ideal glass transition volume fraction of dumbbells is predicted to be a nonmonotonic function of aspect ratio. For continuous cylinders, ellipsoids and disks power law dependencies of glass transition volume fraction and localization length on aspect ratio are found in the highly anisotropic limit. The consequences of discotic liquid crystalline order for infinitely thin disks has also been studied. Multiple scaling behaviors with volume fraction and aspect ratio are predicted for the localization length, barrier height, elastic shear modulus and yield stress.