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Dynamics of Cubic Colloids JOHN R. ROYER, GEORGE L. BURTON, NIST, DANIEL L. BLAIR, Georgetown University, STEVEN D. HUDSON, NIST — There have been significant advances in the synthesis of anisotropic particles, however little is known about how shape and directional interactions influence particle dynamics in a suspension. We address this issue by studying both the bulk rheology and micro-scale particle dynamics in suspensions of hollow, silica cubes. These cubes are particularly well-suited for studying the role of anisotropy since they are mono-disperse, readily dyed and index-matched for confocal imaging, and can be synthesized in bulk quantities. Using confocal microscopy to image dilute, quiescent suspensions of cubes, we find the long-time diffusion coefficient decreases with packing density as $D_\infty/D_0 \simeq 1 - 3.1\phi$, differing from the standard hard-sphere slope of -2.1. Similarly, small-volume viscometry reveal a higher intrinsic viscosity for the cubic particles, demonstrating that the particle shape has a significant impact on the suspension dynamics. We further investigate these shape-effects using confocal-rheometry to characterize shear-induced diffusion in these cubes. Using depletion, we also investigate the role of attractive, directional interactions, tuning the interaction strength by varying the depletant size and concentration.

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