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How do colloidal particles rotate? New Materials and New Physics LIANG HONG, Materials Science and Engineering Department, University of Illinois at Urbana-Champaign, STEPHEN ANTHONY, Department of Chemistry, University of Illinois at Urbana-Champaign, HUILIN TU, Materials Science and Engineering Department, University of Illinois at Urbana-Champaign, STEVE GRANICK, Materials Science and Engineering Department, Department of Chemistry, Physics and Chemical Engineering University of Illinois at Urbana-Champaign
— Surface modification of colloidal particles to a Janus (asymmetric) chemical composition affords an opportunity to measure the rotational dynamics of colloidal particles in suspension as well as at interfaces. Using a metal deposition technique, we make particles half-covered by metal, and generate geometrically symmetric but chemically and fluorescently asymmetric materials. The rotational dynamics of single colloidal particles as well as rod-like structures have been measured utilizing imaging and tracking techniques. Increasing the concentration of polyelectrolytes in the solution results in the retardation of the rotational diffusion of single colloidal particles. This decrease, however, is not proportional to the viscosity of the solution. Moreover, we formed a metal-welded rod-like tetramer with this approach; for the first time, the rotational dynamics along the long-axis is measured. Research in progress includes chemical modification of the metal surface to form new colloid based materials and Brownian dynamics studies of these new materials.

Liang Hong
Materials Science and Engineering Department, University of Illinois at Urbana-Champaign

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