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Effects of topology and curvature on the hydrodynamics of membranes and interfaces MARK L. HENLE, A.J. LEVINE, Department of Chemistry and Biochemistry, University of California, Los Angeles, RYAN MCGORTY, A.D. DINSMORE, Department of Physics, University of Massachusetts, Amherst — Understanding membrane and interfacial hydrodynamics is vital for a variety of biological systems and technological applications. Within the cell membrane, for example, the diffusion of proteins is essential for cell-cell signaling. For many of these applications, the membrane/interface is spherical. Such a geometry imposes a *global* topological constraint that, for instance, forces the velocity field on an incompressible membrane to have two vortices. In addition, the *local* membrane curvature strongly modifies particulate transport when it is comparable to the Saffman-Delbrück length (the ratio of the membrane viscosity to the viscosity of the surrounding fluid). In this talk, we present both experimental and theoretical results on the motion of extended objects (rods) in spherical membranes. The experiments investigate the motion of colloidal rods trapped on the surface of a water-in-oil droplet decorated with nanoparticles; the analytic theory solves for the rod mobility as well as the flows in the membrane and the surrounding fluids caused by the motion of such rods. We find that the topology of the membrane can indeed have a significant effect on the dynamics of the rod, and that our theoretical description agrees quantitatively with the experimental results.

Mark L. Henle
Department of Chemistry and Biochemistry
University of California, Los Angeles

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