

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Anisotropic Stokes Drag and Dynamic Lift on Cylindrical Colloids in a Nematic Liquid Crystal JOEL ROVNER, CLAYTON LAPOINTE, DANIEL REICH, ROBERT LEHENY, Johns Hopkins University — Unlike isotropic fluids, nematic liquid crystals exhibit a complex assortment of hydrodynamic properties that can strongly depend on the director field and local boundary conditions set by inclusions. To understand further these characteristics, measurements were taken of the Stokes drag on magnetic nanowires suspended in nematic 4-cyano-4'-pentylbiphenyl (5CB). Effective drag viscosities for wires moving perpendicular and parallel to the nematic director were measured and were found to differ by factors of approximately 0.88 to 2.4, depending on the wire orientation and surface anchoring. Additionally, a lift force was observed when wires were forced at an oblique angle to the director resulting in motion divergent from the line of force. The lift was greater for wires with homeotropic anchoring and smaller for wires with longitudinal anchoring, suggesting that the lift force can act as a mechanism for sorting colloidal particles according to their surface chemistry.

Joel Rovner
Johns Hopkins University

Date submitted: 19 Nov 2010

Electronic form version 1.4