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Diffusion in Rodlike Polymer Liquid Crystals PAUL RUSSO, GARRETT DOUCET, JIANHONG QIU, Louisiana State University — The optical tracer self diffusion of the rodlike polymer PBLG has been studied in solutions spanning the isotropic-liquid crystalline phase boundary for two different molecular lengths ($L = 92.1$ nm, axial ratio $x = 58$ and $L = 16.8$ nm, $x = 10.5$). The results are compared to previously published data at $L = 159$ nm, $x = 99$ (*J. Chem. Phys.*, 1999, 111(4), 1746-1752). Under the conditions of the measurements, the two longer rodlike polymers align in the liquid crystalline phase with their cholesteric screw axis in the vertical direction. The diffusion is measured in a particular direction normal to this over distances long compared to the polymer lengths. Except for the shortest polymer, whose cholesteric screw axis does not assume the vertical alignment, the diffusion suddenly increases as the liquid crystalline phase is entered, then declines, signaling the disappearance of topological constraints in the isotropic phase having a vertical component. The parallel component of diffusion is little reduced in the least concentrated liquid crystalline regime, compared to dilute solutions. The solutions also contain a small, fluorescent component whose mobility was not at all affected by the isotropic-liquid crystalline phase transition. Additional measurements have been made for magnetically aligned rods, in which case the differences between parallel and perpendicular diffusion components can be measured directly.

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