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Abnormal Slowdown of Longitudinal Diffusion of F-actin across Isotropic to Nematic Phase Transition[1] JUN HE, JORGE VIAMONTES, JAY TANG, Brown University — F-actin is a semi-flexible macromolecule. Above a few tenths of a percent in volume fraction, F-actin solution undergoes an isotropic (I) to nematic (N) phase transition. By tracking fluorescently labeled F-actin in a network of unlabeled filaments, we studied the diffusion behavior of F-actin across the I-N phase transition and found an abnormal slowdown of longitudinal diffusion after the system enters the transition region. In contrast, for an ordinary liquid crystalline I-N phase transition, there is an abrupt increase of longitudinal diffusion coefficient at the transition point. By comparing the diffusion behaviors of F-actin, microtubule and fd virus in F-actin solution and studying the apparent viscosity dependence on divalent counter-ion concentration, we attribute this counter-intuitive phenomenon to counter-ion condensation induced weak attraction between filaments in nematic phase.

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