Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

The orientational order parameter of nematic liquid crystalline phase of F-actin JORGE VIAMONTES, JAY X. TANG, Brown University — The cytoskeletal protein actin self-assembles to form long and stiff filaments, F-actin, which serves essential functions in cells, such as control of cell shape, division, and motility. Suspensions of F-actin form either entangled isotropic networks or a nematic liquid crystalline phase. Depending on the average filament length, the isotropic-nematic (I-N) liquid crystalline transition occurs at a concentration of 2 mg/ml or above. We have measured the orientational order parameter of F-actin traversing the I-N phase transition using a combination of techniques, including fluorescence microscopy, local birefringence measurement, and x-ray scattering. With actin concentrations above the region of I-N transition, the order parameter approaches a saturated value of 0.75. This value implies significant extent of misalignment or entanglement among long actin filaments even in the nematic phase. At concentrations slightly below the I-N transition, non zero values of the order parameter were detected within a time window on the order of an hour following the sample preparation, which tends to cause unintended initial alignment. This result shows extremely slow rotational kinetics of F-actin in the entangled networks.

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Date submitted: 04 Dec 2004 Electronic form version 1.4