Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

**Fluctuating hydrodynamics of nematics for models of liquid-crystal based biosensors via lattice Boltzmann simulations** ORLANDO GUZMAN, JOSE ANTONIO VELEZ, DAVID CASTAÑEDA, UAM-Iztapalapa —

Experimental biosensors based on liquid crystals (LC) use nematics to detect the presence of specific analytes, via the optical textures exhibited by the LC at long times. Efforts to model the time evolution of these textures have relied on relaxational models, ignoring transport phenomena. In this work we include hydrodynamics into a model for these LC biosensors, using lattice Boltzmann (LB) methods and assess the effect on the lifetime of multidomain structures, characteristic of high concentrations of analyte. We apply Yeoman's et al. LB algorithm, which reproduces the hydrodynamic equations developed by Beris and Edwards for LCs. We also take into account thermal fluctuations, by adding random perturbations to the hydrodynamic modes. Following Adhikari et al., their amplitude is determined by the Fluctuation-Dissipation theorem and we excite both hydrodynamic and the sub-hydrodynamic modes (also called ghost modes). As a result, we analyze the influence of the fluctuations and hydrodynamics on the movement of topological defects.

Orlando Guzman
UAM-Iztapalapa

Date submitted: 03 Dec 2007 Electronic form version 1.4