Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Real-time microbe detection based on director distortions and light transmittance around growing immune complexes in lyotropic chromonic liquid crystals OLEG LAVRENTOVICH, SERGEI SHIYANOVSKII, TOD SCHNEIDER, IVAN SMALYUKH, TOMOHIRO ISHIKAWA, Liquid Crystal Institute, Kent State University, Kent, OH 44242, GARY NIEHAUS, KATHY DOANE, Northeastern Ohio Universities College of Medicine, Rootstown, Ohio 44272, CHRISTOPHER WOOLVERTON, Department of Biological Sciences, Kent State University, Kent, Ohio 44242 — We describe director distortions in the nematic liquid crystal (LC) caused by a spherical particle with tangential surface orientation of the director and show that light transmittance through the distorted region is a steep function of the particle's size. The effect allows us to propose a real-time microbial sensor based on a non-toxic lyotropic chromonic LC (LCLC) that detects and amplifies the presence of immune complexes. A cassette is filled with LCLC, antibody, and antigen-bearing particles. Small and isolated particles cause no macroscopic distortions of the LCLC. Upon antibody-antigen binding, the growing immune complexes distort the director and cause detectable optical transmittance between crossed polarizers. The work was supported by NSF/ITIC DMR-0346348.

Oleg Lavrentovich
Liquid Crystal Institute, Kent State University, Kent, OH 44242

Date submitted: 01 Dec 2004 Electronic form version 1.4