

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Effect of MWCNTs on the electro-optic properties of 5CB LC cells during the Fredericksz Transition¹ MATTHEW EAKLE, Tufts University, GEORGI GEORGIEV, Assumption College and Tufts University, TIMOTHY ATHERTON, PEGGY CEBE, Tufts University — Multi-walled carbon nanotubes (MWCNTs) affect the electro-optic properties of liquid crystals, but the mechanisms of interaction between the two remain not well understood. To address this, we are investigating the effect of alternating electric fields on the optical properties and Fredericksz Transition of 5CB liquid crystal with different concentrations of MWCNTs. 5CB cells with ITO electrodes were made using spin-coated PVA for sample alignment and Mylar™ spacer films to control the thickness, which ranged from 12 to 23 microns. Transmission optical ellipsometry was used to measure the optical retardance (phase delay) and uniaxial director angle of 5CB liquid crystals as the peak voltage of a high-frequency (1 kHz - 1 MHz) AC electric field was varied from 0 to 10 V. For constant frequency, the Fredericksz Transition was noted by a sharp decrease in retardance from an initial plateau, which gradually decreased toward zero as the voltage increased. With increasing frequency, the decay broadened and the Fredericksz Transition occurred at higher voltage. Numerical simulations of CNT-facilitated switching are also presented.

¹Research was funded by the National Science Foundation, Polymers Program of the Division of Materials Research, through DMR-12061010.

Georgi Georgiev
Assumption College and Tufts University

Date submitted: 12 Nov 2013

Electronic form version 1.4