

Abstract Submitted
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Dielectric and electro-optic measurements of nematic liquid crystals doped with carbon nanotubes¹ MATTHEW PETERSON, Tufts University, GEORGI GEORGIEV, Assumption College, TIMOTHY ATHERTON, PEGGY CEBE, Tufts University — We studied the effects of carbon nanotubes (CNTs) on the dielectric and electro-optic properties of nematic 5CB liquid crystals (LCs). Samples containing 0.01%, 0.10% and 1.00% CNTs by weight were prepared. Anti-parallel rubbed cells with a nominal thickness of 10 μm were prepared using indium tin oxide coated glass cells and a polyimide alignment layer. The capacitance and dissipation factor were measured using an Agilent 4284A precision LCR meter. From these measurements, the complex dielectric permittivity was determined as a function of frequency. Analysis of the low frequency regime ($f < 1000$ Hz) indicates that 5CB samples containing CNTs have a higher conductance than neat samples. The Fréedericksz transition critical voltage was noted by a sharp increase in capacitance after an initial plateau. Numerical simulations of CNT-facilitated switching show that polarization induced on the nanotubes from capacitive effects can significantly reduce the critical voltage in DC electric fields, in agreement with experimental results. Measurements of the critical voltage over a range of frequencies will also be presented.

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