

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Carbon nanotubes effects on the order parameter and crystal structure of 5CB liquid crystal GEORGI GEORGIEV, ERIN GOMBOS, MICHAEL MCINTYRE, Assumption College, PEGGY CEBE, Tufts University, ASSUMPTION / TUFTS TEAM — Carbon nanotubes (CNTs) are elongated anisotropic molecular size cylinders that can form a liquid crystal (LC) phase in lyotropic solutions. When dispersed in LCs their nematic directors couple. We have observed a large downshift in transition voltage during Freedericksz transition in LC/CNT nanocomposites. We are interested in the effect that CNTs have on the order parameter of LCs and their phase diagram and crystal structure. We measured using polarized UV/Vis absorption spectra a systematic increase of the order parameter of LC/CNT cells with increase of the CNTs content. The order parameter vs temperature slope decreases with increased CNTs content, which shows that CNTs support an increased order of the LCs to higher temperatures. This makes the Nematic-to-Isotropic transition sharper increasing its first order phase transition characteristics. The main mechanism for the strong nematic coupling is pi-pi stacking between the aromatic rings of the CNTs and LCs which we measure using FTIR and Raman difference spectroscopy. Through Polarized Microscopy, Ellipsometry and DSC we observed a change in crystalline order and an increase in nematic to crystal phase transition temperature with increasing CNTs concentration due to their crystal nucleation activity.

Georgi Georgiev
Assumption College

Date submitted: 28 Dec 2010

Electronic form version 1.4