

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Coupling of Smectic Liquid Crystalline Order of iPP to Carbon Nanotube Alignment under Melt-Shear¹ GEORGI GEORGIEV, Assumption College, ROBERT JUDITH, Tufts University, ERIN GOMBOS, MICHAEL MCINTYRE, Assumption College, PEGGY CEBE, Tufts University, ASSUMPTION/TUFTS TEAM, ASSUMPTION/TUFTS COLLABORATION — Carbon nanotubes (CNTs) exhibit liquid crystalline order and their nematic director couples to the one of low molecular weight liquid crystals. Here we explore the interactions between CNTs and the smectic liquid crystal phase of a polymer and the possibility for a similar coupling in this system. The pure iPP and iPP/CNT films were sheared in the melt state at 200 ° C and 1Hz. The sheared samples were analyzed using polarized optical microscopy, Two Dimensional Microscopic Transmission Ellipsometry (2D-MTE) and Two Dimensional Wide Angle X-Ray Scattering (2D-WAXS). During shearing we detected a sudden increase of birefringence at 151 ° C in the samples, higher than the iPP crystallization temperature, indicating liquid crystalline ordering. We measured anisotropic 2D-WAXS patterns of the samples that contained CNTs, indicating strong ordering of the crystals. Our results indicate that CNTs couple to the smectic phase of iPP, improve its order upon shearing and the crystals created after the formation of the oriented smectic phase are strongly aligned parallel to the direction of shearing.

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Date submitted: 19 Nov 2010

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