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Photopolymerization-Induced Mesophase Transition in Relation to Phase Diagram of Reactive Nematic Mesogen and Hexagonal Columnar Liquid Crystal Mixture TSANG-MIN HUANG, THEIN KYU, Department of Polymer Engineering, University of Akron, Akron, OH — The phase diagram of columnar liquid crystal, 2,3,6,7,10,11-hexakispentyloxy triphenylene (HPTP), and nematic monomer, 4-(3-Acryloyloxypropyloxy)-benzoic acid 2-methyl-1,4-phenylene ester (RM257) mixtures has been investigated experimentally. Phase transition temperatures are determined by using polarized optical microscopy (POM), and differential scanning calorimetry (DSC). The phase diagram shows a eutectic phase behavior and consists of isotropic, nematic, order hexagonal, crystalline, and an induced mesophase which is not existed in the neat components. Wide-angle x-ray diffraction (WAXD) result shows this induced mesophase is the disordered hexagonal phase. By virtue of photocurable capability of RM257, the evolution of phase morphology of the LC mixtures subjected to photopolymerization has been also studied under UV illumination. Depending on reaction temperature and composition, the morphology of the cured mixtures can be fixed in the isotropic or anisotropic states. The existence of columnar phase of HPTP after reaction can be identified in some compositions by WAXD that undergoes reaction-driven phase transformation.

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