Donor/Acceptor Interaction-assisted Mesophase Formation in Liquid Crystals Containing Azobenzenes and Their Polymers

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Azobenzene-based monomers and their polymers containing donor or acceptor groups at terminal positions have been synthesized. The liquid crystalline (LC) mesophase stability of one type of polymer and mixtures of donor or acceptor substituted polymers have been investigated. Mesophase formation and stability of the mixtures were studied using differential scanning calorimetry (DSC) and a hot-stage optical polarizing microscope (HOPM). The mesophase stability of the mixtures was better than those of the individual components. Binary mixture studies of acceptor monomers (a) and donor monomers (d) show that the pure low molecular weight compounds did not form any molecular aggregates and failed to show LC properties, whereas the mixture of donor substituted azobenzene and acceptor substituted azobenzene exhibits LC property. In the case of polymers, the individual acceptors (A) or donors (D) exhibit LC property, and their mixture stabilizes the crystallinity of the mesophase. The results of correlation studies of various proportions of mixtures of a/d and A/D with regard to LC properties and their mesophase stabilities are presented.

Key words: Azobenzene, Mesophase, Donor-Acceptor Interactions, Liquid Crystals, Polymers