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Synthesis and Characterization of Thermotropic Liquid Crystalline Copolyesters with Quasi- Rigid Cyclohexyl and Biphenyl Moieties

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Abstract: Quasi-rigid random copolyesters with cyclohexyl and biphenyl moieties were synthesized via polycondensation with diphenyldichlorophosphate as the condensing agent. The cyclohexyl units have both cis and trans configuration in the polymer backbone. The phenyl rings in 2,2'-biphenyl dicarboxylic acid are forced into a non-coplanar conformation thus decreasing the interchain interaction. Copolymerization of 2,2'-biphenyldicarboxylic acid and 1,4-cyclohexanediol with specific monomers namely terephthalic acid, 4,4'-oxybis(benzoic acid) and 2,6-naphthalene dicarboxylic acid yielded thermotropic liquid crystalline polymers. The structural features of the three random copolyesters were investigated by FT IR, ¹H NMR, and ¹³C NMR spectroscopy. The polymer properties were characterized by thermal analysis, optical microscopy and wide-angle X-ray diffraction. All of the copolyesters exhibited a nematic mesophase. These polymers may emerge as components of photo-optic devices due to the presence of noncoplanar biphenyl unit.

Keywords: 2,2'-biphenyl dicarboxylic acid, diphenic acid, 1,4-cyclohexanediol, diphenyldichlorophosphate.

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