

Polymer Chemistry

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Investigation on dual effects of photosensitive liquid crystalline polyesters

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Main chain liquid crystalline polymers with photosensitive groups have attained special attention owing to the presence of dual functionalities. The mesogenic groups contribute to the LC properties and the photoactive groups in the polymer backbone, may facilitates various photochemical reactions in the polymer chains under the influence of UV irradiation. Polymers containing α , β -unsaturated carbonyl groups such as cinnomoyl, benzylidene groups are well studied for their phototransformation phenomena, occurring upon irradiation under UV light and named as negative type photoresists. The photosensitivity of these materials is based on the π -electron density of the chromophores present in the polymer backbone. A series of polyesters containing a photosensitive benzylidene chromophores in the main chain were synthesized from 2,6-bis(4-hydroxybenzylidene) cyclohexanone (BHBCCH) with various aliphatic and aromatic diacid chlorides by interfacial polycondensation technique. The molecular structure of the monomer and polymers was confirmed by spectral analyses. These polymers were studied for their thermal stability and photochemical properties. Thermal properties were evaluated by thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC). It was found that the polymers were stable up to 238°C and start degrading thereafter. Increase in acid methylene spacer length decreases the thermal stability. The self-extinguishing property of the synthesized polymers was studied by calculating the limiting oxygen index (LOI) value using Van Krevelen equation. The influence of the length of methylene spacer on phase transition was investigated using DSC and found that isotropic temperature decreases on increasing the acid methylene spacer length. Hot-stage optical polarizing microscopic (HOPM) study showed that polymers P1-P3 exhibit grainy texture in the temperature range of 115-127°C. The photolysis of liquid crystalline polyesters revealed that α , β -unsaturated ketone moiety in the main chain dimerizes through $2\pi+2\pi$ cycloaddition reaction to form a cyclobutane derivative that leads to crosslinking.

Biography

Krishnasamy Balaji has completed his PhD from Ann University. He is working as an Assistant Professor in PSG Institute of Technology and Applied Research, Coimbatore, India. He has published eight papers in reputed journals and has been serving as an Editorial Board Member of reputed international journals. He has attended various international conferences in USA, Germany, Japan, etc.

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