POLYTHIOPHENES CONTAINING MESOGENIC SIDECHAINS: MATERIALS TOWARDS LED BACKLIGHTS FOR DISPLAYS

S.Radhakrishnan, P.R. Dhanya, T.Narashimhaswamy and N.Somanathan *
Polymer laboratory,
Central Leather Research Institute, Adyar, Chennai.

Abstract

There is considerable recent interest in the possibility to use oriented polymers as polarized emitter in polymeric light emitting diodes. Such a polarized light source is of interest for use as a backlight in a liquid crystal display since it would allow the removal of the normal backlight and polarizer combination. Utilization of self-organization of the polymers is a preferred one over other methods like mechanical alignment, LB film technique etc. It is aimed to synthesize thiophene polymers, which can simultaneously emit polarized emission under all base color ranges, from a single layer emissive material using simple synthesize strategy. To understand the side chain effect (spacer) and position of linkage on optical properties and liquid crystalline behavior, thiophene alkyloxy benzoyloxy aniline series (**Triad-N series**) and thiophene-3- alkyloxy phenoxy amino benzoate series (**Triad-R Series**) were synthesized. It is aimed to get orientation in the thin films of the above using thermo tropism (thermal annealing). Polarization in photo absorption, photo and electro emission is observed even in spin-coated films of the above to high order. The polymers show photo and electro emission in all base color. A series of (4-alkoxy benzyloxy benzilidine 4-formayl phenyl thiophene –3- carboxylate) (**Tetrad series**) polymers of thiophene containing mesogenic groups linked by azomethine and ester linkages were synthesized and the optical properties were compared with Triad series. With the increase of phenyl rings in the side chain, the photo and electro emission dichroic ratio increase (in spin coated film itself) and the above properties were influenced by the alkoxy chain length and linkage groups present in the side chain. The results show that the dichroic ratio changes with the spacer length both in triad and tetrad series. In order to understand further, the influence of polymeric structures on aggregation was studied in detail. The obtained results suggest that the type of aggregation change with alkoxy chain of the above polymers, which may contribute for the variation in polarization of optical properties of the spin coated films of the above polymers.