

## Synthesis and Characterization of Soluble $\pi$ -Conjugated Polymers for OLED's Application

**Raman Saini<sup>2</sup>, Anita Meena<sup>2</sup>, Bhakti Khitoliya<sup>2</sup>, Parveen Saini<sup>1</sup>, Ritu Srivastav<sup>1</sup>,  
Kanchan Saxena<sup>1</sup>, M.N.Kamalasannan<sup>1</sup>, D.Kumar<sup>2</sup> and S.k. Dhawan<sup>1,\*</sup>**

<sup>1</sup> Polymeric & Soft Materials Section, National Physical Laboratory, Dr. K.S.Krishnan Road, New Delhi-110012, India

<sup>2</sup> Department of Applied Chemistry and Polymer Technology, Delhi College of Engineering, Bawana Road, Delhi-110042, India

\* skdhawan@mail.nplindia.ernet.in

### Abstract

One of the promising materials for the designing of Organic Light Emitting Diodes (OLEDs) technology is the use of the  $\pi$ -Conjugated polymers. OLEDs promises superior performance in brightness and color resolution, wider viewing angle, lower power consumption, a thin aspect ratio and better physical characteristics. The advantage makes OLED display attraction for the next generation mobile flat panel display (FPD). Polymer Light Emitting Diodes have a good chance to become the main display system in the near future since diodes have many advantage concerning preparation and operation over other display system. In the present work, we synthesized the polymer for the red-light emission with LED performances. The poly p-phenylene is one of the simplest conjugated polymers with high stability, economical and non-degenerated ground state. But problem with poly p-phenylene is insolubility in solvents and unprocessibility. To overcome this problem, we synthesized copolymer of substituted benzene and anthracene using the Kovacic's method, which uses the mechanism of propagation of oxidation coupling occurring through a dehydrogenation step via radical cations. The copolymer is soluble in common organic solvent like chloroform, benzene, acetone, THF and NMP etc. The polymer has an optical absorption band at 308nm of the optical spectrum and a photoluminescence maximum in red region. The polymer has been characterized using spectroscopic and thermo gravimetric. OLED device has been fabricated using ITO/PEDOT/Copolymer/Al. The device give bright red electro luminescence on applying threshold voltage of 9V.