TUESDAY

Sym. I : Polymers for Electronics

LED - Ⅱ

D-TUE-06

LIGHT-EMITTING PROPERTIES OF KINKED PPV DERIVATIVES, H.K. SHIM, M.S. JANG, S.Y. SONG and T. AHN (Dept. of Chemistry, KAIST, Taejon, 305-701, Korea)

Electron-withdrawing perfluorobiphenyl substituted PPV derivative was synthesized in order to improve quantum efficiency. This polymer showed its photoluminescence (PL) and electroluminescence (EL) maxima at 510-520 nm which correspond to greenish blue light and also showed about 100 times higher quantum efficiency to MEH-PPV. Oxadiazole contained kinked PPV derivative (POXPV) was also prepared to use as an electron transport layer and this polymer was blended with MEH-PPV by changing their weight ratios. The polymer blended films showed very higher quantum efficiencies and luminance, respectively. Various kinked PPV derivatives having different substituents were synthesized in order to obtain blue light. Especially, *o*-PBTMS-PPV having trimethylsilyl substituents showed its EL emission maximum at 470 nm corresponding to real blue light at low turn-on voltage (9V). The synthesized polymers showed their PL and EL emission maxima depending on the substituents and the main-chain structural modifications. Other EL properties such as current-voltage, current-EL intensity and voltage-EL intensity characteristics will be discussed in detail.

D-TUE-07

SYNTHESIS AND CHARACTERIZATION OF POLY(DIETHYNYLFLUORENE)

HYUN-NAM CHO, J.M. HONG, J.K. KIM, Y.C. KIM, D.Y. KIM and C.Y. KIM (Polymer Materials Lab., KIST, Seoul, 130-650, Korea)

A novel class of a diacetylene-containing polymer, poly(9,9'-di n-hexyl-2,7-diethynylfluorene) was prepared by oxidative polymerization. The resulting luminescent polymer with high molecular weight (Mn=55,000) was soluble in common organic solvents such as chloroform, THF, toluene, etc., and could be easily cast to give free-standing thin film. The structure of the polymer was confirmed by IR, NMR, and UV-Vis. The polymer was stable up to 300°C and easily crosslinked by UV or thermal treatment. The optical absorption spectrum of the solid film showed a peak at 390nm while the photoluminescence(PL) spectrum gave a main peak at 440nm with two shoulder peaks at 470nm and 520nm. The PL studies of polymer solution, film, and cross-linked polymer film, and light-emitting diode(LED) characteristics of the polymer fabricated with aluminum and indium-tin oxide coated glass will be discussed.

D-TUE-08

BLUE-LIGHT-EMITTING CHARACTERISTICS OF NEW HIGH PERFORMANCE POLYMERS WITH WELL-DEFINED CONJUGATION LENGTHS CONSISTING OF FURYL AND PHENYL MOIETIES, M. REE,* S.M. PYO, S.I. KIM, T.J. SHIN, H.K. PARK (Dept. of Chemistry, Polymer Research Inst., Pohang Univ. of Sci. & Technol., Pohang 790-784 Korea) and K.H. PARK (Dept. of Chemistry, Chungnam Natl. Univ., Taejun 305-764 Korea)

Two monomeric diamines with well-defined conjugation lengths were newly synthesized: bis(5-(4-aminophenyl))-2-furan (PFDA) and 2,2'-bis(furyl)benzidine (FurylBZ). The diamines exhibited intense blue-light emissions with relative quantum yileds of 0.92 and 0.52, respectively, in dioxane. From polycondensation reactions of these monomers with pyromellitic dianhydride (PMDA) soluble poly(amic acid) precursors were synthesized and then thermally converted to the insoluble polyimides in thin films: PMDA-PFDA and PMDA-FurylBZ. The newly synthesized polymers in thin films revealed intense blue-light emissions of ca. 440 nm in the photoluminescence. These polymers are thermally stable up to 370°C. In addition, the structures in the polymer films were characterized by X-ray diffraction. The photoluminescent characteristics will be discussed in detail with considering the conjugation length, conformation and morphological structure. Overall, the new polymers can be considered to be potential materials for fabricating optoelectronic devices which emit blue-light. [*This study was supported by KOSEF (Contract No. 95-0501-08-01-3) and by the Center for Adv Functional Polymers at KAIST*].

D-TUE-09

Blue Electroluminescence From Novel Silicon-based Copolymers at Low Operating Voltages K.-D. Kim, J.-S. Park, **H. K. Kim** (Dept. of Macromolecular Sci., Hannam Univ., Taejon 306-791, Korea)

Very recently, we reported that a new class of silicon-based copolymers with uniform π-conjugated segments was synthesized using the Wittig reaction and the Knoevenagel reaction. The UV-vis. absorbance of present copolymers shows strong absorption bands around 320~380 *nm*. Their photoluminescence spectra appeared around 420~480 *nm* in the blue region. Surprisingly, our copolymers with a relatively short π-conjugation length exhibit blue light-emitting diodes operated at below 7 V. It can be explained with our recent results, where the lowering of the LUMO level in luminescent polymers as well as the *d*-orbital participation of silicon atoms reduces the operating voltages in polymeric light-emitting devices. Interestingly, a single-layered light-emitting device of the Al/SiPhPVK/ITO shows both a strong blue emissive band and an additional strong yellow emissive band. Also, the single layer diode shows the dependence of electroluminescent color on the applied voltage: no luminescence with 0 V, a blue color with 10 V and a white color with 14 V.