

**P-185**

**THE EFFECT OF SIDE CHAIN AND BLENDING ON THE LUMINESCENCE PROPERTIES OF (3-ALKYLESTER SUBSTITUTED THIOPHENE)S,** CHANGJIN LEE, SUH BONG RHEE(Adv. Mater. Div., KRICT, Taejeon, 305-600, Korea), SUNG KOO LEE, SUK IN HONG(Dept. of Chem. Eng., Korea Univ., Seoul, 136-701, Korea) AND TAI JONG KANG(Dept. of Chem., Taegu Univ., Taegu, 713-714, Korea)

It is well known that substituents and regiochemistry of polythiophenes greatly influences on their electronic properties. Although poly(3-alkylthiophene)s showed good film forming properties and excellent electronic characteristics, the softness and hydrophobicity of poly(3-alkylthiophene)s may not be suitable for the device applications. We found that alkyl ester-substituted polythiophenes could be prepared from the alkyl ester-substituted thiophenes by the usual chemical oxidative polymerization. With longer alkyl side chain, the coplanarity of thiophene rings in polymer increased and red-shift in the absorption spectrum was observed. The easy energy transfer from the shorter conjugated polythiophene segments to the longer conjugated segments and easy formation of excimer reduced the photoluminescence efficiency of the longer alkyl ester substituted polythiophene. Higher enhancement of luminescence was observed from films cast from the blend of poly(3-alkylester thiophene)s with PMMA and PC than blend film of poly(3-octylthiophene) which showed the improved compatibility with the matrix polymers due to the ester substituent.

**P-186**

**FLUORESCENCE CHARACTERISTICS OF ACETYLENE CONTAINING FLUORENE POLYMERS**  
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The degradation mechanism of polymer light-emitting diodes (LEDs) was studied. The present work reports light-emitting performance of conjugated polymers with acetylene groups after crosslinking. A processability of being used as a charge transporting crosslinked layer was also examined. Poly(9,9 -di-n-hexyl-2,7fluorenylene meta phenylene ethynylene) (PDHFMPE) was treated thermally or exposed to a UV source in Ar atmosphere for crosslinking. PDHFMPE was thermally treated for 2min. at 189°C to leave ca. 99% of the polymer insoluble in chloroform. Raman spectrum of thermally treated polymer showed that the ratio of the peak intensity for the acetylenic group at 2207cm<sup>-1</sup> to the ethylenic group at 1603cm<sup>-1</sup> decreased with heating to reveal the transformation of the triple bonds into the double bonds. PL intensity of cross-linked polymers decreased with an increase of the crosslinking density. This might be attributed to an increase in the concentration of the quenching sites which were developed on transforming the acetylenic structure in the polymer molecules into the ethylenic one.

**P-187**

**HIGHLY EFFICIENT ORGANIC/INORGANIC HYBRID NLO MATERIALS VIA SOL-GEL PROCESS,** I. K. MOON, H. K. KIM (Dept. of Macromolecular Sci., Hannam Univ. Taejeon 306-791, Korea), Y. H. Min and C. S. Yoon (Dept. of Phy., KAIST, Taejeon 305-701. Korea)

Organic/silica hybrid thin films have many advantages over the organic polymer system such as low optical propagation loss, temporal stability, chemical and mechanical stability. The Molecular structure of dye attached sol-gel monomers for the preparation of DANS-diol or DASS-diol/silica hybrid film was designed and synthesized. Both DC contact poling and corona poling were employed to establish the orientation of NLO chromophores in the films. The largest  $\gamma_{33}$  value obtained was 53 pm/V at  $\lambda=632\text{nm}$  and 16pm/V at  $\lambda=1.3\ \mu\text{m}$  when the applied voltage was 130 V/  $\mu\text{m}$ . At room temperature the initial value of the EO coefficient remained the same after 600h. At 150C the  $\gamma_{33}$  value decreased rapidly at the initial stage and stabilized 80% of its initial value after 3h. The channel waveguide was fabricated by using photobleaching method. Analysis of the intensity distribution of the output beam confirmed that the channel waveguide was a single mode waveguide. The propagation loss was measured to be less than 1dB/cm.

**P-188**

**HIGHLY EFFICIENT SECOND-ORDER NONLINEAR OPTICAL POLYURETHANES,** S.-B. LEE, K.-S. LEE (Dept. of Macromolecular Science, Hannam Univ., Taejeon, 300-791, Korea), J. Y. CHOI and J. W. WU (Dept. of Physics, Ewha Womans Univ., Seoul, 120-750, Korea)

The development of nonlinear optical (NLO) materials continues to attract much attention with respect to potential applications in electro-optic devices.<sup>(1)</sup> Recent research efforts on NLO polymers have been particularly focused on constructing highly stable systems for the use even at high temperatures. In this study, new polyurethanes, which involved azo-type chromophore at side chain, were prepared by step growth polymerization. Activities of the poled samples were measured by SHG setup and Mach-Zehnder interferometry measurement.<sup>(2)</sup> No significant decay of the SHG intensity and EO coefficients were observed within 30 days. The result was interpreted that the hydrogen bonding between polyurethanes effectively prevent aligned chromophore from relaxation.

(1) K.-S. Lee, M. Samoc and P. N. Prasad, *Comprehensive Polymer Science*, Suppl. Vol., Pergamon Press, London, 1992. (2) M. J. Shin, H. R. Cho, S. H. Han, and J. W. Wu, *J. Appl. Phys.*, **83**, 1848 (1998)