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- 권 호 제 32 권 1 호
- 분 야 액정/LCD용 고분자 재료
- 제 목 Lens Application of Liquid Crystalline Polymer with Controlling Liquid Crystal Layer
- 저 자 최윤석, 이광호, 김학린, 김재훈
- 소 속 한양대학교 디스플레이 공학연구소, 한양대학교 전자통신컴퓨터공학부, 한양대학교 디스플레이 공학연구소, 한양대학교 전자통신컴퓨터공학부 / 한양대학교 디스플레이 공학연구소
- 초 록 In this study, we report an electrically controllable lens application of a liquid crystalline polymer (LCP) by using the stacked layer system of liquid crystal (LC), LCP and UV curable polymer. Controlling the polarization state of the incident light through use of an applied voltage, we can tune the focusing intensity of lens easily. Moreover, this lens can be integrated as the arrayed structure of micro size without the complicated fabrication process. We will demonstrate the optical characteristics of LCP and the dynamic performances of our microlens array in this presentation.
- 키워드 liquid crystalline polymer, liquid crystal, lens, microlens array, UV curable polymer
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Recently, we reported a liquid crystal alignment material based on polyimide having cinnamate side chain, which showed extraordinary photosensitivity. As a continuing research, a series of new photosensitive polyimide structure was designed and synthesized to enable pretilt angle control. In these polymers, long alkoxy tail with different chain length was introduced at the end of cinnamate side chain. The photoalignment films result in much higher pretilt angles with homogeneous liquid crystal alignment as well as high photosensitivity. Dependence of pretilt angle was investigated with respect to the cinnamate contents and alkoxy chain length. The effect of mixed alkoxy chain length will also be discussed.

최윤석

2PS-257

Lens Application of Liquid Crystalline Polymer with Controlling Liquid Crystal Layer

In this study, we report an electrically controllable lens application of a liquid crystalline polymer (LCP) by using the stacked layer system of liquid crystal (LC), LCP and UV curable polymer. Controlling the polarization state of the incident light through use of an applied voltage, we can tune the focusing intensity of lens easily. Moreover, this lens can be integrated as the arrayed structure of micro size without the complicated fabrication process. We will demonstrate the optical characteristics of LCP and the dynamic performances of our microlens array in this presentation.

이병훈

2PS-258

Liquid Crystalline Salts Containing Fluorocarbon-Hydrocarbon Microblock

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최근 액정에 표시용도가 고전적인 비편재화 방향족계 mesogen 구조와는 달리 비편재화 비아romatic 구조를 갖고 있어 액정성을 나타내는 새로운 형태의 mesogen이 많이 보고되고 있다. 이러한 비편재성 구조의 퍼플루오로알칸 유도체는 알칼리염이 비아romatic 액정화되기 시작 후 액정성이 없어 용융상태에서 퍼플루오로 알칸 사슬길이 무어든 액정화, 비아romatic 액정화하기 mesogen 으로 작용하게 된다 또한 방향제성 구조, 비아romatic 퍼플루오로알칸의 사슬길이의 비에 따라 packing 되는 양상이 달라질 수 있을 것으로 생각된다. 본 연구에서는 하이드로카본(x)와 퍼플루오로카본(y)의 탄소수 비가 $y/x \geq 1$, $1 < y/x < 2$ 및 $y/x < 1$ 일 때 가지로 다른 액정성 염을 합성하여 그 mesogen의 특성을 조사하였다.

장민호

2PS-259

Synthesis and Characterization of Liquid crystalline Pentacene Derivatives

장민호, 최이준¹ 서울대학교 화학공학과
최근 유기박막트랜지스터 (OTF)는 전유기디스플레이에 적용이 가능하여 많은 관심의 대상이 되고 있다. 이는 유기박막트랜지스터를 활용하면 가격이 저렴하고 간단한 제작 공정으로 우수한 전자회로 기판을 실현시킬 수 있기 때문이다. 현재까지 유기박막트랜지스터용 재료들 가운데 펜타센(pentacene)이 가장 높은 전계이동도($2.7 \times 10^4 \text{ cm}^2/\text{Vs}$)를 보유한 전류 첨가비(-108)를 가지고 있어 가장 유리한 구조로 평가되고 있다. 그러나 펜타센의 경우 산화 안정성이 낮고 용해도가 매우 떨어져 실제적 적용에 있어 큰 제약이 풀어지고 있다. 본 연구에서는 펜타센에 다양한 치환체군 도입하여 선택 안정성, 용해성, 용해능 개선시키고자 하였다. 특히 액정성 펜타센 유도체를 합성함으로써 펜타센 비아의 배형성을 증진시키고자 하였다

유기태양전지(분자전자 부문위원회)(II)

Xin-Ran Zhang

2PS-260

Hybrid Photovoltaic Cells Based on Zinc Oxide Nanoparticles and Hole-Transporting Conjugated Polymers

Xin-Ran Zhang, 박인선, 김지영¹, 마창희¹, 윤도영¹ Department of Chemistry, Seoul National University; ¹Department of Electrical Engineering, Seoul National University
We synthesized solvent-stabilized ZnO nanoparticles which are compatible with hole-transporting conjugated polymers, resulting in solution-processible hybrid bulk-heterojunction photovoltaic cells. Several approaches were made to improve the device performance by enhancing the exciton dissociation and light absorption of the active layer.

곽은식

2PS-261

Dye-sensitized solar cells using inverse opal TiO2 films

곽은식^{1,2}, 김중현², 김준경¹, 이현정^{1,2} ¹한국과학기술연구원; ²연세대학교 화학공학과
Dye sensitized solar cell systems based on highly porous nanocrystalline films of titanium dioxide(TiO2) attracts considerable technological interest because of their demonstrated high energy conversion efficiency, low production cost. In this study, we describe dye sensitized solar cells based on inverse opal titanium dioxide films. Inverse opal (IO) films with thicknesses of 12 and 23 μm are deposited using self-assembly of latex spheres with a diameters of 500 nm or 1 μm, respectively. The interstitial voids between the spheres are filled with well dispersed TiO2 nanoparticles and a subsequent heat treatment yields a highly organized porous structure. Our studies show that these cells have much higher efficiency than ever reported up to now for DSSCs with inverse opal structure.

곽찬규

2PS-262

Synthesis and Optical properties of Conjugated Polyelectrolyte Polymers

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Application of fluorescent conjugated polymers for "amplified" sensing of chemical and biological analytes has received considerable attention. Recently, synthesis and application of water-soluble poly(para-phenylene) via Suzuki-cross coupling reaction has studied for many researchers. We have attempted to synthesize water-soluble poly(para-phenylene) derivatives, such as poly[2,5-bis(4-sulfonatobutoxy)-1,4-phenylene-alt-1,4-phenylene] sodium salt and poly[2,5-bis(6-(N,N,N-triethylammonium)-1-oxapropyl)-1,4-phenylene-alt-1,4-phenylene] dibromide. We developed a method to introduce a benzaldehyde and 4-(bromophenyl)-maleimide group, a versatile functional group for bioconjugation, at both ends of PPPs chain. The synthesized polymers showed good solubility in water. The polymer containing benzaldehyde and 4-(bromophenyl)-maleimide end-group had binding capacity for biological analytes showing fluorescence quenching.

구형준

2PS-263

Size-dependent Scattering Efficiency in Dye-sensitized Solar Cell

구형준¹, 박지희^{2,3}, 유범진¹, 유기천¹, 김경곤¹, 박남규^{1,4} ¹한국과학기술연구원; ²포항공과대학교
Effect of scattering particle size on light scattering efficiency in dye-sensitized solar cell has been investigated with a FTO/semitransparent nano-TiO2 underlayer/scattering overlayer

structure, where two different rutile TiO2 particles of 0.3 μm (G1) and 0.5 μm (G2) were used for a scattering layer and 20-nm anatase particle for nano-TiO2 layer. The conversion efficiency of 7.55% for the 7 μm-thick underlayer film is improved to 8.04% and 8.78% when G1 and G2 particulate overlayer is introduced, respectively. In case of the 14 μm-thick underlayer, the conversion efficiency is slightly improved from 8.60% to 9.09% and 9.15% upon depositing G1 and G2 particulate overlayer, respectively. Significant improvement and strong size-dependence upon deposition of scattering overlayer on the relatively thinner TiO2 underlayer film are associated with the quantity and wavelength of transmitted light and the difference in reflectivity of G1 and G2 scattering particles.

김동환

2PS-264

Electroluminescent Triphenylamine-Phenothiazine Copolymer-Containing 1,3,4-Oxadiazole as Side Chain

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OLEDs are currently the subject of an intense research effort due to their promise as devices for full color display application. Although considerable research efforts have been carried out to enhance the performance suitable for practical use, balanced injection of holes and electrons into an emitting layer are considered a prerequisite for high luminous efficiency. We synthesized triphenylamine phenothiazine copolymer containing 1,3,4-oxadiazole, which is substituted on triphenylamine moiety. From the polymer structure, we can expect that the polymer has balanced charge injection/transporting property. In this presentation, synthesis, optical, electrochemical and electroluminescent properties of the polymer will be discussed.

김봉건

2PS-265

Synthesis and Characterization of Star-shaped Oligothiophene Derivatives for Organic Photovoltaic Cells.

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Poly(3-hexylthiophene) (P3HT) has been generally utilized as an electron donor material due to the low band gap and high hole mobility and thermal stability. P3HT(donor) has good compatibility with various acceptor materials. But P3HT blended perylene derivatives were reported to yield very low conversion efficiency of the photovoltaic cells. In this work, a newly designed star-shaped oligothiophene derivative is investigated as a novel donor material. The synthesis of star-shaped oligothiophene was accomplished with oxadiazole coupling reaction. The HOMO-LUMO levels of the oligothiophene were determined by CV analysis and compared with P3HT.

김선영

2PS-266

Polymer electrolytes with supramolecules containing hydrogen bonds for highly efficient solid state dye-sensitized solar cells (DSSCs)

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The development of stable solid-state dye sensitized solar cells (DSSCs) is desirable because of their intrinsic advantages. However, their energy conversion efficiency is very low compared to that corresponding to liquid state DSSCs. Thus, we employed oligomeric supramolecules containing double hydrogen bonding sites at both chain ends of the oligomer to improve the efficiency of solid state DSSCs. The oligomer was synthesized