제34권 1호

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물로 구성된 대칭 그리고 비대칭 화합물들의 열방성 액정 특성에 대한 연구가 활발히 진행되고 있다. 이들의 연구결과에 의하면 dimer들의 액정 상의 형성능, 열적 안정성, 구조는 아조벤젠 화합물과 유연격자의 화학구조 그리고 유연격자와 mesogenic 그룹의 결합양식에 의존한다. 본 연구에서는 광과 전기에 빠른 응답성을 지닌 시아노아조벤젠 그룹에 메틸렌 단위들의 수(n)가 2~8,10 범위에 있는 유연격자를 통하여 에스터 결합으로 시아노아조벤젠 그룹에 도입시켜 얻은 대칭 dimer들 그리고 콜레스테릴 그룹을 도입시켜 얻은 비대칭 dimer들의 열적 특성을 검토하였다. 본 연구결과와 니트로아조벤젠 그룹에 폴리메틸렌 유연격자를 통하여 에스터 결합으로 니트로아조벤젠 그룹에 도입시켜 얻은 대칭 dimer들 그리고 콜레스테릴 그룹에 도입시켜 얻은 비대칭 dimer들에 대한 선행연구결과들과 비교함에 의해 아조벤젠 그룹의 말단의 화학구조와 유연격자의 길이와 홀수-짝수가 액정 상의 형성능과 특성에 미치는 영향에 대한 정보를 얻는것이 본 연구의 주된 목적이다.

정승용 1PS-104

Thermotropic Liquid Crystalline Behavior of Penta-O-4-{4'-(cyanophenylazo) phenoxy}alkyl-D-glucopyranoses(CAGETn)

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최근 본 연구자들은 penta-O-(cholesteryloxycarbonylalkanoyl)-D-glucopyranoses(CAGLn, n=2~8,10, 유연격자중의 메틸렌 단위들의 수)는 온도상승에 의해광학피처가 감소하는 좌측방향의 나선구조를 지닌 열방성 콜레스테릭 상들을 형성함을 보고하였다. 이러한 사실은 penta-O-(*n*-alkanoyl)-D-pyranoses(n=8~14,16, 알킬기중의 메틸렌 단위들의 수)는 열방성 칼럼 상을 형성하는 사실과 판이하며 non-mesogenic 그룹을 도입시켜 얻은 동족체들의 액정 구조는 글루코오스의 환구조에 의해 지배되는 반면 mesogenic 그룹을 도입시켜 얻은 동족체들의 액정구조는 mesogenic 그룹의 화학구조에 지배됨을 시사한다. 본 연구에서는 글루코오스에 빠른 광이성화속도와 전기응답성을 지닌 시아노아조벤젠 그룹을 유연격자를 통하여 에테르 결합으로 얻은 CAGETn(n=2~10)의 열방성 액정특성을 검토하였다. 본 연구결과와 종래의 연구결과를 비교함에 의해 결합양식, 유연격자의 길이 그리고 mesogenic 그룹의 화학구조가 액정상의 형성능과 구조특성에 미치는 영향을 검토하는 것이 본 연구의 목적이다.

정승용 1PS-105

Thermotropic Liquid Crystalline Prpperties of Symmetric and unsymmertric Dimers Based on the Cholesteryl ether and Nitroazobenzen Groups

정승용, 마영대† *단국대학교 고분자공학과*

최근 본 연구자들은 콜레스테릴과 니트로아조벤젠 그룹을 메틸렌 단위들의 수(n)를 2~8,10으로 하는 유연격자를 통하여 에스터 결합으로 도입시켜 얻은 대칭 그리고 비대칭 dimer들의 열적특성을 검토하여 다음과 같은 사실을 알아냈다. 콜레스테롤 그리고 니트로아조벤젠 그룹으로 구성된 대칭 dimer들은 콜레스테릭 상들 그리고 네마틱 상들을 형성하는 반면 콜레스테롤과 니트로아조벤젠 그룹으로 구성된 비대칭 dimer들의 액정구조는 n에 의존하여 각각 스멕틱 상들(n=2~4,6,8,10) 그리고 콜레스테릭 상들(n=5,7)을 형성한다. 본 연구에서는 mesogenic 그룹과 유연격자의 결합양식 그리고 유연격자의 길이와 홀수-짝수가 열방성 액정특성에 미치는 정보를 얻기위하여 n=2~10의 범위에 있는 유연격자를 통하여 에테르 결합으로 도입시켜 얻은 콜레스테롤 그리고 니트로아조벤젠 그룹으로 구성된 대칭 dimer들과 비대칭 dimer들의 열방성 액정 특성을 검토하였다.

정연숙 1PS-106

Synthesis and Characterization of Solution-Processable Materials for OTFT

정연숙, 윤도영† *서울대학교*

Organic materials which have high charge-carrier mobility have attracted great interest for various potential applications. We are interested in solution-processable materials because they may allow large area fabrications by printing or other low cost fabrication techniques. Recently, DPh-BTBT with high mobility and stability was reported, but low solubility is a serious obstacle in solution-process application. And modified materials of the BTBT with various alkyl chains showed high mobilities of spin-coated films in top contact device structures. We investigated modifying the BTBT for increasing solubility with various tail parts. The resulting materials are soluble and they have liquid crystalline phases. The liquid crystallinity and high crystallinity resulted in desired alignment and ordering of active materials on dielectric layer. We fabricated and characterized OTFT devices with bottom contact structures by solution-process such as spin coating and drop casting.

정용철 1PS-107

Holographic gratings based on epoxy-resin photopolymer for data storage

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In recent decades a great deal of research about photopolymers has been carried out in the field of holographic data storage owing to their great advantages: a relatively large refractive index modulation, high energetic sensitivity, low cost, and no need of post chemical treatment. In spite of these merits, photopolymers have still a fundamental problem that the original image is distorted by volume shrinkage that occurs during photopolymerization of the monomer. To overcome this problem, crosslinked matrix system based on epoxy resin would be beneficial to keep a good dimensional tability during photopolymerization. In connection with these, in this work, we introduce fferent epoxy monomer and amine hardener with longer chain length from the one previously used, which is expected to reduce the crosslinking density of matrix and thereby enhance energetic sensitivity.

정원욱 1PS-108

Preparation of Syndiotactic Poly(vinyl alcohol) Particles Using Emulsion Copolymerization of Vinyl Pivalate and Vinyl Acetate and Heterogeneous Surface Saponification

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Poly(vinyl pivalate/vinyl acetate) micro- and nano-particles prepared by emulsion copolymerization of vinyl pivalate (VPi) and vinyl acetate (VAc) with various monomer ratios at low temperature using 2,2-azobis(2-amidinopropane) dihydrochloride (AAPH) as an initiator and sodium dodecyl sulfate (SDS) as an emulsifier. The effect of the polymerization conditions on the conversion, molecular weight, and particle size distribution was investigated. From the emulsion copolymerization of VPi and VAc, spherical P(VPi/VAc) with high yield was effectively prepared, which might be useful for the precursor of syndiotactic poly(vinyl alcohol) (PVA) micro- and nano-particles with various surface properties. And then, various PVA/P(VPi/VAc) skin/core-structured micro- and nano-particles were obtained through the heterogeneous surface saponification of P(VPi/VAc) particles.

정은화 1PS-109

Electro-optical Properties in Polymer Dispersed Liquid Crystal Based on Nematic Liquid Crystal-Montmorillonite-Clay Hybrid Nanocomposite

정은화, 우주연, 정영근, 김병규† *부산대학교*

The electro-optical performance characteristics of polymer dispersed liquid crystal (PDLC) were investigated with the addition of organized clay minerals. In the case of organized clay having good affinity for the liquid crystal, the organized clay minerals were dispersed homogeneously in the liquid crystal in several micron meters. With the addition and increasing amount of the organized clay, the contrast between the light scattering and transparent memory state was increased due to the high affinity for liquid crystal. Also, it was founded that PDLC based on liquid crystal containing organized clay showed that the memory effect exhibited by the liquid crystal/clay (LCC) is rather unusual since most of conventional nematic liquid crystals do not exhibit such a memory effect due to their low viscosity.

정인환 1PS-110

Synthesis and characterization of a low band gap organic semiconducting polymer for photovoltaic cells

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A novel organic semiconducting polymer for photovoltaic cells was synthesized and characterized. The number-average molecular weights (Mn) of the synthesized polymer was determined with gel permeation chromatography (GPC) using a polystyrene standard and found to be 14,900 (PD=1.86). The polymer was soluble in common organic solvents (i.e., chloroform, toluene, THF), and found to be thermally stable. Absorption maximum of a polymer was 498 nm in film state, and optical band-gap of the polymer was determined to be 2.09 eV from the absorption onset. We will examine the photovoltaic performance of the polymer from a thin film composed of a blend of a polymer and the fullerene derivative [6,6]-phenyl C61 butyric acid methyl ester (PCBM).

정준혁 1PS-111

Enhancement of Photovoltaic Efficiency by Polystyrene based Co-adsorbent on the TiO_2 Nanostructure in the Dye-Sensitized Solar Cells

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The charge recombination at the TiO_2-electrolyte interface in the dye-sensitized solar cells is a major factor to determine the photovoltaic efficiency of DSSC. In this work, we introduced polystyrene containing COOH functional-group as a co-adsorbent on the TiO_2 layer. The hydrophobic co-absorbent molecule is anchored to the surface of titanium dioxide semiconductor and can be the barrier to protect the interface between the triiodide of electrolyte and mesoporous TiO_2 layer. And the electron recombination rate was reduced and open circuit voltage (V_{oc}), short circuit current (J_{sc}) and power conversion efficiency (η) were markedly enhanced under 1 sun condition. The electron recombination rate was characterized by electrochemical impedance spectroscopy (EIS).

정진선 1PS-112

physical properties of Copper phthalocyanine (CuPc) Nanowires

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유기 반도체 단분자인 Copper phthalocyanine (CuPc)를 electriphoretic deposition 방법은 이용하여 나노선 형태로 제작하였다. Electrophoretic deposition 방법은 CuPc 파우더를 녹인 유기 용매 (CH_3Cl)에 CF_3COOH를 혼합하고 나노직경의 다공성 무기 배경물질 (Al_2O_3)을 부착한 전극을 담근 후 직류 전압을 인가하였다. 전자주사현미경 (SEM)과 투

과전자현미경 (TEM)을 이용하여 측정된 CuPc 나노선의 반지름이 약 200 nm이었고, 길이는 수 십 um임을 확인하였다. Raman 실험을 통해 CuPc 나노선의 화학적 구조를 확인하였고, UV/Vis 흡수 스펙트럼 측정 실험과 PL 스펙트럼 측정 실험을 이용하여 CuPc 나노선의 광학적 특성을 측정하였다. CuPc 나노선의 전기적 특성을 파악하기 위하여 4-단자 접촉 방법을 이용하여 구한 전류-전압 (I-V) 곡선으로부터 CuPc 나노선 한 가닥의 전기 전도도를 측정하였다.

정찬근 1PS-113

Polyaniline Nanoparticles without Dispersing Agents

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Polyaniline (PANI)-based conducting polymers have attracted much interest because of their high conductivity, thermal and chemical stability. However, they still have some limitation for wide industrial application due to their low solubility. Achieving high solubility of PANI is therefore still duanting challenge. Here, we synthesized polyaniline copolymer having hydrophilic side-chain to improve the solubility of PANI and characterized its physical properties such as conductivity, inherent viscosity and the solubility. We also examined the dispersion of copolymer with several dopants in the different solvents and made the film using different dopants and solvents. These results showed the applicable potential of polyaniline copolymer in the industrial field.

정충화 1PS-114

Photo-curable organic/inorganic hybrid material as an insulator for organic thin film transistors

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Many organic semiconductors have been developed to improve the mobility of organic thin film transistors (OTFTs). Pentacene, pentacene derivatives, oligothiophenes, poly (3-hexylthiophene) and other hetero-aromatic polymers have been extensively studied as active organic semiconductors for OTFTs. Recently the mobility of pentacene based OTFTs has reached the level of hydrogenated amorphous silicon transistors. In addition to this, the insulators need to be patternable to minimize leakage and crosstalk in OTFTs with active layer, and to create an access to the gate electrode. The processing temperature for patterning also should be low to employ flexible plastic substrates. Up to now several direct patternable organic/polymeric materials for the formation of electrode or active channel layer of OTFTs have been demonstrated, however, only few direct patternable organic materials have been reported as a gate dielectric in organic thin film transistors.

정현 1PS-115

Synthesis of Thermosensitive Nanoparticles Based on PNIPAAM Core and Chitosan Shell Structure

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New thermosensitive nanogels, PNIPAAm-AA conjugated with low molecular weight water soluble chitosan(LMWSC), were designed and synthesized for the controlled release of the loaded drug. PNIPAAm nonogels containing carboxylic group on their surface was synthesized using emulsion polymerization. The carboxylic groups were applied to conjugate with the amino group of the LMWSC. The particle size of synthesized nanogels was varied from 380 nm to 25 nm as temperature of the dispersed medium increased. LMWSC-conjugated nanogels of 2 wt% MBA, crosslinking monomer, leaded to a stable aqueous dispersion at concentration of 1mg/1ml otherwise showed gel collapse temperature. The effect of temperature on the dynamic behavior of the PNIPAAm chains were also studied by ^{1}H-NMR and fluorescent measurements.

정현 1PS-116

Synthesis and Charaterization of bile acid conjugated Low Molecular weight Water-soluble Chitosan

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To make Low Molecular Weight Water-Soluble Chitosan (LMWSC) based polymeric amphiphiles that can form nano-sized core-shell structure (nanoparticles) in aqueous milieus, LMWSC were chemically modified with hydrophobic group of bile acid (BA). To physicochemical properties of the LMWSC conjugated BA were investigated by using ^{1}H-NMR, FT-IR, dynamic light scatting (nanoparticles size and distribution), TEM.

정희준 1PS-117

큰 자유체적을 가지는 형광성 공액고분자의 유무기 하이브리드필름 제조 및 물성: 발광증대, 내광성, 내열성 및 내화학성

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폴리아세틸렌의 유도체인 Poly[1-phenyl-2-(*p*-trimethylsilyl)phenylacetylene] [PTMSDPA]는 필름상에서 큰 자유체적을 가지는 공액계 형광고분자로 잘 알려져 있으며, 필름내의 큰 자유체적으로 인하여 다양한 종류의 화학물질을 필름내부에 쉽게 확산시킬 수 있다. 본 연구실에서는 알코올과 액체탄화수소 등의 화합물을 PTMSDPA폴리머의 필름내부에 확산시키면 필름의 형광이 현저히 증대되는 것을 보고한 바 있다. 반면, 이 폴리머는 빛이나 열, 화학물질과 같은 외부 자극에 쉽게 감응해서 아주 민감하게 형광이 소광되는 것을 관찰해 왔다. 본 연구에서는 표면 개질 시 흔히 이용되는 실란커플링제를 PTMSDPA폴리머필름에 확산시켜 필름내부에서 졸겔반응을 시킴으로써 PTMSDPA의 유무기 하이브리드필름을 제조하였고, 형광/자외가시흡광분광법을 통해 이들의 광학특성을 조사한 결과, 빛이나 열, 화학물질과 같은 외부자극에 대해 현저히 향상된 저항성을 가지는 것을 확인했다.

조귀정 1PS-118

Synthesis, characterization, and photovoltaic properties of novel n-type polymers with perylene skeleton

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In the last decades, photovoltaic devices have attracted interesting renewable energy as an alternative the diminishing fossil fuels and reduce the environmental problems. Especially, polymer-based photovoltaic devices have interested the potential of obtaining cheap and easy methods to produce energy from light. Bulk-heterojunctions of two conjugated polymers have several advantages which exibit a high optical absorption coefficient and cover complementary parts of the solar spectrum. Achievement of high electron mobility remains an important goal for the realization of high performance plastic electronics. Perylene derivatives are promising materials for PV and other photonic devices, since they have excellent thermal, chemical, and photochemical stability, as well as their high electron affinity, and charge carrier mobility. In this research, we synthesized novel perylene-based polymers as electron acceptor, and investigated its optical and photovoltaic properties.

조남철 1PS-119

The Impact of Chemical oxidation and Resonance enhancement on the Two-photon absorption cross section of Ladder-type Pentaphenylene and Fluorene derivatives

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Two-photon absorption (TPA) properties of ladder-type pentaphenylene (LPP) oligomers and fluorene derivatives have been investigated. The LPP series found to have largersσ_2 than the fluorene series with the same kind of donors. The LPP oligomers exhibit a nonlinear increase insσ_2 against the number of the LPP repeating unit; the trimer-core compounds exhibits the peaksσ_2 value of 3400 GM (at 710 nm), which is 3.6 times as large as that of the monomer-core compound. Furthermore, it was found that the dication of the LPP-monomer-core compound generated by addition of antimony pentachloride as an oxidant shows a dramatically enhanced TPA transition (8900 GM) at 899 nm, which is nearly one order of magnitude larger than that of neutral one (940 GM at 676 nm). This drastic change on chemical oxidation is considered to originate from a resonance enhancement by the intense charge transfer (CT) band appeared for the dication in the NIR region.

조민주 1PS-120

Molecular Design and Synthesis of D-A Type Cruciform Dyes for Efficient Dye-Sensitized Solar Cells

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Recently, dye-sensitized solar cells (DSSCs) have been attractive in many research groups because of their various advantages, such as high efficiency and low-cost devices for conventional p-n junction solar cells. Rather than conventional organometallic dyes, an efficient dye becomes so intriguing and is usually designed to be of donor-conjugated bridge-acceptor structure called donor-acceptor architecture. In this work, we have designed and synthesized a novel class of cruciform dyes carrying donor and acceptor and characterized their electronic/photophysical properties. Finally, they were applied to fabricate the DSSC and photovoltaic device performances were investigated.

조병민 1PS-121

Surface charge on nanofibrous polycarbonate electrets prepared by electrospinning

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폴리카보네이트(Polycarbonate, PC)수지는 열가소성 고분자로서 내열성, 충격강도, 인장강도, 인성 등에 있어서 여러 가지 좋은 물리적, 기계적 특성을 가지고 있다. 또한 투명한 외관을 가지고 있어 유리나 금속을 대체할만한 엔지니어링 플라스틱으로 각광을 받고 있다. 본 연구에서는 나노섬유를 얻을 수 있는 방법으로서 최근 많은 연구가 이루어 지고 있는 전기방사법을 통하여 염 첨가, 웹의 형태, 제조 방법 등을 달리하여 폴리카보네이트 나노섬유 웹을 제조하고 여러가지 조건과 이때 제조된 나노섬유 웹의 표면전압과의 관계를 규명하고자 하였다.

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Polymeric Multilayers Prepared by the Layer-by-Layer Deposition onto Nanoporous Anodic Aluminum Oxide (AAO) Template

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