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제33권 2호

The Polymer Society
of Korea



일시 : 2008년 10월 9일(목) - 10일(금)
장소 : 일산 KINTEX



한국고분자학회
The Polymer Society of Korea

12:00 **2L5-3** (좌장 : 백상현)
Wide-ranging pretilt control of nematic liquid crystal driven by anchoring competition
김재훈 · 이유진 · 광진석**
한양대학교 · **한양대학교 정보디스플레이공학과
**한양대학교 디스플레이공학연구소

12:30 **2L5-4**
Fabrication of Micro to Nanolithography Using Highly Periodic Smectic Liquid Crystal Defects
정희태 · 김윤호 · 윤동기* · 정현수
KAIST · *삼성전자 반도체 총괄

액정/LCD 재료(III)/고분자합성

14:00 **2P5-1** (좌장 : 이종찬)
Behavior of nematic liquid crystal on soft polymer
곽진석 · 이유진* · 김재훈**
한양대학교 디스플레이공학연구소
*한양대학교 정보디스플레이공학과
**한양대학교 전자통신컴퓨터공학부

14:20 **2P5-2**
Stepped ribbon structure from Oligo(p-phenylene) Rods with Lateral dendritic chains
홍동재 · 이명수
연세대학교 화학과

14:40 **2P5-3** (좌장 : 홍성철)
Size and Shape Controlled Synthesis of Gold Nanoparticles using Poly(1H,1H-dihydroperfluorooctyl methacrylate-*b*-ethylene oxide) Block Copolymers
이민영 · 임권택 · 김상재
부경대학교

15:00 **2P5-4**
Solubilization and Polymer Analogous Reactions of Poly(epichlorohydrin) in Ionic Liquids
김병각 · 이종찬 · 광승엽 · 손은호 · 정재승
서울대학교

15:20 **2P5-5**
Preparation and Properties of Ultra High Molecular Weight Polyethylene : Effect of Cocatalyst
장허신 · 신영준* · 이호영* · 이동호
경북대학교 · *대한유화

15:40 **2P5-6**
Propylene and Ethylene Polymerization Initiated with Mg-Supported Ti Catalysts : Effects of Internal Donor
신영준*** · 이동호** · 하현수* · 강갑구*
*대한유화공업(주) · **경북대학교 고분자공학과

제6회장 [10월 10일 (금)]

고분자구조 및 물성(II)

11:00 **2L6-1** (좌장 : 하창식)
Gas Pressure effect on Phase Behavior of Polystyrene-*block*- Poly(*n*-pentyl methacrylate) copolymer
김진곤 · 김혜정 · 김승빈*
포항공과대학교 화학공학과
*포항공과대학교 화학과

11:30 **2L6-2**
Reactivity of terthiophene monomers understood using computational chemistry and spectroscopy
K. C. Gordon · D. L. Officer*
T. M. Clarke · D. K. Grant*
Department of Chemistry,
University of Otago, New Zealand
*Massey University, New Zealand

12:00 **2P6-1** (좌장 : 방준하)
Hierarchical Assembly of Nanoparticle Superstructures from Block Copolymer-Nanoparticle Composites
강희만 · François A. Detcheverry
Andrew N. Mangham · Robert J. Hamers
Juan J. de Pablo · Paul F. Nealey
University of Wisconsin-Madison

12:20 **2P6-2**
Electrochemical characterization of polyelectrolyte brush
최은영 · Wilhelm T. S. Huck*
한국과학기술원
*Department of Chemistry,
University of Cambridge

바이오센서

14:00 **2L6-3** (좌장 : 신재섭)
Biosensor Based on the Selective Aggregation of Gold Nanoparticles
이강택 · 이윤희 · 김태훈 · 이소영* · 주상우**
연세대학교 화공생명공학부
*서울대학교 수의학과 약리학교실
**숭실대학교 화학과

14:30 **2L6-4**
Biosensors Based on Conducting Polymer Nanotubes Conjugated with Versatile Receptors
장정식
서울대학교

15:00 **2L6-5**
고분자막 습도센서의 제조방법 및 특성평가
공명선
단국대학교 화학과

15:30 **2L6-6**
Biomimetic TiO₂ gel ultrathin Film Sensor
양도현 · 오미혜 · 윤여성 · 신재섭*
Seung-Woo Lee** · Toyoki Kunitake**
자동차부품연구원 · *충북대학교
**The University of Kitakyushu

제7회장 [10월 10일 (금)]

최신 플라스틱 소재와 성형가공 기술

9:30 **2L7-1** (좌장 : 류민영)
환경 친화성 In-mold coloring 재료 개발
황진택
(주)이폴리머

10:20 **2L7-2**
LCD BLU (Back Light Unit)용 플라스틱 재료와 가공기술 동향
강성욱 · 이연석
LG화학 테크센터 응용기술팀

11:10 **2L7-3**
폴리프로필렌 복합재료를 이용한 자동차 전선용 절연재료의 개발
장도훈
LS전선 중앙연구소

13:00 **2L7-4** (좌장 : 황진택)
The Industrial Applications of Carbon Nanotube and Polymer/ CNT Composites
이영실
제일모직 케미칼 연구소

13:50 **2L7-5**
고품질 외관 사출성형 가공기술 [Multi-Material Molding]
오관식
제일모직 TMC사업부 기술지원팀

14:40 **2L7-6**
다수패기 사출성형에서 캐비티간 충전편차 고찰 및 편차 해소를 위한 방법
류민영 · 강민아
서울산업대학교

15:40 **2L7-7** (좌장 : 정현욱)
광학 플라스틱 부품 특성평가를 위한 사출성형 해석기술
박근
서울산업대학교 기계설계 자동화공학부

16:30 **2L7-8**
O/A 기기의 금속부품 대체를 위한 엔지니어링 플라스틱의 CAE 해석 및 사출성형
구명술 · 김도
(주)삼양사 화성연구소

Nanostructured Materials Technology' under '21st Century Frontier R&D Programs' of the Ministry of Education, Science and Technology, Korea.

Young Gun Ko

2L4-4

Honeycomb-mimic PLLA scaffold for tissue engineering

Young Gun Ko[†], Laura A. Smith¹, Peter X. Ma² *Department of Biologic and Materials Sciences, University of Michigan; ¹Department of Biomedical Engineering, University of Michigan; ²Department of Biologic and Materials Sciences/Department of Biomedical Engineering/Macromolecular Science and Engineering Center, University of Michigan*

A scaffold is a dreamed biomaterial of tissue engineers which can culture cells three-dimensionally outgrowing the two-dimensional cell culture in a petri dish to repair or regenerate tissues and organs. Various scaffolds mimicking natural extracellular matrix have been developed to make an optimum environment for cell adhesion, growth, migration and differentiation from macro- to nano-levels. In this study, a biodegradable honeycomb-mimic scaffold, which consists of nano-fibers, was fabricated to mimic a hierarchical architecture of real tissues. A method of the directional phase-separation was achieved by freezing a mold from bottom to top ways. The novel method was applied to fabricate tubular pores in the honeycomb-mimic scaffold. This novel method overcame the limit of a present solid-liquid phase-separation method which pore shapes in the scaffold are decided by shape of porogens and solvent crystals. The fabricated honeycomb-mimic scaffold showed a hierarchical architecture from nano- to macro-scale. The hierarchical structure of honeycomb-mimic PLLA scaffold shows good cell adhesion and differentiation due to the surface roughness in the scaffold and collagen-mimic nano fibers influencing gene expression.

한세광

2L4-5

Synthesis, Characterization, and Medical Applications of Hyaluronic Acid Derivatives

한세광[†] 포항공과대학교

Hyaluronic acid (HA) is a biodegradable, biocompatible, non-immunogenic and linear polysaccharide which has been widely used for various medical applications. On the basis of real-time bio-imaging of HA derivatives in the body using quantum dots (QDots), highly modified HA derivatives were applied for a long acting conjugation of biopharmaceuticals and slightly modified HA derivatives were applied for targeted drug delivery to the tissues with HA receptors, such as the liver and tumors. The half-life of erythropoietin (EPO) conjugated with 20K stealth HA was comparable to that of 40 K PEGylated EPO. Intratumoral injection of anti-VEGF siRNA/PEI-HA complex with 24 mol% PEI content resulted in the effective inhibition of tumor growth by HA receptor mediated endocytosis to B16F1 tumor cells in C57BL/6 mice. Furthermore, the degradation controlled stealth HA was successfully applied for tissue engineering applications such as tissue augmentation and guided bone regeneration.

김원종

2L4-6

Biopolymers for an efficient non-viral gene delivery carriers

김원종[†], 남극란, 김성완¹ 포항공과대학교; ¹유타대학교

Gene therapy has been studied as an efficient tool for controlled regeneration or specific inhibition of tissue growth. In order to magnify the efficacy of gene therapy, development of powerful gene delivery carrier is essential issue as well as design of therapeutic gene. In this study, we developed various polymeric gene carriers for delivering therapeutic gene into specific cell or tissues such as tumor tissue and muscle cells. Physicochemical characterization of polymers was evaluated followed by gene transfection assay in vitro. Finally, we investigated the efficacy of gene carriers for delivering therapeutic gene in vivo.

정영미

2L4-7

Reconstruction of a rabbit ulna bone defect using a PLA/ β -TCP composite by a novel sintering method

정영미, 박민성¹, 이진우¹, 김영하², 김상현, 김수현[†] 한국과학기술연구원; ¹연세대학교; ²광주과학기술원

Bioceramic and polymers have been used as matrices for bone tissue engineering, and successful bone regeneration depends on cellular interaction with these matrices. The aim of this study was to fabricate polylactide (PLA)/ β -tricalcium phosphate (β -TCP) composites with a novel sintering method. We prepared the composite by pressing and thermal treatment of the mixture of PLA, β -TCP after which we seeded bone marrow stromal cells (BMSCs) and either cultured them in vitro or subcutaneously implanted them into nude mice. The BMSCs more effectively formed bone-like structures on the PLA/ β -TCP composites compared to PLA scaffolds. Also, we confirmed enhanced bone regeneration in the rabbit defect model using representative radiography and histological studies. This study revealed that generating osteoinductive PLA/ β -TCP composites with novel sintering method could significantly enhance bone regeneration and be useful for bone tissue engineering.

김성온

2L4-8

Development of post-surgical adhesion prevention using functional hydrogels

김성온, 정성인, 배민수, 권일근[†] 경희대학교 치의학전문대학원 구강생물학과, 구강생물학연구소

In this talk, we introduce new substances and techniques to prevent post-surgical adhesion formation using photocurable hydrogels. Peritoneal administration of photocurable hydrogel and bi-layer hydrogel appears to prevent post-surgical adhesions. We hypothesize that an adhesion barrier, which also delivers anti-adhesion drugs, can address both physical and physiological causes for adhesion formation. Here, we used an in situ photocurable natural polymeric hydrogels such as hyaluronic acid, chitosan or alginate, or bi-layer hydrogels (barrier device) containing the transilast. Transilast was chosen due to its well-known role of anti-inflammation in adhesion formation, and natural polymers were chosen due to their good biocompatibility in a peritoneum. Thus, photocurable hydrogel and bi-layer hydrogel with the transilast have a strong potential as anti-inflammation barriers for the prevention of post-surgical adhesion.

액정/LCD 재료(II) (제 5 회장 [10 월 10 일(금)])

장지영

2L5-1

Hyperstructured Organic Materials Synthesis via Liquid Crystalline State Polymerization

장지영[†], 이승철, 정병문, 박준하 서울대학교

Hyperstructured organic materials are defined as the highly ordered organic materials with mechanical and thermal stabilities comparable to the conventional organic materials. Molecular ordering of small molecules is relatively easy compared to that of macromolecules, while the ordered structures of macromolecules are generally more stable than those of small molecules. For this reason, molecular ordering is often achieved with monomeric molecules and topochemical polymerization is followed to improve structural stabilities. The topochemical polymerization for preparing ordered macromolecules can be carried out in a liquid crystalline (LC) state. In this talk, we will present some examples of our work on the design of the polymerizable liquid crystals.

박지웅

2L5-2

Alignment and Anchoring Transition of Liquid Crystals on the Surface of Self-Assembled Block Copolymer Films with Periodic Defects

박지웅^{1,2,†} ¹광주과학기술원 신소재공학과; ²분자레벨집적화기초연구센터

A rod-coil block copolymer film comprised of a set of periodic splay-bend Néel-wall defect patterns was used as a template to pattern two liquid crystals (LC). LC cells were then constructed using the dry block copolymer film as the substrate and a glass plate as the superstrate. The nematic LC 5CB exhibited a replica texture of the defect

pattern for thin LC cells. In thicker LC cells, regions of uniform nematic 5CB LC alignment and a coarsely spaced grating pattern coexisted. The LC, 4,4'-diheptyloxybenzene(D7AOB) exhibited planar anchoring and the coarse grating pattern in its nematic state, while in the smectic state, uniform homeotropic alignment occurred over the entire surface of the sample. Due to high values of the twist and bend elastic constants in the smectic phase of D7AOB, switching between the coarse grating pattern and the uniform homeotropic pattern occurred at the nematic-smectic A transition temperature of D7AOB.

김재훈

2L5-3

Wide-ranging pretilt control of nematic liquid crystal driven by anchoring competition

김재훈[†], 이유진¹, 박진석² 한양대학교; ¹한양대학교 정보디스플레이공학과; ²한양대학교 디스플레이공학연구소

배열된 폴리머의 표면에 액정의 균일한 배향은 고품질의 액정디바이스를 위한 핵심적인 사항이다. 액정디스플레이의 광학적 설계에서, 액정의 선경사각은 액정디스플레이 모듈의 전기광학적 특성에 강력하게 영향을 미치기 때문에 가장 중요한 파라미터들 중 하나이다. 하지만 중간레벨의 선경사각 (30°~60°)을 안정적이고 균일하게 생성시키는 방법이 개발되지 않아 고품질 고성능의 새로운 액정모드의 개발이 답보상태에 놓여있다. 여기서 우리는 특성이 전혀 다른 두 액정 배향층 (수평배향막과 수직배향막)의 액정에 대한 상호 배향력을 제어함에 의해 연속적인 액정의 선경사각을 생성시키는 방법과 실험결과를 소개하고 이론적 고찰을 통해 실험결과를 반데르발스 상호작용과 배향력 경쟁

이론을 통해 해석하고 분석한 후 응용의 방향성과 응용의 가능성을 제시한다.

정희태 2L5-4
Fabrication of Micro to Nanolithography Using Highly Periodic Smectic Liquid Crystal Defects

정희태¹, 김윤호, 윤동기¹, 정현수 KAIST; ¹삼성전자 반도체 총괄
 The formation of perfect long-range order by soft building blocks is one of the most exciting interdisciplinary research areas in current materials science and nanobiotechnology. Here, we show perfect surface ordering of toric focal conic domains

(TFCDs) with feature size of submicrometer over millimeter-scale area, which can be formed by smectic liquid crystals and a successful route for suitable surface treatment. The highly regular liquid crystal defect domains are several micrometers apart with nanometer dimple structures in the center of domain and hexagonally ordered with a single structure through large area. The domain patterns are molded by UV-curable polymers and transferred directly to another substrate by using micro contact printing technique. This method has significant advantages over existing approaches to lithographic applications that this is easy to fabricate, generate long-range surface ordering with millimeter-scale, need very short time to form periodic arrays.

액정/LCD 재료(III)/고분자합성 (제 5 회장 [10 월 10 일(금)])

곽진석 2P5-1

Behavior of nematic liquid crystal on soft polymer
곽진석¹, 이유진¹, 김재훈² 한양대학교 디스플레이공학연구소; ¹한양대학교 정보디스플레이공학과; ²한양대학교 전자통신컴퓨터공학부

약한 배향력을 가진 표면경계에서 액정의 특이한 성질은 액정의 새로운 응용과 관련하여 많은 관심이 되고 있다. 특히 소프트 폴리머의 표면과 액정 사이의 약한 상호작용에 대한 물리적인 연구는 새로운 액정디바이스 개발을 위한 가장 기초적이고 핵심적인 지식을 제공할 것으로 기대한다. 이 초록에서는 하나의 소프트 폴리머로써, Poly-Methylmethacrylate (PMMA, $T_g = 110$ °C, Sigma Aldrich)과 일자형 전극을 사용하여 다양한 온도 조건에서 수평전기장을 인가하여 표면 액정방향을 제어하는 방법을 조건적으로 제시하며, 또한 PMMA 표면에서 액정방향자들의 동적 재배열 특성과 완화특성에 대한 실험결과를 바탕으로 물리적, 이론적 고찰을 시도하여 실험결과를 분석한 후 향후 소프트 폴리머 표면에서 액정의 거동현상에 대한 응용 방향성과 가능성을 제공하고 응용성을 향상시키기 위해 요구되어지는 소프트 폴리머의 물리, 화학적 특성을 제시한다.

김병각 2P5-4

Solubilization and Polymer Analogous Reactions of Poly(epichlorohydrin) in Ionic Liquids
김병각¹, 이종찬¹, 박승엽, 손은호, 정재승 서울대학교

In the last decade, there has been increasing interest in using ionic liquid (IL) as solvents for chemical reactions. The interest is stimulated not only by their non-volatility but also by their special properties such as reactivity and selectivity. In the polymer chemistry fields, it is not easy to use the ILs because the polymer doesn't dissolve in ILs. Recently, we investigated the solubility of functional polymers in ILs. Interestingly, polymers bearing oxyethylene units or hydroxy groups have good solubility in ILs. Based on this result, we could synthesize the various polymers through polymer analogous reactions in ILs. The reactions of polyepichlorohydrin and fluorinated alkanethiols in IL, [bmim][Cl], were the most successful case which could afford higher conversions and better yields than the corresponding reaction using the common organic solvents. These results demonstrate the potential of the IL as an alternative to organic solvents for polymer analogous reactions.

홍동제 2P5-2

Stepped ribbon structure from Oligo(p-phenylene) Rods with Lateral dendritic chains
홍동제, 이명수¹ 연세대학교 화학과

Rod-coil systems consisting of rigid rod and flexible coil segments are excellent candidates for creating well defined supramolecular structures via a process of spontaneous organization. Recently, we have synthesized the laterally tethered rod-coil molecules, based on oligo(ethylene oxide) dendrons, with variation in the volume ratio of dendrons. The laterally tethered molecule based on flexible segment was observed to self-assemble into a stepped ribbon oblique columnar structure in a solid state and well-defined nanofiber in an aqueous solution, also exhibited dispersed nematic gel on 2wt% of aqueous solution. These results demonstrate that rational design of a self-assembling molecule based on a laterally tethered rod building block allows stable nanostructures to be produced in solid state and solution state. These nanostructures potentially have a number of applications, including the nanoconductor.

장허신 2P5-5

Preparation and Properties of Ultra High Molecular Weight Polyethylene : Effect of Cocatalyst
장허신, 신영준¹, 이호영¹, 이동호¹ 경북대학교; ¹대한유화

Ultra High Molecular Weight Polyethylene (UHMWPE) is a linear polyethylene with molecular weights over 1.0×10^6 and is known as high modulus PE or high performance PE. UHMWPE is a polymer with a unique combination of wear resistance and low-friction surface properties and is also characterized by a good corrosion resistance and impact strength. In order to prepare UHMWPE, the polymerization of ethylene was carried out with various Ziegler-Natta catalysts and cocatalyst under mild conditions, and the viscosity average molecular weight of obtained PE was found to range from 1.0×10^6 to 7.5×10^6 . The effects of cocatalyst on the catalyst activity, the melting temperature, crystallinity as well as molecular weight of PE were investigated.

이민영 2P5-3

Size and Shape Controlled Synthesis of Gold Nanoparticles using Poly(1H,1H-dihydroperfluorooctyl methacrylate-*b*-ethylene oxide) Block Copolymers
이민영, 임권택¹, 김상재 부경대학교

Well-defined diblock copolymers consisting of a hydrophilic poly(ethylene oxide) (PEO) and hydrophobic poly(1H,1H-dihydroperfluorooctyl methacrylate) (PFOMA) block were utilized to the self-assembly of gold nanoparticles. Gold nanoparticles were prepared through LiAuCl₄ autoreduction in the microphase separated morphology of poly(PFOMA10k-*b*-EO10k) block copolymer from chloroform solution at ambient temperature. The particle size and shape were controlled by the block copolymer concentration and PEO block lengths. Our findings indicate that longer PEO blocks lead to an increase in particle size because of an increase in reduction site. An increase in the LiAuCl₄ concentration causes a change in the particle shape from spherical to tetragonal or multi-pods nanoplates with increased size.

신영준 2P5-6

Propylene and Ethylene Polymerization Initiated with Mg-Supported Ti Catalysts : Effects of Internal Donor
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The electron donor (Lewis Base) in typical Ziegler-Natta catalyst system is divided into two types: the internal donor (ID) is added in the preparation of catalyst, while the external donor (ED) is used at the polymerization process. These donors exhibit the significant effects on the polymerization behaviors in polyolefin preparation. The Ziegler-Natta catalysts of various IDs exhibited the different polymerization behaviors. Without any ED (dialkoxysilane), the catalyst of aliphatic diester and diether ID gave the reasonable catalyst activity and isotacticity in propylene polymerization. In this presentation, the polymerization behaviors of various catalysts with various IDs for homopolymerization and copolymerization of propylene and ethylene were investigated.

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Gas Pressure effect on Phase Behavior of Polystyrene-*block*-Poly(*n*-pentyl methacrylate) copolymer
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Gas pressure effect on phase transitions of polystyrene-*block*-poly(*n*-pentyl methacrylate) copolymer (PS-*b*-PnPMA) was investigated by Fourier-transformed Infrared spectroscopy, small angle neutron scattering (SANS) and birefringence. Depending

on the applied gas types, the size of closed-loop consisting of both the lower disordered-to-ordered transition (LDOT) and the upper ordered-to-disordered transition (UODT) varied dramatically. The loop size of PS-*b*-PnPMA became bigger with increasing nitrogen gas pressure, whereas it became smaller for helium gas. Thus, nitrogen could not be considered as a true inert gas for PS and PnPMA under high temperatures and moderate pressure range (less than 100 bar), but helium became a true inert gas. These results are explained by the binding energy calculation.