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 Nafion, a perfluorosulfonate ionomer, is the major membrane material used in polymer electrolyte membrane fuel cells (PEMFC). However, the Nafion membrane is a poor barrier to methanol crossover. In this study, Nafion 117 membranes were modified with a thin film of sulfonated polyaniline (SPANI) by a diffusion-controlled enzymatic polymerization process using a two compartment cell with the monomer aniline-2-sulfonic acid on one side of the membrane and the oxidizing agent H₂O₂ and, horseradish peroxidase(HRP) on the other side. The performance of the modified membranes were evaluated in terms of methanol permeability, proton conductivity and single cell performance. Compared with Nafion 117 membranes, the methanol permeability of the modified membranes is reduced remarkably while proton conductivity is comparable. Effects of the polymerization condition on the performance of the modified membrane were also examined.

이광희 2PS-114

Electrostatic blending of PS/PBA nanoparticles for baroplastic processing
이광희, 류상욱[†] 충북대학교 공업화학과
 Nano particles of poly(butyl acrylate) and poly(styrene) were synthesized by emulsion polymerization technique using tetradecyltrimethylammoniumbromide(TTAB) and sodium dodecyl sulfate(SDS) as surfactant, respectively. The baroplastic properties were investigated by compression molding at room temperature. It was found that the optimum concentration for electrostatic blending was 14.4 mg/ml to produce almost quantitative yield of precipitants. The composition of blend was characterized by ¹H-NMR and the physical properties were investigated by UV-VIS, UTM. The physical and optical properties were influenced by particle size and composition. The more detail comparison between electrostatic and statistical blending will be described.

이규호 2PS-115

Multifunctional Nanocarriers for Targeted Delivery of Drugs
이규호, 김혜현, 김철희[†] 인하대학교
 본 연구에서는 FDA에 승인 받은 biocompatible한 물질인 PLA와 PEG를 이용하여 나노 입자를 제조하였고, 나노 입자 core내에 hydrophobic한 guest molecule을 로딩하여 시간에 따른 방출 정도를 관찰하였다. 나노 입자의 표면 구조는 carboxyl group으로 되어 있어 다양한 작용기 도입이 쉽도록 설계되었다. 이렇게 설계된 나노 입자의 다양한 pH 조건에서의 안정성, 나노 입자의 크기 및 구조와 guest 분자의 loading 및 release 특성은 DLS, SEM, TEM, UV/vis spectroscopy 등을 통하여 규명하였다. 본 연구에서는 이러한 나노입자를 이용하여 in vitro에서의 표적지향성 및 항암 효과를 확인하고자 한다.

이남진 2PS-116

Formulation of transparent conductive coating using graphenes
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 Recently, graphenes are getting intensive interests as alternatives of carbon nanotubes in most electrical and nano applications due to their facile synthesis and unique electrical properties which originate from their 2D planar structures. In this study, water soluble graphene oxides were prepared using chemical exfoliation of graphite in first step and then ultra-thin coating of graphene oxide solution were tried over glass slides by spin coating. After final reduction step, transparent conductive coating layers were easily formulated in large surface areas. The detailed optical and electrical properties of these graphene coated glass as transparent conducts will be discussed compared with conventional ITO-coated glass conductors.

이동기 2PS-117

Random Phenyl/Methyl methacrylate 공중합체의 sulfonation을 이용한 Proton Exchange Membrane Fuel Cell (PEMFC) 용 고분자 전해질 막의 제조와 특성분석
이동기, 최승석, 이희승, 김형태, 백경열, 황승상[†] 한국과학기술연구원
 현재 상용화 되어 지고 있는 PFSA polymer membrane(e.g., Nafion)을 이용한 PEMFCs 시스템은 Nafion의 높은 수소전도도와 뛰어난 내화학성과 내열성 때문에 기본적인 PEMFCs의 장점을 가장 이상적으로 구현 할 수 있는 시스템이지만 Nafion의 고온에서의 가수분해로 인한 급격한 수소전도도의 감소, 이에 따른 막내부의 수분감소로 인한 막과 촉매 사이의 균열발생, 연료불순물들에 의한 CO 피독 현상 등의 문제점을 안고 있어 고온에서 작동 되어지는 PEMFCs 고분자 전해질 막의 필요성이 증가 되어지고 있다. 본 연구에서는 다른 관능기(phenyl, acrylate)를 가지고 있는 trimethoxy silanemonomer들의 base촉매가수분해, 축합반응을 이용하여내열성이뛰어난haddersisesquioxane을 합성후, solvent casting을 이용하여 고분자 전해질 막을 제조하였다. 제조되어진 막의 내구성 을 증가시키기 위하여 아크릴기의 광경화를 이용하였으며, phenyl기에 sulfonation을 시켜줌으로써수소전달체널을확보하였다. NMR, IR, TGA, DSC, WAXD, SEM, XPS, AFM 등의 기 분석을 통하여 막들의 구조적인 특성과 연료전지에 쓰여질 막으로서의 적합한 물리적 특성을 가지고 있는지의 여부를 알아보았다.

이명건 2PS-118

Azide-assisted crosslinked sulfonated PESs for both high T-PEMFC and DMFC application
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연료전지센터
 We have prepared novel crosslinked sulfonated poly(ether sulfone)s by thermal irradiation of the allyl-terminated telechelic PESs using an arylbisazide. Having both the uniform distribution of the conductive sites and minimized hydrophobic nature, our crosslinked membrane showed high proton conductivity and low methanol permeability without loss of the structural stability. These preliminary results were believed to show potential application for both PEMFC and DMFC.

이상미 2PS-119

Improving water-solubility of chitosan using functionalized PEO
이상미, 최진희, 김태환, 김근석, 김진홍, 김정인[†] 경희대학교
 Chitosan having high molecular weight and low solubility in aqueous solvent. To improve its water-solubility, the molecular weight of chitosan should be reduced or acetylated. To prepare water-soluble chitosan by using poly(ethylene oxide) (PEO), anhydride-terminated PEO was first synthesized. *n*-Butyllithium-initiated ring-opening polymerization of ethylene oxide with *t*-BuOK has been successfully performed in the mixture of dimethylsulfoxide (DMSO) and benzene like a living manner at 40 °C, followed by chain-end functionalization using trimellitic anhydride chloride (TMAC) resulting in the formation of ω-anhydride terminated PEO. Chitosan-*g*-PEO was obtained from the reactions of authentic chitosan with the ω-anhydride PEO in aqueous alcoholic solution at 40 °C for 24h. The water-solubility of chitosan depending on the grafting yield of PEO was studied in this study. We will report the results for these experiments.

이상범 2PS-120

Polyaniline : Counter electrode in dye sensitized solar cell
이상범, 오응주[†] 명지대학교
 To improve the efficiency of dye sensitized solar cell (DSSC), high conductivity and porosity are required for counter electrode. In this study, polyaniline (PANI) was synthesized by oxidative polymerization using camphorsulfonic acid and *m*-cresol as primary and secondary dopant, respectively. To check the possibility of PANI to apply DSSC as a counter electrode, electrical conductivity was measured using 4-probe method and porosity was measured by SEM and AFM. And current density of the I₃⁻/I⁻ redox reaction peak for the PANI electrode was measured using cyclic voltametry. From the results, the performance of PANI as a counter electrode in DSSC will be discussed.

이석호 2PS-121

Ultrasonication의 세기에 따른 poly(3-hexylthiophene) (P3HT) nanoparticle의 제작 연구
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 Regio-regular P3HT는 광전자 소자에 널리 사용되고 있는 polythiophene 유도체이다. P3HT 용액을 mini-emulsion 방법을 이용하여 nanoparticle 형태로 제조하였다. SEM을 통해 P3HT nanoparticle이 sphere형태임을 확인하였다. 벌크 형태의 P3HT와 광학적 특성을 비교하기 위해 UV/Vis absorption과 PL 스펙트럼을 측정하였다. Nanoparticle 제조 과정 중에 사용된 ultrasonication의 세기에 따른 nanoparticle의 크기 변화를 관찰하였으며, 이를 SEM, TEM, AFM으로 확인하였다. 나노미터 스케일의 물성조사를 위하여 laser confocal microscope를 통한 각 P3HT nanoparticle의 PL 스펙트럼을 관찰하였다.

이성일 2PS-122

Synthesis and Characterization of Cyclic Siloxanes with Oligo(ethyleneoxide) Side-chains for Lithium Ion Secondary Battery Electrolytes
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 The ion transporting properties of poly(ethyleneoxide) (PEO) have been studied as polymer electrolytes for lithium ion batteries, due to its ability of lithium ion solvation. However, PEO is a semi-crystalline polymer and the ionic conduction occurs mostly in the amorphous phases, so the molecular design to increase the segmental motion is critical to improving the ionic conductivity. Siloxanes are low *T_g* materials and thermally stable. Siloxanes comprised by oligo(ethyleneoxide) as electrolyte will not make carbonate bond dissociation in cell cycle. And cyclic forms of siloxanes will have very similar boiling points but lower viscosities and vapor pressures in comparison with those of linear forms. Therefore, oligomeric PEO chains have been grafted onto cyclo-siloxanes via hydrosilylation. In this study, substituted cyclosiloxanes with oligo(ethyleneoxide) side-chains were synthesized, and their thermal properties and lithium ion conductivities of thin films were investigated.

이슬 2PS-123

Kinetically and thermodynamically controlled rod-coil block copolymer micelles in selective solvent
이슬, 최수연, 이진욱, 김승현[†], 송윤정¹, 이재욱¹, 조원호¹ 인하대학교 나노시스템 공학부, ¹서울대학교 재료공학부
 Block copolymer can self-assemble in a selective solvent to yield a variety of different morphologies such as sphere, cylinder, lamellae and vesicle, depending on the block