I PS-43  고려대학교 생명공학과에서 작성한 제1호 실험 결과 및 실험 결과 해석 및 특성

* 고려대. 김일진, 김일진, 이은영, 손승주, 심재민, 백종현

I PS-44  Charge Storage Behaviors of Natural Polymer-derived Nanoporous Polymers

* 김일진, 손승주, 이은영, 손승주, 심재민, 김일진

I PS-45  Photo-crosslinking of Grafted Copolymers Containing Benzophenone Group

* 김일진, 손승주, 이은영

I PS-46  Stepwise Synthesis of Sequence-encoded Poly(α-amino ester)

* 김일진, 김일진

I PS-47  Photo-crosslinked Polymer Cubosomes with Surface Functional Groups as Nanoreactors in Organic Solvents

* 김일진, 김일진

I PS-48  Synthesis and Thin Film Properties of Novel Photo-crosslinke Polyiodide Gated Insulators with Low Leakage Current Density

* 김일진, 김일진, 손승주, 김일진

I PS-49  Preparation and Characterization of a Novel Polyamide/Surface Modified Al2O3 Nanocomposite for Solution Processable High Dielectric

* 김일진, 김일진, 손승주, 김일진

I PS-50  Carbonized Metal Organic Framework of Ultrathin Silica Derived from Biomass

* 김일진, 김일진, 김일진

I PS-51  Grafting of Polyelectrolytes onto Grafted Polymer Brushes Using Terminal Group

* 김일진, 김일진, 김일진

I PS-52  Synthesis of Flame Retardant Plasticizer from Soybean Oil and Polyvinyl Chloride

* 김일진, 김일진

I PS-53  Synthesis and Self-assembly of Triphenylenes having Terminal Hydroxyl Groups

* 김일진, 김일진

I PS-54  In situ Synthesis from End-cap of Linear Polymeric Anions for a-norbornene Macromonomers, and Their Ring-opening Metathesis Polymerization

* 김일진, 김일진, 김일진

I PS-55  Crystalline Ice-directed Self-assembly of Conducting Polymer Nanolaminate

* 김일진, 김일진, 김일진, 김일진

I PS-56  Synthesis of Transparent Poly(isoamides-milds) with Controlled CTE

* 김일진, 김일진, 김일진, 김일진

I PS-57  Epoxy Resin Synthesized from Epoxidized Isosorbide and Various Amine Acids

* 김일진, 김일진, 김일진

I PS-58  Water-soluble Polyamide for the Selective Sensing of Mercury ions in the Environment

* 김일진, 김일진, 김일진

I PS-59  Effect of Molecular Weight Distribution of PSSA on Electrical Conductivity

* 김일진, 김일진, 김일진

I PS-60  Polysaccharide Nanoreactors Having Size-selective Permeable Membranes

* 김일진, 김일진, 김일진

I PS-61  Covalently Stabilized Polysaccharides of Polyvinyl alcohol (PVA) and Polyethylene Glycol (PEG) in Solution

* 김일진, 김일진, 김일진

I PS-62  Development of Eco-friendly Flame-retardant Polyamides Machine Producing Process

* 김일진, 김일진, 김일진

I PS-63  Synthesis and Self-assembled Behaviors of Poly(ethylene oxide)-b-poly(acrylic acid) Diblock Copolymer in Mixed Solvent System

* 김일진, 김일진, 김일진

I PS-64  Synthesis of High Molecular Weight Fur-based Copolyester from Its Thermal, Mechanical Properties

* 김일진, 김일진, 김일진

I PS-65  Reducing Responsive Microsphere Composed of Alginate, Propylene Sulfoxide, and Calcium Chloride

* 김일진, 김일진, 김일진

I PS-66  Synthesis of Poly(styrene)-g-(isoprene) and Hydrogenation via Macromonomer Technique

* 김일진, 김일진, 김일진

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* 김일진, 김일진, 김일진

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* 김일진, 김일진, 김일진

I PS-69  Reversible Phase Transfer of Conjugated Polymer Dye Recycling Photocatalyst

* 김일진, 김일진, 김일진

I PS-70  Colorimetric Sensors Based on Light-responsive Polymeric Micelle for Detection of Mercury (II) Ions

* 김일진, 김일진, 김일진

I PS-71  Vegetable Oils-based Hyperbranched Polymers as Green Polysols

* 김일진, 김일진, 김일진

I PS-72  Synthesis of Novel Thermotropic Liquid Crystal Polymers and Characterization of Their Mesophases

* 김일진, 김일진, 김일진, 김일진

I PS-73  Synthesis and Adhesion Characteristics of DOPA Derivatives

* 김일진, 김일진, 김일진, 김일진

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* 김일진, 김일진, 김일진, 김일진

I PS-75  Synthesis of Poly(alkoxylated polyvinylpyrrolidone) (PVPa) and the Crosslinked Hydrogel for Various Applications

* 김일진, 김일진, 김일진, 김일진

I PS-76  Alkaline Anion Exchange Membrane from Poly(ethylene) ether ketone-g-polynorbornadiene Copolymer for Enhanced Hydroxide ion Conductivity and Thermal, Mechanical, and Hydrophilic Stability

* 김일진, 김일진, 김일진, 김일진

I PS-77  Reverse Bimimetic Cubic Mesophases of Giant Amphiphiles with Tunable Lattice Constant and the Demonstration of Correlation of Molecular Weight with thermal Periodicity

* 김일진, 김일진, 김일진

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I PS-78  Tuning the Cross-linker Lengths and Cross-linking Processes for the Development of Robust Anion Exchange Membranes

* 김일진, 김일진, 김일진, 김일진

I PS-79  Photocatalytic Polymer Nanoparticles for Cancer Immunotherapy

* 김일진, 김일진, 김일진, 김일진

I PS-80  Preparation of Mechanochemically Responsive Mesoporous Silica Particle Encapsulated by Water-soluble Polyelectrolyte for Drug Delivery System

* 김일진, 김일진, 김일진, 김일진

I PS-81  FGR- and PMIM-functionalized Crosslinked Norbornene Copolymer Membranes Prepared by In-situ ROMP for CO2 Separation

* 김일진, 김일진, 김일진, 김일진

I PS-82  Ultra-Sensitive Amyloid-b Sensor with Gold Nanoparticles and Conducting Polymers Composite Electrode for Early Diagnosis of Alzheimer’s Disease

* 김일진, 김일진, 김일진, 김일진

I PS-83  Human-Blood-like Resembling Double-walled Micelle Hydrogels Prepared by Triple Channels Microfluidic System

* 김일진, 김일진, 김일진, 김일진

I PS-84  Quaternary Ammonium-functionalyzed Polyether sulfone ketone) Block Copolymer Membranes: the Black Box Effect on the Properties of Anion Exchange Membranes

* 김일진, 김일진, 김일진, 김일진

I PS-85  Preparation of Ultra-stable Perfluorosulfonic Polymer Composite Film by Size Fraction Lithography

* 김일진, 김일진, 김일진, 김일진

I PS-86  Tailored Multichain Photopolymerization to Integrate Desired Properties in Functional Microstructures

* 김일진, 김일진, 김일진, 김일진

I PS-87  Graphene Oxide Multilayers for Long Release of Nitric Oxide Gas

* 김일진, 김일진, 김일진, 김일진

I PS-88  Characterization and Photo-actuation Properties of Polyelectrolytes/ Epoxy Graphene Nanocomposites

* 김일진, 김일진, 김일진, 김일진

I PS-89  TFFT-LOD  with High Performance Voltage application for Application in High-Performance, High-Performance, High-Performance

* 김일진, 김일진, 김일진, 김일진

I PS-90  Study on the Interfacial Properties of Thermal Conducting Liquid Crystal Composites

* 김일진, 김일진, 김일진, 김일진

I PS-91  Polyarylethene Films of PS-b-PS/PVP Diblock Copolymer Synthesized by RAFT Polymerization

* 김일진, 김일진, 김일진, 김일진

I PS-92  Superhydrophobic Surface Possessing Amphiphilic Characteristic for Characterization of Oily Strong Base Solution

* 김일진, 김일진, 김일진, 김일진

I PS-93  Mechanically Enhanced Electrochemical Hydrogel for 3D Printing

* 김일진, 김일진, 김일진, 김일진

I PS-94  Photocatalytic Properties of Dyes for CO2 Capture

* 김일진, 김일진, 김일진, 김일진

I PS-95  Bio-inspired Membrane with Hierarchical Porosity Toward Efficient Solar to Steam Conversion

* 김일진, 김일진, 김일진, 김일진

I PS-96  Fabrication of Split-Ring Resonators Operating in Visible Wavelength in Block Copolymer Confinement Effects

* 김일진, 김일진, 김일진, 김일진

I PS-97  Virus-decorated AgNWs as a Surface-enhanced Raman Scattering (SERS) Biosensor for Specific Pesticide Detection

* 김일진, 김일진, 김일진, 김일진
IPS-78 Abu Zentar Al Munsu
Tuning the Cross-linker Lengths and Cross-linking Processes for the Development of Robust Anion Exchange Membranes
Abu Zentar Al Munsu, King Fahd University of Petroleum and Minerals
The anion exchange membrane fuel cells (AEMFCs) have been noticed as an emerging energy source because of their several advantages over the proton exchange membrane-based fuel cells (PEMFCs). Development and designing of anion exchange membranes with good mechanical, chemical stability, and hence low leaching, together with high conductivity, is still a challenge for real application of anion exchange membrane fuel cells. There have been several approaches adopted for making robust anion exchange membranes, and cross-linking is one of the most widely used techniques for getting those desirable properties. Herein we have studied a broad spectrum of cross-linker length, cross-linking methodology and their effect on AEM properties that will be discussed in detail.

IPS-79 Asael Seikazana
Photosensitizing Polymer Nanoparticles for Cancer Immunotherapy
Asael Seikazana, Chungwon Kim, University of Science and Technology - Korea Institute of Science and Technology Campus
In consequence of investigating the interaction of the immune system with the cancer cells, polymeric nanoparticles (NPs) in combination with photodynamic therapy (PDT) and immunotherapy appears to be a next generation therapeutic strategy that can eliminate primary tumors, inhibit metastases and prevent tumor relapse. Here, we devised combined method on the basis of polymeric nanoparticles with co-encapsulated photosensitizer agent and TLR-9 activating agent. Tumor cell cytotoxicity of PDT treated cells and in vivo anti-tumoric effects are also investigated. As a result Western blot and flow cytometry data demonstrated that the presence of adjuvant triggered more intensive immune response. Further findings in vivo tumor model experiments suggest that NPs can be applied for near-infrared (NIR) light-triggered PDT and cause ablation of primary tumors with following prevention of metastases.

IPS-80 Epriya Iyin Fintiri
Preparation of Mechanochemically Responsive Mesoporous Silica Particle Encapsulated by Ratiometric Polyeuroprene Drug Delivery System
Epriya Iyin Fintiri, Godswill Akpabio Polytechnic
Mechanochemically responsive hybrids material of successively releasing small molecule has been developed. In this research, Rhodamine B molecules were successfully mechanochemically encapsulated into the pore of MCM-41 mesoporous silica by waterborne hyperbranched encapsulation into the pore of MCM-41 mesoporous silica by waterborne hyperbranched polyurethane prepolymer. The dye molecule release was measured by applying mechanical compression and the optical absorption information of UV–vis absorption spectra. The results indicate that the different mechanical stimuli applied has great influence on the amount of Rhodamine B molecules released. The ease, low cost, and scalability of the assembly method makes these hybrids material potential candidates for drug delivery systems application.

IPS-81 Iqbal Hossain
PEG- and PDMS-functionalized Crosslinked Norbornene Copolymer Membranes Prepared by in-situ ROMP for CO Separation
Global Tassos, Diamond Materials Innovation Centre, University of Manchester
The development of high performance materials for carbon dioxide separation and capture will significantly contribute to a solution of global warming and natural gas purification. Polymer membrane-based gas separation has attracted recent interest due to its ease of operation, low operational cost and compactness in module preparation. The high separation performance of most of the current polymers, however, does not meet the requirements of high efficiency for the industrial applications. We report herein, crosslinked norbornene copolymers having both PEG and PDMS units as highly CO2-selective and permeable, respectively, by in-situ ROMP-synthesis as rigid CO2-separation membranes. A series of crosslinked copolymers were prepared by tuning the ratio between PEG and PDMS units, their properties including gas separation performance will be discussed in detail.

IPS-82 Jie You
Ultra-Sensitive Amyloid-β Sensor with Gold Nanoparticles and Conducting Polymers Composite Electrode for Early Diagnosis of Alzheimer’s Disease
Jie You, Jieyou Yang, Peking University
In this work, an electrochemical sensor was prepared using gold nanoparticles–poly (3,4-ethylenedioxythiophene–poly (3,4-ethylenedioxythiophene) acetic acid (AuNPs-PEDOT–PAA) to immobilize cellular prion protein (PrP) for the detection of amyloid beta oligomer (Aβ). AuNPs and PEDOT composite electrode induced a high conductivity and then, provided the high sensitivity to Aβ sensing. PEDOT was enhanced the electrical conductivity and the adhesion between PEDOT and the composite electrode. The thiol and carboxyl groups of PEDOT were played the linking agent between the composite electrode and the amino-terminated PAA peptide. The impedance response of the optimized AuNPs-PEDOT–PAA bioseminor showed a proportional relationship with the concentrations of Aβ in the range from 10^(-8) to 10^(-16) M. The sensitivity at a femtomolar level and high selectivity to the Aβ can be used in practical for the early diagnosis of Alzheimer’s disease.

IPS-83 Kusuma Borna Caiyana Imani
Human-Blood-Vessel-Resembling Double-Walled Microtube Hydrgols Prepared by Triple Channels Microfluidic System
Kusuma Borna Caiyana Imani, Gun van Plassche, Waseda University
In this work, we prepared microcule hydrogels with poly(methylmethacrylate) (PMMA) and poly(acrylamide) (PAAm) as the inner and outer wall respectively. Triple channels microfluidic device combined with alginate-templated photopolymerization was used to allow the preparation of two separated hydrogel walls. The different property of the hydrogel walls enables the microfluids to have the human blood vessel behavior. By increasing the temperature, the thermally active inner wall shrinks while the passive outer wall maintaining its position, which results in a higher flux. In addition, the hydrogel walls can be reversibly to have a thermally controllable outer diameter with a stationary hourglass center by simply swapping the injection position of the precursor solutions. This flexibility suggests that this method can be applied for various hydrogel monomers.

IPS-84 Mayadevi T S
Quarternary Ammonium–Functionalized Poly(ether sulfone ketone) Block Copolymer Membranes: The Block Ratio Effect on the Properties of Anion Exchange Membranes
Mayadevi T S, Iram Khan, Manipal University
Anion exchange membranes based on quarternary ammonium functionalized poly(ether sulfone ketone) block copolymers (QA–PSK) having various hydrophilic-hydrophobic oligomer ‘block ratios were synthesized, and the effect of the block length on the membranes’ physicochemical and electrical properties was systematically investigated.
Tunable hydrophobic side-chain poly(styrene-ethylene-co-butylene-styrene) tri-block copolymer as highly conductive and stable anion exchange membranes

Abu Zafar Al Munsur, Tae-Hyun Kim
Organic Material Synthesis Laboratory, Department of Chemistry, Incheon National University, 119 Academy-ro, Yeonsu-gu, Incheon, Korea, (tkim@mu.ac.kr)

ABSTRACT

There is a surge of interest in the development of anion exchange membrane fuel cells (AEMFCs) in the renewable energy research. The high conductivity and stability under high pH conditions at elevated temperatures are required for AEMs. We report herein the tunable hydrophobic side chain SEBSs as novel anion exchange membranes. The synthesis and properties of these newly developed AEMs are described.

INTRODUCTION

SYNTHESIS

PROPERTIES

Table 1. IEC & Conducitivity data for the hydrophobically modified SEBS membranes at various temperature in their OIl & Br form.

<table>
<thead>
<tr>
<th>Membrane Code</th>
<th>IEC (mmol/g)</th>
<th>Conductivity (mS/cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Oil: 60°C</td>
</tr>
<tr>
<td>NMR</td>
<td>1.18</td>
<td>1.49</td>
</tr>
<tr>
<td>SEBS-5,4QA-0</td>
<td>1.20</td>
<td>1.55</td>
</tr>
<tr>
<td>SEBS-5,4QA-36El</td>
<td>1.20</td>
<td>1.55</td>
</tr>
<tr>
<td>SEBS-5,4QA-56El</td>
<td>1.20</td>
<td>1.55</td>
</tr>
<tr>
<td>SEBS-3,4QA-36El</td>
<td>1.20</td>
<td>1.55</td>
</tr>
<tr>
<td>SEBS-3,4QA-56El</td>
<td>1.20</td>
<td>1.55</td>
</tr>
</tbody>
</table>

Table 2. Water Uptake, In-plane, Through-plane swelling ratio at 30 & 60°C temperature and the density measurement.

<table>
<thead>
<tr>
<th>Membrane Code</th>
<th>Water Uptake (%)</th>
<th>Swelling Ratio (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30°C</td>
<td>60°C</td>
</tr>
<tr>
<td>SEBS-5,4QA-0</td>
<td>16.1</td>
<td>12.4</td>
</tr>
<tr>
<td>SEBS-5,4QA-36El</td>
<td>15.1</td>
<td>14.2</td>
</tr>
<tr>
<td>SEBS-5,4QA-56El</td>
<td>14.6</td>
<td>14.0</td>
</tr>
<tr>
<td>SEBS-3,4QA-36El</td>
<td>14.1</td>
<td>14.6</td>
</tr>
</tbody>
</table>

Table 3. Mechanical Properties at 30% RH and room temperature.

<table>
<thead>
<tr>
<th>Membrane Code</th>
<th>Tensile Code</th>
<th>Elongation (%)</th>
<th>Modulus (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEBS-5,4QA-0</td>
<td>13.0</td>
<td>411.3</td>
<td>0.18</td>
</tr>
<tr>
<td>SEBS-5,4QA-36El</td>
<td>13.0</td>
<td>441.3</td>
<td>0.20</td>
</tr>
<tr>
<td>SEBS-5,4QA-56El</td>
<td>9.2</td>
<td>520.0</td>
<td>0.21</td>
</tr>
<tr>
<td>SEBS-3,4QA-36El</td>
<td>12.8</td>
<td>399.9</td>
<td>0.19</td>
</tr>
</tbody>
</table>

Figure 1: TGA thermogram and derivative curve (a) and DSC curve (b) for the hydrophobically modified SEBS membranes.

Figure 2: AFM-3D images of SEBS-5,4QA-0 (a), SEBS-5,4QA-36El (b), SEBS-5,4QA-56El (c), SEBS-3,4QA-36El (d) and SEBS-3,4QA-56El (e).

Figure 3: Water uptake of SEBS membranes in oil and water.

Figure 4: Stress-strain curve of SEBS-5,4QA-0 (black), SEBS-5,4QA-36El (red), SEBS-5,4QA-56El (green).

Table 4. Mechanical Properties at 30% RH and room temperature.

Figure 5: Alkaline stability curve of SEBS-5,4QA-36El.

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