

서울대학교 섬유고분자학과 및 고분자 관련학과

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서울대학교에서의 고분자 관련 연구는 섬유고분자공학과와 전 교수와 응용화학부 및 화학과, 그리고 농업생명과학대학의 일부 교수들을 중심으로 수행되고 있다. 섬유, 플라스틱, 필름, 고무, 도료 및 접착제 등의 일반적인 고분자 재료는 물론 우주항공, 자동차, 반도체, 정보통신, 의공학, 환경 등 산업 각 분야가 요구하는 고부가가치 첨단 신소재의 제조와 가공 및 응용에 필요한 연구들을 주로 수행하면서 우리나라의 고분자관련 연구를 선도하고 있다. 예를 들면, 이차전지용 고분자 전해질 및 전기 전도성 고분자, 반도체 및 정보통신용의 저유전성 고분자 및 감광성 고분자, 홀로그램용의 광굴절성 고분자, 전기발광성 고분자, 광섬유, 액정고분자, 고차가치형 고분자, 자기 집합형 모노머 및 고분자, 고성능 분리막, 고기능 활성탄소, 이차전지 및 슈퍼캐패시터용 탄소재료 그리고 생분해성 고분자의 합성 및 제조, 섬유강화 고성능 복합재료 등등이 있다.

서울대학교의 고분자 관련 교수들은 그동안 'SNUPOLY'라는 자발적인 협동연구 프로그램을 만들어 두차례의 과학재단 장려연구센터와 장기특정기초연구를 수행한 바 있으며, 이러한 무형의 인프라를 바탕으로 1999년도에는 과학기술부 및 한국과학재단이 신규 우수공학연구센터로 지정한 고차구조형 유기산업재료 연구센터(HOMRC)를 탄생시켰다. 섬유고분자공학과의 조원호교수가 소장인 HOMRC에는 서울대학교의 고분자 관련 교수는 물론 타 대학교의 교수들도 연구원으로 참여하여, 공유결합을 근간으로 한 기존 유기재료의 한계를 극복하기 위하여 수소결합, 극성결합 등의 이차결합까지를 함께 고려한 고차구조를 재료의 용도에 맞게 분자 설계함으로써 기존 소재와 비교하여 성능이 크게 향상되거나 고유 기능과는 다른 차원의 신기능을 발휘하는 미래 지향적 신소재를 개발하는 연구를 해 가고 있다.

한편, 그동안 IBM연구소에 근무하면서 고분자물리 분야에서 세계적인 명성을 쌓아 왔던 윤도영 박사가 지난 학기에 본교 화학과의 전임교수로 부임함으로써 서울대학교의 고분자 관련 연구활동이 질적으로나 양적으로 한층 더 가속화할 것으로 기대되고 있다.

전임교수 (섬유고분자공학과)

• 김상용

- Theoretical and Experimental Approach to the Analysis of Polymer Morphological Behaviors
- The Numerical Simulation of High Speed Spinning, Hollow Fiber Spinning and Rectangular Fiber Spinning
- Application of the Neural Network to the Analysis of Film Drawing Process
- Study on Yield Behavior of High Speed Spun Fibers
- Rheological Modeling of Polymer Viscoelastic Materials

• 홍성일

- Photoresist Polymers
- Chelating Polymers

- LCD and Photorefractive Polymer
- Synthesis of Functional Polyquinoline
- Toughening of Epoxy Resin
- Electroluminescence(EL) Polymers, etc.
- **고석원**
 - Functional Finishing for the Improvement of Fiber Functionality
 - Synthesis and Application of Finishing Agent for New Functionality of Fiber
 - Synthesis, Analysis and Application of Polymers with High Functionality
 - Structural Modification for the Improvement of Fiber Performance
 - Structural Transformation and Application of Natural Polymers
- **조원호**
 - Prediction of Physical Properties of Polymers by Molecular Modeling
 - Anionic and Metallocene-Catalyzed Polymerization
 - Deformation of Polymers by Atomistic Continuum Model
 - Polymer/Metal Interface
 - Off Lattice Monte Carlo Simulation of Hyperbranched Polymers
 - Self Assembly of Block Copolymers by Monte Carlo Simulation
 - Organic/Inorganic Nanocomposite
- **강태진**
 - The Structure and Properties of Polymer, Fiber, Textile, and Composite
 - Engineering Design and Analysis of Structure of Textile and Composite
 - Automization of the Textile and Clothing Production Process
- **윤재륜**
 - Injection Molding of Polymers and Fiber Composites
 - Reaction Injection Molding of Polyurethane Foam
 - Profile Extrusion Die Design
 - Tribological Design of Composite Materials and Modeling by Neural Network
 - Rapid Prototyping-Stereolithography Apparatus (SLA)
 - Characterization of Fiber Orientation by Image Processing
 - Processing of Microcellular Structures
 - Polymer Processing of Electronic Parts
 - Purging Compound for Polymer Processing Equipments
- **정관수**
 - Mechanics of Materials including Plasticity, Viscoelasticity and Elasticity
 - Nonlinear Continuum Mechanics
 - Process Modeling of Polymer, Textile, Fibers and Metals
 - Numerical Methods including Finite Element Methods
 - Process Design and Analysis
 - Formability of Metal Sheets including Aluminum Auto Sheets

- Modeling of Microstructural Effects on Material Performance such as Formability
- 김재필
 - Synthesis and Application of Disperse and Reactive Dyes
 - Development of Dyebath Reuse System
 - Light Fastness Improvement of Traditional Natural Dyeing
 - Synthesis and Application of Dye-Resist for Wool
 - Investigation of Facile Reduction Mechanism and Application of Triphenodioxazine Derivatives
 - Synthesis and Application of Electrochromic Dyes
- 박수영
 - Synthesis of Functional Polymers
 - Photoactive Polymers (Nonlinear Optical, Photorefractive, and Photoconducting Polymers)
 - Polymer Electronic Devices and Polymer Thin Film
- 박종래
 - Design of Environmentally Friendly and/or Biodegradable Polymers
 - Design and Structure Control of Carbonaceous Functional Materials
 - Regeneration of Natural Polymers
 - High Performance Fibers and Polymers
- 곽승엽
 - Processing-Structure-Property Relations of Polymeric Systems
 - Mixing/Blending in Batch Mixer, Morphology Development
 - Relaxation and Microstructure Analysis by Solid-State NMR Spectroscopy
 - Viscoelastic Behavior at Small and Large Deformation
 - Characterization of Ultrafiltration (UF) and Reverse Osmosis (RO) Membranes

전임교수 (응용화학부)

- 이윤식
 - Synthesis of New Polymer Support
 - Modification of Polymer Surface
 - Solid Phase Synthesis
 - Clean Organic Reactions
- 이승종
 - Rheology of Polymeric Materials and Suspensions
 - Flow Properties of Polymers
 - Modeling and Simulation of Materials Processings
- 장정식
 - Interfacial Adhesion between Polymer and Metal
 - Performance Improvement of Composites, Thermal and Mechanical Analysis of Composites
 - Liquid Crystalline Epoxy Resins

• 조재영

- Architecture-Motion-Property Relations in Glassy Polymers
- Structure-Morphology-Property Relations in Polyolefins and Copolymers
- Structural, Mechanical, and Wear Behaviors of Artificial Joint Materials
- Structure-Property Relations in Hyperstructured Polymeric Materials

• 김영규

- Synthesis of Hyperbranched Polymers
- Synthesis of Liquid Crystalline Polymers
- Electroluminescent Materials
- Synthesis of Biologically Active Compounds
- Chirrotechnology
- Process Development for Fine Chemicals

• 차국현

- Interface/Surface Phenomena of Polymers
- Microstructural Characterization of Polymers Using Scattering Techniques
- Low Dielectric Materials for Cu Chip Application
- Organic/Inorganic Nanohybridization
- MC/MD Simulation of Polymers
- Effect of Self-Assembly of Block Copolymers on Solution Behavior

• 이종찬

- Synthesis of Liquid Crystalline Materials
- Ring Opening Polymerization
- Synthesis and Application of Polymer Membrane
- Miscibility Behaviors of Polymers
- Electrical and Optical Polymers

전임교수 (화학과)

• 윤도영

- Atomistic Polymer Modeling: understanding of the atomistic monomer structure-property (thermodynamics and chain dynamics) relationships of polymers from realistic force-field based molecular dynamics simulations.
- Polymer Surfaces and Thin Films: surface energies, dynamics and structures of polymers at surfaces and in thin films, as compared with bulk states.
- Semicrystalline Copolymers: molecular and semicrystalline morphology, interfacial structures, and their relationships to the thermodynamic and mechanical properties of copolymers of varying comonomer structures, as prepared with metallocene catalysts.
- New Low-Dielectric Polymer Materials for Next-Generation On-Chip Interconnect and Electronic Packaging: ultralow-k nanoporous dielectric thin films for the next-generation on-chip interconnect and isotropic low-k thick films for advanced electronic packaging.

- Liquid Crystal Anchoring on Polymer Surfaces: preparation and understanding of anisotropic polymer surfaces for improved alignment and switching characteristics of liquid crystals for LCD.

전임교수 (생물자원공학부-천연섬유학전공)

- 박영환
 - Development of Textile Materials of High Value Added via Chemical Modification and Finishing
 - Biocompatible and Biomedical Materials Based on Natural Fibers
 - Gene Delivery Materials from Natural Polymers
- 박종신
 - Polymer and Functional Composite Materials
 - Biodegradable Polymer Materials
 - High Water Absorbable Polymers
- 조종수
 - Biopolymers for Tissue Engineering
 - Biocompatible Polymers for Artificial Organs
 - Biomedical Sutures
- 탁태문
 - Synthesis of New Polymeric Materials
 - Preparation of Polymeric Membranes and Their Application to the Condensation of Foods
 - Process Development for Waste-Water Treatment

주요기기 및 장비

- HPLC-Control System
- Densitometer-Thermal Analyzer (DSC-TMA)
- Draft Force Tester-Flat Type Sample Card
- Amino Acid Analyzer, High Speed-High Speed Spinning Apparatus
- Pilot Plant-Lectra System Automatic Knife Cutter
- Spectrophotometer, Macbeth Color-Spectrophotometer, Self Recording
- Precision Temperature and Humidity Controller
- Shirley Miniature Drawframe-Spin Tester
- Textile Tensile Tester-Thermal Analysis System (TGA/DTA/DSC)
- Thermal Analyzer Dual Disk Drive Update - Voltammetric Analyzer
- Image Analyzer System-FT-IR Spectrophotometer
- Internal Mixer/Torque Rheometer - Universal Testing Machine
- Polarized Optical Microscope-Mass Spectrometer
- Gas Chromatography - Extruder
- Viscometer-Spectrofluoro Photometer 외 다수