

2025

PSK-이녹스 신진연구자 웨비나

2025년 5월 30일(금) AM 10:30 - 11:30 | 온라인 상

<https://kaist.zoom.us/j/88943989433>

주최 한국고분자학회

주관 콜로이드 및 분자조립 부문위원회

후원 INNOX

○ 초대의 글

'PSK-이녹스 신진연구자 웨비나'는 우수한 연구역량을 가진 신진연구자를 발굴하여 교류의 장을 넓히고자 (주)이녹스의 후원과 한국고분자학회 주최로 마련한 온라인 세미나입니다. 이번 세미나에서는 고분자 분야 중에서도 특히 콜로이드 및 자기조립소재를 이용하여 선도연구를 수행하는 신진연구자의 우수한 연구성과를 공유하는 자리를 마련하였으니 관심있는 분들의 많은 참여 부탁드립니다.

○ 일정

AM 10:30 - 11:30

Functional Polymer Brushes to Engineer Nanoparticle-Based Materials

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ABSTRACT: "Bottom-up" materials synthesis using nanoscale building blocks is a promising strategy for fabricating well-defined nanostructures that are challenging to access via conventional top-down approaches. These approaches are particularly beneficial when they are compositionally flexible or modular, as a single synthetic strategy could be used to produce multiple types of materials, thereby enabling many different applications. Polymer-brush-grafted nanoparticles, consisting of a fixed core with tethered linear polymer brushes, are therefore an attractive platform for designing these building blocks, as they possess multiple parameters to modulate their properties: particle size, particle and polymer composition, and brush architecture. Chemical modification of the polymer brushes of these nanoparticles can also be a powerful tool to incorporate additional characteristic properties and interactions emerging at the molecular level into this system. However, understanding key design factors of functional polymer brushes and their impact to the overall material properties is crucial for potential future application of these nanoparticle-based materials. This presentation will explore how functional polymer brushes can be integrated into nanoparticle building blocks to tailor the properties of the resulting materials. First, dye-functionalized block copolymers are assembled into fluorescent polymeric nanoparticles, which can form chain-like structures with tunable emission properties. The molecular design of block copolymers enables precise placement of fluorescent dyes within the nanostructure, allowing effective control of energy transfer between the dyes. Next, photocrosslinkable polymer brushes are grafted onto inorganic nanoparticles, enabling the fabrication of composites with tunable mechanical anisotropy. Proper loading of crosslinkers into the polymer brushes permits the nanocomposites to maintain softness and facile processability before crosslinking, and stiffness enhancements after crosslinking by over an order of magnitude compared with the initial material. The ability to regioselectively tune crosslinking as a function of UV irradiation empowers the production of soft device architectures with uniform composition, but intentionally designed variation in stiffness.



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