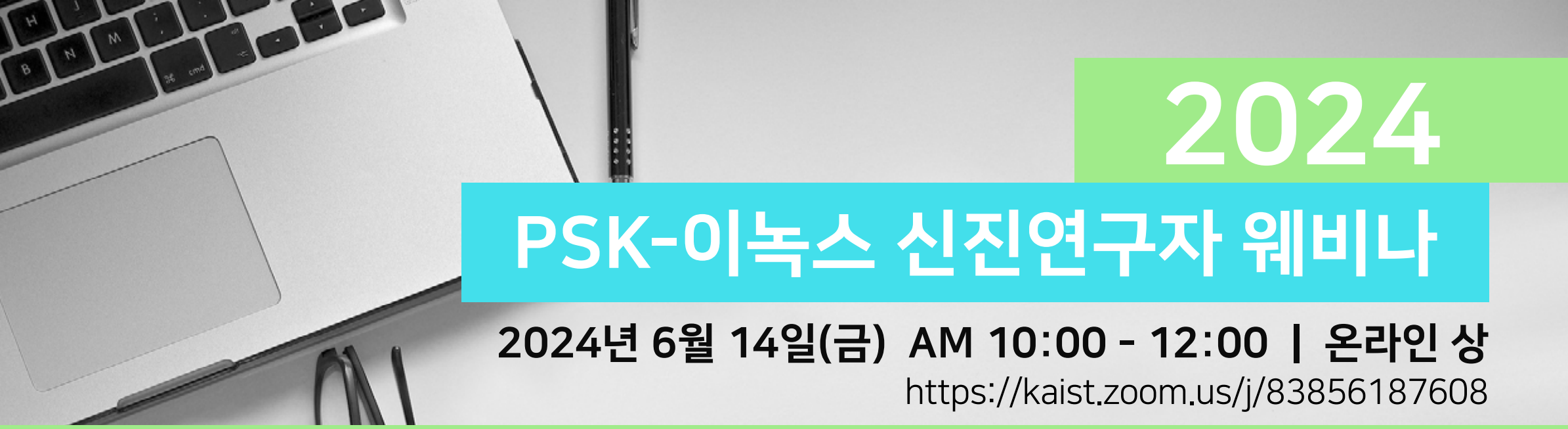

2024 PSK-이녹스 신진연구자 웨비나

2024년 6월 14일(금) AM 10:00 - 12:00 | 온라인 상

https://kaist.zoom.us/j/83856187608

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 10:00 - 11:00	Size-Selective Adsorption of Nanoparticles on Polyelectrolyte Brushes Ye Chan Kim (김예찬), yckim@seas.upenn.edu Department of Materials Science and Engineering, University of Pennsylvania

ABSTRACT: Separating chemical mixtures into isolated components is essential for applications including water purification, chemical processes, and nanoparticle synthesis. In adsorption-based separation processes, it is crucial to control the adsorption and desorption thermodynamics of analytes based on their properties such as size and shape as they pass through the medium. Here, we propose that polymer electrolyte brushes can be designed to selectively adsorb nanoparticles according to their size. First, we developed a facile polymer brush preparation method using a symmetric polystyrene-*b*-poly(2-vinylpyridine) (PS-*b*-P2VP) block copolymer. We found that the buffer pH effectively adjusts the nanoparticle/P2VP brush interactions, neutral pH provides limited penetration depth for nanoparticles and promotes size selectivity for smaller nanoparticle adsorption. In addition to the size selection for smaller nanoparticles, we further demonstrated that it is possible to design a system capable of size-selective adsorption of larger nanoparticles. Specifically, we successfully created a positively charged polyelectrolyte brush by quaternizing pyridine groups of P2VP brushes. We found that electrostatic adsorption of negatively charged nanoparticles onto polyelectrolyte brushes can be controlled by salinity. As the salinity increases, the number of adsorbed nanoparticles monotonically decreases and eventually becomes negligible at high salinity. Interestingly, there is a range of salt concentrations where the decrease in nanoparticle adsorption is more pronounced for smaller particles, leading to size-selective adsorption of larger nanoparticles. This study shows the potential of creating devices for nanoparticle size separations using polymer brushes.

AM 11:00 - 12:00	Multifunctional Polymer Nanocomposite Films with High Nanoparticle-Content Baekmin Q. Kim (김백민), baekmin@seas.upenn.edu Department of Chemical and Biomolecular Engineering, University of Pennsylvania

ABSTRACT: Polymer nanocomposites with high loadings (>50 vol.%) of nanoparticles (NPs) possess exceptional mechanical, transport, and physical properties, making them valuable for various applications. However, manufacturing such polymer nanocomposites presents significant challenges due to difficulties associated with mixing and dispersing a high content of NPs in polymer matrices. Infiltrating a polymer into the interstitial pores of a disordered packing of NPs packing circumvents this issue, resulting in a polymer-infiltrated NP film (PINF). Recently, facile and versatile techniques exploiting the capillarity of disorder NP packings have emerged to successfully manufacture PINFs. These capillarity-driven techniques allow for the production of homogeneous (fully infiltrated), nanoporous (partially infiltrated), and heterostructured PINFs, suitable for a variety of applications. This talk covers the details of these techniques and highlights representative multi-functional coating applications of PINFs, including optical films and water harvesting films.

한국고분자학회
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