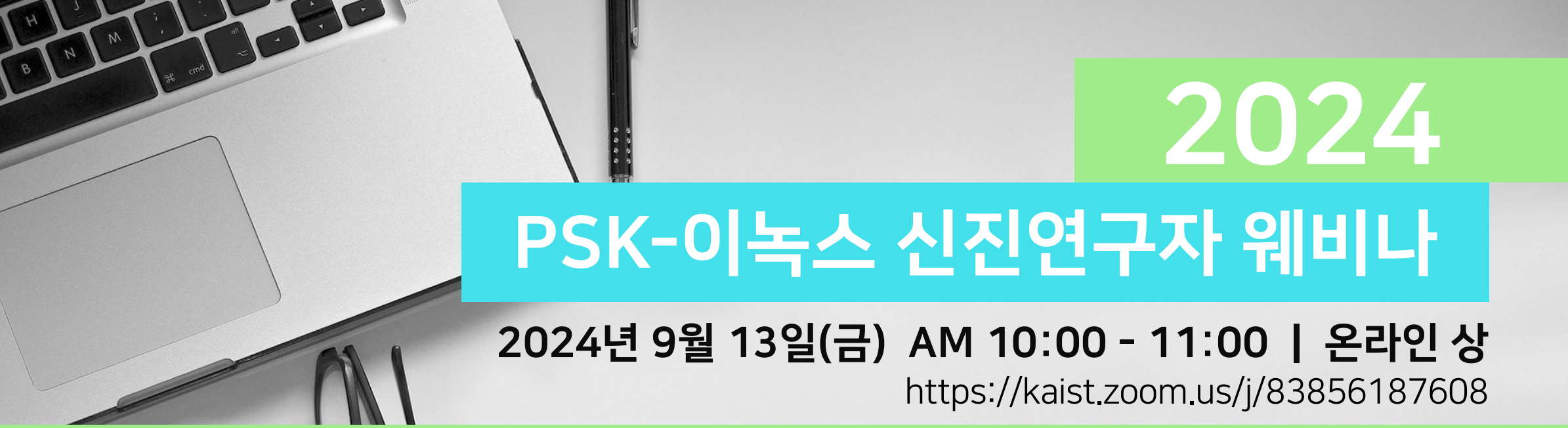


2024 PSK-이녹스 신진연구자 웨비나

2024년 9월 13일(금) AM 10:00 - 11:00 | 온라인 상

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

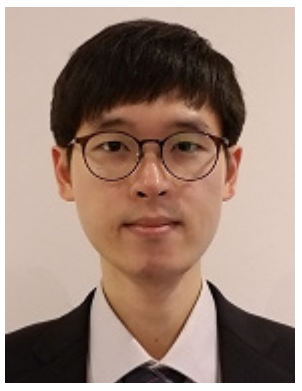
주최 한국고분자학회 **주관** 콜로이드 및 분자조립 부문위원회 **후원** INNOX

○ 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-Dependent Photocatalytic Reactivity of Conjugated Microporous Polymer Nanoparticles Seunghyeon Kim (김승현), kims@mpip-mainz.mpg.de Max Planck Institute for Polymer Research



ABSTRACT: Conjugated microporous polymers (CMPs), featuring high surface area, tunable redox properties, and high chemical stability, have emerged as versatile heterogeneous photocatalysts for chemical reactions. However, the large size (>1 μm) of conventional CMPs significantly limits their photocatalytic reactivity because slow substrate diffusion in the porous materials hinders the efficient use of photo-generated excitons. To address this inefficiency of CMPs, we synthesized well-dispersible CMP nanoparticles by combining cross-coupling reactions with dispersion polymerization. Notably, this method can control the size of CMP nanoparticles in the range of 15 nm to 180 nm while minimally affecting the optical and redox properties of the photocatalysts. Leveraging the precise control of the size, we successfully demonstrated that smaller CMP nanoparticles have higher photocatalytic reactivity in various organic transformations, achieving more than 1000% enhancement in the reaction rates by decreasing the size from 180 nm to 15 nm. The size-dependent photocatalytic reactivity was further scrutinized using a kinetic model and transient absorption spectroscopy, revealing that only the initial 5 nm-thick surface layer of CMP nanoparticles is involved in the photocatalytic reactions because of internal mass transfer limitations. This finding substantiates the potential of small CMP nanoparticles to efficiently use the excitons and improve energy-efficiency of numerous photocatalytic reactions.

한국고분자학회
The Polymer Society of Korea