



Advanced Polymers for Energy and Environment

(onsite and online) SEMINAR

Date: 18 April, 2023 (Tuesday)
Time: 10:30 a.m. (Hong Kong Time)
Venue: Room 7-34, Haking Wong Building, HKU

Speaker: Prof. Yoonseob Kim
Department of Chemical and Biological Engineering
The Hong Kong University of Science and Technology
Hong Kong

Zoom Online Meeting:

<https://hku.zoom.us/j/97102253032?pwd=TlBoRktzWkNOSk9BcktIZElURTJDUT09>

Meeting ID: 971 0225 3032
Password: 243728

Abstract:

Polymers are ubiquitous in our daily life—plastic bags, clothes, house furniture, electronic devices, vehicles, etc. The number of applications is countless. One of the recently developed polymers are with high porosity and crystallinity, called porous crystalline polymers, including covalent organic frameworks (COFs), metal-organic frameworks (MOFs), and porous organic polymers (POPs). The two unique features of those porous polymers, permanent porosity and crystallinity, make them essential in energy and environmental engineering applications. Covalent organic frameworks with ionic functional groups can transport ions (e.g., Li^+ or Zn^{2+}) rapidly and reliably. Those ionic covalent organic frameworks are incorporated in energy devices for enhanced transport and safety, outperforming all other known electrolytes and enabling the next-generation all-solid-state Li batteries. Also, highly porous and water-stable MOFs with functionalized chelating groups can effectively remove contaminants (e.g., heavy metal ions) from water. The chemical principles guide us to design porous polymers with tailored functional groups, high surface area, desired connectivities, morphologies, and compositions on demand. Overall, the advantages of porosity, periodicity, tailorability, and modularity make them ideal materials for sustainable engineering.

Biography:

Prof. Yoonseob Kim is an assistant professor in the Department of Chemical and Biological Engineering, The Hong Kong University of Science and Technology. He studied Chemical Engineering at Hanyang University, Korea (2010) *summa cum laude*, and received his Ph.D. from the Department of Chemical Engineering at the University of Michigan, Ann Arbor, in 2016 (advisor: Prof. Nicholas A. Kotov). His Ph.D. work on stretchable electronic and optical materials from self-organized nanoparticles has earned him the ProQuest Distinguished Dissertation Award 2017 and DSM Science & Technology Award, American Chemical Society 2018. Subsequently, he worked at the Department of Chemistry, Massachusetts Institute of Technology, as a postdoctoral associate from 2016 to 2019 with Prof. Timothy M. Swager. During this time, he synthesized polymers with redox groups and charges for water purification and fuel cell applications. His research group (<http://yoonseobkim.com/>) currently synthesizes porous crystalline polymers and applies them to tackle energy and environmental problems. The current research topics include “all-solid-state Li-metal batteries”, “solid electrolytes from covalent organic frameworks”, “single-atom catalysts on covalent organic frameworks for CO₂ reduction reaction”, etc.

ALL INTERESTED ARE WELCOME

For further information, please contact Dr. D.M. Shin at 3917 8061.