2025

PSK-이녹스 신진연구자 웨비나

2025년 10월 28일(화) AM 10:30 - 11:20 | 온라인 상

https://inha-ac-kr.zoom.us/j/87991975634

주 최 한국고분자학회 **주 관** 에너지 부문위원회 **후 원** 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 차세대 에너지 기술인 에너지 저장 분야에서 선도연구를 수행하는 신진연구자의 우수한 연구성과를 공유하는 자리를 마련하였으니 관심있는 분들의 많은 참여 부탁드립니다.

일정

AM 10:30 - 11:20	Interfacial Functionalization with Non-covalent Organic Hybrid Materials for Long Cycle, High-energy Secondary Batteries Myeong Gyun Nam (남명균), mn3269@columbia.edu Department of Applied Physics and Applied Mathematics, Columbia University

ABSTRACT: In response to the accelerating global demand for portable electronics and electric vehicles, there has been an explosive surge of interest in developing advanced battery technologies with superior energy density. Current research efforts are increasingly directed toward unveiling next-generation secondary batteries that can surpass the limitations of conventional lithium-ion batteries (LIBs) through the use of innovative active materials and interfacial design strategies. In particular, the electrode–electrolyte interface plays a pivotal role in governing surface reactions and electrode utilization, thereby exerting a profound influence on the overall energy density of batteries.

Herein, functionalization strategies based on non-covalent organic hybrid materials are introduced to enhance the electrochemical performance of electrodes. First, coordination-bonded soft carbon materials derived from the molecular reassembly of tannic acid are employed to induce electrochemical functionalization of interfacial stabilization layer for silicon nanoparticles, enabling high-energy LIBs. Second, hydrogen-bonding interactions between p-phenylenediamine and polymer binders are utilized to develop an electrolytic binder, thereby reducing the electrolyte-to-capacity ratio in polymer-electrolyte-based all-solid-state batteries. Third, to transcend the intrinsic energy-density limitations of lithium-based systems, hydrogen-storage anode reactions are realized through coordination-bonded catalytic interfacial layers, paving the way for high-energy hydrogen-ion batteries.

Collectively, this work highlights the critical importance of interfacial control via non-covalent organic hybrid materials and presents a strategic roadmap for advancing next-generation high-energy battery technologies.

한국고분자학회
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