2024
PSK-이녹스 신진연구자 웨비나

2024년 8월 8일(목) PM 15:00 - 17:00 | 온라인 상

https://sogang-ac-kr.zoom.us/j/81817679488

주 최 한국고분자학회 **주 관** 분자전자 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 분자전자 소재 및 소자를 이용하여 선도연구를 수행하는 신진연구자의 우수한 연구성과를 공유하는 자리를 마련하였으니 관심있는 분들의 많은 참여 부탁드립니다.

일정

PM 15:00 - 15:40

Hybrid Tandem Perovskite-Organic LED

Seung-Je Woo (우승제), seungwsj@snu.ac.kr
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ABSTRACT: Perovskite light-emitting diodes (PeLEDs) are emerging as a new light source for vivid displays. The development roadmap for commercializing PeLEDs should include a tandem device structure, specifically by stacking a thin nanocrystal PeLED unit and an organic light-emitting diode unit, which can achieve higher brightness and an extended operational lifetime essential for display applications. However, simply combining light-emitting diodes with different driving characteristics does not guarantee both narrowband emission and high efficiency, as it may cause broadened electroluminescence spectra and a charge imbalance. Here, by conducting optical simulations of the hybrid tandem (h-tandem) PeLED, we have discovered a crucial optical microcavity structure known as the h-tandem valley, which enables the h-tandem PeLED to luminesce green light with a narrow spectrum. Specifically, the center structure of the h-tandem valley (we call it valley-center tandem) demonstrates near-perfect charge balance and optimal microcavity effects. As a result, the h-tandem PeLED achieves a high external quantum efficiency of 37.0% and high color purity with a narrow full-width at half-maximum of 27.3 nm (versus 64.5 nm in organic light-emitting diodes) along with a fast on–off response. These findings offer a new strategy to overcome the limitations of nanocrystal-based PeLEDs, providing valuable optical and electrical guidelines for integrating different types of light-emitting devices into practical display applications.

PM 15:40 - 16:20

Designing Ionic Materials and Iontronic Devices for Artificial Somatosensory Systems

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ABSTRACT: Artificial somatosensory systems are crucial for developing human-machine interfaces, enabling the delivery of external tactile information to humans or machines. These systems consist of three key components: sensory transduction, which is the process of converting a sensory signal into an electrical signal; sensory coding, a form of information processing found in nervous systems; and the neural interface, which serves as the connection between the nervous system and external systems through electrical stimulation of nerves. Addressing the intricate challenges of emulating the biological functionalities of somatosensory systems through electronic materials remains daunting. However, recent advancements in iontronics hold substantial promise for surmounting these challenges. We have developed materials design concepts that endow iontronic devices with somatosensory-like functionalities. A significant breakthrough in our work is the molecular-level control of ionic conduction in solid-state ionic materials, which not only introduces various sensing capabilities but also enhances the stability and energy-efficiency of iontronics. In addition, our materials design principles for iontronics have been instrumental in developing tactile sensors, tactile synaptic devices, and neural interfaces that constitute artificial somatosensory systems, thereby expanding their applications in medical devices, robotics, and wearable technologies.

PM 16:20 - 17:00

The Good, the Bad, and the Ugly: Crystalline, Semi-crystalline, and Amorphous

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ABSTRACT : When scientists and engineers wish to know about the structure of solid materials they are interested in, the first method of choice would be diffraction: X-ray, electron, or maybe even neutron if interested in light elements. Diffraction provides direct information on the spatial arrangement of atoms within the sample and is a technique widely accessible. But the situation becomes a bit more problematic if your sample starts to become less crystalline and/or show significant motion, in which case the information obtained from standard diffraction starts to get limited due to lack of periodicity in the structure.
Solid-state NMR spectroscopy, by virtue of being able to characterise the local environments around each atoms, can be a useful complementary analytical technique for these semi-crystalline and amorphous systems. In this talk, I will highlight some of our recent investigations in perovskite materials involving solid-state NMR spectroscopy as the primary tool. Topics covered include: structure and electronic doping of 2-dimensional metal-halide perovskites and a novel structural model of polymeric silicate glasses through 2-dimensional correlation NMR spectroscopy.

한국고분자학회
The Polymer Society of Korea