Emerging Perovskite Materials for Next-generation Display Applications

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Abstract— Displays have become an indispensable part of modern life, shaping how we interact with technology across various fields such as entertainment, communication, and information sharing. This talk explores the development of display technology, from the early innovations to the widespread use of LCD, OLED, and QLED displays in our everyday lives. Now, there is an increasing demand for vivid display technologies that can deliver experiences similar to what people perceive in reality. Due to this demand, perovskite materials have emerged as a promising next-generation light emitter for displays, gaining significant attention because of their high color purity. This talk will also cover methods for applying perovskite light-emitting materials to display applications. We will discuss strategies to overcome the material challenges of perovskite, focusing on how to develop high-efficiency and long-lifetime performance. Through this talk, we aim to present the current development status of perovskite materials and propose directions for the future of next-generation display technologies.

Tae-Woo Lee is a professor in the Department of Materials Science and Engineering at Seoul National University, Korea. He received his Ph.D. in Chemical Engineering from Korea Advanced Institute of Science and Technology (KAIST), Korea, in 2002. He joined Bell Laboratories, Lucent Technologies, USA, as a postdoctoral researcher in 2002 and then worked at Samsung Advanced Institute of Technology as a member of the research staff (2003–2008). He was an assistant and associate professor in the Department of Materials Science and Engineering at Pohang University of Science and Technology (POSTECH), Korea, until August 2016. He received numerous prestigious awards, including the Merck Award (2006), Korea Young Scientist Award from Korea President (2008), the Scientist of the Month Award from the ministry of science, ICT and future planning in Korea (2013), Research Innovation Award from Ministry of Science and ICT of Korea (2018), Korean Engineering Award (Presidential Award) (2021), Commendation from the Ministry of Trade, Industry and Energy of Korea (Minister's Award) (2021), and Kyung-Ahm Prize (2023). He was appointed as a Fellow of Korea Academy of Science and Technology in 2021. He was honored as 2020 MRS Fellow and 2024 SPIE Fellow. He has published 311 papers in high-impact journals including Science, Nature, Nature Photonics, Nature Nanotechnology, Nature Biomedical Engineering, Science Advances, Nature Communications, Joule, PNAS, Energy and Environmental Science, and Advanced Materials. He is also the inventor or co-inventor of 445 patented technologies. He currently serves as an editorial board member on the Journals such as Advanced Materials, FlatChem, EcoMat, Chem & Bio Engineering, Materials Today Electronics, Nano Convergence, and Semiconductor Science and Technology, and as an associate editor in Organic Electronics. His research focuses on organic, metal halide perovskite, and carbon materials, and their applications to flexible electronics, printed electronics, displays, solid-state lightings, solar energy conversion devices, and bioinspired neuromorphic devices.

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