

## The 1st Workshop for Future Science in Next Generation Synchrotron



Contribution ID: 22

Type: **not specified**

# Lithium-ion Battery Dynamics: From Single Particles to Cells

*Thursday 26 June 2025 10:10 (40 minutes)*

Lithium-ion batteries (LIBs) are at the forefront of energy storage innovation, playing a crucial role in electrification and climate change mitigation. The electrochemical performance of LIBs is governed by the intricate movement of lithium ions across multiple length scales—from atomic-scale lattice structures to microscale porous electrodes and full-cell architectures. Each electrode consists of densely packed particles, each with distinct crystallographic structures and surface properties, contributing to complex, heterogeneous lithium transport behavior.

In this talk, I will demonstrate how advanced analytical techniques provide unprecedented insights into these hierarchical, multiscale dynamics within operating batteries. By bridging nanoscale ion transport with macroscopic electrochemical responses, we reveal how these phenomena impact key performance metrics, including charge-discharge efficiency, capacity degradation, and thermal stability. Understanding these mechanisms is essential for optimizing next-generation battery materials and designs to enhance safety, longevity, and overall performance.

**Primary author:** Prof. LIM, Jongwoo (Seoul Natl. Univ.)

**Presenter:** Prof. LIM, Jongwoo (Seoul Natl. Univ.)

**Session Classification:** Session 3: X-ray Imaging and Spectroscopy for Applied Science (Chair : Kyung-Wan Nam)