

The 137th GREEN Seminar



Cathode chemistry beyond Li-ion batteries

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The development of rechargeable batteries beyond conventional lithium-ion technology requires innovative cathode chemistries that combine high energy density, long cycle life, and the use of earth-abundant elements. This presentation introduces two representative research directions toward next-generation cathode materials.

- 1) Carbon-based cathodes utilizing reversible fluorine–carbon (F–C) reactions will be presented as a new conversion-type cathode chemistry. The reaction mechanism, structural evolution during cycling, and recent approaches to improving reversibility and interfacial stability will be discussed, highlighting the potential of carbon as a high-energy cathode material.
- 2) Layered oxide cathodes for sodium-ion batteries will be introduced from the viewpoint of the relationship between crystal structure and electrochemical performance. Recent studies on P2- and O3-type layered oxides will demonstrate how cation substitution and structural design can regulate phase transitions, Na-ion transport, and structural stability, leading to improved cycling and rate performance.

These two topics illustrate how the rational design of cathode reaction chemistry, encompassing both conversion- and intercalation-type mechanisms, can contribute to the development of high-performance rechargeable batteries beyond Li-ion technology.

Venue: Rm. 409/410, 4F, Collaborative Research Bldg.,
Namiki-site

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