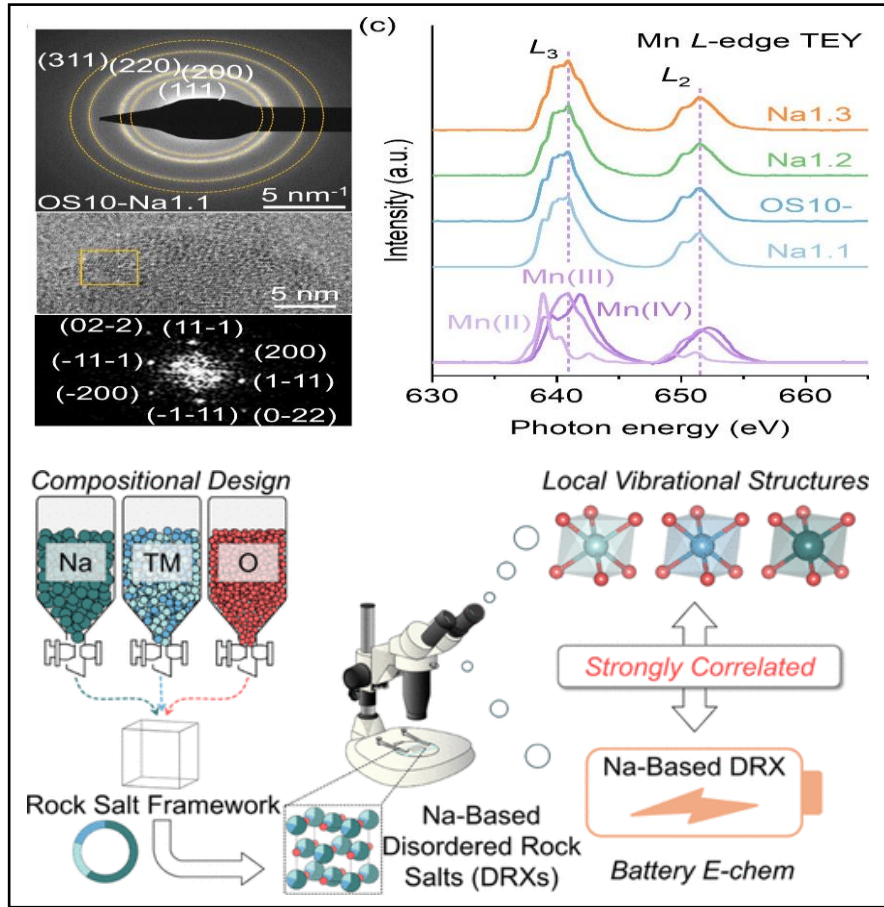


# Expanding Battery Performance Through Tunable Disordered Cathode Materials



**Figure.** Schematic illustration of the synthesis pathway, accompanied by structural characterization of metastable Na-based DRX cathodes, including electron microscopy and X-ray absorption spectroscopy.

## Scientific Achievement

A CINT User Team developed a new class of sodium-ion battery cathode materials with tunable, disordered atomic structures that improve energy storage performance through previously unexplored chemical compositions.

## Significance and Impact

This work expands the design space for lower-cost, more sustainable battery technologies beyond lithium, offering a pathway toward more reliable and scalable energy storage for grid and infrastructure applications.

## Research Details

- Adjusting sodium content changes the material's local atomic structure, which directly controls energy storage behavior; higher sodium levels improve capacity, stability, and ion transport.
- The materials exhibit a “buffering” effect that reduces structural damage during charging, enabling more durable operation and activating additional oxygen-based energy storage mechanisms.

Wang, Y.; Watt, J.; King, M.; Liu, R.; Nordlund, D.; Chen, D. Exploring the Role of Compositional Space of Disordered Rock Salt Na-Ion Battery Cathodes. *ACS Energy Letters*. 2026.

Work was performed, in part, at the Center for Integrated Nanotechnologies.