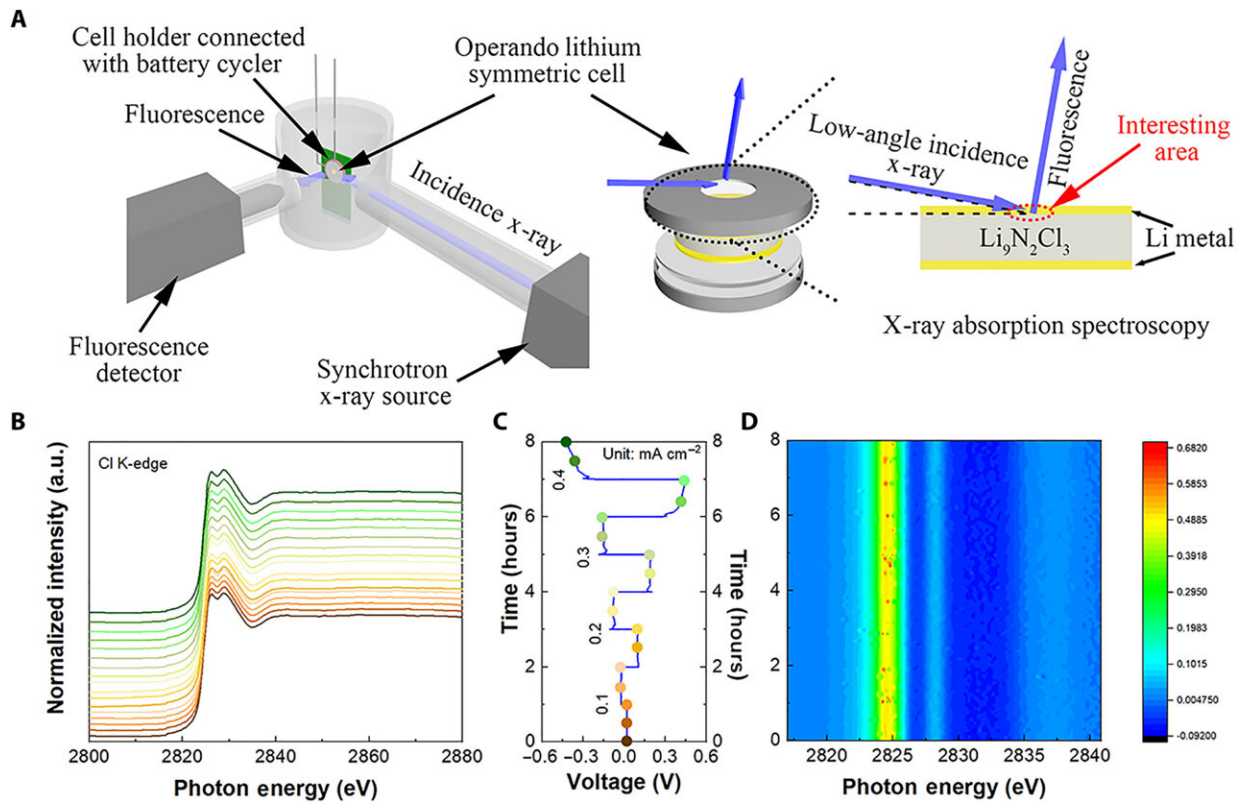


Neutrons offer insights into developing long-range batteries for electric vehicles

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Operando XANES studies of chemical stability toward lithium metal. Credit: *Science Advances* (2023). DOI: 10.1126/sciadv.adh4626

Currently, the biggest hurdle for electric vehicles, or EVs, is the development of advanced battery technology to extend driving range, safety and reliability.

New research has shown how a novel [lithium](#)-based electrolyte material, $\text{Li}_9\text{N}_2\text{Cl}_3$, can be used to develop [solid-state batteries](#) that charge faster and store more energy than conventional designs. Experiments revealed the solid-electrolyte was not only stable in normal air environments, but it also inhibited the growth of dendrites—dangerous, branchlike formations that cause batteries to catch fire.

The findings are [published](#) in the journal *Science Advances*.

Oak Ridge National Laboratory scientist Jue Liu conducted neutron experiments to observe how lithium moved through the material.

"The material's dry air stability, efficient lithium-ion transport and high compatibility toward metallic lithium are crucial advances. It's the best of both worlds," he said. "It offers all the performance benefits of liquid-electrolyte batteries that we use every day, but it's safer and more reliable."

More information: Weihan Li et al, Lithium-compatible and air-stable vacancy-rich $\text{Li}_9\text{N}_2\text{Cl}_3$ for high-areal capacity, long-cycling all-solid-state lithium metal batteries, *Science Advances* (2023). [DOI: 10.1126/sciadv.adh4626](https://doi.org/10.1126/sciadv.adh4626)

Provided by Oak Ridge National Laboratory

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