



UNSW
SYDNEY



Lithium-Ion Batteries; Atomic Scale Know-How to Develop New Components and Understand Degradation

Lithium-ion batteries are currently used extensively across a range of applications. Their increasing uptake in larger-scale applications requires an understanding of degradation mechanisms at the atomic scale and developing new materials or concepts for these batteries.

Competitive advantage

- Access to non-destructive methods to assess battery degradation and failure modes for research and large-scale batteries
- Variety of analytical tools to determine degradation, in particular in situ or operando neutron and synchrotron X-ray diffraction, and solid-state NMR
- Knowhow for analysing data from a range of analytical techniques to build a picture of degradation
- Directed materials design for optimised performance
- Ability to develop materials, characterise, examine electrochemical performance and understand the chemical reasons behind performance

Impact

- Development of the next generation of materials for higher performing or specialised lithium-ion batteries
- Ability to non-destructively assess battery degradation
- Understanding failure and degradation modes to help design next generation batteries

Successful applications

- Non-destructively examined the state-of-health of batteries used in testing by Volvo
- Non-destructively examined the role chemical composition of the cathode plays on cycling and high voltage stability
- Investigated new chemical doping regimes and their influence on electrochemical performance
- Investigated batteries in different form factors; e.g. thin film and all-solid-state
- Investigated new cathodes, anodes and electrolytes

Capabilities and facilities

- Access to in situ/operando neutron diffraction
- Access to in situ/operando synchrotron X-ray diffraction and X-ray absorption spectroscopy
- Solid state NMR
- X-ray photoelectron spectroscopy, Raman, XRD, electron microscopy
- Battery materials development to research-scale cell development

Our partners

- Volvo

More Information

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