Australian Government

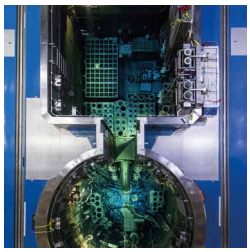
ANSTO
Science. Ingenuity. Sustainability.

Battery Research Capabilities

About ANSTO

ANSTO is home to Australia's most important landmark research infrastructure and expertise in nuclear science and technology. Drawing on more than sixty years of contributions to science, ANSTO has evolved to provide unique capabilities that support a broad range of investigations in energy materials.

Every year thousands of Australian researchers from industry, collaborating organisations and academia use ANSTO's infrastructure, drawing on the expertise of our staff.


OPAL multi-purpose reactor


Australian Synchrotron


National Deuteration Facility


Centre for Accelerator Science


Australian Centre for Neutron Scattering

Our People

ANSTO staff include expert scientists, engineers and technicians who contribute to academic and translational research, collaborate with world leading authorities and foster promising early career professionals.

Collaboration and connection are pivotal to the best translational research outcomes. ANSTO has strong academic and commerical connections with research institutions and companies across Australia and overseas.

1. Raw materials

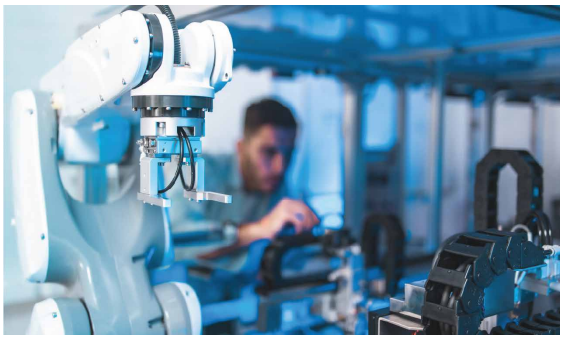
ORE BODY ASSESSMENT

Challenge:

An element of interest can have a range of mineral states in an ore body. A complete assessment of a site needs a large sample set.

Solution:

The high intensity synchrotron x-rays and robotic handling enable rapid throughput of specimens and high-resolution detection of the most dilute mineral phases.



RECYCLING CARBON MATERIALS

Challenge:

Impurities in battery anodes from waste derived carbons can affect electrochemistry.

Solution:

Spectroscopy using intense but 'low-energy' synchrotron X-rays can detect subtle changes of surface chemistry on porous carbon frameworks derived from tyres or even coffee beans.

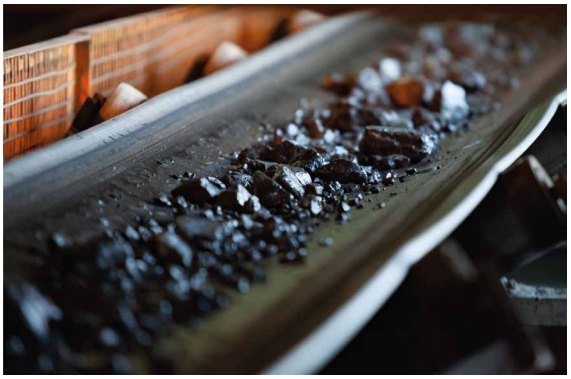
IMPROVING PROCESSABILITY

Challenge:

Extracting important elements and metals can be difficult if they are in challenging mineral forms.

Solution:

Spectroscopy can elucidate an chemical state of the element that is critical to designing the extraction process.



IDENTIFYING UNWANTED PHASES

Challenge:

Even trace phase impurities can compromise the performance of an electrochemical system.

Solution:

Neutron and synchrotron X-ray diffraction offer unparalleled sensitivity and specificty to minor phases.

2. Fundamental Science

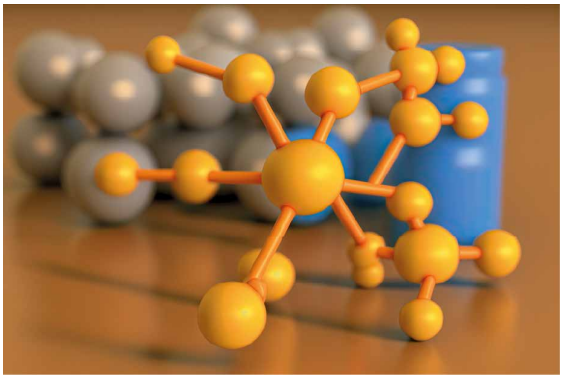
NOVEL ELECTRODES AND MEMBRANES

Challenge:

Understanding the correlation of complex nanostructure in electrode materials with battery performance.

Solution:

Small angle X-ray and neutron scattering provide key information about connectivity and distribution of pores in electrodes in membranes.



ENHANCING REACTION KINETICS

Challenge:

Rapid development of electrochemical systems requires real time analysis of chemical evolution.

Solution:

Neutrons and synchrotron X-rays can monitor electrochemical reactions non-invasively while they happen.

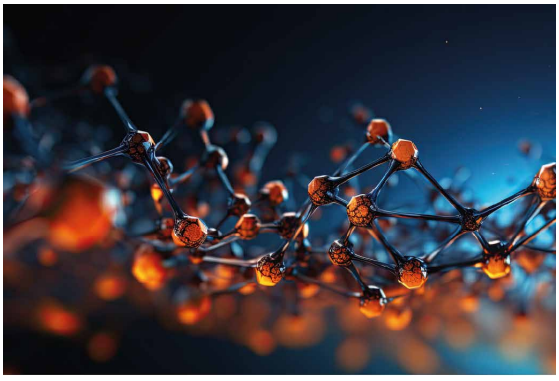
ION TRANSFER EFFICIENCY

Challenge:

Advanced battery development requires understanding of ion mobility beyond conventional electrical measurements.

Solution:

Quasielastic neutron scattering provides at atomic level understanding of the dynamic process important to efficient battery ion transport.



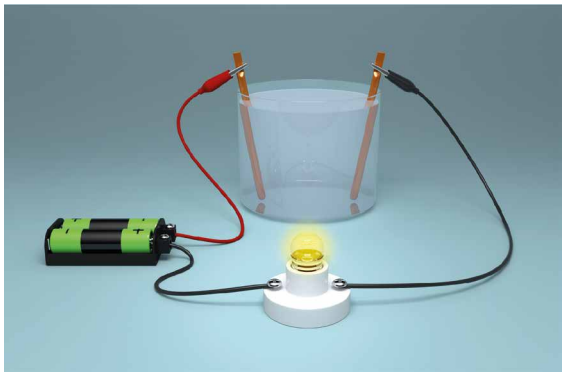
ELECTROLYTE PERFORMANCE

Challenge:

Dynamic changes in electrolyte solutions near electrodes require both high senstivity and high spatial resolution spectroscopy.

Solution:

Synchrotron FTIR microscopy can detect changes in solid and liquid electrolyte components during cycling.



3. Performance

TESTING OF REAL BATTERIES

Challenge:

Commercial batteries come in a range of shapes and sizes that are not always convienient for testing.

Solution:

ANSTO neutron and synchrotron techniques can accomodate a wide range of battery cell forms.

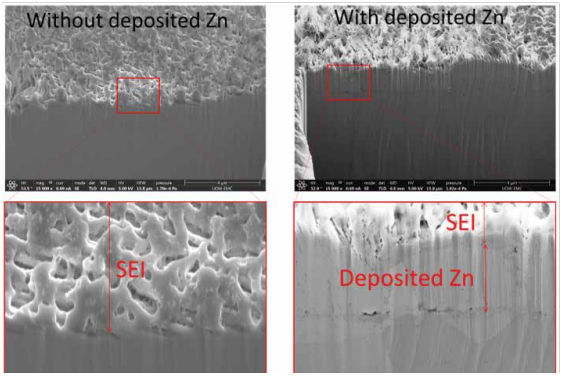
ELECTRODE SURFACE CONTAMINATION

Challenge:

The interfaces within a battery are critical to performance and often need close study of surface changes.

Solution:

Synchrotron spectroscopy in hard, soft and infrared radiation provides microscopically resolved chemical insight.



BATTERY DEGRADATION

Challenge:

Gradual internal changes such as grid corrosion and active material degradation are difficult to monitor.

Solution:

Synchrotron X-rays can illuminate microscopic defects in electrode surfaces and bubble formation due to unwanted side reactions.

BATTERY FAILURE

Challenge:

Internal changes that lead to sudden failure in commercial batteries are best studied in-situ.

Solution:

Neutron and high energy X-ray techniques can reveal a cause of failure before the event during cycling or afterwards with the battery intact.

4. Collaboration

MERIT ACCESS FOR OPEN RESEARCH

ANSTO infrastructure is critical to research projects undertaken by more than 30 Australian universities and government research institutions like CSIRO and the Defence Science Technology Group.

ANSTO facilities are available to researchers via merit programs accessed through peer reviewed application. Outcomes from this work are published in open-access scientific journals and conferences.

COMMERCIAL ACCESS AND INTELLECTUAL PROPERTY

Security and intellectual property protection are a vital component of all business operations at ANSTO's ISO-accredited research sites.

Most capabilities are available via commercial access, allowing the protection of IP with non-disclosure for agreements and work contracts.

ANSTO can also accommodate work requiring Australian Government Security Vetting Agency (AGSVA) clearances.

CONTACT

David Cookson

Commercial Technical Consultant

Phone **+61 3 8540 4101**
Mobile **+61 439 758 864**
Email **david.cookson@ansto.gov.au**

Robert Acres

Commercial Technical Consultant

Phone **+61 3 8540 5371**
Mobile **+61 401 354 826**
Email **robert.acres@ansto.gov.au**

Group Contact

Email **nise@ansto.gov.au**

LOCATION

NSW Campus

New Illawarra Road,

Lucas Heights, NSW 2234

Australia

Vic Campus

Australian Synchrotron, 800 Blackburn Road,

Clayton VIC 3168

Australia