

## Materials Characterisation – NSW based facilities

- Microscopy & Microanalysis
- Medical Imaging
- NSW Synchrotron Consortium
- Australian Nuclear Science and Technology Organisation (ANSTO)

### Benefits to Industry

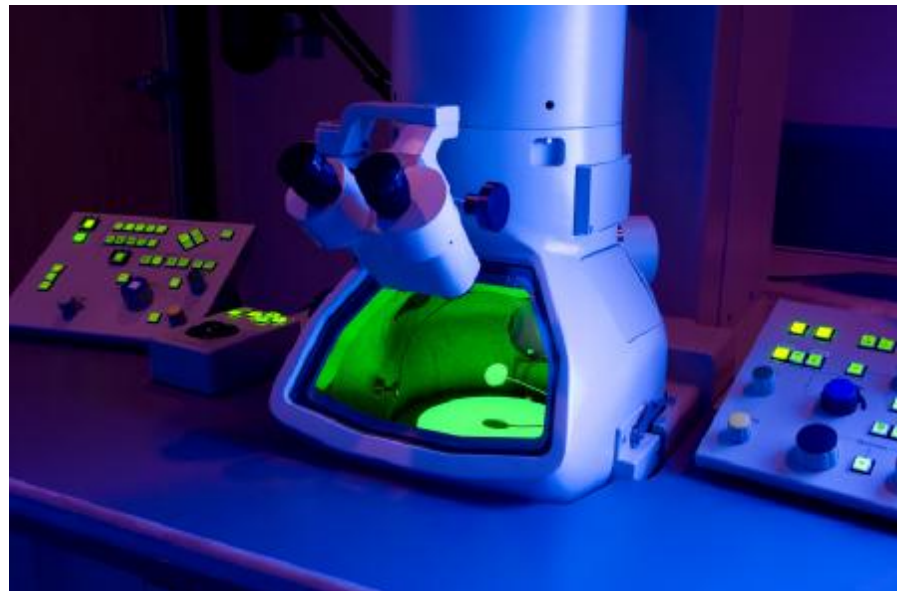
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### Materials characterisation research infrastructure

Microscopy, microanalysis, imaging and nuclear science are important components of modern science, underpinning various disciplines such as engineering, environmental science and medical science. With modern research infrastructure, researchers, industry and government users will have the ability to access and utilise information which will further the knowledge of these areas,

NSW has a large amount of research infrastructure dedicated to characterisation, which can be found in many of the State's universities. NSW is also home to the Australian Government funded Australian Nuclear Science and Technology Organisation (located at Lucas Heights in Sydney) which has capability in materials characterisation using neutron diffraction and X-ray diffraction.

Additionally, through the NSW Science Leveraging Fund (SLF), the NSW Government has also co-invested in the Australian Government's National Collaborative Research Infrastructure Strategy (NCRIS) to support characterisation research infrastructure in the fields of microscopy and microanalysis and medical imaging.



The NSW Government has also provided funding to the NSW Synchrotron Consortium, a group of 10 NSW universities and 3 interstate universities that provides access to the Australian Synchrotron.

## Microscopy and Microanalysis

The **Australian Microscopy and Microanalysis Research Facility** (AMMRF), headquartered at the **University of Sydney**, provides a national network of advanced microscopy and microanalysis research infrastructure capable in the structural, chemical, biological and crystallographic characterisation of matter on a small scale. Part of the NCRIS program, AMMRF will be able to give Australian scientists low cost access to new, state of the art equipment.

This is delivered in NSW by:

- o **University of Sydney's** Australian Key Centre for Microscopy and Microanalysis (node);
- o **University of New South Wales'** Electron Microscope Unit (node); and
- o **Macquarie University** Optical Microcharacterisation Facility (linked lab)

Additional national nodes of the AMMRF include: the University of Queensland; University of Western Australia; Australian National University and the South Australian Regional Facility (University of Adelaide, University of South Australia and Flinders University).

<p><b>University of Sydney</b>  <a href="#">Australian Key Centre for Microscopy and Analysis</a></p>	<p><b>Image Local Electrode Atom Probe: LEAP &amp; Wide-Field-Of-View Laser Atom Probe: LEAP3000</b></p> <p><u>Capabilities</u></p> <ul style="list-style-type: none"> <li>• Acquisition rate up to <math>10^7</math> ions per hour.</li> <li>• <math>10^6</math> - <math>3 \times 10^7</math> atoms per specimen (typ.)</li> <li>• Analysis volume: 50 x 50 x 100nm (typ.)</li> <li>• Spatial resolution: 0.5nm</li> <li>• Mass resolution: 500</li> </ul>
<p><b>University of New South Wales</b>  <a href="#">Electron Microscope Unit</a></p>	<p><b>FEI Nova Nanolab 200 Dualbeam FIB</b></p> <p><u>Capabilities</u></p> <ul style="list-style-type: none"> <li>• Implantation and nano-machining</li> <li>• Quantum Dots and arrays</li> <li>• Precise Surface Reconstructions</li> <li>• Select chemically regions for machining</li> <li>• Alternate between imaging and nanomilling</li> <li>• Single atom implantation, device prototyping or selective alloying</li> </ul> <p><b>High Resolution SEM Analysis Facility (Online 2008)</b></p> <p>The suite of field emission scanning based instruments for high-resolution, chemical and crystallographic analysis will include the use of aberration-corrected lenses to enhance spatial resolution and latest generation detectors to provide high-precision chemical data. The instruments are ideal for the examination of nano-scale materials and devices.</p>

Please direct your enquires about AMMRF to Dr Miles Apperley at [m.apperley@usyd.edu.au](mailto:m.apperley@usyd.edu.au)

## Imaging

Forming a node of the NCRIS funded **National Imaging Facility**; the **Brain and Mind Research Institute** located at the **University of Sydney** provides medical based imaging research infrastructure and facilities in NSW that specialises in the development of new biomarkers (i.e. molecular tools, such as radioligands to measure non-invasively receptor densities and enzymatic activities and their changes in disease). Additional NSW nodes of the National Imaging Facility include nodes at the **University of Western Sydney** and the **University of New South Wales** that specialise in animal and plant imaging.

<b>University of Sydney</b> <b><u>Brain &amp; Mind Research Institute</u></b>	<ul style="list-style-type: none"> <li>• Research Cyclotron</li> <li>• MicroPET</li> <li>• MicroSPECT</li> <li>• Beta Microscope</li> <li>• Imaging Suite/Integrated Laboratory <ul style="list-style-type: none"> <li>○ Medicinal Chem Lab</li> <li>○ Pharmacology/Bio-distribution</li> <li>○ Radiochemistry lab</li> <li>○ Animal Imaging suite microPET/microSPECT</li> <li>○ Separate animal rooms for rats and mice</li> </ul> </li> <li>• 8.5T MRI whole body</li> <li>• 3T MRI whole body</li> <li>• Bio-Modelling lab</li> </ul>
<b>University of Western Sydney</b>	<ul style="list-style-type: none"> <li>• 11.7 Tesla Magnetic Resonance Imaging Facility</li> <li>• 7.0 Tesla Small Animal Magnetic Resonance Imaging Facility</li> </ul>
<b>University of New South Wales</b>	<ul style="list-style-type: none"> <li>• 3 Tesla Whole Body MRI Facility (located at Prince of Wales Medical Research Institute)</li> <li>• IVIS Lumna Live Imaging Facility (located at UNSW)</li> <li>• Faxitron X-Ray Facility (located at UNSW)</li> <li>• Vevo 77 Ultrasound Microimaging Facility (located at UNSW)</li> <li>• Skyscan 1072 Micro CT (located at UNSW)</li> </ul>

Please direct your enquires about the BMRI to Professor Richard Banati at [r.banati@usyd.edu.au](mailto:r.banati@usyd.edu.au)

Please direct your enquires about the UWS facilities to Professor William Price at [w.price@uws.edu.au](mailto:w.price@uws.edu.au)

Please direct your enquires about the UNSW facilities to Professor Pamela Russell at [p.russell@unsw.edu.au](mailto:p.russell@unsw.edu.au)

## NSW Synchrotron Consortium

The NSW Synchrotron Consortium is a group of 10 NSW based universities and 3 interstate based universities that provides access to the Australian Synchrotron located at Monash University, in Clayton, Victoria.

The Australian Synchrotron is a state of the art device with the capacity to provide photons from the infrared region to the hard x-ray region of the light spectrum. These photons are then used to undertake a range of experiments largely for the purpose of characterising research samples.

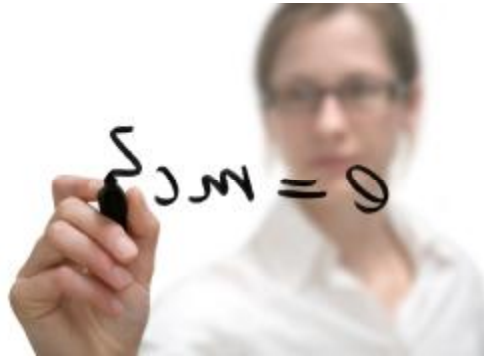
Researchers, industry and government users can access the Australian Synchrotron through the NSW Synchrotron Consortium.

Beamlines planned	Commissioning date
Beamline 1 – High-throughput Protein Crystallography	June 2007
Beamline 2 – Protein Microcrystal and Small Molecule Diffraction	Sept 2008
Beamline 3 – Powder Diffraction	Nov 2007
Beamline 4 – Small and Wide Angle X-ray Scattering	Sept 2008
Beamline 5 – X-ray Absorption Spectroscopy	Nov 2007
Beamline 6 – Soft X-ray Spectroscopy	Sept 2007
Beamline 8 – Infrared Spectroscopy	May 2007
Beamline 9 – Microspectroscopy	Oct 2008
Beamline 10 – Imaging and Medical Therapy	Sept 2008

Please direct your enquires about the NSW Synchrotron Consortium to Dr Joseph Bevitt at [j.bevitt@usyd.edu.au](mailto:j.bevitt@usyd.edu.au)

## Australian Nuclear Science and Technology Organisation (ANSTO)

Located in Lucas Heights, south of Sydney, the Australian Nuclear Science and Technology Organisation (ANSTO) is Australia's premier nuclear and scientific research and development organisation responsible for delivering expert scientific and technical advice, products and services to government, industry, academia and other research organisations. It is committed to the development of new knowledge, delivery of quality services and support for business opportunities.



ANSTO has diverse research capabilities, with potential applications across a range of industries including:

- Medical
- Aerospace
- Resources
- Mineral processing
- Power generation Oil exploration
- Agriculture
- Food processing
- Manufacturing
- Engineering
- Plastic

Please direct your enquires about ANSTO to Professor Peter Holden (Director National Deuteration Facility) [peter.holden@ansto.gov.au](mailto:peter.holden@ansto.gov.au) or [access-ansto@ansto.gov.au](mailto:access-ansto@ansto.gov.au)

### Would you like some further information?

#### NSW Department of State and Regional Development

For more information about the Department, the NSW Government's economic development agency, please visit : [www.business.nsw.gov.au](http://www.business.nsw.gov.au)

#### NSW Office for Science and Medical Research

The Office for Science and Medical Research (OSMR) works with research institutes, universities and businesses to promote growth and innovation in science and medical research to achieve better economic, technological, health and environmental outcomes for NSW. For more information on OSMR, visit: [www.osmr.nsw.gov.au](http://www.osmr.nsw.gov.au)

#### NSW Government Statement on Innovation

The NSW Government Statement on Innovation outlines the NSW Government plans to enhance industry innovation as a means of improving productivity and increasing business investment. A copy of the statement can be downloaded from: [www.nsw.gov.au/thankyou.asp?linkid=7119](http://www.nsw.gov.au/thankyou.asp?linkid=7119)

Visit the Department of State and Regional Development's innovation website at: [www.business.nsw.gov.au/innovation](http://www.business.nsw.gov.au/innovation)

#### Australian Microscopy and Microanalysis Research Facility

For more information on AMMRF, visit their website at: [www.ammrf.org.au](http://www.ammrf.org.au)

#### National Imaging Facility

For more information on NIF, visit their website at: [www.anif.org.au](http://www.anif.org.au)

#### Australian Nuclear Science and Technology Organisation (ANSTO)

For more information on ANSTO, visit their website at: [www.ansto.gov.au](http://www.ansto.gov.au)

#### National Collaborative Research Infrastructure Strategy (NCRIS)

For information about NCRIS visit the Commonwealth Department of Innovation, Industry, Science and Research (DIISR) at: [ncris.dest.gov.au](http://ncris.dest.gov.au)