AINSE

The Australian Institute of Nuclear Science and Engineering

ANSTO RESEARCH CAPABILITIES AND FACILITIES GUIDE

This document outlines all of ANSTO's Research Capabilities and relevant ANSTO contact scientists that you are able to select as part of your Postgraduate Research Award application, and these capabilities are linked with the ANSTO Research Portal. Please ensure that you contact the relevant ANSTO scientist for advice prior to submitting your application.

Under the following clusters, you will find the individual capabilities, contact scientists, associated capability groups as well as facilities, if applicable.

Australian Synchrotron

The Australian Synchrotron produces powerful beams of light that can be used at individual experimental facilities, known as beamlines, to examine the atomic and molecular detail of a wide range of materials from health and medical, food, environment, biotechnology, nanotechnology, energy, mining, agriculture, advanced materials and archaeological research. Compared to traditional laboratory tools, the results from synchrotron analyses are exceptional in terms of accuracy, quality, robustness, level of detail and speed of data acquisition.

PLEASE NOTE: For Applicants seeking to use Australian Synchrotron Facilities: Students will only be eligible for the 2019 PGRA round if they can demonstrate a tangible, promising, realistic plan to access merit-based beamtime at the Australian Synchrotron. Options are: (a) recent successful beamtime application with beamtime scheduled in the forthcoming months, (b) beamtime applications submitted and presently in review, or (c) beamtime application signed off by your co-supervisor to be submitted in the proposal round. Please see the Australian Synchrotron websites for access guidelines."

For more detailed information on the capabilities of the individual beamlines please click on the links below:

Beamline	ANSTO Contacts
Imaging and Medical Beamline (IMBL)	IMBL Team
X-ray Fluorescence Microscopy (XFM)	XFM Team
Macromolecular and Micro Crystallography (MX1 and MX2)	MX1 and MX2 Team
Terahertz/Far-Infrared (THz/Far-IR)	THz/Far-IR Team
Infra-red Microscopy (IRM)	IRM Team
Soft X-ray Spectroscopy (SXR)	SXR Team
Small and Wide Angle X-ray Scattering (SAXS/WAXS)	SAXS / WAXS Team
X-ray Absorption Spectroscopy (XAS)	XAS Team
Powder Diffraction	Powder Diffraction Team

Australian Centre for Neutron Scattering

Neutron scattering covers an extremely wide range of disciplines: from fundamental physics, through chemistry, materials, and biology, right through to interdisciplinary areas such as engineering and archaeology.

Science at the Australian Centre for Neutron Scattering covers many of these areas, usually in collaboration with other groups, with our main focus being on the strongholds of neutron scattering: crystallography, soft condensed matter, solid-state physics, physical chemistry and increasingly biology.

Beamline	ANSTO Contacts
ECHIDNA High-Resolution Powder Diffractometer	Dr Max Avdeev, Dr James Hester, Dr Chin-Wei Wang
WOMBAT High-Intensity Powder Diffractometer	Dr Vanessa Peterson, Dr Helen Maynard- Casely, Dr Chin-Wei Wang
KOALA Laue Diffractometer	Dr Ross Piltz, Dr Alison Edwards
KOWARI Strain Scanner	Dr Vladimir Luzin, Dr Mark Reid, Dr Anna Paradowska
PLATYPUS Neutron Reflectometer (with horizontal sample)	Dr Andrew Nelson, Dr Stephen Holt, Dr Hal Lee
QUOKKA Small-Angle Neutron Scattering	Dr Elliot Gilbert, Dr Katy Wood, Dr Chris Garvey, Dr Jitendra Mata, Dr Chun-Ming Wu
TAIPAN Thermal Neutron 3-Axis Spectrometer	Dr Sergey Danilkin, Dr Kirrily Rule, Dr Anton Stampfl
KOOKABURRA Ultra Small-Angle Neutron Scattering	Dr Jitendra Mata, Dr Liliana de Campo
PELICAN Time-of-Flight Spectrometer	Dr Dehong Yu, Dr Richard Mole
DINGO Neutron Radiography/Imaging/Tomography	Dr Ulf Garbe, Dr Filomena Salvemini, Dr Joseph Bevitt
SIKA Cold Neutron 3-Axis Spectrometer	Dr Guochu Deng, Dr Shin-ichiro Yano, Dr Kirrily Rule, Dr Chun-Ming Wu
BILBY 2nd Small-Angle Neutron Scattering Instrument	Dr Anna Sokolova, Dr Liliana de Campo, Dr Andrew Whitten, Dr Chun-Ming Wu
EMU High-Resolution Backscattering Spectrometer	Dr Nicolas de Souza
JOEY Neutron Laue Camera for single-crystal alignment	Dr Clemens Ulrich
SPATZ 2nd neutron reflectometer (with vertical sample)	Dr Anton Le Brun
SAXS Instruments	Dr Robert Knott
X-ray Reflectometer	Dr Stephen Holt, Dr Andrew Nelson

Centre for Accelerator Science (CAS)

The Centre for Accelerator Science (CAS) provides users with access to a suite of tools in one location that can be used across:

- isotopic dating
- air pollution
- climate science
- modification and characterisation of materials
- radiation damage studies
- forensic science
- nuclear detector characterisation
- microbiological and life science studies.

CAS provides two main capabilities:

- accelerator mass spectrometry (AMS)
- ion beam analysis (IBA).

Capability	ANSTO Contacts
Radiocarbon dating	Dr Geraldine Jacobsen, Dr. Vladimir Levchenko, Dr Quan Hua, Andrew Jenkinson, Dr. Andrew Smith, Dr David Fink
Actinide and heavy ion isotopic analysis	Dr Michael Hotchkis
Cosmogenic isotope dating	Dr David Fink, Dr Toshiyuki Fujioka, Dr. Andrew Smith, Dr Klaus Wilcken
Surface Engineering, Characterisation & Modification	Prof Mihail Ionescu
Bulk Sample Characterisation & Surface analysis	Dr Armand Atanacio
Aerosol Measurement & Fine Particle Characterisation	Dr Armand Atanacio

Isotope Tracing in Natural Systems

Isotope Tracing in Natural Systems (ITNS) is a user focused facility providing a range of radioanalytical, isotopic and elemental analytical techniques, measurements and expertise for environmental studies.

The facility undertakes a broad range of analyses for research and industry. The ITNS team can provide customized services to suit the particular requirements of each client.

Capability	ANSTO Contacts
Tritium in surface / groundwaters	Robert Chisari
Stable isotope ratios of carbon, nitrogen, oxygen, hydrogen	Robert Chisari
Movement of fluids, particulates and contaminants in aquatic and terrestrial environments	Dr Catherine Hughes
Dating of sediment cores using Lead-210	Atun Zawadzki
Radiograph and XRF scans	Patricia Gadd
Grain size distribution determination	Atun Zawadzki
Natural radioactivity from radon	Sylvester Werczynski, Dr Alastair Williams
Elemental and trace metal analysis	Henri Wong
Laser ablation – ICPs	Henri Wong
Environmental radioactivity measurements	Atun Zawadzki

National Deuteration Facility

The National Deuteration Facility (NDF) offers the facilities, staff and expertise to produce molecules in which all or part of the molecular hydrogen is in the form of deuterium (2H or D). This enables complex investigations of the relationship between the structure of molecules and their function using neutron scattering, Nuclear Magnetic Resonance and other types of spectroscopy.

The NDF is a unique facility offering molecular deuteration using both *in vivo* biodeuteration or chemical deuteration techniques. It produces deuterated proteins, biopolymers, nucleic acids and synthesised small organic molecules such as lipids, phospholipids, sugars, surfactants, aliphatic hydrocarbons and aromatic, heterocyclic compounds. Double and triple labelling of proteins with both deuterium and the stable isotopes carbon-13 and/or nitrogen-15, are also available.

The nationally recognised facility is NCRIS funded and the only one of its kind in the Southern Hemisphere.

Capability	ANSTO Contacts
Biological deuteration	Prof Peter Holden, Karyn Wilde, Dr Anthony Duff, Dr Agata Rekas, Dr Robert Russell, Dr Natalia Davydova
Chemical deuteration	Dr Tamim Darwish, Dr Anwen Krause-Heuer, Dr Nageshwar Rao Yepuri, Dr James Howard, Marina Cagnes, Dr Rhys Murphy

Nuclear Materials Development and Characterisation

ANSTO Nuclear Materials Development and Characterisation provides a unique set of capabilities to enable the synthesis, processing, engineering, testing and characterisation of the structure-property relationships of nuclear relevant materials and other advanced material systems.

Applications include advanced materials for fundamental science and industrially relevant applications and specialist radioactive handling capabilities.

Access to these capabilities may be limited to work which includes ANSTO research: please contact the user officer with your enquiry.

Capability	ANSTO Contacts
Materials testing	ANSTO User Office
Microscopy	ANSTO User Office
Metallography	ANSTO User Office
Inactive chemistry and characterisation	ANSTO User Office

Nuclear stewardship

Nuclear Stewardship maintains national capabilities that support industry, government and scientific users. Capabilities include radionuclide metrology, ionising radiation detection and measurement, radioanalytical chemistry and nuclear forensics.

Capability	ANSTO Contacts
Nuclear and ionising radiation detection and dosimetry	ANSTO User Office
Radioanalytical Chemistry	ANSTO User Office

Radiobiology and bioimaging

ANSTO's radiobiology and bioimaging capabilities specialise in the quantification of radiation in living systems.

Our diverse technical approach allows us to extract a comprehensive picture of the biology being investigated using complementary *in vitro*, *ex vivo*, *in vivo*, and in silico methodologies.

Capability	**ANSTO Contacts**
Radiobiology	ANSTO User Office
In vivo imaging	ANSTO User Office
In vitro imaging	ANSTO User Office
Gamma irradiation	ANSTO User Office
Radiotracer characterisation	ANSTO User Office

Radioisotopes and Radiotracers

The Radioisotope and radiotracing capabilities provide a complete work flow to deliver radioisotopes, radiotracers and radiotracing techniques.

Radioisotope and radiotracing capabilities range from reactor and cyclotron irradiations, through separations, to radioisotope or radiotracer production and characterisation.

Neutron-activated isotopes in materials are used to determine the elemental composition of the sample matrix.

Capability	ANSTO Contacts
Radioisotope provision	Dr Paul Pellegrini, Dr Ivan Greguric
Radioisotope research and development	Dr Paul Pellegrini, Dr Ivan Greguric
Radiotracer development	Dr Nigel Lengkeek, Dr Giancarlo Pascali, Dr Ivan Greguric
Radiotracer production	Dr Tien Pham, Dr Nigel Lengkeek, Dr Ivan Greguric
Radiochemistry automation	Dr Gary Perkins, Dr Ivan Greguric
Radioanalytical measurement	Dr Ivan Greguric
Elemental analysis	Attila Stopic
Neutron irradiation	Attila Stopic