

Bragg Institute, Radiopharmaceuticals and Industrials

Bragg Institute

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- 3714a Fast Flux Rigs Irradiation per 24 hours thereafter
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- 3740 Gamma Irradiation Facility – GATRI

2900 The X-Ray Reflectometer

Description

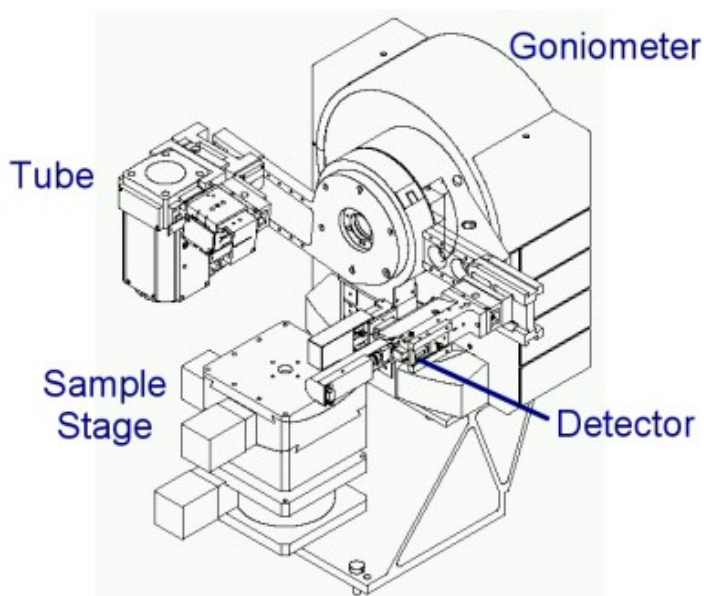
The new X-ray reflectometer, delivered in July 2004 and fully operational by the beginning of 2005, is a Panalytical X'Pert Pro instrument. The instrument is capable of measuring reflectivity at air-solid or air-liquid interfaces. The X-ray reflectometry method provides information complementary to that from neutron reflectometry which is currently available at HIFAR, and which will be a strong feature at Australia's new Replacement Research Reactor. The X-ray reflectometer is used for research on thin-films and surfaces, by the Australian scientific and industrial communities. The sample geometry is horizontal, with (specular reflectivity) taking place in the vertical plane. It is suitable for the study of air-solid and air-liquid interfaces (i.e. horizontal surfaces).

The X-ray reflectometer is equipped with a Cu tube source with parallel beam optics, motorised beam defining slits, an automatic beam attenuator, a "De Wolf" beam knife and a Xe scintillator detector (capable of $>10^6$ cps). Solid samples will be mounted on a motorised XYZ, Phi sample stage while, a motorised Huber stage will be employed for liquid studies.

Applications

X-ray reflectometry is used to probe the structure of surfaces, thin-films or buried interfaces as well as processes occurring at surfaces and interfaces such as adsorption, adhesion and interdiffusion. In particular, recent years have seen an explosion of interest in the biosciences as well as the emerging field of nanotechnology. Applications cover photosensitive films, electrochemical and catalytic interfaces, surfactant layers, polymer coatings and biological membranes. The increasing importance of hybrid materials, the properties of which are determined by their interfaces and the rapid development in the field of thin film technology provides a strong demand for x-ray reflectometry.

Figure 1. Schematic of the X-ray Reflectometer



ANSTO Contacts

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2650 The Small Angle X-ray Scattering Instrument

Description

A new Small Angle X-ray Scattering (SAXS) instrument has been installed in the guide hall at OPAL. The SAXS instrument is a Bruker Nanostar equipped with a rotating anode source and three-pinhole collimation. SAXS is complimentary to Small Angle Neutron Scattering (SANS) which will be available on the new QUOKKA instrument at the OPAL reactor. A variety of sample environments are available for solids and liquids, including two temperature control units one covering temperature range -30°C to 120°C and a second unit for ambient to 300°C. The instrument is capable of being run in two separate configurations either high resolution or high flux; the q-range accessible is 0.005 Å⁻¹ to 3.1 Å⁻¹ in high resolution mode and 0.01 Å⁻¹ to 3.1 Å⁻¹ in high flux mode.



Applications

SAXS is used to study any materials with structure of the length scale 1-100nm. The performance of many advanced materials is crucially dependent on nanostructure, and SAXS can be used to study this. It can be used for study of density variations, colloidal sizes, particles sizes, porosity, domain sizes, orientation, phase identification, the list is endless. With research being directed more towards nano-sized science, SAXS is becoming a widely used tool.

Instrument Specifications

Rotating Anode Cu Ka source (1.541 Å)
Cross-coupled Göbel mirrors
3 pinhole collimation
Large multifunctional sample chamber
Sample temperature control from -30°C to 150°C or ambient to 300°C
Hi-Star 2D detector with 100µm resolution
Capability of two configurations: high resolution or high intensity.
$Q_{\min} = 0.005 \text{ \AA}^{-1}$
$Q_{\max} = 3.1 \text{ \AA}^{-1}$

Further instrument information can be found here:

<http://www.ansto.gov.au/ansto/bragg/facilities/instruments.html>

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Radiopharmaceutical Research Institute

General

The Radiopharmaceuticals Research Institute (RRI) of ANSTO comprises the largest research and development team in radiopharmaceutical chemistry and biology in Australia. Radiopharmaceutical research staff have expertise in the basic sciences of chemistry, biochemistry, pharmacology, and radiochemistry. An integrated team addresses the design, synthesis, evaluation, quality control and application of labelled compounds and radiopharmaceuticals. Activities include radiopharmaceutical chemistry and radionuclide development, *in vivo* and *in vitro* evaluations of labelled compounds and support for clinical trials with promising radiopharmaceuticals.

Postgraduate education and specialised training in the radiopharmaceutical sciences is a priority of the Radiopharmaceuticals Research Institute. AINSE Award and postgraduate research activities are encouraged.

The Radiopharmaceuticals Research Institute (RRI) consists of the following functional groups in radiopharmaceutical research and development:

- Synthetic Chemistry
- Radiochemistry
- Analytical Chemistry
- Radiopharmacology

Radiopharmaceutical Research Institute staff have expertise in the basic sciences of chemistry, biochemistry, pharmacology, radiochemistry and dosimetry. An integrated team addresses the design, synthesis, evaluation, quality control and application of labelled compounds and radiopharmaceuticals. Activities include radiopharmaceutical chemistry, radionuclide development, *in vivo* and *in vitro* evaluations of labelled compounds and clinical trials with promising radiopharmaceuticals.

The Radiopharmaceuticals Research Institute has the following capability/facility available to support AINSE

- I. Radiochemical Chemistry Laboratories
- II. Analytical Instruments
- III. Radiopharmacology laboratories
- IV. Computational Chemistry
- V. Radiolabelled products for clinical trials

Details of the capability are given in the following pages.

Postgraduate education and specialised training in the radiopharmaceutical sciences is a priority of the Radiopharmaceuticals Research Institute. AINSE Award and postgraduate research activities are encouraged.

Initial enquires can be directed to Dr Nabil Morcos, Radiopharmaceuticals Research Institute

Ph 02 9717 9242

Fax 02 9717 9262

Email nabil.morcos@ansto.gov.au

3100 Radiopharmaceutical Chemistry Laboratories

Description

Radiopharmaceuticals has a modern radiopharmaceutical chemistry laboratory (730 m²) which was completed in 1994 and an additional large laboratory complex for radiopharmacology and biodistribution studies.

Laboratories have facilities for radiopharmaceutical preparation, organic synthesis, biological evaluations, and handling of most radionuclides.

Support Services and Facilities

Biochemistry and analytical laboratories; hot cells; radiopharmacology laboratories and instrumentation.

Availability

Subject to ANSTO requirements and not restricted to collaborative projects with ANSTO. Project and facilities should be discussed with contact person prior to completing the application form.

ANSTO Contact

Dr Andrew Katsifis, Radiopharmaceuticals Research Institute

Phone 02 9717 9094

Fax 02 9717 9262

Email andrew.katsifis@ansto.gov.au

3400 Radiopharmacology Laboratories

Description

Radiopharmaceuticals Research Institute operates a suite of radiopharmacology laboratories with a capability of performing various radiobiological studies. The laboratories feature applications of radioisotopes in autoradiography, drug biodistribution, drug metabolism, and receptor and transporter binding under physiological or pathological conditions. Experiments can be conducted *in vivo* in rodents or *in vitro* with human and animal cells or tissues. The laboratories are supported by Radiopharmaceutical Chemistry Laboratories, which possess facilities for organic synthesis, radiopharmaceutical preparation, and handling of a range of research isotopes.

Support Services and Facilities

Major facilities comprise gamma camera with computer imaging system, whole body cryostat, phosphor image plate scanner, computerised imaging analysis system, automatic gamma counter, liquid scintillation analyser, computer-controlled microplate reader, radio-HPLC, radio-TLC, cell culture facilities, gamma irradiation facilities, and animal holding facilities.

Experienced pharmacologists, radiopharmacist and biomedical professionals are on staff. The laboratories provide the following supports or services: provision of laboratory space and facilities, offer of technical and scientific assistance, design and execution of experiments, collection and analysis of data, development of customised new methods, and synthesis and labelling of compounds via the Radiopharmaceutical Chemistry Laboratories.

Applications

Nuclear Biology: Pre-clinical research into new diagnostic radiopharmaceuticals.

Pharmacokinetics: Evaluation of stability, distribution and clearance of drugs or toxicants *in vivo*

Functional Imaging Functional imaging assessment of biological responses to internal or external stimuli in the model systems

Availability

The services and facilities are available to AINSE members under the AINSE Award scheme and to non-members on a contract basis. Bookings are necessary. Studies involving use of living animals on site need to obtain an approval from ANSTO Animal Care and Ethics Committee.

ANSTO Contact

Dr Andrew Katsifis, Radiopharmaceuticals Research Institute

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Fax 02 9717 9262

Email andrew.katsifis@ansto.gov.au

ANSTO Radiopharmaceuticals and Industrials Production (ARI)

ANSTO Radiopharmaceuticals and Industrials (ARI) manufactures commercial and specialist radionuclides in Australia. These materials have applications in Medicine, Industry and Research. The HIFAR Nuclear Reactor at Lucas Heights and IBA 30MeV cyclotron in the city provide the sources of these products.

Commercial products manufactured for Nuclear Medicine applications are done so under the code of Good Manufacturing Practice (GMP). All commercial pharmaceutical products are registered with the Therapeutic Goods Administration (TGA) and ARI is accredited to ISO9001.

ANSTO Radiopharmaceuticals and Industrial consists of the following functional groups:

- Regulatory Affairs and Quality Assurance
- Marketing
- Business Services
- Production
- Operations, Camperdown

ANSTO Radiopharmaceuticals and Industrials has the following capabilities available to support AINSE

- A wide range of Radionclides
- Neutron Irradiations

Details of the capability are given in the following pages.

Ordering and Application

Orders and routine enquiries to Radiopharmaceuticals Customer Service

Phone Toll Free 1800 251 572
Fax Toll Free 1800 648 132

3600 Radioisotopes for Research

General

Access to a range of Reactor and Cyclotron produced radionuclides for research are available from ARI

AINSE Awards may be used for the purchase of radionuclides provided they are to be used for developing new techniques and processes. They are not to be used for established or routine purposes.

ANSTO Contact

Daniel Kenny - ARI
Phone: 02 9717 9010
Fax: 02 9717 9262

3700 Neutron Irradiations

Applications

There is a wide range of potential applications for neutron irradiations. They vary from irradiating minerals to determine yields to irradiating tracer substances for various research, environmental, and industrial processes and applications.

Support services and facilities

Technical advice on usage and methods to minimise radiation levels are available

Availability

The availability of this service is dependent on reactor scheduling. Prior contact with ARI is required to ensure correct scheduling is achieved

3711a Low Thermal Flux Irradiation (3E12 up to 1E13 ncm⁻²s⁻¹)

3711b Low Thermal Flux Irradiation per 24 hours thereafter

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3712b Medium Thermal Flux Irradiation per 24 hours thereafter

3713a High Thermal Flux Irradiation (6E13 up to 1.4E14 ncm⁻²s⁻¹)

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3714a Fast Flux Rigs Irradiation (approx 1E13 ncm⁻²s⁻¹, at greater than 1MeV)

3714a Fast Flux Rigs Irradiation per 24 hours thereafter

3730 Gamma Irradiation Facility – GC220

3740 Gamma Irradiation Facility – GATRI

Technical Enquiries

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