

Workshop

Nuclear techniques for Cultural Heritage

12-15 June 2018 | Sydney, Australia



credit: Jason Reed

Guidelines

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Scope of the workshop

This ANSTO-AINSE workshop offers a comprehensive introduction to the latest scientific analytical tools which are available under the operation of ANSTO, including neutron-, synchrotron- and accelerator-based techniques. Operating at unprecedented levels of sensitivity and accuracy, these nuclear-based techniques can provide isotopic characterization of biological, organic, and terrestrial samples of most types, provide chemical, spatial, and temporal information of objects leading to identification and mapping of the climate, geology, and anthropological environment as well perform non-invasive studies of irreplaceable works of art.

The following capabilities and expertise will be demonstrated

- Neutron imaging
- Neutron diffraction: full patten diffraction, texture, residual stress analyses
- Neutron activation analysis
- Accelerator mass spectrometry
- Ion-beam analysis
- Synchrotron X-ray Imaging
- X-ray fluorescence microscopy
- Infrared microspectroscopy
- Microscopy facility: scanning electron microscope, focused ion beam, transmission electron microscopy.

This event is led by researchers experienced in applications for the diagnostic and conservation of heritage materials. It will be tailored for novice to intermediate users of these techniques from the research fields of Cultural Heritage, Conservation Science, and Archaeology.

Local Organising Committee

Floriana Salvemini, Rachel White, Joseph Bevitt, Garry McIntyre, Kelly Cubbin

Scientific Programme

Structure of the workshop

Technical presentations on basic theory and applications followed by laboratory demonstrations using nuclear techniques available at ANSTO are offered:

- First-hand introduction on the techniques will be delivered by ANSTO professionals who use the available methods on a daily basis.
- Overview of the successful application of the techniques to various heritage materials drawn from ANSTO and AINSE experience.
- Researchers from Australian universities and museums who work professionally with nuclear techniques will provide overviews on how to integrate results of the analytical techniques into the wider scope of Cultural Heritage research.
- There will be opportunities to present posters of your research, even if it is not based on nuclear techniques - this will allow attendees to get feedback from experts on how the nuclear techniques discussed in the workshop may be applied and benefit their research.

The following capabilities and expertise will be offered

Australian Centre for Neutron Scattering

- **Neutron radiography and tomography** for non-invasive structural and morphological analysis of the bulk for a range of Heritage materials (i.e. metals, pottery, pigments, etc.)
- **Neutron diffraction** for phase determination, residual stress and texture analysis to clarify the composition and deformation history associated to the manufacture of Heritage materials

OPAL multipurpose reactor-Radioisotopes and Radiotracers

- **Neutron activation analysis** as a very sensitive method of quantitative multi-elemental analysis. It has the potential to determine concentrations in a sample from ppb to tens of percent, depending on the particular element and bulk matrix composition. NAA is the gold standard when it comes to provenance studies of pottery, ceramics and, more recently, ochre.

Centre for Accelerator Science

- **Ion-beam analysis** for elemental analysis. It is a fast, sensitive and non-destructive way of establishing how atoms are distributed throughout a sample.
- **Accelerator mass spectrometry** as an ultra-sensitive method for analyzing isotopes concentrations for long-lived radioisotopes such as ^{14}C , ^{10}Be , ^{26}Al , ^{129}I , ^{236}U and Pu isotopes, which have extensive applications as chronometers and tracers in a wide range of disciplines. Only small quantities of the specific element are needed, often less than 1mg.

Australian Synchrotron

- **Synchrotron X-ray imaging** for non-invasive structural and morphological analyses of Heritage materials in 2D and 3D.
- **Infrared microspectroscopy** for the characterization of pigments and other artist materials based on the identification of chemical components.
- **X-ray fluorescence microscopy** as a non-destructive tool for mapping elemental distribution and for a range of spectroscopic applications such as determining oxidation state and speciation.

Microscopy facility

- Complete run-down on **scanning electron microscopy (SEM)**, **focused ion beam (FIB)**, and **transmission electron microscopy (TEM)** used to probe structure down to one Angstrom resolution, provide chemical compositions and crystal structure information.

Provisional Agenda

12 th June	
Time	Agenda
11:00	Registration and light refreshment
12:00	Welcome and Introduction to ANSTO and User Office
12:30	Introduction to OPAL multipurpose reactor
13:00	Lunch
13:30	Australian Centre for Neutron Scattering Neutron radiography and tomography Neutron diffraction
15:00	Coffee break
15:30	Neutron activation analysis
16:30	X-ray diffraction
17:30	Coffee break with Discussions

13 th June	
Time	Agenda
9:00	Centre for Accelerator Science Accelerator Mass Spectroscopy Ion beam analysis
11:00	Coffee break
11:30	Microscopy facility
12:30	Lunch
13:30	Introduction to Synchrotron
14:00	Synchrotron X-ray imaging Infrared microspectroscopy X-ray fluorescence microscopy
17:00	BBQ and Poster session

14 th June	
Time	Agenda
9:30	Lecture 1: Prof. Rachel Popelka-Filcoff
10:30	Coffee break with Discussions
11:00	Lecture 2: Dr. Paula Dredge
12:00	Lunch with Discussions
13:00	Lecture 3: Dr. David Saunders
14:00	Break with Discussions
14:30	Lecture 4: Dr. David Thorrowgood
15:30	Coffee break with Discussions
16:00	Lecture 5: Prof. Kenneth Sheedy
17:00	Break with Discussions
19:00	Social Event

15 th June	
Time	Agenda
9:00	Instructions for practical sessions*
9:30	Morning session
12:00	Lunch
13:00	Afternoon session
15:30	Wrap up / Q&A

*Each session will last 2.30 h max. Participants should select 2 sessions only among:

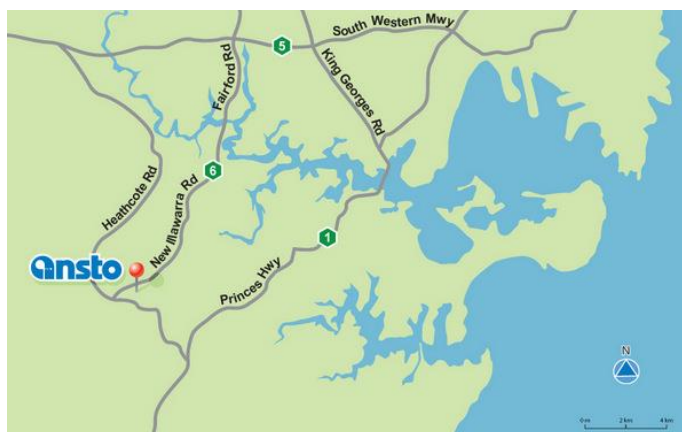
- Neutron Imaging
- Neutron Diffraction
- Accelerator Mass Spectroscopy
- Ion beam analysis
- Neutron activation analysis

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When and where

Dates: 12 - 15 June 2018

Location: AINSE Lecture theatre
New Illawarra Rd, Lucas Heights NSW 2234



Who can attend?

Graduates and post-graduates from Cultural Heritage, Conservation Science, and Archaeology and associated fields are welcomed. Museum, gallery, and cultural-heritage experts are also encouraged to apply.

How to apply?

Candidates are invited to support their application through submission of their CV and an abstract of their current research. The participants are expected to present posters of their research, even if it is not based on nuclear techniques - this will allow participants to get feedback from experts on how the nuclear techniques discussed in the workshop may be applied and benefit their research.

Please, email your application to the Workshop Organising Committee (culturalheritage@ansto.gov.au)

Registration fee

The registration fee includes workshop costs and social events.

Student: \$150

Non-student: \$250

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AINSE student travel support

Students from AINSE member institutions (including New Zealand) are eligible for Travel Support!

The Australian Institute of Nuclear Science and Engineering (AINSE) are generously providing travel assistance for 20 students with accepted abstracts. To be in the running simply email ainse@ainse.edu.au before 19 May with your notification of Nuclear Techniques for Cultural Heritage accepted abstract.

The Details and Eligibility

- Graduate or post-graduate need to be from AINSE member institutions – full list of members can be found on the [AINSE website](#)
- Travel support is for flights only. Flights will be booked by AINSE.

For further information, please email us or call +61 2 9717 3376

The workshop will also be able to offer share accommodation in double room at [Lucas Heights Motel](#) for the successful students.

Accommodation

On-site

A limited amount of accommodation is available at the [Lucas Heights Motel](#). The registration fee covers accommodation in shared rooms for only the first 20 applications who meet the merit criteria. Other delegates should make their own accommodation bookings direct with the hotel.

[The Motel](#) offers 3.5 star accommodations within a quiet bushland setting, yet close to Menai town centre and all amenities. The Motel provides a recreation room with large-screen TV, Foxtel, pool table, table tennis, and swimming pool. The complex contains 18 standard motel rooms and two self-contained family units that sleep up to five people. All rooms are serviced daily. Call 02 8525 4400 for more information. Booking will be arranged by the Workshop Organising Committee.

Check In

Check in is after 2pm, if you arrive earlier please come to AINSE and we can arrange storage of your bags.

Check Out

Check out is at 10am. Please ensure all bags are out of room, you can leave your bags at AINSE if you are catching a later flight.

Internet Access

If you require internet access in your motel room please see the motel staff.

Off-site

Delegates should make their own accommodation bookings direct with the hotel.

Here the reference to the closest facilities to the workshop venue

<http://www.engadinemotorinn.com.au/>

<https://www.sutherlandmotel.com/>

Meals

Breakfast, lunch, and dinner are at your own expense

Breakfasts

Breakfasts can be purchased from the cafeteria from Monday to Friday however if you wish to have a continental breakfast left in your motel room please notify the motel staff.

The allowance for a breakfast is up to \$11.00 per day. The Cafe will have a list with your name on and you must sign for your breakfasts.

Lunch

Lunch can be purchased from the cafeteria. Hours are 7am - 5pm Monday to Friday. If required, a lunch pack can be organised through the Motel staff at your own expense.

Dinners

Dinners are available at the motel dining room from 5:45pm – 7pm weekdays. There are also takeaway menus available at the motel reception if you wish to order take away.

Please let the motel staff in advance if you would like dinner arranged for you.

BBQ poster and Social event

The dinners for these events will be provided in the cafeteria and the cost will be covered by the workshop.

Dietary Requirements

If you have any dietary requirements (vegetarian, allergies, Halal, etc) please inform us so that we can arrange appropriate meals.

Directions to the Venue

By car

The ANSTO Lucas Heights Campus is located 40 km south-west of the Sydney CBD and can be referenced in Sydney street directories, Whereis, or Google Maps to show the location of Lucas Heights.

On arrival at ANSTO (after turning off New Illawarra Road) visitors should proceed to Reception by following the road after turning right at the roundabout.

Directions from the Airport

During weekdays researchers are required to take the train from the Airport to Sutherland station and catch the ANSTO bus from Sutherland to the Lucas Heights for which you advise the bus driver that you are with AINSE so that we can provide them with a ticket.

By taxi

Taxis are abundant in the CBD and easily accessible outside the CBD. However, a taxi from the Sydney CBD to ANSTO can be costly.

If you are coming by train to Sutherland station, taxis connect at Flora Street, Sutherland. The St George Taxi company can be contacted on 13 21 66 or you can [book a cab online](#).

More information:

<http://www.ansto.gov.au/AboutANSTO/VisitingANSTO/Transportoptions/index.htm>

Important dates

Call for abstract: Open Now
Abstract closes: 30 April 2018
Accepted advised: 6 May 2018
Registration open: 7 May 2018
Registration closes: 27 May 2018

Contact us

Should you have any queries or require any further information please do not hesitate to email culturalheritage@ansto.gov.au

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Diversity Statement

Our goal is to create an inclusive, respectful symposium environment that invites participation from people of all races, ethnicities, genders, ages, abilities, religions, and sexual orientations. We are actively seeking to increase the diversity of our attendees, speakers, and sponsors through our calls for abstracts, other open-submission processes, and through dialogue with the larger community. We value diversity in the communities we bring together. We strive to provide balanced representation of the richness of our collective human experience, and welcome your contributions to helping us achieve that goal.