National Deuteration Facility (NDF)

The Australian Nuclear Science and Technology Organisation’s (ANSTO) NDF is Australia’s first biological and chemical deuteration facility.

Deuteration is used for determining the role of molecules. Adding another neutron to the nucleus of hydrogen atoms creates the unusual non-radioactive isotope deuterium, which is found in heavy water. When used to replace normal hydrogen in molecules, deuterium can show scientists how molecules are structured and interact in a unique way. For example, researchers at ANSTO have used the NDF to study Alzheimer's and Parkinson's disease, the behaviour of environmentally friendly plastics and the development of new nano and biotech materials.

Key facts

- State: NSW
- Lead institute: ANSTO
- Project status: In progress
- Australian Government contribution:
  - $3.25 million from the National Collaborative Research Infrastructure Strategy (NCRIS) programme from 2009 to 2012
  - $1.0575 million from NCRIS 2013.
- Co-investor for NDF implementation: ANSTO

Project deliverables

The NCRIS 2013 component of this project is to operate the existing NDF infrastructure that was commenced under the NCRIS funding, as part of the ‘characterisation’ capability. This facility produces deuterated proteins, biopolymers, nucleic acids and synthesised small organic molecules such as lipids, phospholipids, sugars, surfactants, aliphatic hydrocarbons and aromatic, heterocyclic compounds. Proteins labelled with both deuterium and non-radioactive carbon$^{13}$ and/or nitrogen$^{15}$ are also produced.

These deuterated molecules enable researchers to use neutron scattering or Nuclear Magnetic Resonance (NMR) spectroscopy more effectively to investigate the relationship between the structure and function of proteins, DNA, synthetic polymers and organic chemical materials collectively known as 'soft matter'.

Regarding neutron scattering investigations, the deuterated molecules can be studied using the Small Angle Neutron Scattering, Neutron Reflectometer and thermal Neutron Diffraction instruments at Australia’s OPAL Reactor or used for neutron crystallography studies at overseas facilities.
Access
Access to the NDF is merit-based.

For chemical and biodeuteration of materials for subsequent application in neutron scattering and non-neutron based techniques, calls for applications close in March and September of each year.

For proposals involving neutron based techniques, applications can be submitted any time via the Bragg Institute Application Portal.

For proposals requiring non-neutron based techniques, applications can be submitted via the Australian Institute of Nuclear Science and Engineering (AINSE) application portal. For how to apply, read the ANISE Funding Opportunities and Access to ANSTO Facilities.

More information
For more information about the NDF, visit the National Deuteration Facility page on the ANSTO website.

Related links
The NDF is one of four characterisation facilities funded by the Australian Government. The other three facilities are:

- National Imaging Facility
- The Australian Synchrotron
- Australian Microscopy and Microanalysis Research Facility