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Deuteration at the NDF: facility overview and update on diversity of capabilities, user program and impact.

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Deuteration can provide contrast and improved resolution to assist investigations into the relationship between molecular structure and function of molecules of both biological and synthetic origin. Molecular deuteration of organic compounds and biomolecules increases options available in characterisation and complex structure function investigations using neutron scattering and reflectometry, nuclear magnetic resonance (NMR), mass spectrometry (MS) and other techniques and also creates functional materials with superior properties in life sciences, pharmaceutical and advanced technology applications.

The National Deuteration Facility (NDF) at the Australian Nuclear Science and Technology Organisation (ANSTO) has the specialised expertise and infrastructure to deliver deuteration through both biological and chemical molecular deuteration techniques to provide for a range of experimental and research applications that benefit from availability of custom deuterated molecules. The NDF has developed a suite of capabilities supporting researcher and industry access to a diversity of molecules. Capabilities include production of isotopically labelled proteins (variably deuterated, multiple-labelled - 2H, 13C, 15N) and cholesterol-*d45* through bacterial recombinant expression and bio-engineered yeast growth respectively and catalysed 1H/2H exchange and chemical synthesis of a wide range of small organic molecules using tailored deuteration approaches to provide bespoke deuterated molecules generally unavailable commercially. This includes a range of deuterated lipids, unsaturated phospholipids (e.g. POPC and DOPC), surfactants, ionic liquids, fatty acids and detergents. Availability of these molecules widens the breadth of systems that can be investigated with applications across multiple research fields.

An overview and update on the NDF will be provided including details on the NDF User Program and modes of access, capability advancements and brief highlights of research enabled through utilisation of deuterated molecules produced by the NDF.

Level of Expertise

Expert

Presenter Gender

Woman

Pronouns

She/Her

Which facility did you use for your research

National Deuteration Facility

Students Only - Are you interested in AINSE student funding

Do you wish to take part in the Student Poster Slam

Condition of submission

Yes

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