Neutrons for the Biotech Industry

SINE2020
Industry Consultancy

28 - 29 March 2019

Aragon Materials Science Institute (ICMA)
CSIC - University of Zaragoza
Zaragoza, Spain

Join us at SINE2020's Neutrons for the Biotech Industry event where you can find out how neutrons can help *your* company and *your* research.

At this event you will meet experts from the field of neutron scattering, be introduced to some examples, and have the opportunity to discuss your particular questions.

REGISTER

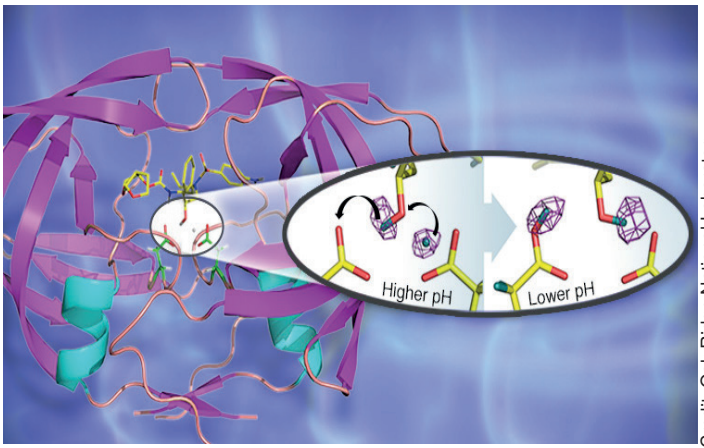
https://indico.frm2.tum.de/event/158/overview

Start: 12.30 Thursday 28th March
End: 13.30 Friday 29th March
FREE registration incl. evening dinner

Programme: Presentations and workshops on applications for neutron analytical techniques in the field of Biotechnology

We are looking forward to welcoming you

Neutrons for Biotech Organising Committee



Credit: Oak Ridge National Laboratory

Neutrons are a non-destructive way of investigating biological and biotechnological materials and can locate individual hydrogen atoms on molecules.

Neutrons can be used to study interfaces, surface morphology, solubility, crystal structure, colloids, determine interactions between drug-molecules and their binding sites, nanoparticles and much more.

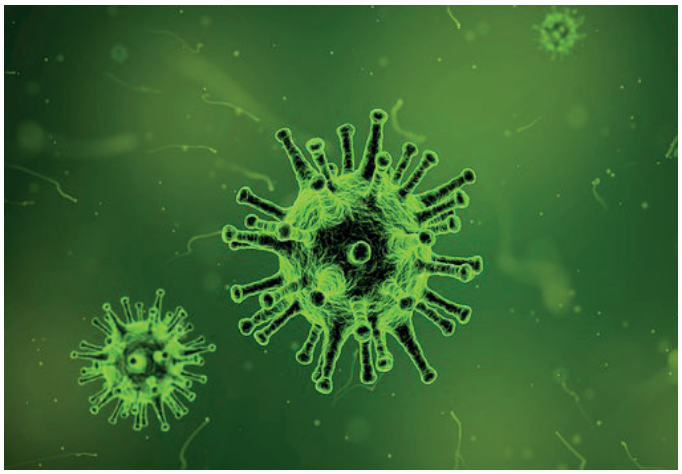
NEUTRONS FOR INDUSTRY
http://sine2020.eu/industry.html

Contact: **industry@sine2020.eu**

NEUTRON REFLECTOMETRY

is a technique for measuring and characterisng the structure of thin films and layered structures from 1 nm to several hundreds of nm in thickness.

- **Determine morphology and localisation of proteins at interfaces**
- **Study thickness, density and roughness of surfaces**
- **Molecular and water transport in membranes and thin films**
- **Adsorption and surface coverage of antibodies and antigens**



SMALL ANGLE NEUTRON SCATTERING (SANS)

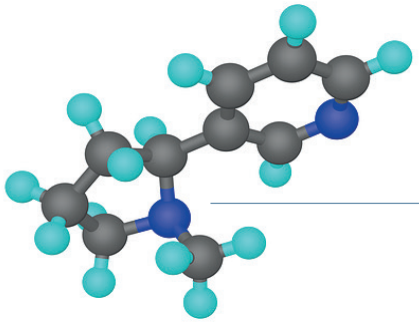
can probe structures in the range of 1 - 100 nanometers that have no particular ordering.

- **Locate guest molecules in liposomes e.g. targeting agents, drugs**
- **Characterise nanocarriers in terms of size, dispersity or stability**
- **Measure magnetic moments in magnetotactic bacteria**
- **Molecular self-assembly in solutions**
- **Structure and interactions in micelles, colloidal suspensions, microemulsions**
- **Study the core or the shell of particles under various conditions.**

NEUTRON CRYSTALLOGRAPHY

is utilised in order to locate individual protons of special interest without damaging samples. Depending on the instrument and unit-cell edge, data collection is feasible from a volume of about 0.05 mm^3.

- **Answer questions concerning enzyme mechanisms**
- **Determine drug or ligand-binding interactions.**
- **Locate and study small atoms like hydrogen.**
- **Biological structures and packing arrangements**



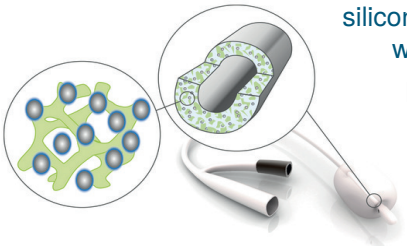
"The measurements provided by the SINE2020 programme verified that the hydrogel structure in our samples could be studied with SANS, and enabled us to decide on purchasing beam time for a detailed study of the effect of processing conditions on the hydrogel structure"
Martin Alm, Head of polymers, BioModics

HYDROGELS

INTERPENETRATING POLYMER NETWORKS

Biomodics
Reimagine silicone

At the core of Biomodics' IPN technology is the ability to impregnate silicone medical tubing with a cross-linked polymer aqua gel



BioModics's patented technology for medical devices and drug-delivery through a catheter incorporates a hydrogel into silicone in a so-called interpenetrating polymer network (IPN) and decreases the risk of infection by preventing biofilm formation.

SANS was used to visualise the specific hydrogel structure and to investigate its capabilities for drug transport in medical applications.

MEAT ANALOGUES

TU Delft Delft University of Technology

WAGENINGEN UNIVERSITY & RESEARCH

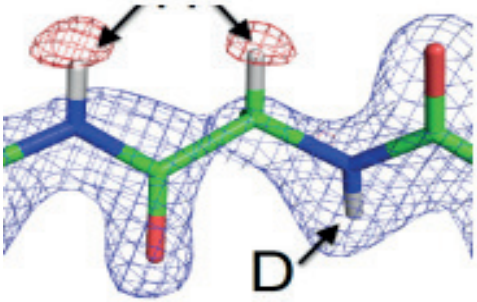
IMPROVING TEXTURE

Macroscopic properties of meat alternatives are heavily dependent on the microstructure of the food composite. The aim is to closely resemble meat itself to encourage consumers to choose this as a more environmentally-friendly option.

Neutron techniques were used to study the internal texture of the food and the number of fibre layers, their thicknesses and orientation and also the size and distribution of air bubbles were all types of microstructure that could be determined.

OAK RIDGE National Laboratory

ILL NEUTRONS FOR SCIENCE



A 3D structure of the HIV-1 protease. Credit M. Blakeley & N.Coquelle (ILL)

DRUGS

HYDROGEN BONDING

HIV-1 protease is an enzyme essential for the replication of HIV, the retrovirus that causes AIDS, so it is a key drug target for AIDS/HIV therapy. Understanding its structure and function at the atomic level, including the location and movement of hydrogen atoms, is vital for guiding rational drug design

Researchers used neutron crystallography to probe the structure of HIV-1 protease allowing details of the hydrogen-bonding interactions in the active site to be determined and revealing ways to enhance drug-binding and reduce drug resistance. These details will help the design of new antiretroviral therapy drugs.