Small Angle Neutron scattering: a technique to look at nanostructure of biomacromolecules, polymers, liquid crystals, surfactants, and so on

A.Sokolova1*, A.E.Whitten1, and L. de Campo1

1Australian Centre for Neutron Scattering, Australian Nuclear Science and Technology Organisation, Lucas Heights, NSW 2234, Australia

*Corresponding author: anna.sokolova@ansto.gov.au

Abstract Summary:


BILBY has been designed to operate in two different modes: monochromatic and time-of-flight (ToF) mode, where four choppers are used to create neutron pulses. Two arrays of position sensitive detectors in combination with utilizing of wide wavelength range provide capability to collect scattering data of wide angular range without changing experimental set-up (the most common settings used by now allow simultaneous data collection in the range between 1·10-3Å⁻¹ and 0.6Å⁻¹, with the highest accessible angle ~1.8Å⁻¹).

The question is how the advanced design features can be applied to the real world of complex systems, like biomacromolecules, polymers etc. In short, having large Q-range available in one go, open up a possibility to study complex system, like gels, micelles, hierarchical features at the large scale of sizes without changing the instrument set-up. An option to tune the resolution allows one to resolve structural features very close in dimensions so the majority of the existing SANS machine cannot distinguish them. Or, in contrary, for the samples lacking defined structural features, relaxing resolution allows to increase neutron flux decreasing time of the data collection.

Also, additionally to having an instrument flexible in set-up by itself, there is a range of sample environment devices available for users. It provides, for example, a possibility to change the temperature of a sample, or apply the shear in-situ, or mix a complex system’ component in the beam collecting data simultaneously, which is priceless for study food related samples.

BILBY is the new instrument which is servicing users for under three years, but already has a portfolio which demonstrates the benefits of features briefly describes above.

Also, the information about proposals system, deadlines, experiments planning will be presented.

Biography:

Dr Anna Sokolova is an instrument scientist on the Small Angle Neutron Scattering (SANS) instrument BILBY at the Australian Neutron Scattering Center. Between years 2009 and 2015 Dr Sokolova was a Project Leader for the design, construction and commissioning of this instrument. Anna is a physicist from Institute of Crystallography, Russian Academy of Sciences (RAS), Small Angle Scattering Laboratory. During her PhD and the following several years, she extensively worked in the European Molecular Biology Laboratory (EMBL, Hamburg outstation c/o Deutsche Electronen Synchtroon).

She has a Masters in Physics/Biophysics from Faculty of Physics, M.V.Lomonosov Moscow State University, and a PhD in Condensed Matter Physics at the Institute of Crystallography RAS (Moscow, Russia).

Anna’s main scientific interest has been expanded significantly during last decade from study of the complex biology related structures small angle scattering data collection, processing and interpretation to the instrumentation and expanding area of application of SANS to structural studies.