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Hot Commissioning and First User Experiments on the Spatz Neutron Reflectometer

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The Spatz neutron beam instrument is the latest to be installed and commissioned in the Neutron Guide Hall at the 20 MW OPAL Research Reactor. Spatz is a time-of-flight neutron reflectometer used for studying nanoscale structures at surfaces and interfaces and utilises a vertical sample geometry / horizontal scattering geometry. The instrument is situated at the end position of the CG2B neutron guide and views the cold-neutron source (CNS). The disc chopper cascade that pulses the neutron beam to produce the time-of-flight is very configurable to provide a wavelength resolution between 1 to 12 %. The detector is a helium-3 two-dimensional detector that is capable of measuring both specular and off-specular reflectivity. The sample stage can support a range of different sample environments including multiple solid-liquid cells, an atmospheric chamber with temperature control, the ATR-FT-IR spectrometer for simultaneous infra-red spectroscopy and neutron reflectometry measurements, electrochemical cells, etc. The geometry of the instrument and the sample environment available means that Spatz is well suited to studying phenomena at the gas-solid interface and solid-liquid interface. The Spatz instrument has been fully commissioned with neutrons and the results of the commissioning are presented. This includes measurements using the 'Bragg mirror' consisting of 25 bilayers of nickel and titanium, different solid substrates of silicon, quartz and sapphire, spin-coated polymer samples, and films under liquid. Reflectivity down to 10^{-7} can be achieved within 1 hour measuring time with good counting statistics in most cases. Early user experiments cover a range of science including investigating the thermal stability of organic solar cell materials and proteins interacting with biomimetic phospholipid cell membranes.

Level of Expertise

Experienced Researcher

Presenter Gender

Man

Pronouns

He/Him

Which facility did you use for your research

Australian Centre for Neutron Scattering

Students Only - Are you interested in AINSE student funding

Do you wish to take part in the Student Poster Slam

No

Condition of submission

Yes

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