

SESANS Standards Working Group Meeting (30 November 2021)

Attendees Wim Bouwman (WGB), Rob Dalglish (RMD), Fankang Li (FL), Henrich Frielinghaus (HF), Steven Parnell (SRP), Roger Pynn (RP), Gregory Smith (GNS)

Apologies Andrew Parnell (AJP)

Summary of Actions from Previous Meeting (22 March 2021)

- Perform measurements at ISIS in May 2021 (AJP, RMD, GNS) *Completed and discussed in this meeting*
- Determine if alumina gratings are at Diamond (GNS) *Sourced, measured on Larmor and discussed in this meeting*
- Disseminate previous Indiana data on porous alumina (SRP) *Disseminated on 24 March 2021*
- Contact USAS beamlines to see what they use as standards (GNS) *Completed and will be reported in future meeting*
- Decide on convenor and group members (all) *Agreed and added to canSAS webpage*
- Set up mailing list and webpage on CanSAS wiki (GNS) *Completed in Dec 2021*

Introductions

GNS welcomed everyone to the meeting, and everyone introduced themselves.

Instrument Updates

ORNL (FL)

SESANS measurements had been done on CG-4B, and SEMSANS measurements had been done on CG-1D (both at HFIR). PMMA had been measured as a test, and spin-echo length (SEL) calibration done with quartz using the entanglement setup. SEL calibration with quartz crystals was most relevant for all instruments. RP was asked for specifications, and he said that they have yet to think about effect of beam divergence with quartz.

TU Delft (WGB)

The reactor was being restarted. SESANS was moving from the experimental hall to the reactor hall. The foils were being remounted, which would hopefully result in a more stable setup. The thermal stability in the reactor hall is not great, but hopefully mounting foils together will cancel that out.

WGB provided an example measurement (<https://doi.org/10.1016/j.physb.2004.03.206>) of the reflection from an aluminium block, which showed a relationship between SEL and phase shift.

ISIS (RMD)

Several things had been attempted recently on Larmor, but the results weren't great (either anisotropic scattering, too little depolarisation or too much depolarisation). Also, there are some instabilities: short wavelengths drift between repeated measurements.

In the medium term, Jeroen Plomp and Michel Thijs (TU Delft) were coming to replace components, which would hopefully improve the stability. The SEMSANS detector will also

be tested to increase flux of measurements, which will hopefully enable a pseudo-monochromatic (Delft-like) mode of operation.

Action Contact Briau Pauw (BAM) for specifications of alumina membranes. Get thinner gratings if possible.

Samples for future testing

RMD strongly advised that we return to basics and measure very well characterised samples, get these right and then compare between instruments. He suggested PMMA spheres, which would be useful to test with ToF beam. RP was concerned about downsides to colloidal samples (swelling, dispersing, settling) and advised gratings instead.

RMD proposed using wedges of different materials (quartz, silicon, sapphire) as these would have different refractive indexes. These measurements would be refraction not SAS, but it would be useful if these could give self-consistent measurements. RP agreed that if you are looking at phase shifts, then single crystals are not required, as could be seen from WB's study on aluminum. SRP was concerned about longer wavelengths. FL suggested instead that two wedge angles should be used rather than one.

In summary, RP favoured RMD's suggestion of using different materials and also liked the idea of using rotating nanoporous materials.

A detailed and useful discussion was had, but a standard sample was not agreed. This will be revisited in the next meeting when some new data from run cycles at ISIS and Delft has been completed.

Next meeting

A date was not selected. The suggested timeline was a meeting in 6 months, once measurements had been performed again at Delft and ISIS.

Actions

- Find specifications of SmartPor alumina membranes and see if thinner ones can be obtained (GNS)