Poster

Integrated sample preparation, characterization and delivery for room temperature serial crystallography at the European XFEL

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Structural analysis at atomic and near atomic resolution of biomolecules, organelles, viruses and cells requires high quality sample preparation and characterization prior to and during the experiment. The Sample Environment and Characterization (SEC) group at the European XFEL works closely with visiting users to provide and optimize delivery of samples to the beam for high throughput high rate data measurements. Sample delivery for up to MHz repetition rate experiments via liquid jet and aerosol injection methods will be presented as well as sample efficient delivery options including high viscosity extruder, fixed targets compatible with ambient pressure experiments including temperature and humidity control [1-4].

The multidisciplinary SEC team supports a variety of sample types within bio-, chemistry and physics laboratories equipped with state-of-the-art technologies providing complementary information on the samples being studied with the FEL pulses [5]. Highly interactive pipelines supported by dedicated onsite expertise enables streamlined access to methods which otherwise would not be available to the users. These pipelines and the expert support of our staff facilitates the work of experienced users, enables utilization by novice users and enables training of scientists new to the filed. To further support researchers our outreach program for young scientist provides support for visits of up to 3 months with access to the user labs and characterisation facilities for their own project to gain essential knowledge and skills in XFEL experiments.

This presentation will also highlight the advantages of Protein Crystal Screening (PCS) beamtimes at the SPB/SFX instrument (the main beamline used for biology research at European XFEL) [6]. PCS beamtime lowers barriers for new users to enter into XFEL research giving streamlined access to collect SFX data. By taking advantage of the European XFEL high prepetition rate PCS beamtime provides both preliminary results and data to support full applications for more involved time resolved experiments at the European XEFL.

[1] Vakili, M., Han, H., et al. (2023) *Journal of Applied Crystallography*, **56**, 1038.

[2] Vakili, M., et al. (2022) *Journal of synchrotron radiation*, **29**, 331.

[3] Bielecki, J., et al. (2019) *Science advances*, **5**, 1.

[4] Schulz, J., et al. (2019) *Journal of synchrotron radiation*, **26**, 339.

[5] Han, H., Round, E., Schubert, R., et al. (2021) *Journal of Applied Crystallography*, **54**, 7.

[6] Mancuso, A. P., et al. (2019) *Journal of synchrotron radiation*, **26**, 660.