Contribution ID: **287** Type: **Poster**

Establishment of the SEC-SANS option at KWS-2 in MLZ

Monday, 20 March 2023 16:00 (2 hours)

The small-angle neutron scattering (SANS) diffractometer KWS-2 at the neutron source Heinz Maier-Leibnitz (MLZ, Garching, Germany) is operated by the Jülich center of neutron science (JCNS), with applications focusing on soft matter, colloidal particles, micelles, nanocomposites, and polymer gels. In recent years, we are working on the establishment of a new sample environment –the in-situ size exclusion chromatography (SEC) directly followed by SANS measurements, the SEC-SANS setup. The motivation is the growing demand from users interested in bio-molecular systems where the single-particle structure is the investigation target. However, many of such systems are prone to form aggregates, which then coexist with the interested single ones. Thus, an in-situ separation is necessary shortly before SANS data collection, for the sake of obtaining the scattering of individual particles. While the powerful technique of combining in-situ chromatography with small-angle scattering has been widely applied with X-ray sources, the SEC-SANS option has the advantage of the opportunity for contrast matching so that observation on specific domains is possible.
At KWS-2, the SEC-SANS setup is equipped with two pumps that allow simultaneous elute and rinse of two columns, in an attempt to increase beamtime efficiency. After elution, the biomolecules are directed to a specially designed flow cell for SANS measurement. A UV-vis spectrometer is installed right before the cell, serving to indicate the arrival of the targeted biomolecules at the neutron beam, and the exposure is triggered.

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Session Classification: Poster Session MONDAY

Track Classification: Neutron Instrumentation, Optics, Sample Environment, Detectors, and Software