

SAXSDisk

Screening for protein structure analysis

The SAXSDisk is a microfluidic Disk for small angle x-ray scattering (SAXS) screening. It allows high-throughput, fully automated protein structure analysis.

It features:

- Automated dilution of a protein solution in two buffers
- 20 different buffer conditions with 2.5 µl of protein solution
- Each buffer condition takes a volume of only 240 nl
- Screening of up to 120 conditions in one run
- Protein samples can be measured on chip

The SAXSDisk enables routine and rapid SAXS screenings with only minute protein consumption. For state-of-the-art sample changers, consumption of the very expensive protein samples is still at least 6 µl per condition and the time per measurement is at best 3 min. In most cases this still renders high-throughput multi-parameter screening impractical.

The SAXSDisk decreases both time per measurement and consumed protein volumes in small angle scattering screenings by more than one order of magnitude.

Protein solution (2.5 µl), buffer solution (3 µl) and screening solution (3.5 µl) are pipetted onto



Fig. 1: SAXSDisk: Protein structure screening from only 2.5 µl protein volume.

Key Features

- Fully automated nanoliter scale dilution series
- Protein volume of 2.5 µl for 20 different screening conditions
- Format adapted to conventional compact disks (CD)
- Automated read-out, positioning and data processing directly at the beamline

the disk. The disk then fully automates liquid handling by centrifugal microfluidics. First, liquids are split into 120 aliquots of 40 nl each. Then, 20 different mixtures are generated by combining six aliquots of the three liquids in varying combinations. Liquids are mixed using repetitive centrifugal compression of an air-

Developed in cooperation with



bubble.

First SAXS data was successfully taken at the BioSAXS beamline of Petra III (DESY, Hamburg). The SAXSDisk enables fully automated liquid handling for rapid high-throughput SAXS screening of protein solutions directly at the beamline.