Current state and perspectives of small angle X-ray scattering for pharmaceutical and biotechnological companies

M. Gräwert and D. Svergun

EMBL, Hamburg Unit, Notkestrasse 85, 22607 Hamburg, Germany, **graewert@embl-hamburg.de**

Small angle X-ray scattering (SAXS) is a universal and powerful method to analyze proteins, nucleic acids and other macromolecules and complexes in solution, in a broad range of sizes and conditions. The synergistic improvements in hardware as well as software over the last decade have transformed SAXS into a high-through put technique, which has become very attractive for the pharmaceutical industry. SAXS provides direct insights in the quaternary state and structural responses to the effects of buffer composition, to interactions with other macromolecules or small ligands. On the one hand, SAXS is a very convenient tool for formulation studies: not only are slight traces of aggregates easily detected but unfolding events and subtle changes in localized protein domains, which may contribute to the conformational instability of the drug candidate can be analyzed. On the other hand, the versatility of SAXS makes it a suitable method for studies in the early stages of drug discovery as well as for the characterization of biosimilars.

The biological SAXS group at the EMBL-Hamburg has many years of hands-on experience with this technology and presently runs EMBL's P12 SAXS beamline (@PETRA3, DESY, Hamburg). We have been involved in the development of innovative instrumentation and novel data analysis methods for SAXS, and an extensive service program for industrial companies in biological SAXS is running at EMBL-Hamburg since 2006.

Importantly, the group is always open for new collaborations and other modes of access are made possible through European funded translational activities such as iNEXT. Recently, a spin-off company, BIOSAXS GmbH (www.biosaxs.com), was founded utilizing the achievements made at EMBL Hamburg in the field of industrial access to synchrotron SAXS. BIOSAXS GmbH presently provides services for numerous pharmaceutical and biotechnological companies ranging from advanced SAXS measurements at the P12 beamline to complete projects involving sample handling, measurements, data analysis and reporting, to answer the relevant biological and structural questions.