

NANOSTRUCTURE ANALYSIS OF PHARMACEUTICAL APPLICATIONS USING 2D SMALL ANGLE X-RAY SCATTERING

K. Erlacher^{1,2}, R. Görgl^{1,2}, P. Doppler³, H. Jakob³

1) *Material Center Leoben GmbH, Austria*

2) *Erich Schmid Institute, Austrian Academy of Sciences and University of Leoben, Austria*

3) *Bruker AXS, Austria*

Nanostructure investigation using X-ray scattering makes it necessary to detect the signals in the immediate vicinity of the primary beam. Using the laboratory system NanoSTAR this can be done more accurately and much faster as ever before. It is based on a combination of specially designed X-ray multilayer optics (Göbel Mirrors) with optical bench, pinhole collimators, sample changer and primary beam stop as well as a two dimensional multiwire detector (HI-STAR). The control of the system and data evaluation is performed by a powerful software package running under Windows 2000/NT (SAXS NT).

The nanostructure analysis of anisotropic specimens (like many polymers, fibrous materials, single crystals and bio-materials) by SAXS becomes possible by use of a strong collimated point beam and a high speed area detector. Several examples of the system configuration as well as applications on various materials are discussed.

Colloidal particles like liquid medicines can be analyzed using the SAXS technique to reveal their size, shape, and internal structure. The NanoSTAR is specially equipped for studying these pharmaceutical applications. For analyzing liquid medicines or gels, the sample can be filled into a capillary which seals the specimen from the surrounding vacuum which is necessary for optimal SAXS conditions. For most samples the behavior under definite temperatures is very essential. The heating unit allows measurements at sample temperatures from -30°C to 300°C.

The influence of two model drug compounds (caffeine and paracetamol) on the structure of cross-linked polyethylene oxide are only a few examples of presented applications of pharmaceutical interest.