HIGH PRECISION SMALL/WIDE ANGLE X-RAY SCATTERING DIFFRACTOMETER

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The simple High Precision Small/Wide Angle X-ray Scattering diffractometer (Bonze-Hart optical scheme, Figure 1) was designed and developed for investigation of structure rearrangement during liquid state - solid state transformations (with reaction time 10 or more hours) for simulating the solid state phase formation [1]. As monitor and detector the FEM detectors are used. As analyzer double crystal Si_{111} analyzer (with changeable relative angle of the second crystal) is used. All controlling electronics is designed in CAMAC. The diffractometer is controlled by Sun SPARCStation with SVIC/VCC modules under Solaris 2.4 operating system.

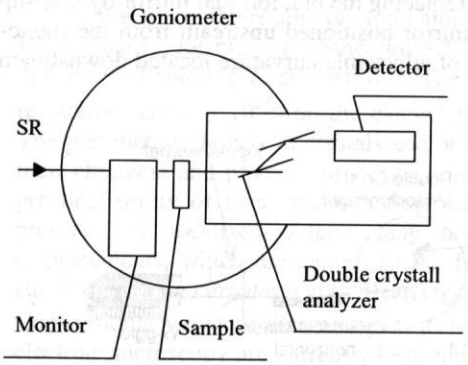

Figure 1. The diffractometer scheme.

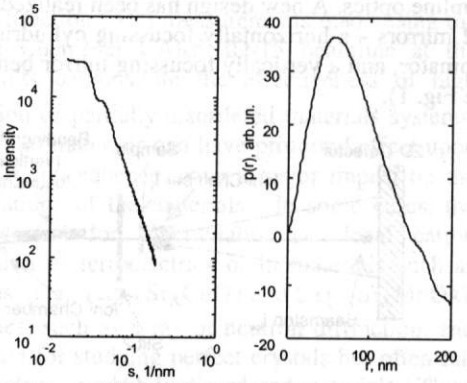

Figure 2. The SAXS curve and calculated distance distribution function of test synthesized opal sample.

For controlling the experiment with designed diffractometer the Control Application SAXSTools was designed and developed. For treatment the SAXS data (Guinier and Porod approximations, distance distribution function $p(r)$ and density distribution function $\rho(r)$ calculation) the Treatment Application SAXSTreat was designed and developed. The application was designed using the C++ Interface Object Library [2].

Diffractometer allows one to obtain the SAXS curve with accuracy about $\delta S \sim 0.002 nm^{-1}$ and $S_{min} \sim 0.02 nm^{-1}$ (scattered centers with the size about 100-300nm may by observed).

Figure 2 shows the SAXS curve and calculated $p(r)$of test synthesized opal sample. It is clear that there are particles with the size about 140nm.

References

[1]. *Yu.A.Gaponov et al,* J. Synchrotron Rad., V5 (1998) 962-963.

[2]. *Yu.A.Gaponov et al*, J. Synchrotron Rad., V5 (1998) 593-595.

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