22.4-01 VERY-SMALL ANGLE X-RAY SCATTERING OF AMORPHOUS AND CRYSTALLINE SOLIDS.
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The very-small angle region of X-ray scattering (VSAXS), down to 0.1 sec. of arc has been explored using a Bonse-Hart type small angle apparatus. With the use of MoKα, Si(111) reflections, the central peak of the instrumental profile (without specimen) has a half-maximum width of 3.3 sec. of arc. It has been verified that both, the instrumental and the experimental (with specimen) profiles are Gaussians in the angular range between 0.1 and ~3.0 sec. of arc. Therefore, the deconvolution in this case is straightforward, and the range of few microns up to 30μm density fluctuations can be estimated using the Guinier's approximation.

The VSAXS technique has been applied to study the structural properties of metallic glasses. For example, amorphous $Pd_{80}Si_{20}$ alloys in the as-quenched state revealed density fluctuations with radius of gyration ~7.0μm. Structural change was observed after 20% cold-forging, with the sample being homogeneized.

A-15 type superconducting Nb_3Ge and Nb_3Al revealed structural inhomogeneities of micron order, the former compound presenting anisotropy.

Perovskite-type superconducting $BaPb_{1-x}Bi_xO_3$ revealed a variation in density fluctuation with composition (x), the smallest average size corresponding to highest critical temperature, and vice-versa.

The VSAXS technique also proved very useful to study the growth kinetics of milky precipitates (of micron order) in synthetic quartz.

22.4-02 DETERMINATION OF POROSITY AND PORE SIZE DISTRIBUTION OF BROWN COAL BY MEANS OF SMALL ANGLE X-RAY SCATTERING.
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Brown Coal can be classified as a colloidal system, i.e. system in which the ratio of surface to volume is high. An important aspect of the investigation of Victorian Brown Coal concerns determinations of the pore size distribution and porosity of Brown Coal, because this, for instance, leads to a better characterisation of the reactivity of Brown Coal in conversion processes.

A method used for such investigation consisted of X-ray scattering at very low angles where parameters such as the pore size distribution, internal surface area and micropore volume were determined. Samples of both air dried coal and same coal in bad moist condition have been examined. Surface area and micropore volume figures were compared with data obtained by means of gas adsorption in case of air dried coal. (Wet coal cannot be investigated by the method of gas adsorption). Reasonable agreement was obtained in case of micropore volume, however, somewhat higher figures were obtained for surface areas.

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