

PARTICLE STATISTICS IN SYNCHROTRON POWDER DIFFRACTOMETRY

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The effect of particle statistics becomes more pronounced in synchrotron powder diffraction measurements due to higher brilliance of the synchrotron source than that of laboratory x-ray. It is also expected that spinning motion of a capillary specimen in transmission-mode geometry applied in synchrotron powder diffractometry will provide significantly more detailed information than in-plane rotation of flat specimen. The number of statistically independent data available on axial rotation of capillary specimen is estimated at about several ten thousands, which is equal to the reciprocal of intrinsic angular resolution of the order 0.01° , while in-plane rotation of flat specimen gives number of about several hundreds restricted by the aspect ratio of the allowed axial divergence angle to the equatorial divergence angle.

It is known that the average and variance of the statistical distribution of the observed diffraction intensities are related to approximate crystallite size (Alexander et al., 1948). The author has found that the skewness of the statistical distribution of the observed diffraction intensities can be related the broadness of crystallite size distribution.

Preliminary results of statistical analysis of observed intensities from a powder sample with narrow size distribution and another powder sample with similar average size but wide crystallite size distribution will be presented.