

Use of Anomalous Scattering in SAXS Measurements

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Single energy SAXS is a “bread and butter” experimental method at CHESS D-line and promises to be an important tool for work done at the new G-line stations. At C line we have extensive experience with x-ray scattering when energy resolution and/or incident beam energy scanning is important to the measurement. This experience includes anomalous (or resonant) x-ray scattering.

Responding to user interest, we have provided the capability for energy tunable (typically dual energy) anomalous small angle x-ray scattering (ASAXS) at C1. The method is used to observe scattering from a particular element in a mixture by exploiting the energy dependent change in atomic scattering when the species has an absorption edge compatible with the SAXS measurement.

We describe: 1) some principles underlying the ASAXS method, 2) how the technique has been implemented at C line, including a variation used to collect data at two energies simultaneously (for instance when the specimen is changing with time), 3) some results from two very different experiments we have performed.

In the first experiment we measured the particle size distribution of finely divided platinum catalyst contained in a strongly scattering zeolyte support. We have observed changes in this distribution during calcination (i.e. heating in the presence of oxygen).

A second very recent experiment involved solution scattering. We have observed interesting differences in the distribution of ions condensing around nucleic acids.

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