

Oblique diffraction geometry for the observation of several non-coplanar Bragg reflections under identical illumination

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We present a method to determine the strain tensor and local lattice rotation with Dark Field X-ray Microscopy. Using a set of at least 3 non-coplanar, symmetry-equivalent Bragg reflections, the illuminated volume of the sample can be kept constant for all reflections, facilitating easy registration of the measured lattice variations.

This requires an oblique diffraction geometry, i.e. the diffraction plane is neither horizontal nor vertical. We derive a closed, analytical expression that allows determination of the strain and lattice rotation from the deviation of experimental observables (e.g. goniometer angles) from their nominal position for an unstrained lattice.