X-ray Topography by using Resonant Scattering

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Contrast variations of defect lines in X-ray topography are observed by changing X-ray energy very near the absorption edge of a crystal. X-rays from synchrotron radiation are used in the observation, which makes it possible to observe the X-ray topography using resonant scattering [1]. The variations of the defect contrasts using GaAs 200 reflection in the Laue case are observed by changing resonant condition near the K-absorption edges of both Ga and As. A typical example is as follows. A dark line defect is observed when the imaginary part of X-ray polarizability χ_{hi} is zero. The line becomes double and two lines with the same contrast are observed when the real part of X-ray polarizability χ_{hir} is zero. The bright and dark contrasts are reversed by changing the phase of χ_{hr} and χ_{hi} as shown in the figure below. This clearly shows that such a change of contrast using resonant scattering should be quite useful to analyze characteristics of defects in a crystal.



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