3D-visualization for Structure of Large CaF_2 by Step-scanning Section Topography

Taihei Mukaide[a], Takashi Noma[a], Kazuhiro Takada[a], Hidenosuke Ito[a], Kentaro Kajiwara[b], [a]*Leading-Edge Fusion Research Center, Canon INC.* [b]*SPring-8, JASRI.* E-mail: mukaide.taihei@canon.co.jp

The crystal defects affect solid state properties such as optical property. A fluorite (CaF_2) is an attractive material for the ultraviolet optics due to its high transparency for the short-wavelength light. Accounting for the relationship between the optical characteristics and crystal defects, it is important to know the distribution of the defects in the large crystal. In this study, we performed to measure internal structure of large size of fluorites single crystal block using white-beam X-ray topography.

The experiments were performed at BL28B2 of SPring-8. The white X-ray beam from the bending magnet was shaped to the sheet-like beam of 30mm (horizontal) and 0.1mm (vertical) by the slits. The fluorite samples were grown by the Bridgman- Stockbarger method and cut into several sizes (for example 60mm of diameter and 60mm of thickness or 100mm of diameter and 40mm of thickness). The X-ray imaging detector was used to detect the diffracted X-rays from the sample. The section topographs were measured at intervals of 0.1mm in the vertical direction.

The three-dimensional images were reconstructed from the section topographs. Using this method, we can obtain the defect structure inside the large single crystals.

Keywords: x-ray topography, crystal defects, three-dimentional reconstruction