X-ray Back-diffraction Wavefields Self-imaged with a CCD Detector

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Self-detection of X-ray diffraction [1,2] has been measured by a decreasing in the photocurrent or photocounting of a detector when its crystal is in diffraction condition. The x-ray self-detection image with the diffraction of a single crystal CCD detector and conventional x-ray sources at diffraction angles far from 90º [3] was recently reported. In the present work the self-detection of x-ray diffraction was imaged using a CCD detector (EEV 05 30) diffracting Si (800) with Bragg angle around 90º (back-diffraction). The measurements were carried out in the XRD2 beamline at LNLS (Brazilian synchrotron). The depletion layer of this CCD (30 μm thick) makes it a finite crystal for the used energy (9.14keV). Self-back-diffraction topographies and back-diffraction topographies of the CCD, taken at different back-diffraction angular positions, show the crystal structure strain, i.e., only parts of the CCD are diffracting at each diffraction angular positions. A phase effect of the wavefield inside the CCD chip due to the interference of the **o** and **h** beam was also detected. This interference effect open the possibility to exploit phase contrast images obtained from the different **o** beams, those crossed a sample, and the **h** beam leaving the CCD chip. The use of the CCD being, simultaneously, detector and analyzer crystal in an analyzer-based x-ray back-diffraction phase contrast imaging setup was also exploited.

[1] Holý V., Hlávka J., Kubena J., *Phys. Status Solidi*, 1985, A **90**, K87. [2] Hönnicke M.G., Kakuno E.M., Mazzaro I., Cusatis C., *J. Appl. Cryst.*, 2004, **37**, 451. [3] Hönnicke M.G., Cusatis C., 2004, *7th Biennial Conference on High Resolution X-ray Diffraction and Imaging - XTOP 2004.*

Keywords: x-ray imaging, x-ray back-diffraction, instrumentation