

### **Convergent Beam Method in X-ray Diffractometry to Determine Single Crystal Cuts' Orientation**

Alexander.V. Lyuttsau, M.A. Kumakhov, N.S. Ibraimov, S.V. Nikitina, A.E. Bulkin, A.D. Zvonkov, A.V. Kotelkin, *Institute for Roentgen Optics, Moscow, Russia*. E-mail: nar@iroptic.ru

The scheme of orthogonal incidence of primary convergent x-ray beam is applied. Two linear PSDs symmetrically placed on both sides of primary beam register the diffraction picture in Bragg plane with primary beam and detectors' wires in it. We take account of interference maximums from the planes being at the diffraction angle or at a close angle, perpendicular to the surface. Example: single crystal Si, surface –  $(111) \pm 2^\circ$ , primary beam convergence angle –  $8^\circ$ , beam axis is orthogonal to the single crystal surface, the diffraction plane –  $\{220\}$ , angle between planes  $(111)$  and  $(220)$  –  $35,27^\circ$ , radiation Cr  $K_\alpha$ ,  $\lambda = 2,286$ , diffraction angle for plane  $(220)$  –  $36,43^\circ$ . The task: determine angles of rotation and tilting to bring plane  $(111)$  into the plane of the single crystal surface with minimum manipulations. Solution: Any angular deviations of the diffraction cone axis in the directions perpendicular to the Bragg plane lead to closing in of the interference maximums, and in the directions within the Bragg plane – to their shift along the detectors wires to the left or to the right.

Processing software allows real time control of the Bragg's plane tilting and turning, producing within a few seconds the necessary orientation of the single crystal.

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