X-ray Diffraction Image under the Grazing Angles of Incidence on a Surface Acoustic Wave

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The X-ray diffraction in noncomplanar symmetric Laue geometry under the total external reflection is characterized by the formation of both the specularly reflected and specular reflected diffracted waves [1]. The character of the intensity distribution of these beams depends on the value of the grazing angle of incidence which in the case of crystal surface modulation by surface acoustic wave (SAW) will locally change.

In the present paper the process of diffraction of X-ray radiation on the planes perpendicular to the crystal surface modulated by Rayleigh SAW under the total external reflection has been studied. The character of the diffracted image essentially depends on the crystal-detector distance. In the nearest diffraction zone a focusing from the SAW concave parts occurs, which may be observed for the standing SAW, but in the case of the running SAW a synchronization technique is needed. With the increase of the crystal-detector distance the focused beams are covered and observed on the same pedestal. In the farthest diffraction zone diffraction satellites are formed both for the standing and for the running SAW. The dependence of the focal distance from the amplitude and length of SAW, the grazing angle of observation, the deviations from Bragg orientation, etc. are found. It is shown that the change of the crystal surface curvature may be controlled both by the focusing in the nearest diffraction zone and by the process of formation of diffraction satellites and their focusing.

[1] Afanas'ev A.M., Melkonyan M.K., *Acta.Cryst.*, 1983, **A39**, 207. **Keywords: x-ray glancing-angle scattering, ultrasonics, crystal diffraction**