X-RAY DIFFRACTION BY SURFACE ACOUSTIC WAVE PROPAGATED IN YZ-CUT OF A LINBO3 CRYSTAL

I.A. Schelokov, D.V. Irzhak, D.V. Roshchupkin, R. Tucoulou 1

Institute of Microelectronics Technology Russian Academy of Sciences,
142432 Chernogolovka, Moscow District, RUSSIA
E-mail: igor@ipmt-hpm.ac.ru
1ESRF, BP 220, F-38043 GRENOBLE CEDEX 09, FRANCE

Some number of practically important applications require the control of the temporal structure of X-ray radiation. For example, various XAFS methods (X-ray absorption fluorescence spectroscopy) are based on examination of the relaxation processes in object after applying of ultra short pulses of X-ray radiation. During these processes it is necessary to eliminate the influence of radiation on the sample. Devices providing that time control above X-ray radiation are called "beam chopper".

Recently we proposed and tested acoustooptical beam chopper for X-ray radiation [1-2]. The idea of X-ray beam chopper is based on X-ray diffraction by multilayer X-ray mirror modulated by pulsed surface acoustic waves [3]. Next step in given direction consists in using of Bragg diffraction of X-ray radiation from perfect piezoelectric crystals modulated by surface acoustic waves. In the case of multilayer mirror the reflecting planes reproduce the relief of crystal surface modulated by SAW, while in the case of the crystal the displacements of atomic planes are damping in deep of crystal, and X-ray radiation, as has shown in [4], is sensitive to this attenuation. In present work we present the theoretical model based on Takagi equations for the dynamic theory of X-ray diffraction in crystals and comparison of computer simulation with experimental results.

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[3] Roshchupkin D.V., Schelokov I.A., Tucoulou R., Brunel M., X-ray diffraction on a multilayer mirror modulated by surface acoustic waves, Nuclear Instruments and Methods in Physics Research (1997) B129 414-418.

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