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Keywords: anomalous transmission and absorption; interference fringe

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The Phenomenon of Focusing of X-ray in Crystals Under Influence of the Temperature Gradient.

Vardan V. Margaryan[a], Karlen T. Hayrapetyan[a], Serob N. Noreyan[a]. [a]*X-Ray Pungs Laboratory. Yerevan, Republic of Armenia.*
E-mail: x-ray@web.am

The phenomenon of diffraction focusing of X-ray radiation in mono crystals under the influence of temperature gradient is analyzed in details. The phenomenon of focusing of X-ray radiation in crystal in simply way is approved.
The parallel plane single crystal samples of quartz (1x10x20mm^3) have been experimentally investigated. The topogrammes of diffracted-reflected and diffracted-transmitted beams of Laue geometric have been obtained in the reflecting position of samples after adjustment at the presence of temperature gradient on distance L=3cm form the sample. For the observation of the propagation in the range of diffraction in front of the entrance of the investigated single crystal apart of incident X-ray beam is cut with wedge shaped screen. At the (m,n,n) diffraction scheme on the back side of intersection in the absence of temperature gradient of the reflected beam the wedge has a weak reverse position. The presence and the increasing of the temperature gradient brings to the increase of reflected beam and on the topogramme section the shape of the cut screen is seen more distinctly (in the reverse view). In the scheme (m,n,-n) in the absence of temperature gradient on the reflected beam on the cut height it is observed only the decrease of intensity. However, in the presence and gradually increasing of the temperature gradient, the length of diffracted beam is slowly narrowed and the track of cut at the beginning slowly and then distinctly is appeared on the backside of reflected beam. The above mentioned confirms the well known phenomenon of focusing of incident X-ray radiation inside of single crystal.

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Effect of Doping on the Structure of $Bi_4Ge_3O_{12}$.

Rositsa Titorenkova[a], Rositsa Nikolova[a], Boriana Mihailova[b]. [a]*Central Laboratory of Mineralogy and Crystallography, Bulgarian Academy of Sciences, Sofia, Bulgaria.* [b]*Mineralogisch-Petrographisches Institut, Universität Hamburg, Germany.*
E-mail: rosititorenkova@dir.bg

Single crystals of $Bi_4Ge_3O_{12}$ ($I\bar{4}3d$) doped with V, Co and Mn have been grown by the Czochralski method. Samples with concentration of V= $6.8*10^{18}$ cm^{-3}, Co=$0.011*10^{18}$ cm^{-3} and Mn = $0.81*10^{18}$ cm^{-3} were studied using single crystal structural analysis and the dependence of the main structural parameters (bond lengths and angles, unit cell parameter) on the doping elements is followed. These data can provide a basis for estimating the incorporation of doping ions in the crystal lattice of such type of materials, which are of importance for their optical properties.
It is found that V, Co and Mn doping affects the BiO_6 octahedrons asymmetry, namely Bi-O(a) bond is shortened while Bi-O(b) bond elongates. The measured relative changes are of the order of 10^{-2}. On the other hand, the GeO_4 tetrahedron becomes more symmetric. The structural change per a doping atom is strongest for Co, for which the shortening of the Ge-O bond is highest.

Keywords: doped $Bi_4Ge_3O_{12}$; structure; optical properties