Annotation

In this paper, we demonstrate a technique for three-dimensional microscopy of the second harmonic of crystal interfaces, using as an example a polycrystalline zinc selenide (ZnSe). Despite the prohibition of effective conversion of radiation into the second harmonic due to the impossibility of performing phase matching in isotropic crystals, it is possible to obtain a significant signal at the interface between two differently oriented single-crystal domains. We have been studied the spatial resolution of the technique, the effect of phase matching in the formation of a local response, it has been shown that the polarization properties of SHG microscopy make it possible to determine the orientation of individual microcrystalline. The visualization of individual granules in the thickness of a polycrystalline with microscopic accuracy at depths up to 2 mm is realized.

The second part of the work is devoted to the study methods of increasing the maximum depth of brain tissue visualization using two-photon fluorescence microscopy. As a biomarker, it is planned to use prospective fluorescent proteins of the infrared range - iRFP, whose two-photon absorption spectrum is shifted to the long-wave region up to 1300 nm. A formula is derived for the intensity of the ballistic component of the radiation at each point in the focused beam and its contribution to the fluorescent signal is constructed. A decrease in the effective numerical aperture because of scattering is shown.