Optical Spectroscopy of High Resistance CdTe(III) Single Crystals at the Fundamental Optical Transitions E_0

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Recently, more attention is paid to the technology of growth high resistance CdTe crystals and solid solutions based on them. The development of technology based on the control of the synthesis, determining the defect structure and its impact on the physical properties of the material. Conditions for obtaining material determine the composition and distribution of point defects that materially influence on electronic processes in the material. It is known that CdTe is used to make not cooled detector of gamma radiation. One of the main problems when using A_2B_6 semiconductor compounds as the base material optoelectronics is to obtain a homogeneous volume of material.

In order to characterize highresistance CdTe (III) single crystals with a resistivity 10^9-10^{10} ohm·cm were conducted optical study of the material at the fundamental optical transition E_0.

Reflection and transmission spectra at the fundamental optical transition E0 of CdTe(III) single crystals (range 800-1100 nm) were measured using diffraction lattice monochromator MDR-23.

Working brink of samples subjected to different treatment including mechanical polishing, removing layers of damaged layer using chemical-dynamic etching and free etching, and chemical treatment to remove the products of etching.

In the spectral dependence of reflectance observed a clearly expressed band from 829 to 910 nm. From the transmission spectra determined the values energy that corresponds to the fundamental optical transition E_0 for CdTe single crystals (E = 1.44 eV).

It is known that the peak refractive index corresponds to the fundamental absorption edge. The band-gap of samples associated with complex energy band structure of the valence band and the conduction band gap, technological conditions crystal growth. Features of the energy band structure of functional materials for electronic equipment are observed in the experimental spectra classical spectroscopy (reflection and transmission).

Thus, studies of optical properties (reflectance and transmittance spectra in the range 800 - 1100 nm) are shown that the investigated crystals have high (detector) quality, which is crucial for the production of highly sensitive and high resolution sensors of ionizing radiation.