Aneta Wardak

Analysis of selected defect-related properties in CdMnTe, CdMgTe and CdMnTeSe crystals

Abstract

In this work the results of investigations of selected kinds of defects in (Cd,Mn)Te, (Cd,Mg)Te and (Cd,Mn)(Te,Se) crystals obtained by Bridgman method are presented. The choice of analyzed properties depended on the potential application of these crystals, which are room-temperature X- and gamma-ray detectors. The crystals must be high-resistivity and have good charge transport properties.

The relationship between the shape of photoluminescence spectra in low-energy region (0.4–1.4 eV) and crystals' resistivity has been studied. Its value depends on point defects Te antisites(Te_{Cd}^{2+}). It is explained the presence of which defects is connected with the photoluminescence in energies: 1.1 eV, 0.8 eV and 0.55–0.60 eV. Basing on the Pockels effect, it is shown how grain boundaries (twins) and Cd and Te inclusions influence internal electric field within the crystals. The distribution of resistivity as well as electrical contacts affect the distribution of internal electric field. Using techniques accompanying scanning electron microscopy, namely cathodoluminescence and electron backscatter diffraction, the vicinity and stresses distribution around Cd and Te inclusions have been investigated. The influence of both types of inclusions on $\mu\tau$ parameter value, which is mobility lifetime product, has been analyzed.

03.08.2021

A. Wardak