

**Title:** *Photoluminescence of CdTe crystals*

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**Abstract:** Energy levels connected with defects in nominally undoped crystals CdTe, indium-doped crystals and chlorine-doped crystals were studied using low-temperature photoluminescence. The crystals are intended for X- and gamma- ray detectors operated at room temperature. An effect of annealing in cadmium or tellurium vapor on luminescence spectra was investigated. Some changes were interpreted by filling of vacancies not only by atoms coming from gaseous phase but also by impurities from defects like interstitials, precipitates, inclusions, grain boundaries etc. The luminescence bands assigned to defects important for compensation mechanism were examined, namely A-centers (complexes of vacancy in cadmium sublattice and impurity shallow donor) and complexes of two donors bound to a vacancy. It was shown, that temperature dependence of the luminescence bands results from more complicated processes than a simple thermal escape of bound excitons or thermal excitation of electrons (holes) from defects to bands. We observed expressive “selective pair luminescence” bands (SPL) on partially compensated In-doped samples during sub-gap excitations by photons in the range 1,575 eV – 1,588 eV (energy gap is 1,606 eV). The SPL bands result from excitation and radiative recombination in the same donor-acceptor pair [(donor In + A center) in our case]. A difference between energies of exciting and emitted photons is equal to a difference between energies of excited and ground states of a hole on the acceptor. A model for the observed temperature shift of the A-center luminescence band was suggested. It is based on temperature changes of space distribution of ionized and neutral donors in the vicinity of the acceptors as a consequence of the Coulomb interaction and thermal excitation.

**Keywords:** cadmium telluride, CdTe, photoluminescence, selective pair luminescence;