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THERMALLY STIMULATED CONDUCTIVITY AND LUMINESCENCE, PHOSPHORESCENCE AND CURRENT RELAXATION OF ZNSE MONOCRYSTALS AFTER X-RAY IRRADIATION

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Zinc selenide (ZnSe) is one of the wide-gap AIIBVI materials and is widely used in semiconductor electronics. Specially undoped ZnSe single crystals can also be used as a semiconductor detector. In this regard, there is need for a complex study of electric and luminescent properties of ZnSe single crystals.
There was performed complex experimental research of X-ray conductivity (XRC), X-ray luminescence (XRL), thermally stimulated conductivity (TSC) and luminescence (TSL), phosphorescence (Ph) and current relaxation (CR) of ZnSe single crystals.
A comparison between the phosphorescence intensity and TSL intensities for both bands with maxima at 630 and 970 nm, and the comparison between current relaxation and the TSC current proved that they are the values of the same order. If we'd compare these values with the stationary values of XRL and XRC, we have that those relations are close for the 970 nm band and the current. And for the 630 nm band the relation of stationary X-ray luminescence intensity to the phosphorescence intensity or to the intensity of the first TSL peak is ten times higher than the corresponding ratio for the 970 nm band and for currents. This difference in the ratio of intensities and currents can be explained by the simultaneous implementation of these two mechanisms of recombination (electron and hole) on corresponding centers during X-ray excitation.
The bulk of generated free electrons and holes recombines at luminescence centers (94%) and only a small part (6%) goes to the charge accumulation during the X-ray excitation.

Topics

Session A. Physics of condensed matter and spectroscopy

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