IMPACT OF ELECTROMAGNETIC RADIATION FROM SPARK DISCHARGE ON THE DIELECTRIC PROPERTIES OF CD1-XZNXTE CRYSTALS WITHIN THE LOW-FREQUENCY REGION

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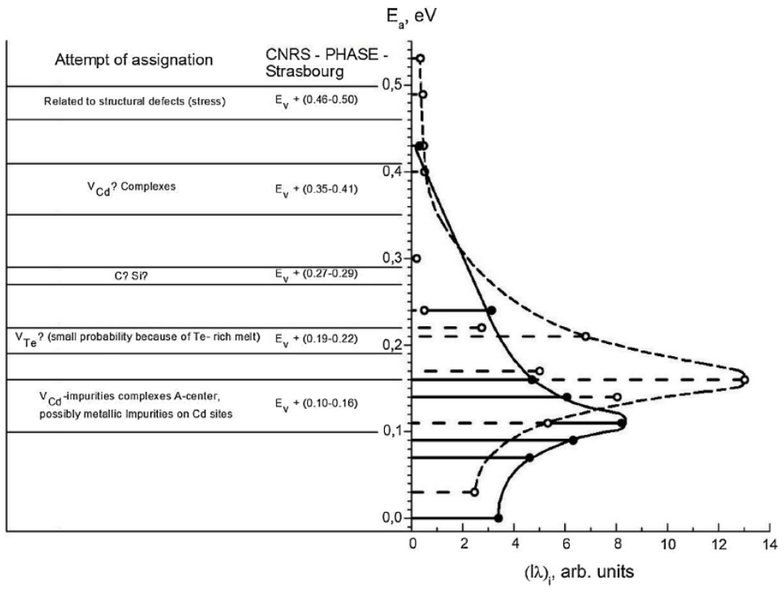

Fig. 1. Energy spectrum and the parameter $(\ell\lambda)_i$ of the localized states in CZT crystals.

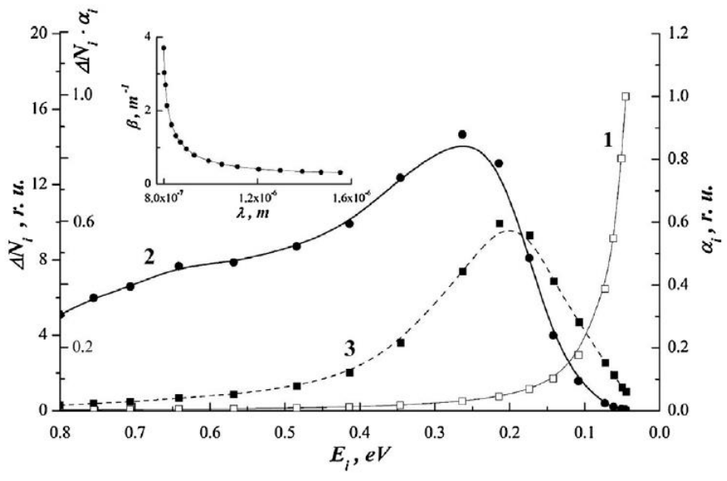

Fig. 2. Dependence of quantities α_i and ΔN_i, and their product from the depth of the acceptor localized states. Insertion – spectral dependence of light coefficient in CZT crystals.

The crystalline structures of $Cd_{1-X}Zn_XTe$ (X = 0.10...0.20) crystals, which were grown from the melt under high pressures of argon, were examined. The experiments were conducted on samples exhibiting low-frequency values of the real and imaginary parts of the complex dielectric permittivity within the range of 11.5...15.5 and 0.50...2.10, respectively.

The long-term changes in these values, caused by the influence of electromagnetic radiation from the spark discharge, were investigated at constant frequencies of the measuring field. Additionally, the energy spectrum of localized charge carrier states was examined using scanning photodielectric spectroscopy [1].

The investigation revealed that electromagnetic radiation from the spark discharge can induce both positive and negative alterations in the values. However, the mean values of these alterations, calculated across all samples, exhibit a natural variation with the frequency of the applied field.

The influence of electromagnetic radiation from the spark discharge on the energy spectrum of localized states of charge carriers has been examined.

The observed changes in the dielectric properties of crystals are attributed to the presence of point defect complexes inherent in their crystal structure. The exposure of these defects to electromagnetic radiation from the discharge leads to their transition into a metastable state, characterized by a distinct polarizability.

This transition is accompanied by a discernible change in the investigated values within the low-frequency region.

[1] Chugai, Oleg, et al. "Scanning Photodielectric Spectroscopy of CdZnTe Crystals." Advances in Fabrication and Investigation of Nanomaterials for Industrial Applications. Cham: Springer International Publishing, 2024. 111-132.

[2] Meng, Binshen, et al. "Microwave absorption in insulating dielectric ionic crystals including the role of point defects." Physical Review B 53.19 (1996): 12777.

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