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Features of electrical and photoelectric properties of diodes based on CdTe

Among AIIBVI semiconductor compounds, cadmium telluride occupies an important place as a material used to create detectors of various types of ionizing radiation [1-3]. Much attention is paid to the study of electrical, optical, and photoelectric properties of CdTe crystals and diode structures based on it in connection with the search for ways to create uncooled nuclear radiation detectors with optimal parameters [4].
The paper presents the results of research into the electrical and photoelectric properties of CdTe samples obtained by low-temperature synthesis technology, as well as diode structures based on them.
Monocrystalline plates of size 5 × 5 × 0.5 mm3 with specific resistance ρ = (2 - 4)×109Ω·cm at room temperature were used for the manufacture of diodes. Electrical contacts (In, Au) were applied by thermal sputtering in a vacuum. The contact In was irradiated with nanosecond pulses of a neodymium Nd:YAG laser.
The I-V characteristics, C-V characteristics, photoconductivity spectra (PC) of In/CdTe/Au crystals and diode structures were studied. From the graphical dependences of the I-V characteristics, it can be concluded that with the help of laser irradiation, depending on the conditions of sample processing (pulse power, irradiation dose, etc.), it is possible to change the electrical characteristics of crystals, in particular, to form diode structures with a high rectification coefficient.
Analysis of the PC spectra of CdTe crystals and In/CdTe/Au diode structures revealed that the maximum PC of the diode is shifted to the long-wavelength region by 15 nm relative to the maximum PC of the crystal. In the PC spectra of diode structures at forward voltages of 1 V and 10 V and reverse biases of 10 V and 50 V, the PC maximum was observed at a wavelength of 860 nm, and at a short-circuit current - at 856 nm. C-V spectra of In/CdTe/Au diode structures, measured at different frequencies, had a similar shape, but differed in signal value.
It is shown that the manufactured diode structures can be effective for detecting X-ray radiation.

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Type of presence

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