LUMINESCENCE OF SYNTHETIC DIAMONDS*

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Currently, synthetic diamond is used in various high-tech devices. Due to its unique properties, this semiconductor is used as a basis for detectors and visualizers of charged particle beams and electromagnetic radiation. For example, the samples studied in this work will be used as scintillator-visualizers in the construction of the X-ray beam position monitor in the Novosibirsk SKIF synchrotron.

At the moment, one of the main problems of synthetic diamond is the impossibility to precisely control the concentration and structure of embedded impurity atoms and multi-atomic complexes. Therefore, each sample contains different impurity-defect centers including vacancies and internodes in its structure. In this regard, the study of the impurity-defect composition of diamond samples, depending on the synthesis conditions and post-stack processing, is an urgent task.

This paper reports the observation of structure defect bands in the luminescence spectra of three diamond samples with a spectroscopic designation of 3H and a zero phonon line (ZPL) at 503 nm. In addition, the luminescence spectra of these samples showed electron-vibrational systems "389 nm", TR12 (BFL at 470 nm), S3 (497 nm), NV0 (575 nm) and others. Most of these centers are poorly studied in the literature, so one of the objectives was to investigate them.

The use of pulsed cathodoluminescence to study the spectral properties of crystalline materials allows a detailed analysis of their impurity-defect composition. The paper also presents a comparison of luminescence spectra of diamond samples under photo- and X-ray excitation, as well as their absorption spectra.

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