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CATHODOLUMINESCENCE OF DIAMONDS WITH DIFFERENT IMPURITY-DEFECTIVE COMPOSITION*

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Diamond is a promising semiconductor, so at the moment it is used in such area as medicine, construction, optics and electrical engineering [1].

Paper deals with the study of cathodoluminescence of impurity-defect centers in diamond. The samples were irradiated using electron beam generated by NORA type accelerator. At a short treatment time, this type of radiation is an example of nondestructive inspection technique of crystal structure perfection.

In this work, five samples of diamonds synthesized by the chemical vapor deposition (CVD) and high pressure, high temperature (HPHT) methods with different impurity defect compositions were used to study their cathodoluminescence. We registered spectra of samples cathodoluminescence in the temperature range from 72 K to 500 K, using optical spectrometers Ocean Optics HR2000 and HR4000, in the spectral range 200-1100 nm and 200-300 nm, respectively. For example, Fig. 1 shows the spectra of diamond at different temperatures.

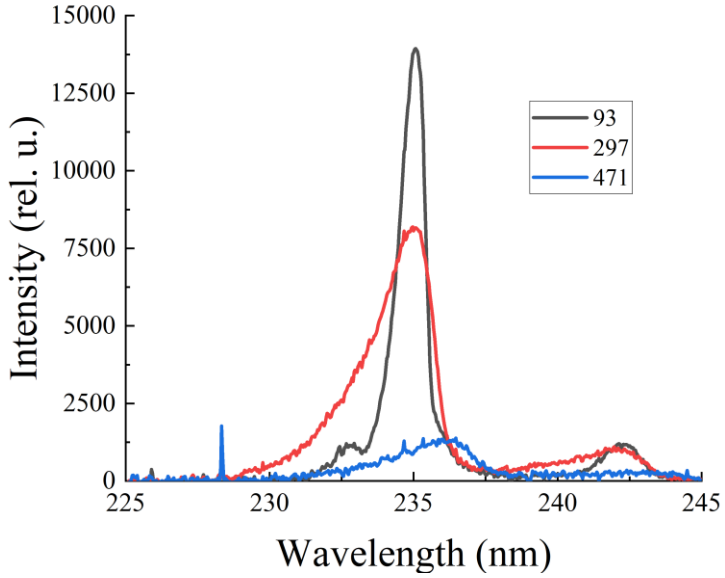

Fig. 1. Exciton cathodoluminescence spectra of pure (N<10 ppm) diamond at different temperatures.

The spectra of cathodoluminescence can be used to estimate not only quality of the crystal, but also the impurity-defective composition of test sample.

References

[1] R.A. Khmelnicky, N.Kh. Talipov, G.V. Chucheva, Synthetic diamond for electronics and optics. Izdatelstvo ICAR, 2017.

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