CHANGE OF CATHODOLUMINESCENCE SPECTRA OF DIMONDS IRRADIATED BY ELECTRON BEAM[1]

D.E. GENIN[1,2], V.S. RIPENKO[1,2], E.I. LIPATOV[1,2], A.G. BURACHENKO[1,2], M.A. SHULEPOV[1], K.P. ARTYOMOV[1], A.P. ELISEEV[3], V.G. VINS[4]

[1]Institute of High Current Electronics SB RAS, Tomsk, Russia
[2]National Research Tomsk State University, Tomsk, Russia
[3]Institute of Geology and Mineralogy named after V.S. Sobolev, Novosibirsk, Russia
[4]VELMAN Ltd., Novosibirsk, Russia

It is known, that nitrogen-vacancy (NV) centers in diamond are adjective single-photon emitters, with applications in quantum technologies. Two charge states are known for NV centers: NV^0 and NV^- , with the latter being mostly studied due to its long electron spin coherence time. NV centers in diamond are promising elements for quantum optical systems since they are single-photon emitters with high photostability, quantum yield and brightness, even at room temperature [1-3]. Typically, synthetically prepared diamonds with NV centers contain both NV^0 and NV^- states. Therefore, control of NV centers state in diamond is an important scientific problem.

Here we investigate changes in the cathodoluminescence (CL) spectra of HPHT diamonds, irradiated by electron beam at the room temperature (298 K) and liquid nitrogen temperature (77K).

RADAN-220-IMA3-150E accelerator was used as a source of electrons (220 keV). For temperature control we used platinum thermo-resistor. All experiments were conducted in the vacuum chamber (10^{-2} Pa). Optical spectra of diamonds cathodoluminescence were recorded ever 20 K and than compared with each other.

REFERENCES

[1] R. Brouri,A. Beveratos, J.-P.Poizat, P. Grangier, "Photon Antibunching in the Fluorescence of Individual Color Centers in Diamond," Opt. Lett. , vol. 25 (17), 2000.

[2] M. W. Doherty, N. B. Manson, P. Delaney, F. Jelezko, J. Wrachtrup, L. C. L. Hollenberg, "The Nitrogen-Vacancy Colour Centre in Diamond," Phys. Rep. , vol. 528 (1), pp. 1–45, 2013.

[3] A. Gruber, A. Drabenstedt, C. Tietz, L. Fleury, J. Wrachtrup, C. von Borczyskowski, "Scanning Confocal Optical Microscopy and Magnetic Resonance on Single Defect Centers," 2012.

1 This work was performed on state task, project No 0721-2020-0048 and RFBR project No 14-02-31132.