N4-P-014901

TEMPERATURE DEPENDENCES OF ABSORPTION SPECTRA IN DIAMOND *

O.I. LYGA[1], M.A. SHULEPOV[1,2]

[1] National Research Tomsk State University, Tomsk, Russia
[2] Institute of High Current Electronics, Tomsk, Russia

Today, presence of diamonds as the main element in computing technologies and space industry plays an important role. In this regard, an urgent task is to create diamonds with identical properties. In this paper, we investigated changes of absorption spectra from temperature. The sample was placed in a vacuum chamber of cryostat on a substrate, which was cooled to 12 K and then heated to 470 K in 10 K increments.

When the temperature of the diamond changed, transmission spectra were recorded. Absorption spectra were calculated from the transmission spectra according to formula (1), and the temperature dependences of SiV-center phonon wing change were determined [1].

$$\alpha(E) = +\frac{1}{d}\ln\left[\frac{(1-R)^2}{2T} + \sqrt{\frac{(1-R)^4}{4T^2} + R^2}\right], \quad (1)$$

where d - thickness of diamond sample, T - transmission coefficient, R - reflection coefficient.

Figure 1 shows the absorption spectra of a diamond sample with SiV-centers at temperatures of 12 K, 300 K, 470 K, calculated by formula (1).

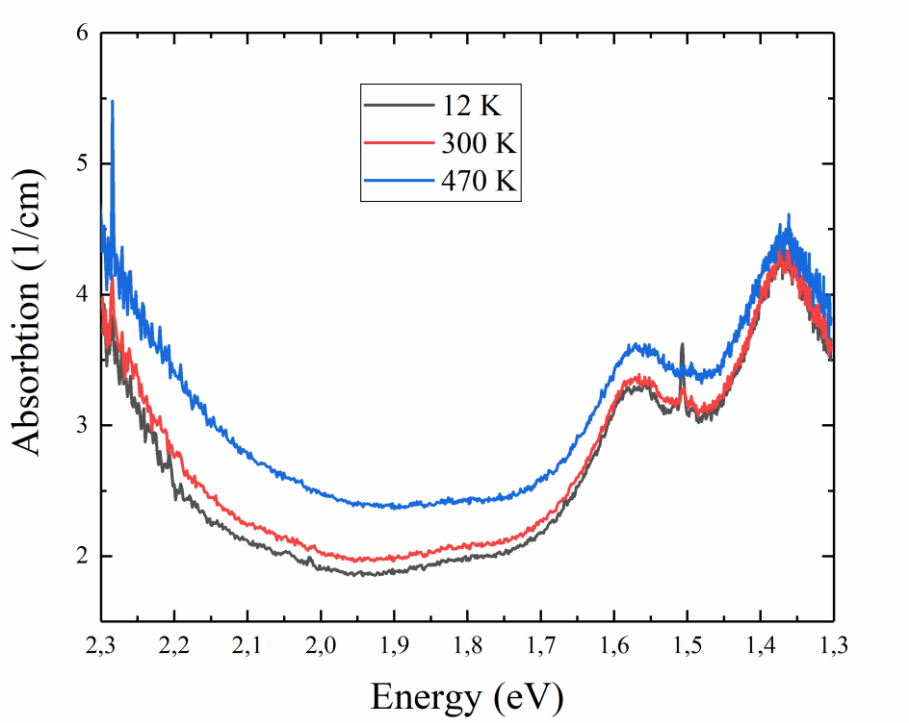

Fig.1. Absorption spectra of a diamond sample with SiV-centers at temperatures of 12 K, 300 K, 470 K.

REFERENCES

[1] A. R. Zanatta, “Revisiting the optical bandgap of semiconductors and the proposal of a unified methodology to its determination, ” Scientific Reports, vol. 9, 11225, August 2019.

* The study was carried out on the state order of the Ministry of Science and Higher Education of the Russian Federation, project No 072120200048.