

Cyclicity of the gettering effect when irradiated 4H-SiC with protons

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Samples preparation

Fig. 1. Cross-section of Cr/4H-SiC UV detector structures with Chottky arriers in diameter - 8 mm and Cr thickness - 20 nm formed on CVD layer with thickness 5 µm and



Fig. 2. Spectra of the external quantum efficiency of the Cr/4H-SiC UV photodetector taken after each of the eight proton irradiations with a fluence of 1E12 cm-2, for three wavelengths: 240 nm (curve 1), 280 nm (curve 2), and 320 nm (curve 3).



Fig.3. CL data of the Cr/4H-SiC photodetector with Nd-Na = 1E14 cm-3 in CVD epitaxial layer after each irradiation with protons with fluence of 1E12 cm-2, presented in two spectral maxima: 2.2 eV and 2.6 eV.

Conclusion

Cr/4H-SiC UV detectors with Nd-Na = (1-4)E14 cm-3 in CVD layers were irradiated 8 times with 15 MeV protons with a fluence of 1E12 cm-2. The studies were carried out after each irradiation with protons, the total fluence was 8E12 cm-2.

The nature of the change in the external quantum efficiency of Cr/4H-SiC UV photodetectors and CL spectra are cyclical in successive irradiation with protons with a fluence of 1E12 cm-2.

The cyclicity of QE and CL can be explained by the cyclicity of structural changes upon successive irradiation of 4H-SiC by protons with an energy of 15 MeV with fluence of 1E12 cm-2.

The cyclic effect of gettering in 4H-SiC under staged proton irradiation was observed for the first time



Fig. 4. Distribution maps of X-ray reflection intensity (reflex (0008)) from the initial 4H-SiC sample (Initial) and after each of the eight acts of irradiation with protons with fluence of 1E12 cm-2 (2D -8D), respectively.



Fig. 5. Dependence of Rdiff on the fluence irradiation by protons 8 times of the Cr/4H-SiC photodetector with different Cr Schottky diameters: 1 - 2.6 mm, 2 - 6 mm. The total fluence was 8E12 cm-2.