Summary

As is known, at present, pulsed photonic methods have been widely used to implement activation-diffusion processes in modern electronic materials. Rapid thermal annealing methods replace the traditional high-temperature (close to the melting point of the material) and long-term (several hours) annealing process in a thermal furnace. Despite the diversity of the devices used in the above methods, they are a tool for shorter, but still high-temperature impact on the material compared to a thermal furnace, where the contact mechanism of heat transfer from the device to the material is replaced by that of electromagnetic radiation - absorption. Rapid thermal annealing methods completely ignore the role of the processes accompanying the absorption of light in semiconductor materials, such as the generation of antibonding electron-hole pairs, selective absorption by defects, etc. These factors, if appropriate conditions are created, can have a significant impact on the efficiency of activation-diffusion processes in materials. Based on the above, one of the goals of this project was to create a broad-spectrum device and methods of pulsed photon irradiation that would take into account the above problems. The proposed device - a broad-spectrum pulsed photon irradiation setup – is broad emission spectrum (190 - 4100 nm) light sources placed in a reflective case. The light source with a wavelength of 190-700 nm (UV, VIZ) is located in the upper part of the device and operates continuously. Light sources with a wavelength of 400-4100 nm (VIS, IR) operate in a pulsed mode and are located in two rows in the lower and lateral parts of the device. The device allows irradiating the sample from both sides during operation. The device provides a change in the intensity and spectrum of light falling on the test sample. Photostimulated processes are carried out at low temperatures (<3000C) in the air or inert gas environment.

One of the important areas of modern photonics is the creation of highly efficient photosensors operating in a wide spectral range. Therefore, it is obvious how important it is to have maximum information about both the main semiconductor structures and various stages of technological processes, as well as about finished devices. The optical device "Polychromator with optical filters" refers to the devices intended to study the optical and optoelectric properties of test objects exposed to ultraviolet, visible and infrared radiation.

This is an optical device placed in a single housing, which contains: lamps with a wide emission spectrum (190-4100 nm); a cooler; lamp holders at different heights, which allows changing the

intensity of light falling on the sample; a set of optical filters with a sharp light emission front and a variable spectral range; holders of optical filters and samples. The mentioned device and the method for measuring photosensitivity allow us to identify the effect of different areas of illumination on the photosensitivity of devices. The use of the studied device made it possible to identify both positive as well as zero and negative photosensitivity areas in photodiodes. It is shown that the optical range of negative photosensitivity depends on the technology of photodiode fabrication.