Nanostructured surfaces

The creation of heterostructures InSe – graphite with organic binder

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One of the problems of creating heterostructures based on thin films is to obtain homogeneous films. The formation of graphite films is of great interest in solar energy. But along with the usability and accessibility of the material coating the graphite films creates a significant problem, namely, uniformity of the film. The aim of this work is the creation of InSe - graphite heterostructures with an organic binder.

Graphite was applied on the surface of layered InSe crystal (5 x 5 x 1 mm), which was grown by Bridgman method, using a binder of the organic component. Powdered graphite of PGM-6 brand was dispersed at the frequency of 22 kHz; after that it was rinsed in alcohol and distilled water. Dried powder was mixed with a binder in the ratio (2:1), and it was applied to the sample in the liquid state in the form of drops. To ensure the homogeneity of the film across the whale surface, the sample was spun at the speed of 1000 Rev/min. Thus the heterostructure InSe – graphite was obtained. This heterostructure is of the diode nature, as it can be seen from the current – voltage characteristics.

Fig.1. Current – voltage characteristics of InSe heterostructure – graphite

Fig.2.The quantum efficiency of the heterostructures n-InSe – graphit.

From I – V curve the semilog dependence was built from which the nonideality coefficient was determined n=3.3 by the formula:

$$\Delta \mathrm{Ln}(I)/\Delta V = e/nkT \quad (1).$$

The photosensitivity spectra of heterojunctions produced were analyzed using the monochromator MDR-3 with the resolution of 2.6 nm/mm and are within the range (0,4-1,2 microns). All spectra were normalized in relation to the number of incident photons. In the analysis of capacitance - voltage characteristics value of the height of the barrier structure was determined at frequencies of 20-30 (kHz), which amounts to 0.6(eV).