The Photosensitivity Nanostructures Based on II-VI Semiconductors

Vuichyk M., Tsybrii Z., Svezhentsova K., Smirnov O., Bilevych O., Sizov F.

V. Lashkaryev Institute of Semiconductor Physics NAS of Ukraine, Kyiv, Ukraine

Perspective materials to create a solar converters are composite structures based on A_2B_6 (CdTe, ZnO) semiconductor films, which activated by CdS, CdSe quantum dots. Their basic electrical properties depend on the structure of the atomic lattice and its defects. Carrier transport efficiency is defined microstructure sensitive layer. The study of the physical properties of such structures is necessary in view of the fact that such heterostructures are promising when used as active elements photosensitive converters for solar cells.

In work are studied the photoelectric properties of nanostructured A_2B_6 thin films and heterostructures based on them, and surface morphology of thin layers at each stage of production prototype solar cell (SC). SC prototype consisted thin nanostructured layers of CdTe, CdS on glass substrate with gold contacts.

To study the surface morphology was used atomic force microscope "FemtoScan". Depending on the choice of growing conditions observed two characteristic surface relief with a large (d ~ 100-200 nm) and a small (d ~ 10-30 nm) nanorods CdTe. Fig. 1 shows the surface morphology of the heterostructure CdTe/CdS at an intermediate stage of manufacture SC.

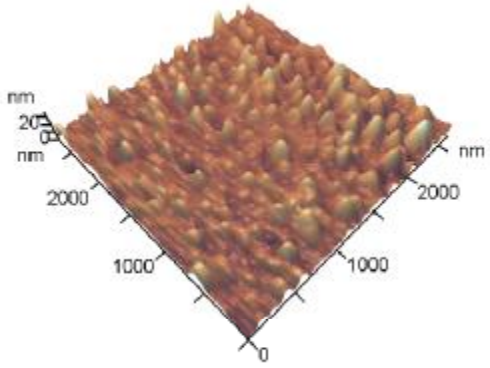

Fig. 1. Morphology of surface CdTe/CdS heterostructure.

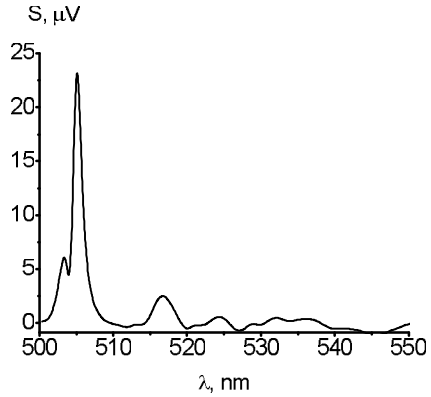

Fig. 2. Photoresponse's spectral dependence for the prototype solar cell at T = 300K.

Spectral dependencies of photosensitivity (Fig. 2) were measured at using SPM-2 spectrometer with a prism G-60 and nanovoltmeter UNYPAN-232V without prior amplification mode. As the result, the structures of this type characterized spectrally narrow strip of photoresponse in the visible spectrum with a peak sensitivity at 505 nm, which confirms the promising use this structures for photovoltaic systems.