PROPERTIES OF In_2O_3-InSe HETEROSTRUCTURES WITH NANOSTRUCTURED OXIDE

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In the present paper, photosensitive n-In_2O_3–p-InSe heterostructures with nanostructured In_2O_3 frontal layer were studied. It was established that photoresponse spectra of these heterostructures considerably depend on surface topology of the oxide. This attests that the oxide with the semiconductor substrate serves not only as an active component of the structure but also as a cellular diffraction element.

Surface topology of the oxide was investigated by means of atomic force microscope (Nanoscope IIIa Dimension 3000 SPM). Under different conditions of oxidation of the InSe, the surface of the samples contains predominantly needle-shaped nanostructures. Their structure had ordered as well as random nature.

Optical dimensional effect in the oxide film was revealed owing to the combination of properties of nanostructured In_2O_3 surface and anisotropic light absorption in InSe. The higher the deflection of incident light from the normal direction induced by the nanostructured oxide surface, the more significant are changes in carrier photogeneration in the anisotropic semiconductor. These changes are the extension of photoresponse range and the peculiarities of behavior of excitonic line in photoresponse spectra of the heterostructure. The higher density and ordering of the nanoneedles, the bigger are long-wave shift of the photoresponse range and more intensive exciton peak in the photoresponse spectra.

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