

Photoelectric Phenomena in Isotope Vitreous As₂S₃-Silicon Single-Crystal Heterojunctions

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Introduction Heterojunctions on the basis of chalcogenide vitreous semiconductors (ChVS) attract attention mainly due to peculiarities of their photoelectrical properties, that allow to use them in vidicons, electrophotography, and other methods of registration of optical information /1, 2/. The hybride heterojunctions on the basis of ChVS and elementary single-crystal semiconductors Ge and Si /3/, the most interesting properties of which are electrical switching and memory, make an exception /4/. Photoelectrical properties of such heterojunctions are studied mainly on the basis of anisotype n-Si/ChVS structures /5 to 7/ from the viewpoint of the photovoltaic effect.

At the same time, the peculiarities of the current-flow mechanism in such kind of heterojunctions /4, 8/ allow to assume that the internal photoeffect reveals better in the isotype hybride heterojunctions.

In the present note the photoelectrical phenomena in isotype heterojunctions on the basis of single-crystal p-Si and vitreous As₂S₃ with aluminium or chromium electrodes, were investigated. The electrical properties and the possible band diagram of As₂S₃/p-Si heterojunctions had been published earlier /9/.

Experimental results and discussion Fig. 1 shows a typical I-U characteristic of As₂S₃/p-Si heterojunctions in darkness and integral light illumination from the side of the As₂S₃ layer. One can see that the illumination influences mainly the reverse branch of the I-U characteristics. Alongside with the usual parallel shift of the reverse branch of the I-U characteristics, an increase of the reverse current with bias voltage can be observed; and the short-circuit current does not coincide with the saturation current (Fig. 1b). This peculiarity can be explained by the division of the generated charge by the contact field (considering the local states in the forbidden gap of As₂S₃ that cause

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