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STRUCTURAL DISORDER AND OPTICAL PROPERTIES OF ELECTON-IRRADIATED $As_2S_3(Se_3)$ CHALCOGENIDE GLASSES

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Glassy chalcogenides of arsenium are characterized by high transparency in a near and middle infrared and belong to a class of materials which are used as active or passive elements in optical engineering. Experimental studies of the influence of radiation load (gamma radiation, X−radiation or electron radiation) enable to determine the character and change of physical properties of these materials, boundary doses of radiation, to learn the nature and mechanisms of radiational defect–formation, reveal conditions of renewing the initial parameters.

In Fig.1 the correlation between optical pseudogap E_g^* and characteristic energy W for glassy $As_2S_3(Se_3)$ in dependence of the nature of disorder due to various external factors.

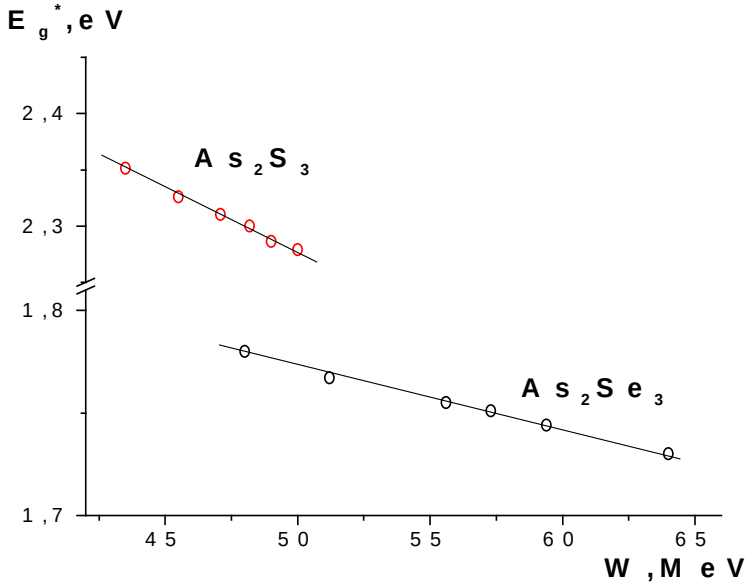

Fig.1. The dependence of optical pseudogap E_g^* on the slope of the exponencial Urbach tail W. Blank and black circules correspond to different phases and conditions of preparation.

This correlation shows that the optical pseudogap E_g^* and – this being more important – the slope of an exponential portion of the edge are changing in dependence of the disorder degree. A linear relation between E_g^* and W for chalcogenide glasses $As_2S_3(Se_3)$ is fulfilled practically in the whole range of the values of W energies which was studied up to this time. Thus it can be stated that in this case for these materials the contribution of the structural ("intrinsic" and induced) and the thermal contributions into a change of disorder potential is adequate, and the change of the slope probably reflects the change of the distribution of the states in the tails of zones.

Thus, the dose dependences of energy parameters of the intrinsic absorption edge testify to an electron-induced creation of new defects which change the disorder potential. A characteristic energy of the exponential absorption tail $W(T,X)$ shows not only the temperature but also the structural disordering of other kinds: intrinsic structural disorder of an "ideal" glass; induced structural disorder due to external factors (of radiation or technological).