**Ternary Germanium Containing Chalcogenide Glasses**

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Bulk chalcogenide glasses of the (GeSex)1-yGay and (GeTex)1-yGay systems with Ga content (y) up to 20 mol.% are prepared with melt-quenched technique. The glassy properties – density, microhardness, compactness are determined as a function of the composition. Thermal characteristics: glass transition temperature (Tg), crystallization temperature (Tcr) and melting temperature (Tm) are obtained from the calorimetric investigations. The smooth increase in the characteristic temperatures in the glasses with gallium content reveals the stability of the investigated materials.

The FIR spectra show reorganization in the glassy network after gallium introduction. The main tetrahedral structural units are partially substituted for chain-like structural units due to bonding of the gallium atoms with tellurium atoms. Apparently a peak related to a new-formed structure appears after introduction of additives into the tetrahedral chalcogenide structure.

The stress in the films was measured by cantilever bending method. It was found that the Ge-Te-Ga films are under tensile stress which is higher for the films with higher Te content. The addition of gallium to the Ge-Se matrix affects the stress formation in the films: without gallium films possess negligible stress, while all gallium-containing films are under compressive stress. The increase of the gallium content leads to structural changes and an increase in the density, which results in higher stress values. The origin of the tensile stress could be sought in the difference of the atomic radii of the elements constituting the structural units of the glass.

The spectral distribution of the refractive index variation depends on the addition of gallium in the films. The sign of the Δn has been found to convert from negative into positive. The irradiation of the thin films causes shift of the absorption edge. The peculiarity of the absorption edge and refractive index modulation could be explained with re-organization of the atomic structure due to floppy – rigid transition. The chain-like structure encourages the

photoinduced structural transformations due to light illumination.

**Keywords:** chalcogenides, glasses, optical properties