Nanocomposites and nanomaterials

$(Ag_3AsS_3)_{0.9}(As_2S_3)_{0.1}$ thin films under the influence of laser irradiation

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Imposing number of experiments has been performed with chalcogenide bulk glasses, thin films and nanomultilayers in order to examine structural, compositional and surface changes as a result of laser and e-beam stimulations. Ag-As-S films are considered to be suitable materials for optical recording, electrochemical sensing, as photoresistive materials, etc. We chose Ag_3AsS_3-As_2S_3 system due to absence of data on it, and explored interesting photo- and e-beam induced effects.

In this study $(Ag_3AsS_3)_{0.9}(As_2S_3)_{0.1}$ thin films with thickness 1500 nm were prepared by a rapid thermal evaporation at near 1350ºC in vacuum onto glassy substrates kept at room temperature. Structural properties of the given thin films were studied using SEM and AFM. Optical transmission spectra were recorded using grating monochromator. Laser irradiations (LI) were performed using red (633 nm, 6.7 mW) and green (532 nm, 30 mW) lasers.

Time dependences of the relative transmitted light intensity, I/I_0, during LI of the $(Ag_3AsS_3)_{0.9}(As_2S_3)_{0.1}$ thin film were studied. Two irradiation detection schemes were used, i.e. detection of transmitted and reflected light. The film under investigation becomes lighter owing to LI. Moreover, transmitted laser beam increases its relative intensity while reflected beam remains more or less unchanged till the end of the experiment. AFM showed that LI causes descend of surface at irradiated regions in such a way that green laser affects more strongly comparing with red one. It worth noting that efficient holographic gratings can be recorded at surface of the given $(Ag_3AsS_3)_{0.9}(As_2S_3)_{0.1}$ thin film.