# “Nanocomposites and nanomaterials”

## Structure studies of Ag-doped $As_2S_3$ chalcogenide glasses

**L.O. Revutska[1], O.P. Paiuk[2], A.V. Stronski[2], O.Y. Gudimenko[2], K.V Shportko[2], A.O. Gubanova[3], Ts.A. Kryskov[3], V.V. Kidalov [4]**

[1]*National Technical University of Ukraine “KPI”, Prospect Peremogy 37, Kyiv, Ukraine. E-mail: liubov.revutska@gmail.com*

[2]*V. Lashkaryov Institute of Semiconductor Physics NAS of Ukraine, Kyiv, Ukraine*

[3]*Kamianets-Podilsky National University, Kamianets-Podilsky, Ukraine.*

[4]*Berdyansk State Pedagogical University, Berdyansk, Ukraine.*

Nanostructured chalcogenide glasses (ChGs) have numerous optical and photonics applications, due to their optical transparency in IR spectral region, chemical stability, photosensitivity phenomena, high linear and non-linear refractive index. ChGs have great potential for many applications including integrated and non-linear optics, information technology, etc.

In present work the results of investigations on the influence of Ag doping (10, 15, 20 wt.%) on structural properties of $As_2S_3$ glasses are presented. X-ray diffraction studies confirmed amorphous structure of glasses. Radial distribution functions have been obtained and analyzed, which testified about certain increase of the first coordination sphere radius after introduction of silver into $As_2S_3$. From obtained HH and HV-polarized Raman spectra of doped $As_2S_3$:Ag it can be seen that structure changes. The Raman spectra of these ChGs are dominated by strong band at 340 $cm^{-1}$ attributed to the symmetric As-(S)-As stretching vibrations in $AsS_{3/2}$ pyramids. Besides this strong band at 340 $cm^{-1}$, there are additional features (shoulders) at 314 $cm^{-1}$ and can be assigned to the asymmetric stretching modes of $AsS_{3/2}$ pyramids. Weak bands situated at 187, 221, 231 $cm^{-1}$ correspond to the presence of the non-stoichiometric molecular fragment of $As_4S_4$ nanophase. Doping of $As_2S_3$ glass with Ag causes a slight increase of the band intensity located at 187, 221, 231 $cm^{-1}$. The presence of excess sulfur is indicated by the weak band at 475 $cm^{-1}$, characteristic for the vibrations of S-S bonds, and it is increased with the Ag introduction. Deconvolution of obtained Raman spectra was performed for analysis of their compositional dependencies.

The main effect that is observed at introduction of silver into nanostructured $As_2S_3$ glass is the change of the relative concentration of the main and non-stoichiometric molecular structural units characteristic for $As_2S_3$ glasses.

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