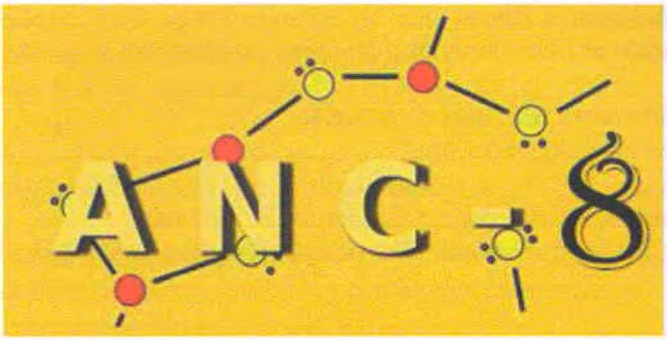
Abstract Book

8th International Conference on

Amorphous and Nanostructured Chalcogenides

Sinaia, Romania, July 2 - 5, 2017



Contents

Invited Papers

Regular Papers – Oral Session

Regular Papers - Poster Session

observed for gratings recorded in $As_4S_3Se_3$ thin films, doped with Sn. With the adding of the computer control of electron beam positioning both the raster scan and vector patterns were recorded. In the former case the images from BMP-files were patterned. In the latter case the mosaic of diffraction gratings, producing the multi-beam light diffraction was recorded. Relief mosaic of diffraction gratings, producing multi-beam light diffraction was formed. The dependences of the diffraction efficiency gratings with the periods of Λ=1 μm and Λ=2 μm versus the radiation dose for the compositions $(As_4S_3Se_3)_{1-x}Sn_x$ (x=0.01, 0.03, 0.05) was investigated. It was established that the diffraction efficiency begin a sharp increasing at the electron beam current j=8 nA (2.22 mC/cm^2) for the gratings with period of Λ=2 μm. The mechanism of electron-beam recording of diffraction gratings in chalcogenide films mainly is attributed to periodic modulation of their refractive index and transmittance, caused by induced structural transformation. The thin films of $(As_4S_3Se_3)_{1-x}Sn_x$ were used for direct e-beam recording of relief grating structures, which also were examined using the AFM.

Comparison of sensitivity of $Ge_9As_9Se_{82}$ and $Ge_{16}As_{24}Se_{60}$ thin films to irradiation with electron beam

O. Shylenko[a], V. Bilanych[b], A. Feher[a], V. Rizak[b], V. Komanicky[a]
[a]*Faculty of Science, Safarik University, Kosice 04001, Slovakia*
[b]*Faculty of Physics, Uzhgorod National University, Uzhgorod 88000, Ukraine*

Corresponing author: vladimir.komanicky@upjs.skvbilanych@gmail.com

Depending on average coordination number, $Ge_xAs_ySe_{100-x-y}$ systems may contain one-dimensional, two-dimensional or three-dimensional structural units and exhibit different structural hardness [1]. Although mechanism of interaction of electrons with chalcogenide glasses is still not clear, it has been shown that extent of the surface alterations follows changes in composition related parameters such as softening temperature and glass network connectivity [2, 3] It is possible to tune the strength of interaction between amorphous chalcogenide thin films, and electron beam by variation of their chemical composition [4]. In our previous studies [5] we found that extent of surface alterations exhibits maxima at average coordination number where chalcogenide electrical conductivity has minimal value [5]. The type of the surface relief formed during electron irradiation is also strongly dependent on the electron dose. We compared sensitivity of thin films with two compositions; namely $Ge_9As_9Se_{82}$ and $Ge_{16}As_{24}Se_{60}$ which have maximal and minimal electrical conductivity respectively, and find that not only latter film is more sensitive to electron irradiation but also at some dose ranges forms very peculiar shapes such as doughnut shapes craters or rings structures within craters (see Fig. 1).

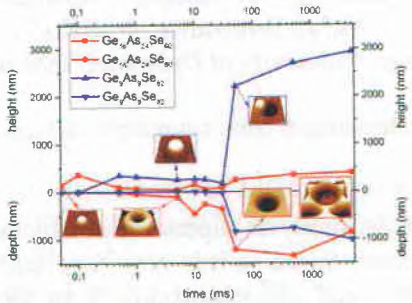


Fig. 1. Dependence of types of surface reliefs formed in $Ge_9As_9Se_{82}$ (blue points) and $Ge_{16}As_{24}Se_{60}$ (red points) thin films by electron beam on the beam exposure time.

References

[1] Y. Wang, P. Boolchand, M. Micoulaut, Europhys. Lett. **52**, 633 (2000).
[2] K. Tanaka, Appl. Phys. Lett. **70**, 261 (1997).

[3] M. L. Trunov, C. Cserhati, P. M. Lytvyn, Yu. Kaganovskii, S. Kokenyesi, Journal of Physics D: Applied Physics, **46**, 245303:1 (2013).
[4] G. B. Hoffman, R. M. Reano, J. Vac. Sci. Technol., B **30**, 06F301:1 (2012).
[5] V. Kuzma, V. Bilanych, M. Kozejova, D. Hlozna, A. Feher, V. Rizak, V. Komanicky, J. Non Crystal. Solids, **456**, 7 (2017).

Study of dielectric properties of some bulk Cu-As-Se-I chalcogenides

F. Skuban[a],S. R. Lukić-Petrović[a], M. V. Šiljegović[a], D. M. Petrović[a], M. Slankamenac[b]†
[a]*Faculty of Sciences, University of Novi Sad, Trg D. Obradovića 3, 21000 Novi sad, Serbia*
[b]*Faculty of Technical Sciences, University of Novi Sad, Trg D. Obradovića 6, 21000 Novi Sad, Serbia*

Corresponding author: fedor.skuban@df.uns.ac.rs

The impedance spectroscopy technique was used to study the frequency dependence of some dielectric parameters in the frequency range from 100 Hz to 1 MHz for the bulk amorphous semiconducting glasses from the system $Cu_x[(As_2Se_3)_{0.9}(AsI_3)_{0.1}]_{100-x}$at different temperatures (298–398 K). Values of the dielectric permittivity ε′ and dielectric loss ε″ were found to decrease with frequency and increase with temperature. The introduction of copper into the system increased the values of dielectric parameters. The results obtained are interpreted in terms of the Debye theory of molecular dipoles, and they indicate the existence of different types of dipoles that determine the mechanism of dielectric behavior of the investigated glasses. The dielectric permittivity of these compounds are explained by means of a model of the process of hopping over the potential barrier between localized sites and the maximum barrier height W_M were calculated.

Keywords: Chalcogenide glassess; Dielectric properties; Dielectric permittivity

High-conductive Cu_6PS_5I-based thin films: structural, electrical and optical properties

I. Studenyak[a], V. Izai[a], A. Bendak[a], P. Kúš[b*], S. Kökényesi[c]
[a]*Faculty of Physics, Uzhhorod National University, 3 Narodna Sq., 88000 Uzhhorod,Ukraine,*
[b]*Faculty of Mathematics, Physics and Informatics, Comenius University, Mlynska dolina, 84248 Bratislava, Slovakia,*
[c]*Faculty of Science and Technology, University of Debrecen, 18/a Bem Sq., 4026 Debrecen, Hungary*

Corresponding author: studenyak@dr.com; kus@fmph.uniba.sk; kiki@science.unideb.hu

Cu_6PS_5I crystals belong to a wide family of superionic conductors with argyrodite structure. Changing the bulk materials with thin-layer structures based on it is very important task. Such materials in thin-film form are more applicable for modern micro- and nanoelectronics from viewpoint of integrated semiconductors technology.

Cu_6PS_5I-based thin films were deposited using technique of non-reactive radiofrequency magnetron sputtering on the silicate glass substrates in Ar atmosphere. For sputtering we used the co-deposition technique from two tilted magnetrons – one equipped with Cu_6PS_5I target (pressed powder) and second with pure Cu target. Structural studies, performed using SEM technique, confirm the formation of a uniform two-dimensional structure. EDX spectroscopy was used to ensure the thin films chemical composition. At increase of copper content the increase of halogen content and decrease of phosphorous and sulphurare observed.