



International Meeting

**CLUSTERS AND NANOSTRUCTURED MATERIALS  
(CNM'4)**

**PROGRAM  
and  
MATERIALS**



Uzhgorod Ukraine  
12 – 16 October, 2015



National Academy of Sciences of Ukraine  
Institute of Physics  
G.V.Kurdyumov Institute for Metal Physics  
V.E. Lashkaryov Institute for Semiconductor Physics  
Institute for Information Recording  
Uzhgorod Scientific-Technological Center of the Institute for Information Recording  
Uzhgorod National University

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12-16 October 2015**

**PROGRAM & MATERIALS  
OF THE MEETING**

**Uzhhorod  
2015**

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The materials represent the contents of meeting's reports based on the results of fundamental and applied works on topical questions in the field of nanostructured systems, nanomaterials and nanotechnologies. Main attention is given to the consideration of problems of nanophysics and nanoelectronics, to atomic and electronic structure of cluster and nanostructured materials, amorphous alloys, nanostructured films and coatings, colloidal and biofunctional materials, to study of their properties. The results of investigations in the field of supramolecular chemistry, synthesis of nanoparticles, nanostructures and multifunctional nanomaterials, physico-chemistry of superficial phenomena and diagnostics of nanosystems are presented.

The edition is designed for scientists, engineers, higher school lecturers, post-graduates and students of corresponding specialities.

THURSDAY, 15<sup>TH</sup> OF OCTOBER, 2015

8<sup>00</sup> – 9<sup>00</sup> – breakfast

SECTION

Chairman: Uvarov V.M.

9<sup>00</sup> – 9<sup>20</sup> – OPTICAL CONDUCTIVITY OF ELLIPTICAL METAL NANOWIRES

*Korotun A. V., Pogosov V. V. and Koval A. O.*

*Zaporizhzhya National Technical University, Zaporizhia, Ukraine.*

9<sup>25</sup> – 9<sup>45</sup> – POSITRON AND POSITRINIUM IN METAL-DIELECTRIC NANOSANDWICHES

*Babich A. V., Vakula P. V., Reva V. I., Pogosov V. V.*

*Zaporizhzhya National Technical University, Zaporizhia, Ukraine.*

9<sup>50</sup> – 10<sup>10</sup> – MULTILAYER NANOSCALE CARBON CLUSTER – THE LATEST MODERN MULTIFUNCTIONAL ADDITIVES TO THE MOTOR FUELS

*Polunkin E.V.*

*Institute of Bioorganic Chemistry and Petrochemistry NASU, Kyiv, Ukraine.*

10<sup>15</sup> – 10<sup>35</sup> – CARBON NANOSTRUTURES, NANOPORES AND METAL NANOPARTICES IN ADVANCED OPTOELECTRONIC MATERIALS FABRICATED BY LOW-ENERGY ION IMPANTATION

*Kavetsky T.S. and Stepanov A.L.*

*Drohobych Ivan Franko State Pedagogical University, Drohobych, Ukraine.*

10<sup>40</sup> – 11<sup>00</sup> – ENVIRONMENTAL EFFECT ON DEFECT INTRODUCTION EFFICIENCY INTO CARBON NANOTUBES

*Danilchenko B.A., Lev S.B., Tripachko N.A., Uvarova I.Y., Voitsihovska E.A., Yaskovets I.I.*

*Institute of Physics, NASU, Kyiv, Ukraine.*

11<sup>00</sup> – 11<sup>30</sup> – coffee-break

SECTION

Chairman: Prokopenko I.V.

11<sup>30</sup> – 11<sup>50</sup> – ELECTRON-PHONON INTERACTION IN RESONANT TUNNELING STRUCTURES – KEY FACTOR OF QUANTUM CASCADE DETECTORS OPERATING

*Tkach M.V., Seti Ju.O., Grynyshyn Y.B.*

*Chernivtsi National University, Chernivtsi, Ukraine.*

11<sup>55</sup> – 12<sup>15</sup> – ON THE PRESSURE AND TEMPERATURE DEPENDENCES OF THE DYNAMIC VISCOSITY AND SELF-DIFFUSION COEFFICIENTS FOR CLUSTERED SIMPLE LIQUIDS

*Lugovskiy S. S., Tatarenko V. A.*

*G. V. Kurdyumov Institute for Metal Physics, NASU, Kiev, Ukraine.*

12<sup>20</sup> – 12<sup>40</sup> – LOW TEMPERATURE THERMAL CONDUCTIVITY IN NANOSTRUCTURED Ge-As-S GLASSES ABOVE THE PLATEAU

*Petretskij S., Feher A., Mitsa V., Holomb R., Rigo I., Tkach V.*

*Uzhgorod National University, Uzhgorod, Ukraine.*

12<sup>45</sup> – 13<sup>15</sup> – COMPARISON OF HOLOGRAPHIC RECORDING IN As<sub>2</sub>S<sub>3</sub> LAYERS AND As<sub>2</sub>S<sub>3</sub>-Se NANOMULTILAYER STRUCTURES

*Meshalkin A., Triduh G., Prisacar A., Achimova E., Abashkin V., Paiuk O., Stronski A.*

*Institute of Applied Physics of the ASM, Chisinau, Moldova.*

13<sup>30</sup> – 15<sup>00</sup> – lunch

## LOW TEMPERATURE THERMAL CONDUCTIVITY IN NANOSTRUCTURED Ge-As-S GLASSES ABOVE THE PLATEAU

**Petretskij S.<sup>1</sup>**, Feher A.<sup>2</sup>, Mitsa V.<sup>1</sup>, Holomb R.<sup>1</sup>, Rigo I.<sup>1</sup>, Tkach V.<sup>2</sup>

<sup>1</sup>*Uzhgorod National University, , 88000, Ukraine; e-mail: v.mitsa@gmail.com*

<sup>2</sup>*Pavol Jozef Šafárik University in Košice, 041 54 Košice, Slovak Republic*

According to the topologic - cluster Phillips-Thorpe model in semiconductor glasses at the value of the mean coordination number  $z = 2.4$  has to be a transition from one-dimensional to two-dimensional 1D -2D matrix structure [1], with further growth of connectivity of glasses to 3D with increasing  $z$ .

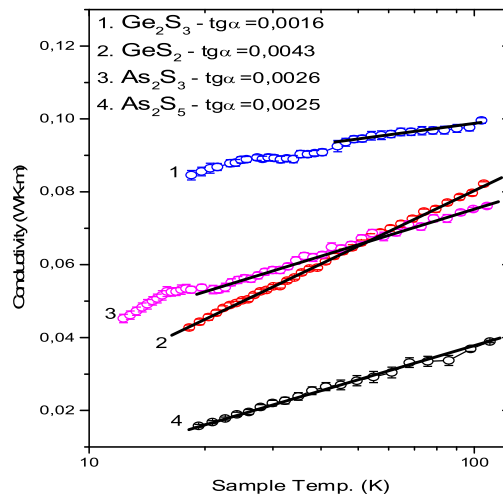


Fig.1. Temperature dependence of thermal conductivity in Ge-As-S glasses

In this report we presents the results of investigations of coordination dependences of low thermal conductivity Ge-As-S glasses in the temperature range  $10 < T < 100$  K. In  $As_2S_3$  ( $z=2.4$ ) and  $Ge_2S_3$  ( $z=2.8$ ) glasses depending  $k(T)$  revealed two distinct plateau  $k(T) = \text{const}$  (Fig.1). In the measured temperature range the plateau  $k(T) = \text{const}$  is extends up to 20 K for  $As_2S_3$  K and 40 K for  $Ge_2S_3$  (Fig. 1) and extending plateau to higher temperature in g- $Ge_2S_3$  correlated with high frequency shifting of Boson peak from 26( $As_2S_3$ ) to 33 ( $Ge_2S_3$ )  $cm^{-1}$ [2]. Temperature dependence above the plateau can be extrapolated by straight lines (Fig.1). At temperatures above the plateau an additional channel associated with sl mode hopping becomes important, accounting for the increase in  $k(T) \propto T$  above the plateau temperature [2]. Theoretically has been estimated for  $GeS_2$  ( $z=2.66$ ) that  $k(T) = 0.0065 T$  (W / K m) [2]. It is easy to see that the experimental data for  $GeS_2$   $k(T) = 0.0043 T$  (W / K m) (Fig.1) are close to the theoretical estimation. At the level of 100 K the value of  $k$  for measured samples (Fig.1) is depends on mean coordination number  $z$  and sound velocity ( $v_l$ ) in glasses. The highest value of  $k$  is corresponds to g- $Ge_2S_3$ ,  $z=2.8$  and  $v_l=3,12 \cdot 10^3$  m/sec .

1. Thorpe M., Cai J. J. Non-Cryst. Sol. 114 (1989)19–24.

2. Mitsa V. , Holomb R. , Veres M. , Marton A. , Rosola I. , Fekeshgazi I. , Koós M. Phys. Stat. Sol. C. 8(2011) 2696-2700.

3. Tsuneyoshi Nakayama. Rep. Prog. Phys. 65 (2002) 1195–1242.

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