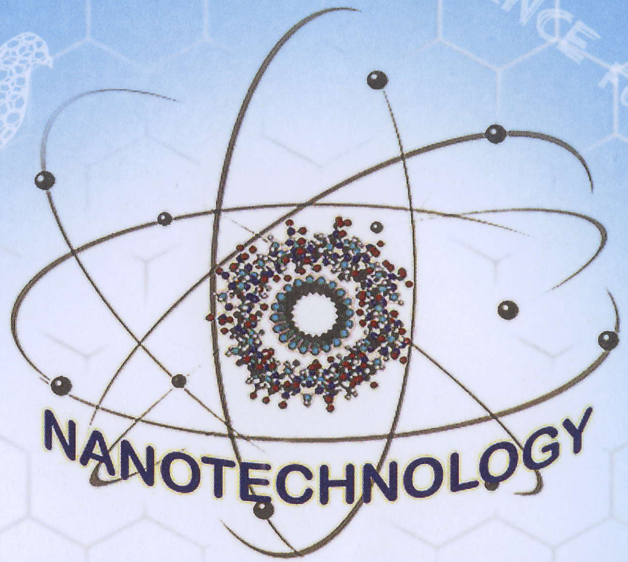

ABSTRACT BOOK

International research
and practice conference:

NANOTECHNOLOGY AND NANOMATERIALS (NANO-2016)

24–27 August 2016
Lviv
Ukraine

INTERNATIONAL RESEARCH AND PRACTICE CONFERENCE "NANOTECHNOLOGY AND NANOMATERIALS" (NANO-2016)

24 -27 AUGUST 2016

LVIV, UKRAINE

BOOK OF ABSTRACTS

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This book contains the abstracts of contributions presented at the International research and practice conference "Nanotechnology and Nanomaterials" (NANO-2016).

The NANO-2016 Conference was organized by the Institute of Physics of NAS of Ukraine with the participation of the Ivan Franko National University of Lviv (Ukraine), University of Tartu (Estonia), University of Turin (Italy), Pierre and Marie Curie University – Paris 6 (France) and European Profiles A. E. (Greece).

NANO-2016 was the fourth conference in the series of NANO-conferences initiated by the Institute of Physics of NAS of Ukraine in 2012 in the framework of FP7 Nanotwining project. From year to year, they attract more attention and participants. In 2012, the first meeting was held in the format of International Summer School for young scientists "Nanotechnology: from fundamental research to innovations". The 2013 and 2014 conferences were organized in conjunction with the International Summer Schools for young scientists under the same title. In 2013, this event was attended by more than 200 scientists, and in 2014 it gathered above 450 participants from Ukraine, Poland, Italy, Estonia, France, Austria, Germany, Greece, Turkey, USA, Romania, Moldova, Czech Republic, Taiwan, Lithuania, Egypt, Iran, India, Algeria, Indonesia and other countries. This Organizer Committee has received more than 700 application forms from about 25 countries of the world.

The NANO-2016 conference brought together leading scientists and young researchers from many countries of the world. This year its topics were as follows: Nanoobjects microscopy; Nanocomposites and nanomaterials; Nanostructured surfaces; Nanooptics and photonics; Nanoplasmonics and surface enhanced spectroscopy; Nanochemistry and biotechnology; Nanoscale physics; Physico-chemical nanomaterials science.

This year the NANO-2016 Conference was organized in the framework of the NAS of Ukraine Program "Fundamental issues of creation of new nanomaterials and nanotechnologies" for 2015–2019.

Website of the Nano-2016 conference: http://www.iop.kiev.ua/~nano2016

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Welcome to International Conference «NANOTECHNOLOGY AND NANOMATERIALS»!

It gives me a great pleasure to welcome you all at the International conference «Nanotechnology and nanomaterials» (NANO-2016) that is being held in Lviv. Its aim is to promote scientific contacts and discussions between researchers representing various fields.

Previous NANO Conferences, held in Ukraine in 2012-2015, were organized in the joint format with the International Summer Schools "Nanotechnologies and nanomaterials: from fundamental research to innovations". They allowed the participants, including young scientists, to familiarize with current research and application problems in this area and thus to promote further implementation of nanotechnologies into innovations which meet public needs. The events also gave the opportunity to young and early-career researchers to attend lectures of internationally recognized experts and round-table discussions on the emerging fields in nanosciences and nanotechnologies.

Our International Conferences and Summer Schools received a positive feedback from international experts and sparked interest in the media. This year above 650 registration forms have been received from

Hysteresis of low temperature thermal conductivity and Boson peak in glassy (g) As_2S_3: nanocluster contribution

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Thermal conductivity and heat capacity with low temperature anomalies, the Boson peak in the in glassy materials are still not clearly understood and are matter of debate. We studied thermal conductivity in g-As_2S_3 between 2 and 100 K. Thermal conductivity is weakly temperature $\kappa(T)$ dependent from 2 to 10 K showing a plateau region during both cooling and heating. The jump of value in $\kappa(T)$ dependence compare with cooling $\kappa(T)$ curves was found during heating g-As_2S_3. The values show that the jump of $\kappa(T)$ is greater than the accuracy of the measurement producing an appreciable deviation from k values taken during cooling. The appearance of hysteresis of $\kappa(T)$ during heating was found in range of temperature from 11 to 60 K. Difference curve of $\kappa(T)$ (heating minus cooling) is complex asymmetric peak in energy range from 1 to 10 meV and reproduces the experimental low-temperature Boson peak (BP). Intensity of it being proportional to the density of states ($g(\omega)$) by the rule of $g(\omega)/\omega^2$. Our spectroscopic theoretical and experimental studies of glass structure in cluster approximation have shown that the nature of excitations in the low frequency region of the spectrum might be originate from rich a variety of vibrational properties clusters vibrations resulting from atomic scale disorder [1]. In order to understand how these low frequency-modes depended on system clusters size we focus of attention in this work on the modes which might have vibrational character and be involved in measured low temperature thermal conductivity anomalies and Boson peak in g-As_2S_3.

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Calculation of energy diagram of asymmetric graded-band-gap superlattices

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The paper investigates the peculiarities of energy diagram of asymmetric graded-band-gap superlattices with linear coordinate dependences of band gaps and electron affinities. It is considered in detail the case of applicability of the common anion rule when the edge energy of the valence band does not depend on composition.

For calculating the energy diagram of the asymmetric graded-band-gap superlattices the linearized Poisson's equation has been solved for the two layers forming a period of the lattice under study. The continuity of electrostatic potential and carrier concentration at the lattice interfaces was used as boundary conditions for the Poisson's equation.

The obtained coordinate dependences of edges of the conduction and valence bands demonstrate substantial transformation of the shape of the energy diagram at changing the period of the lattices and the ratio of width of the adjacent layers. The most marked changes in the energy diagram take place when the period of lattice is comparable with the Debye's screening length. In the case when the lattice period is much smaller that the Debye's screening length the energy diagram has the shape of a saw-tooth pattern. Extrema of the coordinate profiles for the asymmetric lattices are located in the thicker layer while in the symmetric ones they are located at the interfaces [1, 2].

It has been analyzed the shape of the energy diagram for different types and concentrations of impurities.

1. *Savitskii V. G., Sokolovskii B. S.* Energy diagram of classical varigap superlattices // Semiconductors, 1994. – **28**, No 2. – P. 217–219.
2. *Sokolovskii B. S.* Multilayer structures based on doped graded-band-gap semiconductors: features of energy band diagram // Phys. Stat. Solidi (a)., 1997. – **163**, No 2. – P. 425–432.