

National Academy of Sciences of Ukraine

Institute for Information Recording of the NAS of Ukraine

Institute for Information Recording Uzhgorod laboratory of optoelectronics and photonics  
materials of the Institute for Information Recording of the NAS of Ukraine

Technical Center of the NAS of Ukraine

Uzhgorod National University

**INTERNATIONAL MEETING**

**CLUSTERS AND NANOSTRUCTURED  
MATERIALS  
(CNM-6)**

**Uzhgorod *Vodograj* Ukraine,  
5-9 October 2020**

**PROGRAM & MATERIALS  
OF THE MEETING**

**Uzhgorod  
2020**

УДК 536:669  
ББК 34

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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.

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## **PROGRAM**

MONDAY, 5<sup>TH</sup> OF OCTOBER, 2020

8<sup>00</sup> – 13<sup>00</sup> – registration of CNM'6 participants

13<sup>00</sup> – 14<sup>00</sup> – lunch

15<sup>00</sup> – 15<sup>15</sup> – Opening MEETING (official speakers)

#### PLENARY

Chairman: **Karbivskyy V.**

15<sup>15</sup> – 15<sup>55</sup> – **THERMAL TRANSPORT IN VAN DER WAALS CRYSTALS  
MM'P2(S,Se)6 (M - Cu, Ag; M' - In, Bi) WITH DIFFERENT DIPOLE  
ORDERING**

Liubachko V., Oleaga A., Salazar A., Glukhov K., Kohutych A.,  
Pogodin A., Vysochanskii Yu.

15<sup>55</sup> – 16<sup>30</sup> – coffee-break

16<sup>30</sup> – 17<sup>10</sup> – **PHOTORREFRACTIVE AND DIELECTRIC PARAMETERS OF  
DOUBLE-DOPED Sn<sub>2</sub>P<sub>2</sub>S<sub>6</sub> CRYSTALS**

M. Tsyhyka, S. Hasynets, A. Molnar, R. Pavlyshyn, K. Glukhov, A. Kohutych,  
A. Grabar

17<sup>10</sup> – 17<sup>50</sup> – **COMPUTER-INTEGRATED MODEL OF As-S ATOMIC CLUSTERS  
CONDENSATION**

Ivanitsky V.P., Kovtunenکو V.S., Ryaboschuk M.M.

17<sup>50</sup> – 18<sup>20</sup> – **LASER RECORDING OF NANOSIZED ELEMENTS ON THIN FILMS  
OF CHALCOGENIDE GLASSY SEMICONDUCTORS**

KryuchynA.A., Petrov V.V., Rubish V.M., Kostyukevych S.O.

18<sup>20</sup> – 18<sup>50</sup> – **INNOVATIVE NANOMATERIALS AND DEVELOPMENTS AT THE  
NATIONAL ACADEMY OF SCIENCES-USE AND OPPORTUNITIES  
FOR COMMERCIALIZATION**

Bespalov S.A., Malchevsky I. A., Uvarov V. N.

19<sup>00</sup> – 20<sup>00</sup> – dinner

TUESDAY, 6<sup>TH</sup> OF OCTOBER, 2020

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

**PLENARY**

Chairman: **Rubish V.**

9<sup>00</sup> – 9<sup>40</sup> – **MODEL CALCULATIONS OF THE COMPLEX CRYSTALS  
PHONON SPECTRUM DISPERSION**  
**Nebola I.I.**

**SECTION**

9<sup>40</sup> – 10<sup>00</sup> – **OPTICALLY ACTIVE COATING BASED ON CHALCOGENID  
GLASSES FOR MIDDLE IR RANGE PHOTODETECTORS**  
**Kabatsii V.M.**

10<sup>00</sup> – 10<sup>20</sup> – **GOLD NANOPARTICLES FOR BIOMEDICAL APPLICATION**  
**Mukha Iu.**, Vityuk N., Khodko A., Severynovska O., Eremenko A.

10<sup>20</sup> – 10<sup>50</sup> – coffee-break

**SECTION**

Chairman: **Nebola I.**

10<sup>00</sup> – 12<sup>20</sup> – **ON THE GROWTH AND PROPERTIES OF PURE AND Ag-DOPED  
ZnO NANOCOMPOSITES**  
**Ievtushenko A.**, Karpyna V., Shtepliuk I., Ericksson J., Yakimova R.,  
Khranovskyy V.

12<sup>20</sup> – 12<sup>40</sup> – **THE MORPHOLOGY, ELECTRONIC STRUCTURE, OPTICAL  
PROPERTIES AND CYTOTOXICITY OF Ag-DOPED ZnO  
NANOSTRUCTURES**  
**Ievtushenko A.**, Khyzhun O., Karpyna V., Bykov O., Zahornyi M., Dzhagan  
V., Yukhymchuk V., Valakh M., Zagorodnya S., Naumenko K.3, Zarembo P.,  
Khranovskyy V.

12<sup>40</sup> – 13<sup>00</sup> – **GLUCURONIC ACID-BASED HYDROGELS**  
**Dil K.V.**, Okovityy S.I., Kondratyuk N.V.

13<sup>00</sup> – 14<sup>00</sup> – lunch

**SECTION**

Chairman: **Barabash M.**

14<sup>00</sup> – 14<sup>20</sup> – **EPR STUDY OF MAGNETIC NANOPARTICLES ENSEMBLES  
PROMISING FOR BIOMEDICAL APPLICATIONS**  
**Konchits A.A.**, Shanina B.D., Krasnovyd S.V., Shevchenko Yu.B.,  
Petranovs'ka A.L., Rieznichenko L.S.

**14<sup>20</sup> – 14<sup>40</sup> – BINDING OF CALIX[4]ARENE TO THE A-KNOB OF FIBRIN: IN SILICO PROVES IN VITRO**

**Didkivkyi V.A.**, Hrabovskyi O.O., Humenyuk A.S., Selikhova A.I., Banya M.O., Cherenok S.O., Chernyshenko V.O.

**14<sup>40</sup> – 15<sup>00</sup> – OBTAINING TECHNOLOGY OF HYBRID NANOMATERIALS CARBON NANOTUBES - GRAPHENE NANOPARTICLES**

**Sementsov Yu.I.**, Ivanenko K.O., Grebelna Yu.V., Kartel M.T., Karachevtseva L.A., Makhno S.M., Zhuravskiy S.V., Wang Bo, Yang Weiyou

**15<sup>00</sup> – 15<sup>30</sup> – coffee-break**

## **SECTION**

Chairman: **Ivanitsky V.**

**15<sup>30</sup> – 15<sup>50</sup> – MANIFESTATION OF FERROELECTRIC PROPERTIES OF ALUMINUM-SUBSTITUTED NANOSIZED LITHIUM-IRON SPINELS**  
**Kaykan L.S.**, Sijo A.K., Mazurenko J.S., Ostapovych N.V.

**15<sup>50</sup> – 16<sup>10</sup> – INVESTIGATION OF THE MORPHOLOGY AND LUMINESCENCE PROPERTIES OF MG-DOPED ZnO NANOSTRUCTURES GROWN AT DIFFERENT SUBSTRATE TEMPERATURES**

**Myroniuk D. V.**, Karpyna V. A., Myroniuk L. A., Khranovskyy V. D., Ievtushenko A. I.

**16<sup>10</sup> – 16<sup>30</sup> – ULTRASONIC AND MAGNETIC-FIELD-ASSISTED ARRANGEMENT OF NANOSIZED CRYSTALLITES OF COBALT-CONTAINING LAYERED DOUBLE HYDROXIDES**

**Pashkevich Yu. G.**, Salak A. N., Vieira D. E. L., Lukienko I. M., Shapovalov Yu. O., Fedorchenko A. V., Fertman E. L., Babkin R. Yu., Shilin A. D., Rubanik V.V., Rubanik V. V. Jr., Ferreira M. G. S., Vieira J. M.

**16<sup>30</sup> – 18<sup>00</sup> – POSTER SECTION (DISCUSSION)**

**19<sup>00</sup> – 20<sup>00</sup> – dinner**



WEDNESDAY, 7<sup>TH</sup> OF OCTOBER, 2020

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

**PLENARY**

Chairman: **Rubish V.**

9<sup>00</sup> – 9<sup>40</sup> – **THE SPECIAL TECHNOLOGIES OF SYNTHESIZING MATERIALS WITH SPECIFIC PROPERTIES**  
**Zhiguts Yu.Yu.**

**SECTION**

Chairman: **Zhiguts Yu.**

9<sup>40</sup> – 10<sup>00</sup> – **NEW TECHNOLOGIES OF DIFFUSION SATURATION TITANIUM OF STEEL SURFACE**  
Zhiguts Yu.Yu., Krajnjaj I.I., **Karpovych V.A.**

10<sup>00</sup> – 10<sup>20</sup> – **RESEARCH OF TECHNOLOGIES FOR PRODUCING FUNCTIONAL COATINGS BY COMBINED METHODS OF SHS-ALLOYING SURFACES OF STEEL BY METALS**  
Zhiguts Yu.Yu., Segeda Yu.V., **Kasynetsj S.O.**

10<sup>20</sup> – 10<sup>40</sup> – **EQUIPMENT FOR PLASMA SPRAYING**  
Zhiguts Yu.Yu., Legeta Ya.P., **Strukov B.M.**

10<sup>40</sup> – 11<sup>10</sup> – coffee-break

**SECTION**

Chairman: **Zhiguts Yu.**

11<sup>10</sup> – 11<sup>30</sup> – **INTEGRATED DIFFUSION SATURATION OF THERMITE STEEL SURFACE BY POLYMERS**  
Zhiguts Yu.Yu., **Zub I.M.**

11<sup>30</sup> – 11<sup>50</sup> – **PONDEROMOTIVE FORCES AS A REASON FOR DESTRUCTION OF VIRUS INTERACTING WITH NANOPARTICLES**  
V. Lozovski, **N. Rusinchuk** and V. Lysenko

11<sup>50</sup> – 12<sup>10</sup> – **JOINT ADSORPTION OF METHANE AND WATER ON HYDROPHOBIC AND HYDROPHILIC SILICA ADSORBENTS**  
Turov V.V., Gun'ko V.M., **Krupska T.V.**

12<sup>10</sup> – 12<sup>30</sup> – **PHOTOCHEMICAL SYNTHESIS OF METAL-SEMICONDUCTOR COMPOSITES BASED ON CRYSTALLINE GRAPHITIC CARBON NITRIDE FOR PHOTOCATALYTIC HYDROGEN PRODUCTION**  
**Shvalagin V.V.**, Korzhak A.V., Kutsenko O.S., Kuchmiy S.Ya.

**12<sup>30</sup> – 12<sup>50</sup> – SERS SUBSTRATES BASED ON LATERALLY ORDERED GOLD NANOSTRUCTURES FOR DETECTING ORGANIC MOLECULES**  
**Hreshchuk O.M.**, Yukhymchuk V.O., Dzhagan V.M., Indutnyi I.Z.,  
Min'ko V.I., Lytvyn P.M., Danko V.A.

**13<sup>00</sup> – 14<sup>00</sup> – lunch**

**14<sup>00</sup> – 14<sup>20</sup> – METALLIC REPLICA OF THE NANOSTRUCTURED TEMPLATE SURFACE AS A TOOL FOR SMART TEXTILES**  
**Barabash M.Yu.**, Suprun N.P., Pozhilov-Nesmiyan G.M., Martynchuk V.E.,  
Kolesnichenko A.A., Rybov L.V., Litvin R.V.

**14<sup>20</sup> – 14<sup>40</sup> – FESEM STUDY OF SURFACE MORPHOLOGY OF ARRAYS OF NOBLE METALS NANOPARTICLES**  
**Makar L.I.**, Mudry S., Rubish V.M., Shtablavyi I., Yasinko T.I.

**14<sup>40</sup> – 15<sup>10</sup> – coffee-break**

**15<sup>10</sup> – 18<sup>00</sup> – POSTER SECTION (DISCUSSION)**

**19<sup>00</sup> – 20<sup>00</sup> – dinner**

THURSDAY, 8<sup>TH</sup> OF OCTOBER, 2020

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

**PLENARY**

Chairman: **Karbivskyy V.**

9<sup>00</sup> – 9<sup>40</sup> – **FORMATION OF Ag AND Au NANOPARTICLES ARRAYS AND SOME ASPECTS OF THEIR PRACTICAL USE**  
**Rubish V.M.**

9<sup>40</sup> – 10<sup>20</sup> – **ON THE LONGITUDINAL ELECTRO-SCALAR WAVE IN THE NANOSTRUCTURES, WAVE GUIDES AND MAXWELL ELECTRODYNAMICS**  
**Simulik V.M., Zajac T.M.**

10<sup>20</sup> – 10<sup>50</sup> – coffee-break

**SECTION**

Chairman: **Simulik V.**

10<sup>50</sup> – 11<sup>10</sup> – **MULTIPLE MECHANISMS OF HOLOGRAPHIC GARTING RECORDING IN POLYMER NANOCOMPOSITES WITH GOLD NANOPARTICLES**  
**S. Kokenyesi, I.Csarnovich, S.Molnar, A. Bonyar, D. Alkhalil, A.Burunkova**

11<sup>10</sup> – 11<sup>30</sup> – **THE POLARIZABILITY OF METAL NANOISLANDS ON A DIELECTRIC SUBSTRATE**  
**Korotun A.V., Titov I.M., Rubish V.M.**

11<sup>30</sup> – 11<sup>50</sup> – **INNOVATIVE NANOLAYER VACUUM ARC COATINGS FOR SURFACE HARDENING OF PRODUCTS THAT OPERATE IN DIFFICULT CONDITIONS**  
**Stolbovoy V.A., Andreev A.A., Voevodin V.N., Serdiuk I.V., Dolomanov A.V.**

11<sup>50</sup> – 12<sup>10</sup> – **THERMOMAGNETIC EFFECT IN NANOFILMS AND CAPILLARIES**  
**Shevchenko S.I., Konstantinov A.M.**

12<sup>10</sup> – 12<sup>30</sup> – **FORMATION OF THIN DRY DRAWN GRAPHITE FILMS AND PROPERTIES OF PHOTSENSITIVE GRAPHITE/n-InSe JUNCTIONS**  
Savitskii P.I., Kovalyuk M.Z., Tovarnitskii M.V., **Kovalyuk Z.D.**

12<sup>30</sup> – 12<sup>50</sup> – **SAPATIALLY MODULATED PHASES IN ANTIFERRODISTORTIVE MULTIFERROICS**  
Anna N. Morozovska, Eugene A. Eliseev, Deyang Chen, **Vladislav Shvetz**, Christopher T. Nelson, and Sergei V. Kalinin

13<sup>00</sup> – 14<sup>00</sup> – lunch

**SECTION**

 Chairman: **Zajac T.**

- 14<sup>00</sup> – 14<sup>20</sup> – OPTICAL CUBIC NONLINEARITY OF THIN FILMS OF PALLADIUM OXIDE: VALUE, DYNAMICS AND NATURE**  
**V. Liakhovetskyi, A. Brodin, V. Rudenko, M. Brodyn, V. Styopkin**
- 14<sup>20</sup> – 14<sup>40</sup> – MANIFESTATION OF FERROELECTRIC PROPERTIES OF ALUMINUM-SUBSTITUTED NANOSIZED LITHIUM-IRON SPINELS**  
**Kaykan L.S., Sijo A.K., Mazurenko J.S., Ostapovych N.V.**
- 14<sup>40</sup> – 15<sup>00</sup> – SYNTHESIS AND CHARACTERIZATIONS OF COLLOIDAL Ag<sub>2</sub>ZnSnS<sub>4</sub> AND Cu<sub>2</sub>ZnSnS<sub>4</sub> NANOCRYSTAL THIN FILMS DEPOSITED BY SPIN-COATING**  
**Mazur N.V., Dzhagan V.M., Havrylyuk Ye.O., Valakh M.Ya., Kapush O.A., Hreshchuk O.M., Yukhymchuk V.O.**
- 15<sup>00</sup> – 15<sup>20</sup> – THE MECHANISMS AND DYNAMICS OF ANTIOXIDANT ACTION OF NANOCERIA AND CERIA-BASED NANOPARTICLES**  
**Vladyslav Seminko, Pavel Maksimchuk, Ganna Grygorova, Elena Okrushko, Yuri Malyukin**
- 15<sup>20</sup> – 15<sup>50</sup> – coffee-break**

**SECTION**

 Chairman: **Ivanitsky V.**

- 15<sup>50</sup> – 16<sup>10</sup> – ELECTRICAL PROPERTIES OF MERCURY MODIFIED AMORPHOUS SELENIUM**  
**Kyrylenko V.K., Rubish V.M., Nykyruy L., Pisak R.P., Durkot M.O., Zapukhlyak Z.R., Fedelech V., Uvarov V.N.**
- 16<sup>10</sup> – 16<sup>30</sup> – AMORPHOUS CHALCOGENIDES WITH PHASE-CHANGE EFFECT**  
**Durkot M.O., Kyrylenko V.K., Kryuchyn A.A., Petrov V.V., Pop M.M., Rubish V.M., Yurkin I.M.**
- 16<sup>30</sup> – 18<sup>00</sup> – POSTER SECTION (DISCUSSION)**
- 19<sup>00</sup> – 20<sup>00</sup> – dinner**

FRIDAY, 9<sup>TH</sup> OF OCTOBER, 2020

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

Satellite conference **ACCELERATE**

Invited lectures:

Chairman **V. Rizak**

9<sup>00</sup> **Grand opening of the ACCELERATE Satellite Session**

9<sup>30</sup> Vladimir Matolin, Salma Baghdadi, Natalia Popovych, Vitalii Bilanych, Oleksandr Chobal, Vasyl Rizak

**The outpost CERIC-ERIC in Ukraine: Current State and Prospects**

10<sup>00</sup> Matúš Orendáč, Slavomír Gabáni, Pavol Farkašovský, Emil Gažo, Jozef Kačmarčík, Gabriel Pristáš, Konrad Siemensemeyer, Natalya Shitsevalova, and Karol Flachbart  
**Magnetic phases in two-dimensional geometrically frustrated Shastry-Sutherland system TmB<sub>4</sub>**

10<sup>30</sup> Vladimir Matolin, Natalia Tsudi, Natalia Popovych, Vasyl Rizak  
**Investigating the short range order of chalcogenide amorphous materials by photoelectron spectroscopy**

11<sup>00</sup> Leonid Dubrovinsky, Iryna Chobal, Anna Pakhomova, Oleksandr Chobal, Aleksandr Kurnosov, Volodymyr Adamiv, Vasyl Rizak  
**Structural, mechanical and thermodynamic properties of lithium potassium tetraborate crystals under high pressure: DFT calculations and synchrotron radiation X-ray diffraction**

11<sup>30</sup> M. Vorokhta, L. Piliai, I. Khalakhan, D. Tomeček, P. Fitl, M. Vršata, J. Lančok, I. Matolínová,  
V. Matolín  
**Near ambient pressure XPS for in operando study of gas sensors**

12<sup>00</sup> Bih.L., Guranich P.P., Mykaylo O.A., Pisak R.P., Rizak I.M., Rubish V.M., Solomon A.M., Tsiple M.  
**Structure and properties of chalcogenide glasses and composites on their basis**

12<sup>30</sup> Elouadi B., Barj M., Gasinets S.M., Guranich P.P., Makar L.I., Mykaylo O.A., Pop M.M., Rizak I.M., Rubish V.M., Solomon A.M.  
**Nanocomposites with ferroelectric properties in As(Ge)-Sb-S(Se)-I system**

13<sup>00</sup> -14<sup>30</sup> Dinner

Chairman **V. Rubish**

- 14<sup>30</sup> Latyshev V., Kozejova M., Vorobiov S., Shylenko O., You. H., Komanicky V.  
**Non-precious metal catalyst systems prepared by magnetron sputtering for hydrogen evolution reaction**
- 15<sup>00</sup> Kostyuk O.B., Głowa Ł., Naidych B.P., Tsymbalyuk T.P., Mezhylovska L.Y., Nykyruy L.I.  
**Analysis of the Growth and Crystal Structure for Pb<sub>0.9</sub>Cd<sub>0.1</sub>Te:Pb Thin Films**
- 15<sup>30</sup> Lofaj F., Shilenko O., Bilanych V.S., Bilanych B.V., Komanicky V., Feher A., Rizak V.M.  
**Investigation of laser induced effects in As-Se glasses and films based on them by nano- and microindentation methods**
- 16<sup>00</sup> Korposh S. O., Trikur I. I., Sichka M.Y., Tsoma I. Y., Rizak V. M.  
**Bacteriorhodopsin as a biological material for optical recording, processing and security information.**
- 16<sup>30</sup> Zapukhlyak Z.R., Rubish V.M., Wisz G., Yavorskyi R.S., Nykyruy L.I.  
**SCAPS simulation of ZnO/CdS/CdTe/CuO heterostructure for photovoltaic application**
- 17<sup>00</sup> Csach K., Bilanych V.S., Jurikova A., Miskuf J., Bilanych V.V., Rizak V.M.  
**Studies of As-Se glasses and films based on them by differential scanning calorimetry**
- 17<sup>30</sup> Popovych N., Gažova Z., Rizak V.M.  
**Application of the photoelectron spectroscopy to study the organic materials properties: adenine molecules and amyloid fibers**
- 18<sup>00</sup> Discussion of invited lectures and closing ceremony of the ACCELERATE Satellite Session
- 18<sup>20</sup> Closing MEETING

## POSTERS

### **EFFECT OF Se-CONTENT DOPING ON ELECTRONIC, DYNAMICAL AND MECHANICAL PROPERTIES OF $\text{TiInS}_2$ LAYERED CRYSTAL**

T. BABUKA, O.O. GOMONNAI, K.E. GLUKHOV, L.YU. KHARKHALIS, A.V. GOMONNAI, D.R.T. ZAHN, M. MAKOWSKA-JANUSIK

### **DEVELOPMENT OF HIGH-EFFICIENT SOLAR CELLS WITH PYRAZOLINE LUMINOPHOR COATING LAYER**

IE.V. BELIAK, D.YU. MANKO

### **MIXING AND SELF-ORGANIZATION OF THE STRUCTURE OF MATERIALS UNDER SEVERE PLASTIC DEFORMATION**

BEYGELZIMER Y., KULAGIN R., DAVYDENKO O., DMITRENKO V.

### **ELECTROCHEMICAL SYNTHESIS OF NANOCRYSTALLINE Mo-RICH SUPERALLOYS**

BERSIROVA O.L., KUBLANOVSKY V. S.

### **INDENTATION SIZE EFFECTS AND MECHANICAL PROPERTIES OF SUPERIONIC MIXED CRYSTALS WITH ISOVALENT CATION SUBSTITUTION**

BILANYCH V.S., SKUBENYCH K.V., BABILYA M.I., POGODIN A.I., STUDENYAK I.P.

### **ELECTRONIC STRUCTURE OF $\text{Na}_2\text{GeSe}_3$ CRYSTALS**

BLETSKAN D.I., VAKULCHAK V.V., STUDENYAK I.P.

### **THIN FILMS OF SAMARIUM VANADATE NANOPARTICLES FOR ENHANCED LIGHT HARVESTING OF NEAR UV AND VISIBLE LIGHT**

CHUKOVA O.V., DOROFEEVA A.I., NEDILKO S.A., NEDILKO S.G., VOITENKO T.A., PASZKOWICZ W., RAHIMI MOSAFER H.S., MANOUSAKI M., SAVVA K., STRATAKIS E.I.

### **PROXIMITY-INDUCED TRIPLET SUPERCONDUCTIVITY IN $\text{Bi}_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{6+x}:\text{La}_{2/3}\text{Sr}_{1/3}\text{MnO}_3$ NANOCOMPOSITES**

DMITRENKO V.YU., KRIVORUCHKO V.N., TARENKOV V.YU.

### **SURFACE MORPHOLOGY AND OPTICAL CHARACTERISTICS OF ARRAYS OF RANDOMLY DISTRIBUTED GOLD NANOPARTICLES**

DURKOT M.O., KYRYLENKO V.K., TARNAJ A.A., VLAYKOV G.G., KREMENTITSKY V.V., NOVICHENKO V.M.

### **DIELECTRIC PROPERTIES OF $\text{Cs}_2\text{Ag}_2\text{P}_2\text{Se}_6$ CRYSTALS**

MOLNAR A., GAL D., BAN H., HAYSAK A.

### **THERMOKINETICS OF FORMATION AND OXIDATION OF CARBON NANOFORMS**

GARBUZ V.V., SILINSKA T.A., KUZMENKO L.M., PETROVA V.A.

### **FIRST PRINCIPLES STUDY OF FERROELECTRIC AND ANTIFERROMAGNETIC STATES IN MIXED $\text{M}_1\text{M}_2\text{P}_2\text{S}(\text{Se})_6$ CRYSTALS**

GLUKHOV K.E., BABUKA T.YA., KHARKHALIS L.YU., VYSOCHANSKII YU.M.

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**I.M. SHKYRTA**, I.I. NEBOLA

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## **AUTOMATATION OF FIBER OPTIC THERMOMETERS WITH GaAs NANOPOWDERS AS TEMPERATURE SENSITIVE ELEMENTS**

TURIANYTSIA I.I., CHYCHURA I.I. KUTCHAK S.V.

## **PROBIOTIC LACTOBACTERIA FOR CREATION OF SELENIUM CONTAINING DIETARY SUPPLEMENT**

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## **CALIX[4]ARENE C-956 INHIBITORY ACTION KINETIC ON PLASMA MEMBRANE $Ca^{2+}$ , $Mg^{2+}$ -ATPASE ACTIVITY OF SMOOTH MUSCLE CELL**

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## **OPTICAL PROPERTIES OF $As_2S_3$ - $Bi_2S_3$ NANOCRYSTALLINE COMPOSITE**

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**RAMAN SPECTROSCOPIC STUDY OF NANO-SIZED AMORPHOUS LAYERS OF SELENIUM AND PLASMON STRUCTURES “Au NPS/ Se FILM”**

**YASINKO T.I., YUKHYMCHUK V.O., RUBISH V.M., MINKOVICH V.V., MIKLA V.I., MAKAR L.I., HRESHCHUK O.M., HORVAT A.A.**

**SURFACE NANOSCALE STRUCTURE OF SUPERCONDUCTING FILMS PROBED BY JUNCTION SPECTROSCOPY**

**ZHITLUKHINA E.S.**

**SOME APPLICATIONS OF NANOSTRUCTURED MATERIALS AS INTERMEDIATE LAYER FOR RESISTANCE BUTT WELDING OF HIGH TEMPERATURE ALLOYS**

**ZIAKHOR I.V., KUCHUCK-YATSENKO S.I., ZAVERTANNYI M.S., NAKONECHNYI A.O., RADCHENKO L.M.**

**VACUUM DIFFUSION WELDING OF HIGH NB CONTAINING TIAL ALLOY WITH NI-BASED ALLOY**

**PETRUSHYNETS L.V., FALCHENKO I.U.V., ZIAKHOR I.V., FEDORCHUK V.E., NAKONECHNYI A.O.**

## STRUCTURE AND PROPERTIES OF CHALCOHALODENIDE GLASSES AND COMPOSITIES ON THEIR BASIS

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The possibility of practical application attracts the interest to the chalciodide glasses on the basis of ferroelectric-semiconductor SbSI (antimony sulphoiodide). In the structural network of such materials under certain heat treatment conditions, it is possible to form crystalline SbSI inclusions of different dimensions and, accordingly, to create nano- and microcomposites with ferroelectric properties.

It is known that the structure and properties of non-crystalline materials can be changed by varying the regimes of synthesis and subsequent heat treatment.

In the present report the results of investigation of technological conditions influence (different regimes of synthesis – homogenization temperature of the melt and melt cooling rates; different regimes of heat treatment – annealing (low and high) temperature and annealing time) on structure, thermal and dielectric properties of glasses and composites in As<sub>2</sub>S<sub>3</sub>-SbSI, As<sub>2</sub>Se<sub>3</sub>-SbSI and GeS<sub>2</sub>-SbSI systems.

Chalcogenide glasses were prepared using the vacuum melting method. Cooling the melts was carried out in the air and into cold water.

By the DTA method at heating rates 3, 6, 9 and 10 K/min the temperatures of heat effects  $T_g$ ,  $T_c$  (glassforming and crystallization ( $n=1-3$ ) temperatures, respectively) of glasses were determined.

The structure and dielectric properties ( $\epsilon$  and  $\tan\delta$ ) of as-prepared and annealed glasses was studied by the methods of X-ray diffraction, Raman and dielectric spectroscopy.

It was established that the crystallization of studied chalciodide glasses is accompanied by anomalies on the temperature dependences of dielectric characteristics. The structure of the phase that arises in the glassy network at low temperature annealing corresponds to the structure of the SbSI crystal. A mechanism of nanocrystalline inclusions formation in structural network of chalciodide glasses has been suggested. In the course of cooling the melts from lower homogenization temperatures and accordingly, at lower cooling rates, the presence of SbSI nanocrystals in the glassy matrix was detected.

It has been established that the sizes of SbSI crystalline inclusions increase with annealing temperature and time. The nature of crystalline inclusions, which are formed in the structural network in conditions of high-temperature annealing, is determined.

The influence of annealing conditions on the structure and dielectric properties of chalciodide ferroelectric composites are discussed.