

Ministry of Education and Science of Ukraine

**Journal  
of Nano- and Electronic Physics**

**Volume 5, No4, Part 1 2013**

*Founded in 1994*

*Sumy  
Sumy State University*

Journal publishes papers, which contain new theoretical and experimental results in the field of physical and mathematical sciences, prepared by teaching staff, postgraduate students, and specialists of the Sumy State University and other institutes of higher education, and by scientists and specialists of other scientific institutions as well. For lecturers of institutes of higher education, scientists, and postgraduate students.

**ISSN 2077-6772**

Address of the editorial office: 2, Rimsky-Korsakov Str., 40007 Sumy

Tel.: + 38 066 93 79 149

E-mail: [lyuty@oeph.sumdu.edu.ua](mailto:lyuty@oeph.sumdu.edu.ua)

Web-site: <http://jnep.sumdu.edu.ua>

Registration certificate  
*KB No 15451-4023 IIP*  
*22.06.2009*

The journal was registered by Presidium of the  
Higher Certifying Commission of Ukraine (*de-*  
*cision No1-05/1 from 10.02.2010*) as the scien-  
tific edition in physics

© Sumy State University, 2013

**EDITORIAL BOARD**

***Editor-in-chief***

Protsenko I.Yu., Dr. Phys.-Math. Sci. (Sumy State University, Ukraine)

***Consulting Editor***

Vorobjov G.S., Dr. Phys.-Math. Sci. (Sumy State University, Ukraine)

***Managing Editor***

Lyutyi T.V., Cand. Phys.-Math. Sci. (Sumy State University, Ukraine)

***Members of the editorial board***

Nepijko S.A., Dr. Sci. (Johannes Gutenberg Universität, Mainz, Germany)

Panchal C.J., Ph.D. (The Maharaja Sayajirao University of Baroda, Vadodara, India)

Chornous A.M., Dr. Phys.-Math. Sci. (Sumy State University, Ukraine)

Protsenko S.I., Dr. Phys.-Math. Sci. (Sumy State University, Ukraine)

Odnodvoretz L.V., Cand. Phys.-Math. Sci. (Sumy State University, Ukraine)

Denisova E.S., Cand. Phys.-Math. Sci. (Sumy State University, Ukraine)

**ADVISORY BOARD**

Azarenkov M.O. Academician of NASU, Dr. Phys.-Math. Sci. (V.N. Karazin Kharkiv National University, Ukraine)

Andrievskii, R. A., Dr. Phys.-Math. Sci. (Institute of Problems of Chemical Physics, Russian Academy of Sciences, Russian Federation)

Denisov S.I., Dr. Phys.-Math. Sci. (Sumy State University, Ukraine)

Majková, Eva (Institute of Physics Slovak Academy of Sciences, Bratislava, Slovakia)

Kondratenko P.O., (National Avia University, Kyiv, Ukraine)

Lopatkin Yu.M., (Sumy State University, Ukraine)

Zhukovski P.V., Dr. Sci. (Politechnika Lubelska, Lublin, Poland)

Tatarenko V.A. Dr. Phys.-Math. Sci. (Institute of Metallophysics NAS of Ukraine, Kyiv, Ukraine)

Freik D.M., Dr. Chem. Sci. (Stefanyk Precarpathian National University, Ivano-Frankiv'sk, Ukraine)

Stanishevsky, A.V., Dr. Sci. (University of Alabama at Birmingham, Birmingham, USA)

Opanasyuk A.S., Dr. Phys.-Math. Sci. (Sumy State University, Ukraine)

Ievlev V.M., Academician of RAS, Dr. Phys.-Math. Sci. (Voronezh State University, Russian Federation)

Verma K.D., Ph.D. (S.V. College, Aligarh, India)

Komarov F.F., Cor. Member of ASB, Dr. Phys.-Math. Sci. (Belarusian State University, Minsk, Belarus)

Pogrebnyak A.D., Dr. Phys.-Math. Sci. (Sumy State University, Ukraine)

Rozhitskiy N.N., Dr. Phys.-Math. Sci. (Kharkiv National University of Radioelectronics, Ukraine)

Khomenko O.V., Dr. Phys.-Math. Sci. (Sumy State University, Ukraine)

Tsyvk O.I., Dr. Phys.-Math. Sci. (IRE of NASU, Kharkiv, Ukraine)

Musil J., Dr. Sci. (University of West Bohemia, Plzen, Czech Republic)

Kunyts'ky Yu.A., Dr. Phys.-Math. Sci. (Taras Shevchenko National University of Kyiv, Ukraine)

Chaudhry A., Ph.D. (Panjab University, Chandigarh, India)



## CONTENT

2013, Volume 5, No4 Part 1

- Emelyanov V.M., Dobrovolskaya T.A., Danilova S.A., Emelyanov V.V., Butov K.V., Orlov E.J.**, The Control of Gold Nanoparticles on Polyester Fibers by Raman Spectrograms in Conditions of Information Uncertainty with Detection Accuracy ..... 04001(6)
- Morchenko A.T., Panina L.V., Kostishin V.G., Yudanov N.A., Kurochka S.P., Sergienko A.A., Piliposyan R.D., Krupa N.N.**, Magneto-Ellipsometry Investigations of Multilayer Nanofilms of Fe and Co ..... 04002(4)
- Panina L.V., Morchenko A.T., Kozhitov L.V., Ryapolov P.A.**, Effective Impedance Method for *In situ* Ellipsometry Analysis of Magnetic Films ..... 04003(4)
- Yudanov N.A., Panina L.V., Morchenko A.T., Kostishyn V.G., Ryapolov P.A.**, High Sensitivity Magnetic Sensors Based on Off-diagonal Magnetoimpedance in Amorphous FeCoSiB Wires ..... 04004(4)
- Samsonov V.M., Sdobnyakov N.Yu., Bembel A.G., Sokolov D.N., Novozhilov N.V.**, Size Dependence of the Melting Temperature of Metallic Films: Two Possible Scenarios ..... 04005(3)
- Postnikov E., Storozhenko A.**, Practical Simulation of Magnetic Field of Permanent Magnets System to Explore Size of Magnetic Nanoparticles ..... 04006(4)
- Kozhitov L.V., Muratov D.G., Yakushko E.V., Kozhitov S.L., Savchenko A.G., Shchetinin I.V., Emelyanov S.G., Chervjakov L.M.**, The Synthesis of Metalcarbon Nanocomposite Ni / C on the Basis of Polyacrylonitrile ..... 04007(4)
- Kozhitov L.V., Kuzmenko A.P., Kozhitov S.L., Muratov D.G., Harseev V.A., Rodionov V.V., Popkova A.V., Matveev K.E., Yakushko E.V.**, Influence of the Ratio of Metal Composed Nanocomposites Fe-Co / C on Phase Composition ..... 04008(3)
- Kirichek A.V., Soloviyev D.L.**, Nanostructure Changes in Iron-Carbon Alloys as a Result of Impulse Deformation Wave Action ..... 04009(4)
- Kirichek A., Soloviev D.**, Properties and Technology for Quasi-Composite Blanket Using Natural Reinforcement of the Metal by Strain Affected Areas ..... 04010(5)
- Bashtovoi V.G., Pogirnitskaya S.G., Kuzhir R., Polunin V.M., Ryapolov P.A., Shabanova I.A., Storozhenko A.M.**, Influence of Mass Transfer Processes on Couette Flow of Magnetic Fluid ..... 04011(3)
- Bashtovoi V., Klimovich S., Motsar A., Reks A., Ryapolov P., Storozhenko A., Shabanova I.**, Statics of Magnetic Fluid Drop with Compound Magnetic Core in a Wedge-Shaped Channel ..... 04012(4)
- Kochura A.V., Ivanenko S.V., Lashkul A., Kochura E.P., Marenkin S.F., Fedorchenko I.V., Kuzmenko A.P., Lahderanta E.**, Magnetic Properties of  $A^{II}B^{IV}CV_2$  Compounds Doped with Mn ..... 04013(4)
- Boev M.L., Polunin V.M., Lobova O.V., Shabanova I.A., Chervjakov L.M., Ryapolov A.N.**, Fluctuations of the Solitary Bubble at the Separation from the Air Cavity, Compressed by the Magnetic Field in Magnetic Liquid ..... 04014(5)

<b>Kochura A.V., Aronzon B.A., Alam M.<sup>1</sup>, Lashkul A., Marenkin S.F., Shakhov M.A., Kochura E.P., Lahderanta E.,</b> Magnetoresistance and Anomalous Hall Effect of InSb Doped with Mn .....	04015(6)
<b>Morozov A.V., Alekseev V.P., Naumov V.A., Morozov V.V.,</b> The Study of Anisotropy and Domain Condition of Permalloy Thin Films .....	04016(4)
<b>Demydenko M.H., Kuzmenko A.P., Protsenko S.I. Fedchenko O.V.,</b> Correlation Between Phase-Structural State and Magnetic Characteristics of Spin-Valve Systems Based on Fe, Co and Au .....	04017(6)
<b>Maslobrod S.N., Mirgorod Yu.A., Borodina V.G., Borsch N.A.,</b> Stimulation of Seed Viability by Means of Dispersed Solutions of Copper and Silver Nanoparticles.....	04018(3)
<b>Kuzmenko A.P., Chakov V.V., Chan Nyein Aung, Dobromyslov M.B.,</b> Mechanisms of Fractal Formation in Colloidal Carbon-Bearing Natural System .....	04019(3)
<b>Kozhitov L.V., V'et N.Ch., Kozlov V.V., Emelyanov S.G.,</b> The Structure and Content Peculiarities of Carbon Material Obtained under the Polyacrylonitrile Infra-red Heating .....	04020(3)
<b>Kobeleva S.P., Anfimov I.M., Yurchuk S.Y., Turutin A.V.,</b> Some Aspects of Phosphorus Diffusion in Germanium in In <sub>0,01</sub> Ga <sub>0,99</sub> As / In <sub>0,56</sub> Ga <sub>0,44</sub> P / Ge Heterostructures .....	04021(3)
<b>Kosushkin V.G., Kozhitov S.L.,</b> "The Thermal Wave" in Technology of Crystal Growth from the Melt .....	04022(2)
<b>Emelyanov S., Kuzmenko A., Rodionov V., Dobromyslov M.,</b> Mechanisms of Microwave Absorption in Carbon Compounds from Shungite .....	04023(3)
<b>Kuzmenko A., Sizov A., Yacovlev O., Emelianov N.,</b> Formation of Spherical Nanoparticles BaTiO <sub>3</sub> by Peroxide Method .....	04024(2)
<b>Kuzmenko A.P., Chekadanov A.S., Zakhvalinsky S.V., Pilyuk E.A., Dobromyslov M.B.,</b> Features of Structure of Magnetron Films Si <sub>3</sub> N <sub>4</sub> and SiC .....	04025(3)
<b>Kuzmenko A., Grechushnikov E., Kharseev V., Dobromyslov M.,</b> Kinetic Characteristics, Phase and Structural Changes in Electrical Materials and Devices .....	04026(3)
<b>Emelyanov S.G., Polunin V.M., Tantsyura A.O., Storozhenko A.M., Ryapolov P.A.,</b> From the Dynamic Demagnetizing Factor to the Heat Capacity of a Nanodispersed Magnetic Fluid .....	04027(3)
<b>Bashtovoi V., Reks A., Klimovich S., Motsar A., Ryapolov P., Storozhenko A., Shabanova I.,</b> Influence of Brownian Diffusion on Levitation of Bodies in Magnetic Fluid .....	04028(3)
<b>Zakhvalinskii V.S., Borisenko L.V., Aleynikov A.J., Piljuk E.A., Goncharov I., Taran S.V.,</b> Diode Based on Amorphous SiC .....	04029(3)
<b>Zhakin A.I., Kuz'ko A.E., Kuz'ko A.V., Abakumov P.V.,</b> Influence of Electroconvection on Nano- and on Microstructural Relief of the Electrodes Surface .....	04030(3)
<b>Laptinskiy K.A., Burikov S.A., Laptinskaya T.V., Rosenholm J., Shenderova O.A., Vlasov I.I., Dolenko T.A.,</b> Mechanisms of Ions Adsorption by Nanodiamonds in Aqueous Suspensions .....	04031(3)

<b>Larin S.L., Orlov E.Y., Borsch N.A., Gorbacheva L.A., Budko E.V., Khabarov A.A.</b> , Synthesis and Identification of Zinc Oxide Nanoparticles as Precursor for Getting Zinc-Based Biologically Active Additives .....	04032(2)
<b>Mirgorod Yu.A., Fedosyuk V.M., Borsch N.A.</b> , Physico-Chemical Properties of Nanoparticles Functionalized by Polypyrrole .....	04033(3)
<b>Neruchev Yu.A., Korotkovskiy V.I.</b> , Method of Measurement Isobaric Heat Capacity of the Organic Liquid .....	04034(3)
<b>Kuzmenko A.P., Chuhaeva I.V., Dobromyslov M.B.</b> , Features in Formation and Properties of Langmuir-Blodgett Monolayers .....	04035(2)
<b>Kurochka A., Sergienko A., Kurochka S., Kolybelkin V., Emelyanov S.G., Yakushko E.V., Chervjakov L.M.</b> , Features of Ion-Electronic Emission from Surface of Semiconductors .....	04036(3)
<b>Arefyev I.M., Arefyeva T.A., Kazakov Yu.B.</b> , Colloidal Stability and Thermal Stability of Magnetic Fluids .....	04037(3)
<b>Ageeva E.V., Ageev E.V., Osminina A.S.</b> , Properties And Characterizations Of Powders Produced From Waste Carbides .....	04038(2)
<b>Kuzmenko A.P., Abakumov P.V., Roslyakova L.I., Dobromyslov M.B.</b> , Interrelation of Shape and Structure of Domain Walls with Magnetic Inhomogeneities .....	04039(2)
<b>Emelyanov S.G., Kuz'ko A.E., Kuz'ko A.V., Kuzmenko A.P., Timakov D.I.</b> , Opportunities of AFM in the Description of Charge Formation from the Nanostructured Electrode at Electroconvection .....	04040(3)
<b>Kiselev D.A., Ksenich S.V., Zhukov R.N., Bykov A.S., Malinkovich M.D., Shvartsman V.V., Lupascu D.C., Parkhomenko Yu.N.</b> , Piezoelectric Characteristics of LiNbO <sub>3</sub> Thin-film Heterostructures via Piezoresponse Force Microscopy .....	04041(3)
<b>Kovarda V.V.</b> , Fundamental Research of Physics of Magnetic Nanodispersed Fluids as Hardware Dampers .....	04042(2)
<b>Kuzmenko A.P., Zhukov E.A., Kaminsky A.V., Zhukova V.I., Adamova M.E.</b> , Method for the Determination of Magnetoelastic and Elastic Constants of Weak Ferromagnets .....	04043(3)
<b>Melnikov G.A., Ignatenko N.M., Melnikov V.G.</b> , Some Abnormal Properties of Water in the Cluster Model .....	04044(2)
<b>Kuzmenko A., Kuzko A., Timakov D., Dobromyslov M.</b> , Atomic Force Analysis of Elastic Deformations of CD .....	04045(3)
<b>Kovarda V.V., Yevglevskaya T.A., Shevyakin A.S., Kuznetsova O.I.</b> , Importance of Nanotechnologies in Supply of Sustainable Social Economic Development in Russia .....	04046(2)
Information for authors .....	I-1

## INFORMATION FOR AUTHORS

**Journal of Nano- and Electronic Physics** publishes papers, which have not been previously published and are not submitted for publication elsewhere, and which contain the original results of the experimental and theoretical investigations in the field of condensed matter physics, physical electronics, and investigations aimed at the development of mathematical methods of the processes and phenomena description in the specified fields as well.

### Journal research area:

- physical properties of film and nanostructured materials;
- physics of nanosized objects;
- development of experimental investigation techniques in physics of condensed matter;
- description methods of dynamical systems and nonequilibrium processes;
- generation and propagation of microwave electromagnetic and optical radiation;
- electron and ion beam physics.

Papers should be submitted in one of three languages: Ukrainian, English, or Russian.

Journal of Nano- and Electronic Physics is the peer-reviewed journal. In the case of inadequacy of manuscript preparation to the stated below requirements they will be returned back to authors for their improvement. In this case the day of manuscript re-submission prepared by the rules is considered as the date of the submission.

### General Requirements to the Article's Manuscript

1. Text of the manuscript should be logically bracketed, clearly expressed, and have a corresponding structure. Scientific style is required. Introduction should be brief but characterize the current state of a problem and motivate relevance of the author's search. Obtained results and investigation methods should be explained and analyzed in the main sections of the manuscript. All numerical data should be presented in conventional units. Conclusions should be sound and contain comparison of the obtained results with equivalents, recommendations about the applications, etc. Abstract and conclusions should not duplicate each other.

2. Manuscript size: a) more than 12 pages for topical reviews; b) 5-10 pages for conventional problem-solution articles; c) 3 pages for research notes.

3. For authors from Ukraine, if one of the official languages has chosen, authors should specify the manuscript title, names of authors, affiliations, abstract and keywords (so-called metadata) in the same format in two other languages after the body text before references. If no one author belongs to any Ukraine institutions, the Ukrainian metadata is not mandatory. If no one author belongs to any institutions of any CIS Countries, the Russian meta-data is also optional.

4. The paper first line should contain index by the Physics and Astronomy Classification Scheme (PACS) that specifies the object of the investigation. The full list of PACS numbers is accessible for download in the Journal [web-site](#).

### Text format requirements to manuscript

The manuscript should be typed using the word processor MS Word, the part of the office suite MS Office of any version. For the manuscript preparation, please, use the Journal template and follow all the requirements. MS Word template is accessible for download in the Journal web-site (download the template). All the necessary formatting is embedded in the template. Manuscript's text should be typed instead of the text given in the template as an example. Any consultations about the template may be got if send the corresponding inquiry to the Journal e-mail address. For simplification of the Journal issue preparation, submitted manuscripts should be designed using the above-mentioned template only. To start the manuscript preparation you should download the last version of the template.

### Article's manuscript submission

The Editors of the Journal of Nano- and Electronic Physics appreciate the authors and their time. Therefore, submission procedure is very simple and the number of related documents is minimal. If you have an article manuscript prepared in accordance with the requirements stated above, you need only

1. To upload the manuscript file through the easy-to-use submission [web interface](#) of the Journal web-site. To access this service you have to register and authorize on the web-site.

2. Along with the text of the manuscript to download photocopy (scan) of the completed and signed Assignment of Copyright Form. This Form can be downloaded from the web-site of the Journal.

Other documentation, as well as printed copies of the manuscript, *is not required* by the Editorial Board.

**Editorial Office Address:** 2, Rimsky-Korsakov Str.,  
40007 Sumy, Ukraine  
Sumy State University,

**Editor-in-chief** Protsenko Ivan Yuhymovych  
**Telephone:** + 380 542 335 612  
**E-mail:** [protsenko@aph.sumdu.edu.ua](mailto:protsenko@aph.sumdu.edu.ua)

**Executive secretary** Lyutyy Taras Volodymyrovych  
**Telephone:** + 380 66 93 79 149  
**E-mail:** [lyutyy@oeph.sumdu.edu.ua](mailto:lyutyy@oeph.sumdu.edu.ua)

**Web-site:** <http://jnep.sumdu.edu.ua/>

## ASSIGNMENT OF COPYRIGHT FORM

The undersigned authors\* of article manuscript titled \_\_\_\_\_

on acceptance for publication hereby transfer to the Editorial board and Founders of the Journal of Nano- and Electronic Physics non-exclusive licence for the full term of copyright for

1. Publication of this article and distribution of printed copies.
2. Distribution of electronic copies for all electronic media and formats (posting on the Journal's official web-site, any e-print services and electronic databases or repositories).

While, we keep the rights without Editorial board and Founders of the Journal of Nano- and Electronic Physics authorization to:

1. Make copies of the Article (all or part) for teaching purposes.
2. Include the Article (all or part) in a research thesis or dissertation.
3. Make oral presentation of the Article (all or part) and to include a summary and/or highlights of it in papers distributed at such presentations or in conference proceedings.
4. Include electronic copies of the Article (including final published Journal format) on:
  - a. personal authors' web-resources (web-sites, web-pages, blogs, etc.);
  - b. web-resources of the Institutions (including their repositories) where Authors worked when research for the Article was carried out;
  - c. **noncommercial** web-resources of **open** access (arXiv.org, and etc.).

In all cases the appropriate bibliographic citation or URL on the official Journal web-site **must** be included.

The undersigned guarantee that the submitted manuscript

1. Does not infringe upon a copyright of any third party.
2. Was not published in any other journals and has not been submitted for consideration to any other journals.

\_\_\_\_\_  
signature

\_\_\_\_\_  
author's name

\_\_\_\_\_  
status, occupation

\_\_\_\_\_  
address of working place

\_\_\_\_\_  
address of working place

\_\_\_\_\_  
address of working place

\_\_\_\_\_  
date

\*Signature of the first author only on behalf of all authors is permitted

Scientific edition

*Journal of Nano- and Electronic Physics*

Scientific journal

Computer design:

T.V. Lyutyi, Yu.M. Shabelnyk

---

Підписано до друку 26.09.2013. Формат 70 × 100/16.

Папір офс. Друк офс.

Ум. друк. арк. 9,65. Обл.-вид. арк. 9,28.

Наклад 100 пр. Замовлення № \_\_\_\_\_.

Сумський державний університет. 40007, м. Суми, вул. Р.-Корсакова, 2  
Свідоцтво про внесення суб'єкта видавничої справи до Державного реєстру  
ДК № 3062 від 17.12.2007.

Надруковано у друкарні СумДУ  
40007, м. Суми, вул. Р.-Корсакова, 2.