

# Development of principles for the creation and machine-oriented characterization of porous silicon nanostructures with optimal heat transport properties

Application ID: 2023.03/0252

Competition title

Excellence Science in Ukraine

Subject area

Тематичні напрями Конкурсу – мають відповідати фундаментальному напряму розвитку науки і техніки (у відповідності до статті 3 Закону України «Про пріоритетні напрями розвитку науки і техніки»). Конкурс орієнтований на фундаментальні наукові дослідження з найбільш важливих проблем розвитку науково-технічного, соціально-економічного, суспільно-політичного, людського потенціалу для забезпечення конкурентоспроможності України у світі. Права інтелектуальної власності, створеної під час проведення досліджень за рахунок грантової підтримки Національного фонду досліджень України (далі – НФДУ /Фонд), належать грантоотримувачу та/або виконавцям проєкту, крім випадків, передбачених частиною другою статті 11 Закону України «Про державне регулювання діяльності у сфері трансферу технологій». До розгляду на Конкурсі не приймаються роботи, зміст яких становить державну таємницю (згідно з Законом України «Про державну таємницю»). Реалізація проектів передбачається у 2024-2026 рр., три проміжні етапи реалізації проєкту (за умови наявності відповідних бюджетних призначень): - перший етап реалізації проєкту (орієнтовно 4,5 місяців, серпень-грудень 2024 року); - другий етап реалізації проєкту (орієнтовно 9 місяців, березень-грудень 2025 року); - третій етап реалізації проєкту (орієнтовно 9 місяців, березень-грудень 2026 року). Закінчення кожного проміжного етапу корелюється із закінченням відповідного фінансового року. Початок реалізації проектів планується з серпня 2024 року. Реалізація проектів у 2025-2026 рр. здійснюватиметься з урахуванням та у відповідності до бюджетних надходжень у відповідному році. Планування тривалості проміжних етапів реалізації проєкту має здійснюватись з урахуванням визначених строків опрацювання звітної документації, яка надається грантоотримувачем для підтвердження виконання первого-другого етапів реалізації проєкту та третього етапу реалізації проєкту (14 календарних днів з дати завершення відповідного проміжного етапу реалізації проєкту). Запланована у Заявці тривалість проміжних етапів реалізації проєкту може бути скоригована на момент укладання Договору про надання грантової підтримки з урахуванням та у відповідності до бюджетних надходжень у відповідному році.

Kind of study

Fundamental research

Type of grant

Collective grant

Grant support area

- Research and development

Area of expertise

- Natural, technical sciences and mathematics

Specialisation

- Solid state physics

# Project description

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## Project abstract

This project develops methods for fine-tuning the thermal properties of multilayer porous silicon (MPSi) structures for efficient energy conversion or thermal control in modern devices. The novelty of the work is the use of machine learning (ML) algorithms to optimize the thermal-physical parameters of the structure, which involve the simultaneous variation of several MPSi parameters (number of layers, porosity, etc.). The project is a comprehensive study that combines advanced computer modelling for the initial accumulation of an information base, ML algorithms for processing the results and determining the optimal configurations of MPSi, and experimental methods for verifying the results of ML. The implementation of the project objectives will allow us to reduce the cost of manufacturing structures with the necessary properties by optimizing the synthesis algorithms and identifying the optimal MPSi parameters for a wide range of practical applications.

## Brief description of the project

In the age of rapid technological progress, which is accompanied by the miniaturization of modern electronics elements, the development of new power supply technologies, etc., a serious challenge is the growth of specific heat generation in the microscale, which requires effective solutions for heat dissipation or creating thermal barriers (thermal management). In this case, a fundamental role is played by the search for new materials or ways to modify existing materials that will have optimal thermal transport characteristics to solve the stated problems.

On the other hand, the limited resources of fossil fuels are stimulating the development of green energy, one of the directions of which is semiconductor thermoelectricity, where a partial solution of environmental and economic problems is associated with the conversion of excess or waste heat into electricity. However, thermoelectric generators are currently characterized by low efficiency compared to, for example, solar cells, which restricts their production and use on industrial scales. The key to solving the problem of energy efficiency of thermoelectric modules is the development of new materials that can provide reduced thermal conductivity at moderate electrical conductivity. However, the interdependence of the electrical and thermal transport characteristics of materials on the one hand, and the need for resource-intensive and time-consuming research to create the latest materials, on the other hand, have not yet led to a scientific breakthrough in this field.

In recent years, new opportunities have emerged for the development of the latest materials with optimal physical properties for applied applications thanks to the development of machine learning methods. In particular, such methods have already been partially tested for predicting the thermal transport characteristics of solid-state structures. However, the use of machine learning algorithms to solve thermal management problems or the problem of increasing the efficiency of thermoelectric conversion is still limited, and the scale of databases related to these areas is much smaller than in other areas.

This project aims to expand the information base on thermal transport characteristics of semiconductor materials and develop a scientific basis for machine-oriented optimization of materials with given characteristics for applications in thermal flow control systems or thermoelectric converters. The object of research will be silicon multilayer porous structures,

which, on the one hand, are successful model materials in which thermal transport properties are determined by interlayer boundaries and pore morphology, and on the other hand, such structures have prospects for applied applications and simple integration with modern silicon technology.

At the first stage of the research, computer modelling of heat transfer processes in multilayer structures of various morphologies will be carried out, thanks to which a database of thermal physical properties of materials will be created and the physical mechanisms of heat transport will be clarified. Further, machine learning methods will be directly involved in processing the accumulated results, their analysis and determining the optimal configurations of multilayer structures capable of effectively dissipating heat in thermal flow control systems or performing thermoelectric conversion in elements of green energy.

Finally, the project provides for experimental verification of the results of computer modelling and machine learning. For this, multilayer structures with parameters that are as close as possible to those predicted by machine-oriented algorithms will be synthesized, and their structural, optical, thermal physical and electrical studies will be carried out. Such a comprehensive nature of the project research will allow us to obtain and develop new knowledge about the laws of heat transfer in multilayer structures, as well as to adjust machine learning algorithms for predicting the thermal transport characteristics of a material with high accuracy. It is assumed that the approach used in the work will not be limited to the search for materials for thermoelectricity or thermal management systems, but in the future, it can be applied to the search for other functional materials with optimal parameters.

The actual scientific problem stated in the project will be solved by a team of performers that will include leading and young scientists. This will contribute to the development of the research space and competitiveness of Ukraine, which fully correlates with the purpose and subject of the competition "Excellent Science in Ukraine". The work does not contain information the content of which constitutes a state secret (following the Law of Ukraine "On State Secrets").

#### Keywords

porous silicon, thermal conductivity, multilayer structures, machine learning, metaheuristic algorithms, photoacoustic methods, molecular dynamics, finite element method

#### The goal of the project

Optimization of thermal transport parameters of multilayer porous silicon structures for use in thermoelectric modules or thermal flow control systems. Development of methods for creating and characterizing silicon structures with specified thermal transport properties based on the results of computer modeling, machine learning and their experimental verification.

#### Main tasks of the project

1. Computer modelling of the effect of morphological parameters of multilayer porous silicon structures (MPSi) on their thermal and electrical properties, to accumulate a database of results for further implementation of machine learning.
2. Atom-level heat flow modelling in MPSi and the establishment of physical mechanisms of heat transfer in structures with different porosities and interface quality.
3. Tuning of machine learning (ML) expert systems based on artificial deep neural networks and random forests, capable of predicting the thermal properties of MPSi, trained using the results of computer modelling.

4. Determination of optimal MPSi configurations for efficient energy conversion in thermoelectric elements or heat flow control using metaheuristic algorithms and ML methods.
5. Synthesis of MPSi with a given number of layers, thickness and porosity. Verification of ML results by experimental methods of studying the thermal and electrical properties of synthesized MPSi.

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**Project title \_\_\_\_\_ Development of principles for the creation and machine-oriented characterization of porous silicon nanostructures with optimal heat transport properties\_\_\_\_\_**

**Project supervisor \_\_\_\_\_ Pavlo Lishchuk\_\_\_\_\_**

**3.1 Current state of the problem (up to 2 pages)**

Controlled thermal transport in materials is a critical factor for a number of modern technologies (Appl. Therm. Eng., 227, 120427 (2023); En. Stor. Mater., 65, 103144 (2024); Mat. Sci. and Eng.R: Rep., 151, 100700 (2022)). Firstly, due to environmental and economic reasons, the problem of energy conservation, related to the utilization of waste heat, is becoming increasingly important today. However, semiconductor thermoelectric generators, designed to recover waste heat, are characterized by low efficiency, which significantly limits the possibilities of their production and widespread use (Therm. Sci. and Eng. Progr., 45, 102064 (2023)). One way to solve the problem of energy efficiency of thermoelectric elements is to create working semiconductor materials, in particular, nanostructures, with reduced thermal conductivity while maintaining a sufficiently high electrical conductivity (Mater. Tod., 66, 137 (2023)). Since these material parameters are interrelated, this task is non-trivial and requires the search for new methods and ways to control the processes of thermal transport in semiconductor structures.

On the other hand, thermal management is of fundamental importance for the development of modern electronics and optoelectronics, where the continuous increase in the density of active elements is accompanied by a sharp increase in thermal power (Renew. and Sust. Ener. Rev., 187, 113711 (2023); Mater. Tod., 17, 163 (2014)). The need for efficient heat dissipation and the creation of thermal barriers poses new challenges for researchers and designers to find progressive materials for these needs and ways to control heat flows in them.

Solving the described problems usually requires resource-intensive and time-consuming experimental studies. However, recently, the approach that has been named material informatics has been increasingly used, which involves combining the measurement or calculation of material properties with various informatics algorithms, including machine learning methods.

Compared to traditional material research procedures, which often rely on the use of the trial and error method and are extremely expensive, material informatics has opened up new opportunities for significantly reducing the cost and speeding up the processes of developing, creating, and implementing new systems with the required operating characteristics. Similar

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approaches are used today in almost all areas of applied physics, including the study of thermal transport properties of materials. For example, a small overview of the mentioned topic can be found in the work of Qian and Yang (Mat. Sci. Eng. R 146, 100642 (2021)).

Among the many methods aimed at optimizing heat transfer processes, we believe that it is worth highlighting several directions. One of them, which has proven its effectiveness, is the combination of molecular dynamics modelling and machine learning. The first component allows for a detailed consideration of atomic structures, including defects and interfaces, while the second allows for the generalization and expansion of the results (Appl. Phys. Lett. 121, 133501 (2022)) or to improve the accuracy of calculations (for example, due to the calculation of interatomic potentials – Mat. Today Phys. 10, 100140 (2019)). Another option, which, in particular, was used to achieve effective thermal transport properties of metamaterials with macroscopic pores, is the combination of a metaheuristic optimization algorithm with a neural network (Appl. Phys. Lett. 122, 144102 (2023)). But such complex studies are still in their infancy, so they require further development and experimental verification of the results of computer modelling and machine learning, which will be partially implemented in the presented project.

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### 3.2 Novelty of the project (up to 1 page)

Existing approaches to controlled thermal management in materials are typically based on the variation of one parameter, such as the geometric dimensions of the structure (e.g., the length or diameter of nanowires, the thickness of films), the size or concentration of the filler (e.g., nanoinclusions in composites, nanopores in porous systems), the quality of interfaces or surfaces in multilayer structures, the defect-impurity composition, etc. However, not all proposed modifications lead to the expected effects, while others are incompatible with the technologies for the synthesis of semiconductor structures.

The novelty of this project is the development of a strategy for controlled heat transport that involves the simultaneous variation of not one, but several material parameters. Using multilayer porous silicon structures, which are suitable model objects, the optimization of thermal transport characteristics will be carried out by varying the thickness of the layers, their number, the degree of porosity, and the quality of the interfaces. It is expected that in the future, the algorithms developed and tested in the project will be extended to other types of practically important materials and nanostructures.

Since the described optimization problem includes the systematization and analysis of large data sets, its solution will be carried out using machine learning methods, which is also one of the elements of novelty. In addition, the novelty of the project will be the testing of the potential of machine learning in the study of thermal transport in multilayer structures using molecular dynamics methods.

It is also worth emphasizing the comprehensive paradigm of the project, which will include a full research cycle with a combination of powerful computer modeling methods for data accumulation and the study of physical processes in structures, machine learning algorithms for solving the problem of optimizing thermal management in the material, and a set of experimental methods for the synthesis, characterization of multilayer structures and verification of the results of modeling and machine learning.

It is worth noting that within the framework of experimental studies, not only the thermal transport, but also their electrophysical parameters of structures will be studied, which is especially important for thermoelectric converters.

It is these components of the novelty of the project in combination with a comprehensive approach to solving the set tasks that will make it possible to obtain new knowledge about the laws of heat transfer in multilayer structures and to adjust machine learning algorithms for predicting their thermal transport characteristics with high accuracy.

### 3.3 Research methodology (up to 2 pages)

The methodology of the proposed project combines several research directions. The first one involves computer simulations of thermal transport processes in multilayer porous structures with different layer thicknesses, porosity, interface quality, etc. The simulations will be performed using both atomistic (molecular dynamics) and continuum (finite element) approaches. As a result of such studies, an information base of thermal physical parameters of multilayer structures will be accumulated for further machine learning and the physical mechanisms of the influence of structure parameters on the thermal transport characteristics of the material will be clarified.

The second research direction will involve the implementation of machine learning to identify multilayer structures with the best configurations for applications in thermoelectric modules or thermal management systems. Within the framework of the project, it is planned to tune machine learning systems to optimize their efficiency. In the case of deep neural networks, the selection of the number of hidden layers and neurons in them, regularization methods and initial initialization of weight coefficients, activation function type, learning rate, number of epochs used, and batch size for simultaneous parameter update will be carried out. For random forest and gradient boosting models, different options for the number of trees and their depth, the number of features used in splitting, and samples that can be both in leaf and internal nodes, as well as the feasibility of bootstrapping, will be considered. During tuning, random search methods will be used at the initial stages and grid and Bayesian methods at the final stages. The reference tools for working with a deep neural network, random forest, and gradient boosting are the Keras and sklearn.ensemble packages.

The project also provides for the use of metaheuristic algorithms to determine the optimal parameters of multilayer systems based on porous silicon. According to the No Free Lunch theorem, there is no universal metaheuristic method for solving all optimization problems. Therefore, the possibilities for solving the specified problem will be considered for a number of algorithms, namely DE, EBL SHADE, ADELI, NDE, MABC, TLBO, GOTLBO, STLBO, PSO, IJAYA, ISCA, NNA, CWOA, WW. The comparison of efficiency will be carried out using nonparametric statistical methods.

The third research direction will include the synthesis of multilayer structures with parameters obtained as a result of machine learning, as well as experimental analysis of their structure, thermal, electrical, and optical parameters. Within the framework of this direction, the methodology for the synthesis of multilayer porous structures will be improved to obtain

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materials with specified parameters. The structure and morphology of the synthesized materials will be established by complex studies using X-ray diffractometry (XRD), scanning tunneling microscopy (SEM), and optical microscopy. Using photoacoustics methods, the measurement of thermal physical parameters of samples will be implemented.

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**3.4 Justification of the ability of the Contest participant to implement the project (up to 3 pages).**

Information is provided about:

- previous work experience and scientific achievements of the scientific director and authors in the fields related to the submitted project;
- the potential importance of the expected results and the acquisition of new knowledge, the development of new scientific approaches, the novelty of breakthrough scientific ideas (including from the standpoint of interdisciplinarity if the research is multidisciplinary in nature);
- the presence of a corresponding update by the project authors - published results of previous research and development, laid as a basis for scientific research (development);
- availability of protective documents for objects of intellectual property rights in accordance with Articles 425 and 465 of the Civil Code of Ukraine, the right to use which belongs to the tenderer in accordance with Article 426 of the Civil Code of Ukraine.

The selection of project team members was carried out by balancing the number of participants, the range of methods, skills, and knowledge they possess, as well as age and gender principles. Each of the project members has a sufficient level of qualification, experience, and practical experience to perform the stated tasks.

Project leader Pavlo Lishchuk has 8 years of research experience, is the author of over 40 scientific papers, including 1 chapter in a monograph in a foreign publication, 22 publications in the Scopus database, including 10 articles in Q1-Q2 publications, and 1 single-authored article. He is the author of 1 patent. His main areas of research are photothermal and photoacoustic conversion in bulk and inhomogeneous nanostructured materials; synthesis and study of thermal transport in systems based on porous semiconductors. He is the scientific leader of the ongoing project of the Ministry of Education and Science of Ukraine “Development of advanced phase-change composite systems for efficient use of thermal energy” (2024-2026). He was the responsible performer of the youth project of the Ministry of Education and Science of Ukraine “Features of photothermal and photoacoustic processes in low-dimensional semiconductor systems based on silicon” (2018-2020). He is a participant in international research projects: Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE), HORIZON-2020 under the name “Carbon-based nano-materials for theranostic application” Call: H2020-MSCA-RISE-2015, the Marie Skłodowska-Curie Actions (MSCA), Research and Innovation Staff Exchange (RISE) project under the name “Ultra-small Nanohybrids for Advanced Theranostics (UNAT) Call:H2020-MSCA-RISE-2020. He was a performer of the project “Computer design, synthesis and thermal transport properties of silicon nanostructures for energy-efficient applications” (2020-2021, 2023, Grant of the National Foundation for Development of Ukraine, project number 2020.02/0067).

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Victoriya Shevchenko has the skills to synthesize porous silicon nanostructures, as well as experience in studying their structure and physicochemical properties. In particular, she has developed methods for the production of porous silicon layers and multilayer structures by electrochemical etching to study their thermal physical properties (J. Nano- Electron. Phys. 15, 06006 (2023)). The influence of different treatments on the morphology, chemical composition, and properties of porous nanomaterials was studied (EPJ Appl. Phys., 76, 30401 (2016)). She has experience in studying the structure and optical properties of nanostructures and composites (Physica E 154, 115812 (2023)). She was a performer of the project “Computer design, synthesis and thermal transport properties of silicon nanostructures for energy-efficient applications” (2020-2021, 2023, Grant of the National Foundation for Development of Ukraine, project number 2020.02/0067).

Vasyl Kuryliuk has experience in the study of thermal properties of solid-state structures and is proficient in the use of computer simulation methods (molecular dynamics and finite element methods). In particular, he has studied the thermal properties of graphene composites (J. of Mat. Sci., 54, 9247 (2019)), nanocomposites (Phys. Chem. Chem. Phys. 17, 13429 (2015)), quantum dot structures (Sci. Rep. 9, 16335 (2019), Phys. Chem. Chem. Phys. 25, 6263 (2023)), and bulk materials (Appl. Phys. Lett. 122, 172201 (2023)). Vasyl Kuryliuk has experience in leading research projects: "Engineering of mechanical stresses in semiconductor heterostructures as the basis of the latest architecture of nanodevices" (2012, Grant from the President of Ukraine); "Analysis of mechanical stresses in semiconductor nanostructures for the needs of photo- and thermovoltaics" (2015, project number 0116U006916); "Features of the stressed state of SiGe quantum dots in crystalline and amorphous matrices" (2016-2018, project number 0115U000266); "Computer design, synthesis, and thermal transport properties of silicon nanostructures for energy-efficient applications" (2020-2021, 2023, Grant from the NRF, project number 2020.02/0067)."

Oleg Olikh has 27 years of research experience, is the author of over 90 scientific papers, including 46 articles (10 of which are single-authored, including 5 in Q1-Q2 journals). His research is focused on the application of machine learning methods for the characterization of semiconductor structures (Progr.in Photovolt., 30, 648 (2022)). For example, deep neural networks were used to analyze the results of experiments and modeling in the framework of the project led by Oleg Olikh "Development of the physical foundations of acoustically controlled modification and machine-oriented characterization of silicon solar cells" (2020-2021, project number 2020.02/0036). In addition, he is an expert in the use of metaheuristic

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methods for optimization problems (J. Appl.Phys 118, 024502 (2015), Superlat. and Microstr. 136, 106309 (2019)), has extensive experience in studying the electrical properties of semiconductor structures (Sol. St. Electron. 165, 107712 (2020)), their characterization (J. Appl.Phys 130, 235703 (2021)), as well as defect engineering (Sem. Sci. Tech. 37, 075006 (2022), J. Appl. Phys 123, 161573 (2018)).

Mykola Borovyi has 42 years of research experience and is an expert in X-ray spectroscopic and structural studies of the electronic and atomic-spatial structure of a wide range of materials. He is the author of over 80 papers, of which 35 are indexed in the Scopus database; 8 papers in Q1-Q2 journals. On the basis of data from X-ray low-temperature diffractometry, the mechanisms of transformation of spatial modulated structures and the effect of X-ray irradiation on them were clarified (Phys. stat. sol. (b), 2021, 258(5), 202000556). He has experience in X-ray diagnostics of the structure and morphology of composite materials and the determination of their relationship with the electrical and magnetic characteristics of systems. In particular, for a number of functional epoxy composites, systems with carbon nanofillers, the relationship between the atomic-spatial structure and magnetic and electrodynamic parameters was determined (Nanomaterials, 2019, 9(12), 1720 Mater. Sci. and Eng.: B, 2022, 283, 115776, Physica E, 2022, 144, 115463). Four PhD dissertations have been defended under his supervision. He was the scientific leader of 3 Ukrainian research projects and a performer of 4 international research projects.

Lesya Chepela has experience in the development and application of models for the analysis of heat transport in multilayer systems (Appl. Phys. Lett. 2019, 115(2), 021902), has skills in photoacoustic and photothermal studies, including piezoelectric method for the study of liquids and gas microphone method for porous systems and composites "porous matrix-liquid" (Sci. Rep. 2023, 13, 5889) and the study of silicon nanowires by the method of combined light scattering. She participated in the synthesis of porous silicon with different morphology. She is the author of 5 publications and has participated in 4 international conferences (3 of them with presentations).

The implementation of the project tasks will be carried out on the basis of the existing material and technical base, equipment and facilities that are on the balance of Taras Shevchenko National University of Kyiv and include:

1. Equipment for conducting X-ray structural studies of materials - X-ray diffractometer DRONE-4-07 with a temperature chamber for studies of the structure of mono- and polycrystalline samples in the temperature range 100 - 450 K.

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2. Installations for photoacoustic and photothermal methods for diagnostics of thermal properties of structures: Tektronix generators, lasers (UV - IR range) with TTL modulation support, nanovoltmeter Unipan 232b, Tektronix oscilloscope, etc.
3. Complex for measuring electrical characteristics: Keithley 2450 current source-meter, Keithley DMM6500 precision multimeter and LRC meter Sourcetronic ST2829C.
4. Computational capabilities for performing resource-intensive calculations, conducting machine learning, processing and visualizing the results obtained.
5. Equipment for the synthesis of porous silicon nanostructures: programmable DC source PWS4323, electrochemical etching cell and Axio Observer A1M Carl Zeiss optical microscope.

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3.5. Justification of the need to use world-class research infrastructure with a comprehensive list of tasks to be performed. As an alternative to substantiating the need to purchase at the expense of a grant, a comprehensive list of equipment and equipment that is planned to be purchased at the expense of grant support (by year and with an indication of the number of units). Indication of the directions of use of such equipment and facilities after the end of the grant (Information is filled out in the case of submitting an application, which provides for the purchase of equipment and facilities for the implementation of the project). (up to 2 pages).

To implement the project, it is necessary to purchase the following equipment and facilities:

Type of equipment	Quantity	Year of purchase
ARTLINE WorkStation W99 (W99v72)	1	2024
	1	2025
27" Dell S2721HN monitor	1	2024
	1	2025
Axis ANG 220C up to 220 g, 0,0001 g analytical scales	1	2026

1. ARTLINE WorkStation W99 (W99v72) is a high-performance device that meets the requirements for computer modeling of thermal transport processes in multilayer porous silicon structures. The station is equipped with two Intel Xeon Gold 6242 processors, 128 GB of RAM, and an NVIDIA Quadro RTX 4000 graphics card. This allows for calculations using the finite element method, which is one of the most efficient ways to model heat transfer in complex systems, as well as for configuring and training machine learning expert systems. A second workstation of the same type will be purchased in the second stage of the project. It will be used to create a cluster with the first workstation. The cluster will allow for more powerful computational tasks, such as molecular dynamics modeling, and the use of machine learning algorithms.

2. The 27" Dell S2721HN monitor provides high image quality and a wide viewing angle, making it comfortable and efficient to work with the workstations. Their presence will allow for visualizing the results of calculations and monitoring the execution of AI algorithms.

3. The Axis ANG 220C analytical scales allow for gravimetric studies of the samples that will be synthesized in the framework of the third stage of the project. This is necessary to determine the porosity of the formed samples.

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After the grant is completed, the equipment and facilities will be used for the following purposes:

1. The equipment and facilities will be used to model various physical processes for a wide range of structures using finite differences and molecular dynamics methods. This will allow for the development of new technologies and materials with unique properties.
2. Within the framework of the project, machine learning algorithms will be developed and adapted for predicting the thermophysical properties of porous silicon composites. These algorithms can be used to solve other problems, such as predicting the properties of new materials, optimizing production processes, and others.
3. The workstations will be used in the educational process, in particular, for training students and specialists in the field of heat physics and modern materials science.

Therefore, the purchase of equipment and facilities is necessary for the implementation of the project and the further development of scientific activities in the field of heat physics and modern materials science.

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3.6. The amount of funding necessary for the implementation of scientific research (development), with appropriate justification and provision of a corresponding comprehensive list for each individual item of expenditure by year according to the items of expenditure specified in the tables in Chapter VII (tables in Microsoft Excel format, which are available at the link, are filled out ).

The total project costs amount to UAH 7 272 567,34 and include the following funding items:

Total costs of the project	Year 1, UAH	Year 2, UAH	Year 3, UAH.
1. Direct costs	1 361 067,80	2 692 625,58	2 802 696,61
1.1. Labour costs	999 297,00	2 090 737,80	2 237 304,60
1.2. Accruals for labour remuneration	219 845,34	459 962,32	492 207,01
1.3. Materials required to perform work, except for special equipment	3639,00	3639,00	31 625,00
1.4. Special equipment (equipment)	138 286,46	138 286,46	41 560,00
1.5. Expenses for business trips	0,00	0,00	0,00
2. Indirect costs	100 705,56	157 074,63	158 397,16
3. Other expenses	0,00	0,00	0,00
<b>Total costs, UAH</b>	<b>1 461 773,36</b>	<b>2 849 700,21</b>	<b>2 961 093,77</b>
<b>Total project costs, UAH</b>	<b>7 272 567,34</b>		

1. The costs for the remuneration of the actors include

- Remuneration of the project's scientific supervisor, who will manage the project, prepare preparatory and reporting documents and ensure the organisation of the project's research. The project manager will be directly involved in the scientific research, including calculations of thermophysical properties of multilayer structures, synthesis and photoacoustic measurements, as well as interpretation of experimental and theoretical results, preparation of scientific publications on the project.

- Remuneration of a researcher who will be paid to systematise the current results of modelling the thermal transport properties of silicon nanostructures, to create a database of heat transfer properties, to perform X-ray analysis of the samples under investigation, to participate in the discussion and interpretation of the results, and to prepare scientific publications and separate reporting documents.

- Remuneration of a researcher who will prepare and test software codes for the calculation of the thermal transport properties of silicon nanostructures, set up and test machine learning expert systems, machine-oriented determination of optimal configurations of multilayer structures, perform experimental studies of the electrical properties of samples,

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participate in the discussion and interpretation of the results, prepare scientific publications and separate reporting documents.

- Remuneration of the researcher who will carry out molecular dynamics calculations of the thermal transport properties of multilayer structures, compare the modelling results with experimental data and develop a physical model of heat transport in the structures. He will also participate in the discussion and interpretation of the results, preparation of scientific publications and separate reporting documents.

- Remuneration of a researcher who will create test model porous silicon structures for calculations, synthesise multilayer porous structures of a given configuration, study the optical properties of the synthesised structures, participate in the discussion and interpretation of the results, prepare scientific publications and separate reporting documents.

- Remuneration of the researcher who will perform a series of model calculations of heat transfer properties of porous silicon structures using the finite difference method, synthesis of multilayer porous structures, experimental studies of thermal properties of synthesised samples using photoacoustic methods, and participate in the preparation of scientific publications and individual reporting documents.

- Remuneration of two student or postgraduate assistants who will perform experimental calculations, supervise calculations, prepare samples for experimental studies and perform primary processing of results.

2. Labour costs include a 22% withholding tax on "Remuneration" in accordance with current legislation.

3. The cost of materials includes the purchase of silicon wafers for the synthesis of multilayer structures and devices to ensure the smooth operation of the computer stations.

4. Expenditure on the purchase of specialised equipment includes the purchase of two computer stations for high performance calculations and analytical balances.

5. Indirect costs include utility bills and salaries of staff involved in the contractual service.

6. The project does not include expenditure on missions and other expenses.

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3.7 Expected results of project implementation (up to 1 page):

- a) Description of the scientific result that will be obtained as a result of the implementation of the project (with an indication of its expected qualitative and quantitative characteristics).
- b) Justification of the advantages of the expected scientific result in comparison with existing analogues.
- c) Justification of the scientific value of the planned project results for the development of science in Ukraine.

Expected scientific products of the project:

- Systematized database of the results of computer simulations for the analysis of thermal transport in multilayer porous structures and machine learning
- Physical mechanisms of the influence of the parameters of multilayer structures on thermal transport processes
- Tuned machine learning models (deep neural network, random forest, gradient boosting) for the evaluation of thermal transport properties of multilayer porous silicon structures
- Improved methodology for the synthesis of silicon multilayer porous nanostructures with controlled parameters (porosity, average pore size, layer thickness)
- The preparation of at least 5 articles, including publications in Q1 and/or Q2 quartile journals
- The preparation of at least 4 presentations at international conferences

The obtained information base on the analysis of thermal transport in porous structures will be significantly wider than existing analogues. The proposed improvements to the synthesis methodology will allow for increased controllability of the thickness and porosity parameters of multilayer silicon structures. The expert systems created on the basis of machine learning and the identified optimal configurations of multilayer structures will allow for the design of similar systems with significant resource advantages (calculation time, the need for experimental research).

The implementation of the project will contribute to:

1. The development of professional skills and the acquisition of new competencies by young scientists, who make up one-third of the author's team
2. The spread of combined (experiment - computer simulation - information algorithms) methods of scientific research
3. The acquisition of fundamental knowledge about the processes of thermal transport in porous systems.

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**3.8 Description of the ways and methods of further use of the results of the project in social practice (up to 1 page).**

The prospects for the use of the project results in social practice are associated with two main technological areas:

1. Development of materials for efficient thermal management in elements of modern electronics and optoelectronics, where it is important to create materials with abnormally low or, conversely, abnormally high thermal conductivity.
2. Development of alternative energy systems, including thermoelectricity, where one of the key problems is the search for methods and ways to improve the efficiency of energy conversion of semiconductor elements.

A possible solution to this problem is considered to be the modification of the working material to reduce its thermal conductivity without significant changes in electrical conductivity. However, the experimental solution of problems related to the search for materials with specified thermophysical parameters is labour-intensive, costly, and time-consuming. Therefore, the research proposed in the project based on a combination of computer simulations, machine learning, and experimental verification of the results will significantly accelerate and reduce the cost of searching for materials with the necessary parameters for thermal management or thermoelectric applications.

The results obtained can stimulate the development of methods for optimizing silicon-based thermoelectric modules, as well as provide a basis for creating effective thermal barriers or heat sinks in elements of silicon micro- and nanoelectronics.

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**3.9 Possible risks that may affect the implementation of the project and ways to prevent or solve them (up to 1 page)**

Potential risks that may complicate the implementation of the project include:

1. Absence or termination of project funding due to reasons beyond the control of the Grantee or the team of performers. In the event of such circumstances, the implementation of the planned works in the project is suspended until the resumption of funding; changes are made to the Technical Task, the Calendar Plan, and other contractual and budgetary documentation in agreement with the Grantor.
2. The inability of project performers to access experimental equipment or machine resources due to deterioration of the security situation, prolonged power outages, the introduction of quarantine restrictions, the failure of individual components or devices, or other unforeseen circumstances. To address this factor, the possibility of conducting some research and work under the project on the equipment of scientific institutions or scientific groups with which the Grantee has concluded contracts or agreements on cooperation is being considered.
3. The inability of one or more performers to start (continue) the implementation of project tasks due to health, family or other unforeseen circumstances. The solution to the problem is seen in the involvement of specialists who work in the structural units of the Grantee in a close to the project topic, with prior agreement with the Grantor.

**QUESTIONNAIRE**  
on the compliance of the PI of the project  
in the field of Mathematical, Natural, Technical, Biological, Agricultural and Medical Sciences

Of the PI of the project \_\_\_\_\_ **Pavlo Lishchuk**  
*(full name)*  
for carrying out research and development \_\_\_\_\_  
Development of principles for the creation and machine-oriented characterization of porous silicon nanostructures with optimal heat transport properties  
*(project title)*  
for the call ‘Excellence science in Ukraine’.

*\*note: the answer ‘yes’ should be given only if it is possible to verify the information (the fact must be confirmed by a scanned copy of the document, an active link to the official website or in another accessible and reliable way)*

No	Question (criteria)	1 - the answer is ‘yes’ 0 - the answer is ‘no’	Confirmation link or ‘scan attached’
1.	Does the researcher have publications (no more than 15 co-authors) in the last 3 calendar years belonging to the 1st and 2nd quartiles according to the Scimago search engine?  <i>Here and further, the date of publication is defined as the date of publication on the journal's website, indicated on the journal's website, and if it is not available – as the publication date of the printed issue of the journal. If the journal is translated into another language, only the version with international distribution is taken into account to determine the date of publication.</i>	1	<a href="https://www.nature.com/articles/s41598-023-32834-8">https://www.nature.com/articles/s41598-023-32834-8</a>  <a href="https://www.sciencedirect.com/science/article/pii/S0921510723004191">https://www.sciencedirect.com/science/article/pii/S0921510723004191</a>  <a href="https://link.springer.com/article/10.1007/s13204-022-02587-3">https://link.springer.com/article/10.1007/s13204-022-02587-3</a>  <a href="https://www.mdpi.com/2079-4991/12/4/708">https://www.mdpi.com/2079-4991/12/4/708</a>  <a href="https://www.mdpi.com/2079-4991/12/14/2426">https://www.mdpi.com/2079-4991/12/14/2426</a>

			<a href="https://link.springer.com/article/10.1007/s00340-021-07686-7">https://link.springer.com/article/10.1007/s00340-021-07686-7</a>
2.	Does the researcher have at least 6 papers (no more than 15 co-authors) in scientific publications in which an independent anonymous review confirmed by the information on the journal's website or the rules for authors is mandatory?	1	<a href="https://www.nature.com/articles/s41598-023-32834-8">https://www.nature.com/articles/s41598-023-32834-8</a> <a href="https://www.sciencedirect.com/science/article/pii/S0921510723004191">https://www.sciencedirect.com/science/article/pii/S0921510723004191</a> <a href="https://link.springer.com/article/10.1007/s13204-022-02587-3">https://link.springer.com/article/10.1007/s13204-022-02587-3</a> <a href="https://www.mdpi.com/2079-4991/12/4/708">https://www.mdpi.com/2079-4991/12/4/708</a> <a href="https://www.mdpi.com/2079-4991/12/14/2426">https://www.mdpi.com/2079-4991/12/14/2426</a> <a href="https://link.springer.com/article/10.1007/s00340-021-07686-7">https://link.springer.com/article/10.1007/s00340-021-07686-7</a> <a href="https://journals.pnu.edu.ua/index.php/pcss/article/view/4792">https://journals.pnu.edu.ua/index.php/pcss/article/view/4792</a>
3.	Are the PI's works cited (excluding self-citations and co-authors' citations) at a level that meets any one of the following conditions:	1	<a href="https://www.scopus.com/authid/detail.uri?authorId=56156845200">https://www.scopus.com/authid/detail.uri?authorId=56156845200</a>

	<p>1) Hirsch factor <math>h &gt; 5</math>, or</p> <p>2) has a paper that has received more than 100 citations, or</p> <p>3) has 3 works, each of which received more than 30 citations</p> <p>All indicators are determined based on the Scopus database, excluding self-citations.</p>		<b>scan attached</b>
4.	Has the researcher been a PI (co-PI) or main implementer of a research project which was financed on a competitive basis by an institution located outside of Ukraine during the last 10 calendar years?	0	-
5.	Has the researcher been a leader of a collective research project financed by a resident of Ukraine on a competitive basis during the last 5 calendar years?	1	<a href="https://mon.gov.ua/ua/npa/pro-zatverdzhennya-pereliku-proyektiv-fundamentalnih-naukovih-doslidzhen-prikladnih-naukovih-doslidzhen-ta-naukovo-tehnichnih-eksperimentalnih-rozrobok-molodih-vchenih-yaki-pracyuyut-navchayutsya-u-zakladah-vishoyi-osviti-ta-naukovih-ustanovah">https://mon.gov.ua/ua/npa/pro-zatverdzhennya-pereliku-proyektiv-fundamentalnih-naukovih-doslidzhen-prikladnih-naukovih-doslidzhen-ta-naukovo-tehnichnih-eksperimentalnih-rozrobok-molodih-vchenih-yaki-pracyuyut-navchayutsya-u-zakladah-vishoyi-osviti-ta-naukovih-ustanovah</a> <b>scan attached</b>
6.	Does the researcher have students who prepared and defended their PhD theses directly under his guidance/advising?	0	-
7.	Has the researcher made reports at national or international conferences (in person or remotely) during the last 5 calendar years?	1	<a href="https://ieeenap.org/ieee-nap22/">https://ieeenap.org/ieee-nap22/</a> <a href="https://ieeenap.org/data/IEEE_NA_P-2022_Program.pdf">https://ieeenap.org/data/IEEE_NA_P-2022_Program.pdf</a> <b>scan attached</b>

8.	Is the researcher a member of the editorial boards of international scientific journals (except journals that are published exclusively in national languages and distributed exclusively within the borders of one country) as for the date of submission of the application?	0	-
9.	Is the researcher a laureate of international or Ukrainian prizes (awards, honors) awarded on a competitive basis for scientific achievements?	1	<b>scan attached</b>
10.	Whether the researcher was the author/co-author of the author's intellectual product during the last 5 calendar years, including patents, copyright certificates, licenses, trademarks, author's theories, methods.	0	-

"\_19\_" \_\_\_\_January\_\_\_\_ 2024



Pavlo O. Lishchuk

## Analyze author output

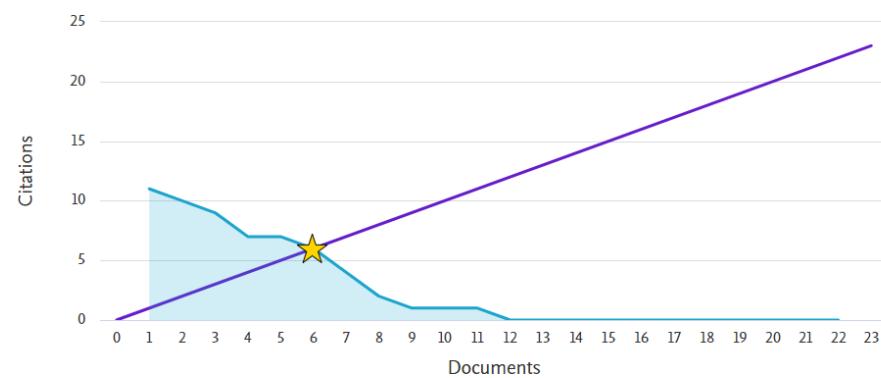
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1	11	Investigation of Ther...
2	10	Features of photothe...
3	9	Application of the Ph...
4	7	Photoacoustic charac...
5	7	Thermal conductivity...
6	6	Interfacial thermal re...
7	4	Photo- and Radiofre...
8	2	Thermal transport pr...
9	1	Bi-modal photother...

### This author's *h*-index

 The *h*-index is based upon the number of documents and number of citations.


3)

6



МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

**НАКАЗ**

27.12.2023

м. Київ

№ 1569

Про затвердження переліку проектів фундаментальних наукових досліджень, прикладних наукових досліджень та науково-технічних (експериментальних) розробок молодих вчених, які працюють (навчаються) у закладах вищої освіти та наукових установах, що належать до сфери управління Міністерства освіти і науки України, які пройшли конкурсний відбір та фінансування яких розпочнеться з 2024 року за рахунок коштів Державного бюджету України

Відповідно до пункту 14 розділу II Положення про проведення Міністерством освіти і науки України Конкурсу проектів фундаментальних наукових досліджень, прикладних наукових досліджень та науково-технічних (експериментальних) розробок молодих вчених, які працюють (навчаються) у закладах вищої освіти та наукових установах, що належать до сфери управління Міністерства, подальше виконання цих досліджень і розробок за рахунок коштів загального фонду державного бюджету та управління ними, затвердженого наказом Міністерства освіти і науки України від 14 грудня 2015 року № 1287, зареєстрованим у Міністерстві юстиції України 06 січня 2016 року за № 15/28145 (зі змінами), наказу Міністерства освіти і науки України від 21.09.2023 № 1143 «Про оголошення у 2023 році конкурсного відбору проектів фундаментальних наукових досліджень, прикладних наукових досліджень та науково-технічних (експериментальних) розробок молодих вчених» з урахуванням протокольного рішення № 2 засідання Конкурсної комісії Міністерства освіти і науки України від 15 грудня 2023 року (далі – Конкурсна комісія МОН)

**НАКАЗУЮ:**

1. Затвердити перелік проектів фундаментальних наукових досліджень, прикладних наукових досліджень та науково-технічних (експериментальних) розробок молодих вчених, які працюють (навчаються) у закладах вищої освіти (далі – ЗВО) та наукових установах (далі – НУ), що належать до сфери управління Міністерства освіти і науки України, які пройшли конкурсний відбір та фінансування яких розпочнеться з 2024 року за рахунок коштів Державного бюджету України, що додається.

2. Керівникам ЗВО та НУ включити до тематичного плану наукових досліджень та розробок, які виконує ЗВО та НУ, проекти, що пройшли

72	Розробка мобільної електро-очисної установки для підновлення будівель, споруд та техніки після пожеж у військовий період	Сумський державний університет	БАГА Вадим Миколайович	2. Сучасне машинобудування, інтелектуальний, «електронний» та інтегрований транспорт; розвиток галузі ядерної фізики, радіофізики, астрономії та ракетно-космічної галузі, авіа- і суднобудування, військової техніки	79
73	Розробка механізмів підвищення конкурентоспроможності підрини АПК та забезпечення енергоефективності сільських територій через інтенсифікацію виробництва біопласти	Вінницький національний аграрний університет	ОХОТА Юлія Володимирівна	3. Продовольства безпека, ресурсозберігаюче сільське та лісове господарство, дослідження морських, прибережних та внутрішніх вод, біосфера	79
74	Турбота про розташування промислових об'єктів для забезпечення соціально-економічної безпеки територіальних громад	Національний технічний університет «Дніпровська політехніка»	БСЛОБОРОДОВА Марія Валеріївна	4. Економічний перетворення, демографічні зміни та добробут	79
75	Інтернований підхід до професійної підготовки STEM-орієнтованих педагогів: синергія наукових і цифрових технологій	Бердянський державний педагогічний університет	НЕСТЕРЕНКО Марина Миколаївна	5. Україна у міжнародному сайті: інклузіонне, інноваційне, мисливче суспільство	79
76	Розробка передових фахомінних композитних систем для ефективного використання теплової енергії	Київський національний університет імені Тараса Шевченка	ЛІЦЮК Павло Олександрович	6. Економічний перетворення, демографічні зміни та добробут	78
77	Розробка та дослідження тривалості активної автономної системи очищення та занесення питної води в екстремних умовах	Національний технічний університет «Харківський політехнічний інститут»	ТОМАШЕВСЬКИЙ Роман Сергійович	7. Україна у міжнародному сайті: інклузіонне, інноваційне, мисливче суспільство	78
78	Екологічна безпека суспільства: подолання скозагроз та наслідків екодиз	Національний університет «Полтавська політехніка імені Юрія Кондратюка»	МАКСЮТА Наталія Сергіївна	8. Безпечна, чиста та ефективна енергетика	78
79	Збереження ієрархічного здоров'я українців в умовах війни: концептивно-псевдінковий, психолінгвістичний та ресурсний підходи	Волинський національний університет імені Лесі Українки	КОСТРУБА Наталія Сергіївна	9. Зміна клімату, довкілля, чисте будівління та раціональні природокористування	78

В. о. генерального директора  
директорату розвитку науки

Григорій МОЗОЛЕВИЧ

Silesian University of Technology  
IEEE Nanotechnology Council  
Sumy State University

**2022 IEEE 12<sup>th</sup> INTERNATIONAL CONFERENCE “NANOMATERIALS: APPLICATIONS & PROPERTIES”**

# NAN<sup>o</sup>materials: Applications & Properties -2022

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Kraków, Poland  
September 11-16, 2022

[www.ieeenap.org](http://www.ieeenap.org)  
[info@ieeenap.org](mailto:info@ieeenap.org)

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IEEE NAP-2022

Kraków, Poland, Sept. 11–16, 2022

**THURSDAY MORNING SESSIONS**

- ORAL SESSION #4A**  
**Electronic & Thermal Transport**  
(CONFERENCE HALL D+E – “SATURN”+“URANUS” & [in ZOOM](#))
- 9:00AM – 9:15AM **Contributed Talk 107**  
Shreyas Srivatsa, Waldemar Tokarz, Janusz Przewoźnik, Łukasz Gondek, Dariusz Kata, Krzysztof Grabowski, Tadeusz Uhl, Jerzy Lis, Czesław Kapusta / Electronic and Thermal Properties of Ti3C2-MXenes for Sensing Applications (ID #435)
- 9:15AM – 9:30AM **Contributed Talk 108**  
Anastasiia Stepura, Michal Procházka, Matej Mičušík, Daiva Zeleniakiene, Andrey Aniskevich, Mária Omastová / Nanocomposites Based on Polymeric Matrix With MXenes and Carbon Nanotubes as Nanofillers (ID #51)
- 9:30AM – 10:00AM **Invited Talk 60**  
Prof. Maytal Caspary Toroker, Technion - Israel Institute of Technology, Israel  
Modeling Charge Transport Through Nanomaterials (ID #448) ([in Zoom](#))
- 10:00AM – 10:30AM **Invited Talk 61**  
Dr. Nicola Curreli, Italian Institute of Technology, Italy  
Nicola Curreli, Michele Ghini, Matteo Bruno Lodi, Nicolò Petrini, Alessandro Fanti, Ilka Kriegel / Depletion Layer Engineering in Core-Shell Metal Oxide Nanocrystals (ID #402) ([in Zoom](#))
- 10:30AM – 11:00AM **Coffee break** (Planetarium Terrace)
- 11:00AM – 11:15AM **Contributed Talk 109**  
Mateusz Wróbel, Jakub Ossowski, Anna Krzykawska, Krzysztof Koziel, Michael Zharnikov, Piotr Cyganik / The Impact of the Anchoring Group on Thermal Stability and Electrical Conductivity of Self-Assembled Monolayers (ID #112)
- 11:15AM – 11:30AM **Contributed Talk 110**  
Ewa Sroczynska Anna, Zuzanna Krysiak, Urszula Stachewicz / Numerical Modeling of Oil Flow Through Porous Polymer Membranes (ID #114)
- 11:30AM – 11:45AM **Contributed Talk 111**  
Kateryna Dubyk, Pavlo Lishchuk, Andrey Kuzmich, Sergei Alekseev, Boris Zousman, Olga Levinson, Aleksey Rozhin, Alain Geloen, Mykola



ПРЕЗИДІЯ НАЦІОНАЛЬНОЇ АКАДЕМІЇ НАУК УКРАЇНИ

**ПОСТАНОВА**

23.02.2022

м. Київ

№ 69

Про нагородження грамотами  
за підсумками конкурсу 2021 р.

За досягнення у розробленні важливих наукових проблем та з метою захочення молодих учених і студентів закладів вищої освіти до науково-дослідницької роботи за підсумками конкурсу 2021 р., проведеного відділеннями Національної академії наук України, Президія НАН України постановляє нагородити грамотами Президії НАН України:

1. Молодих учених:
  - **Рашитова Богдана Сергійовича**, аспіранта Київського національного університету імені Тараса Шевченка – за серію робіт «Функціональні граничні теореми для загальних процесів дробового ефекту»;
  - **Ліщука Павла Олександровича**, кандидата фізико-математичних наук, асистента кафедри Київського національного університету імені Тараса Шевченка – за дослідження особливостей транспорту в неоднорідних наноструктурованих матеріалах;
  - **Смірнова Олександра Євгеновича**, кандидата біологічних наук, доцента Київського національного університету імені Тараса Шевченка – за роботу «Адаптивна пластичність сільськогосподарських культур за дії екстремальних факторів довкілля та її регуляція металомісними наноколоїдами»;
  - **Предко Вікторію Володимирівну**, доктора філософії, асистента кафедри Київського національного університету імені Тараса Шевченка – за роботу «Психологічні передумови оптимізації та розвитку етноціональної ідентичності особистості українця».

Президент  
Національної академії наук України  
академік НАН України **Анатолій ЗАГОРОДНІЙ**

В.о. головного вченого секретаря  
Національної академії наук України  
академік НАН України **Вячеслав БОГДАНОВ**





## THE CALENDAR PLAN

implementation of scientific research and development for 2024-2026

Development of principles for the creation and machine-oriented characterization of porous silicon nanostructures with optimal heat transport properties

**Name of the Call:** 2023.03 Excellent Science in Ukraine

<b>№ stage</b>	<b>Name of the stage of the Project implementation (SPI)</b>	<b>SPI goals</b>	<b>Scheduled tasks for SPI</b>	<b>Implementation period (start-end), month, year</b>	<b>Performance indicators (scientific or other results that will be obtained within the stage)</b>	<b>Amount of financing, UAH</b>
1	<b>Project technical base development</b>	Testing and debugging of software and hardware tools to be used in the research process	Grantee:  Task 1: Preparation and testing of software codes for calculations of thermal transport properties of silicon nanostructures  Task 2: Testing of interatomic potential for molecular dynamics simulation of silicon porous structures  Task 3: Generation of test simulated porous structures and performance of a series of calculations	08.2024 - 12.2024	1. A set of software codes for modelling heat transfer in multilayer porous silicon structures  2. Thermal conductivity coefficients of silicon structures of various porosities, calculated with different interatomic interaction potentials  3. A limited set of calculated thermal transport parameters of modelled porous silicon structures	<b>1 461 773,36</b>

			of their thermal transport properties		4. A report on the work performed	
Amount of funding by stage of SPI № 1 in the year 2024, UAH						1 461 773,36
2	<b>Implementation of machine learning algorithms for silicon structure parameters optimization</b>	Accumulation, systematization and machine-oriented processing of the results of modeling of heat transfer processes in porous structures with interfaces	<p>Grantee:</p> <p>Task 1: Formation of a database of thermal transport characteristics of multilayer structures depending on the degree of porosity, number of layers, and interface quality</p> <p>Task 2: Setup and testing of expert machine learning systems for predicting thermal properties of multilayer porous silicon structures</p> <p>Task 3: Use of metaheuristic algorithms and machine learning methods to determine optimal configurations of multilayer structures for efficient thermoelectric energy conversion or heat flux control</p> <p>Task 4: Molecular dynamics simulation of thermal transport in multilayer structures of various morphology</p>	03.2025 – 12.2025	<p>1. Systematic database of thermal transport parameters of multilayer structures of various morphologies</p> <p>2. Optimized machine learning models for the evaluation and optimization of thermal transport properties of multilayer structures</p> <p>3. A scheme for determining optimal configurations of multilayer structures for different application purposes</p> <p>4. Physical model of heat transfer in multilayer porous structures</p> <p>5. Scientific publications, report on the work performed</p>	2 849 700,21

3	<b>Experimental verification of machine learning and computational modeling results</b>	Experimental analysis, generalization and improvement of the methodology for determining optimal configurations of semiconductor multilayer structures based on machine learning algorithms	Grantee:  Task 1. Development and optimization of a synthesis methodology for multilayer porous silicon structures with a given configuration.  Task 2. Fabrication of a series of experimental samples with configurations determined by machine learning algorithms.  Task 3. Structural, optical, thermal transport, and electrical characterization of the parameters of the fabricated multilayer structures.  Task 4. Comparison of experimental results with computer simulation data and verification of machine learning algorithms.	03.2026 – 12.2026	1. Improved synthesis methodology for multilayer porous structures with controlled parameters  2. Set of samples of multilayer porous silicon structures of various morphologies  3. Results of structural, optical, thermal transport, and electrical characterization of the synthesized structures  4. Scientific publications, report on the work performed	<b>2 961 093,77</b>
Amount of funding by stage of SPI № 3 in the year 2026, UAH						<b>2 961 093,77</b>
The total volume of financing, UAH						<b>7 272 567,34</b>

Project supervisor

 - Lishchuk Pavlo

**Обсяг фінансування за окремими статтями витрат**

№ з/п	Найменування статті витрат	I етап (2024 рік), грн.	Питома вага в загальному обсязі витрат за I етап, %	II етап (2025 рік), грн	Питома вага в загальному обсязі витрат за II етап, %	III етап (2026 рік), грн	Питома вага в загальному обсязі витрат за III етап, %	Разом за проектом, грн.	Питома вага в загальному обсязі витрат разом за проектом, %
1	Прямі витрати	1 361 067,80	93,1	2 692 625,58	94,5	2 802 696,61	94,7	6 856 389,99	94,3
1.1	Оплата праці	999 297,00	68,4	2 090 737,80	73,4	2 237 304,60	75,6	5 327 339,40	73,3
1.2	Нарахування на оплату праці	219 845,34	15,0	459 962,32	16,1	492 207,01	16,6	1 172 014,67	16,1
1.3	Матеріали, необхідні для виконання робіт, крім обладнання та устаткування	3 639,00	0,2	3 639,00	0,1	31 625,00	1,1	38 903,00	0,5
1.4	Обладнання та устаткування	138 286,46	9,5	138 286,46	4,9	41 560,00	1,4	318 132,92	4,4
1.5	Витрати на відрядження	0,00	0,0	0,00	0,0	0,00	0,0	0,00	0,0
2	Непрямі витрати (не більше 15% статті витрат "Прямі витрати" за етапом)	100 705,56	6,9	157 074,63	5,5	158 397,16	5,3	416 177,35	5,7
3	Інші витрати	0,00	0,0	0,00	0,0	0,00	0,0	0,00	0,0
	<b>Разом:</b>	<b>1 461 773,36</b>	<b>100,0</b>	<b>2 849 700,21</b>	<b>100,0</b>	<b>2 961 093,77</b>	<b>100,0</b>	<b>7 272 567,34</b>	<b>100,0</b>



**The volume of funding for individual expenditure items**

No.	The expense item name	Stage I (2024), UAH	Specific weight in the total amount of expenses for the stage I, %	Stage II (2025), UAH	Specific weight in the total amount of expenses for the stage II, %	Stage III (2026), UAH	Specific weight in the total amount of expenses for the stage III, %	Total amount for the project, UAH	Specific weight in the total amount of expenses for the project, %
1	Direct costs	1 361 067,80	93,1	2 692 625,58	94,5	2 802 696,61	94,7	6 856 389,99	94,3
1.1	Salary	999 297,00	68,4	2 090 737,80	73,4	2 237 304,60	75,6	5 327 339,40	73,3
1.2	Charges for salary	219 845,34	15,0	459 962,32	16,1	492 207,01	16,6	1 172 014,67	16,1
1.3	Materials required to perform the work, except equipment and facilities	3 639,00	0,2	3 639,00	0,1	31 625,00	1,1	38 903,00	0,5
1.4	Equipment and facilities	138 286,46	9,5	138 286,46	4,9	41 560,00	1,4	318 132,92	4,4
1.5	Travel expenses	0,00	0,0	0,00	0,0	0,00	0,0	0,00	0,0
2	Indirect costs (not more than 15% of the cost item 'Direct costs' by stage)	100 705,56	6,9	157 074,63	5,5	158 397,16	5,3	416 177,35	5,7
3	Other costs	0,00	0,0	0,00	0,0	0,00	0,0	0,00	0,0
<b>In total:</b>		<b>1 461 773,36</b>	<b>100,0</b>	<b>2 849 700,21</b>	<b>100,0</b>	<b>2 961 093,77</b>	<b>100,0</b>	<b>7 272 567,34</b>	<b>100,0</b>

## Financing

<b>Amount of funding</b>	
Duration of the project	Three-year
Total cost of the project (UAH)	7,272,567
First year annual project's cost - stage 1	1,461,773
Second year annual project's cost - stage 2	2,849,700
Third year annual project's cost - stage 3	2,961,094

<b>Funding stages</b>	
The amount of funding, stage 1	1,461,773
The amount of funding, stage 2	2,849,700
The amount of funding, stage 3	2,961,094

## **Organization / subcontractors**

# Taras Shevchenko National University of Kyiv

Participating organization

Organizational and legal form of the employer organization

**Public organization (institution/establishment /enterprise)** Subordination of the company/institution/organization  
**Ministry of Education and Science of Ukraine**

Registration code (EDRPOU)

**02070944**

Code of activity(-ies)

**72.11 72.19 72.20**

Main/strategic areas of research activity

Correspond to the priority areas of development of science and technology (Law of Ukraine № 2519-VI of 09.09.10): Fundamental scientific research on the most important problems of development of scientific and technical, socioeconomic, sociopolitical, human potential in order to ensure Ukraine's competitiveness in the world and sustainable development of the society and the state. Information and communication technologies. Energy and energy efficiency. Rational use of nature. Life sciences, new technologies for prevention and treatment of the most common diseases. New substances and materials.

Name of principal investigator

**Volodymyr A. Bugrov**

Legal address of the company/institution/organization

**60 Volodymyrska Street, City of Kyiv, 01033**

Mailing address of the company/institution/organization

**60 Volodymyrska Street, City of Kyiv, 01033**

Actual address of the company/institution/organization

**64/13, Volodymyrska Street, City of Kyiv, Ukraine, 01601**

Telephone

**044-239-33-88**

E-mail

**office@knu.ua**

Link on the web page

**<https://www.knu.ua/>**

**Principal investigator**

# Mr. Lishchuk Pavlo Oleksandrovych

Gender Date of birth  
Male 12.07.1992

Country of Permanent Residence Citizenship  
Ukraine Ukraine

Cell phone number E-mail  
+380635757925 pavel.lishchuk@knu.ua

Other contact information (skype, viber, etc.)  
viber +380635757925

## SCIENTIFIC PROFILE

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Scientific-research profile (Orcid, Google Scholar, Scopus authors, etc) minimum two:

Orcid 0000-0002-4665-1648  
Google Scholar jq0jtOYAAAAJ&hl  
Scopus authors 56156845200

Research experience: number of years Total number of patents  
8 1

Total number of publications Number of publications in Q1 & Q2 quartile journals  
for the last 10 years  
22 10

Hirsch index (SCOPUS) Number of monographs  
6 1

Obtained research grants

- 1) Ultra-small Nanohybrids for Advanced Theranostics (UNAT) (Надмалі наногібриди для передової тераностики («терапія + діагностика»). Funding scheme: Marie Skłodowska-Curie Actions (MSCA), Research and Innovation Staff Exchange (RISE), Call:H2020-MSCA-RISE-2020.
- 2) "Carbon-based nanomaterials for theranostic application." Funding scheme: Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE), HORIZON-2020. Call: H2020-MSCA-RISE-2015
- 3) "Features of photothermal and photoacoustic processes in low-dimensional silicon-based semiconductor systems" (2018). Ministry of Education and Science of Ukraine, State Registration Number 0118U000242
- 4) Ministry of Education and Science of Ukraine № 24БФ051-02М "Розробка передових фазозмінних композитних систем для ефективного використання теплової енергії" (2024-2026)
- 5) «Комп'ютерний дизайн, синтез і теплотранспортні властивості кремнієвих наноструктур для енергоекстивних застосувань» (2020-2021, 2023 pp., grant NRFU, r/n 2020.02/0067).

Experience as a reviewer (peer review of scholarly papers, review of research projects)

reviewer of 2 publications in:  
Advanced Optical Materials,  
Journal of Applied Physics.

## RESEARCH ACTIVITY

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### Solid state physics

Area of expertise	Branch of science
Natural, technical sciences and mathematics	Physical and mathematical sciences
	Keywords
	теплопровідність, фотоакустичні та фототермічні методи, наноструктури, поруваті матеріали; thermal conductivity, photoacoustic and photothermal methods, nanostructures, porous materials

Number of publications in the field of expertise  
8

### LIST OF SCIENTIFIC PUBLICATIONS WHICH ARE RELEVANT FOR THIS COMPETITION ( ENTER NOT MORE THAN 12 PUBLICATIONS)

#### [10.1063/1.5099010](#)

*L. Chepela, K. Dubyk, David Lacroix, Ali Belarouci, Pavlo Lishchuk, Mykola Isaiev, Mykola Isaiev*

Features of photothermal transformation in porous silicon based multilayered structures

<https://hal.archives-ouvertes.fr/hal-02400118>, AIP Publishing, 2019

Пористі кремнієві багатошарові структури, фотоакустика, тепловий опір на  
інтерфейсі; Porous silicon multilayered structures, photoacoustics, interfacial thermal  
resistance, /Materials, /Micro and nanotechnologies/Microelectronics, /Condensed Matter  
[cond-mat]/Materials Science [cond-mat.mtrl-sci], /Mechanics [physics.med-ph]/Thermics  
[physics.class-ph], Physics and Astro

#### [10.1016/j.physe.2018.11.016](#)

*Lishchuk Pavlo, Isaiev Mykola, Osminkina Liubov, Burbelo Roman, Nychyporuk Tetyana,  
Timoshenko Victor*

Photoacoustic characterization of nanowire arrays formed by metal-assisted chemical  
etching of crystalline silicon substrates with different doping level

Physica E: Low-dimensional Systems and Nanostructures, Elsevier BV, 2018

Оптичне поглинання, фотоакустика, кремнієві нанонитки, теплопровідність; optical  
absorption, photoacoustics, silicon nanowires, thermal conductivity

#### [10.1016/j.ijthermalsci.2018.08.015](#)

*Lishchuk Pavlo, Dekret Anastasiya, Pastushenko Anton, Kuzmich Andrey, Burbelo Roman,  
Belarouci Ali, Lysenko Vladimir, Isaiev Mykola*

Interfacial thermal resistance between porous layers: Impact on thermal conductivity of a multilayered porous structure

International Journal of Thermal Sciences, Elsevier BV, 2018

Міжфазний тепловий опір, Фототермічний метод, Пористий кремній, Тепловий транспорт; interfacial thermal resistance, Photothermal technique, Porous silicon, thermal transport

[10.1016/j.matlet.2014.04.105](#)

*Isaiev Mykola, Newby Pascal J., Canut Bruno, Tytarenko Alona, Lishchuk Pavlo, Andrusenko Dmytro, Gomès Séverine, Bluet Jean-Marie, Fréchette Luc G., Lysenko Vladimir, Burbelo Roman*

Thermal conductivity of partially amorphous porous silicon by photoacoustic technique

Materials Letters, Elsevier BV, 2014

Аморфний кремній, фотоакустичний метод, пористі напівпровідники, теплопровідність; amorphous silicon, Photoacoustic technique, Porous semiconductors, thermal conductivity

[10.1007/s10765-015-1849-8](#)

*Lishchuk Pavlo, Andrusenko Dmytro, Isaiev Mykola, Lysenko Vladimir, Burbelo Roman*

Investigation of Thermal Transport Properties of Porous Silicon by Photoacoustic Technique

International Journal of Thermophysics, Springer Science and Business Media LLC, 2015

Композитна система, фотоакустичний метод, пористі напівпровідники, теплопровідність; composite system, Photoacoustic technique, Porous semiconductors, thermal conductivity

[10.21272/jnep.12\(3\).03024](#)

*L. V. Poperenko, , Volodymyrska St., Kyiv, Ukraine, I. V. Yurgelevych, S. G. Rozouvan, P. O. Lishchuk*

Angular Ellipsometry of Porous Silicon Surface Layers

Journal of Nano- and Electronic Physics, Sumy State University, 2020

поруватий кремній, оптичні властивості, окислення, плівка, еліпсометрія, porous silicon, optical properties, oxidation, film, ellipsometry, General Materials Science, Radiation, Condensed Matter Physics, Ellipsometry, Materials science, Porous silicon, Optoelectronics, business.industry, business

[10.15330/pcss.22.2.321-327](#)

*Lishchuk P.O.*

Optimized photoacoustic gas-microphone cell for semiconductor materials thermal conductivity monitoring

Physics and Chemistry of Solid State, Vasyl Stefanyk Precarpathian National University, 2021  
photoacoustic gas-microphone method, thermal conductivity, monocrystalline silicon, doped semiconductors

## LIST OF PATENTS WHICH ARE RELEVANT FOR THIS COMPETITION (NO MORE THAN 12)

978-981474565-9;978-981474564-2, 2017: Thermal wave methods

Теплопровідність твердих тіл, Теплова дифузія; Thermal conductivity of solid bodies, thermal diffusion

U 2018 04935, 2018: An approach for reduction of thermal conductivity of semiconductor nanostructures based on silicon

теплопровідність, мультишаровий поруватий кремній; thermal conductivity, multilayer porous silicon

## EDUCATION

### **Taras Shevchenko National University of Kyiv**

Country	City
Ukraine	Kyiv
Faculty (school)	Specialisation
physics faculty	Physics of Nanosystems
Diploma number	Date of issue
M15 № 051171	30.06.2015

## EMPLOYMENT AND POSITION

### **Taras Shevchenko National University og Kyiv**

Position	Employment period
assistant professor of General Physics department	18.11.2019 - Current employment
Institution's subordination	Institutions EDRPOU code (for Ukrainian institutions only, foreign experts enter 00000000)
Ministry of Education and Science of Ukraine	02070944
Country	City
Ukraine	Kyiv
Institution's Address	
64/13, Volodymyrska Street, Kyiv, Ukraine, 01601	
Office phone number	
+380635757925	

## SCHOLARLY / RESEARCH DEGREE

**Ph.D.**

Diploma number

ДК 056206

Date of issue

26.02.2020

## ACADEMIC RANK

- No academic rank

# CURRICULUM VITAE

## Lishchuk-Pavlo Oleksandrovich

date of birth\* **12.07.1992**

citizenship\*Ukraine

<b>Contact information*</b>	<p><b>Address</b> - Akademika Hlushkova Ave, 4, Kyiv, 03680 +38 063 57 57 925 <a href="mailto:pavel.lishchuk@knu.ua">pavel.lishchuk@knu.ua</a> <a href="https://gen.phys.knu.ua/1869-lishchuk-pavlo-oleksandrovich/">https://gen.phys.knu.ua/1869-lishchuk-pavlo-oleksandrovich/</a></p>
<b>Personal profiles in scientometric databases*</b>	<p><a href="https://www.scopus.com/authid/detail.uri?authorId=56156845200">https://www.scopus.com/authid/detail.uri?authorId=56156845200</a> <a href="https://www.webofscience.com/wos/author/record/1729027">https://www.webofscience.com/wos/author/record/1729027</a> <a href="https://www.researchgate.net/profile/Pavlo-Lishchuk">https://www.researchgate.net/profile/Pavlo-Lishchuk</a> <a href="https://orcid.org/0000-0002-4665-1648">https://orcid.org/0000-0002-4665-1648</a> <a href="https://scholar.google.com.ua/citations?user=jqojoYAAAAJ&amp;hl=en">https://scholar.google.com.ua/citations?user=jqojoYAAAAJ&amp;hl=en</a></p>
<b>Education*</b>	<p><b>Taras Shevchenko National University of Kyiv, Faculty of Physics, 2009-2015, specialization: physics of nanosystems, Diploma number M15 № 051171</b></p>
<b>Degree*</b>	<p><b>“FEATURES OF THERMAL TRANSPORT IN POROUS SEMICONDUCTOR STRUCTURES BASED ON SILICON”</b> <b>Specialization 01.04.07 – physics of solids, Scientific supervisor: Roman Burbelo, 2019, Defense at a meeting of the specialized scientific council D 26.001.23 of Taras Shevchenko National University of Kyiv at the address: 03022, Kyiv, Academician Hlushkov Ave. 4, Faculty of Physics, room 500.</b> <b>Candidate of Physical and Mathematical Sciences, Diploma number DK 056206</b> <b>Date of issue of the diploma 26.02.2020</b></p>

<b>Academic status*</b>	-
<b>Professional work experience*</b> <i>(for the last 10 years)</i>	<p><b>2019-present: Assistant of the Department of General Physics, Faculty of Physics, Taras Shevchenko National University of Kyiv</b></p> <p><b>2018-2019: Engineer of the 1st category, Faculty of Physics, Taras Shevchenko National University of Kyiv</b></p> <p><b>2015-2018: PhD student, Faculty of Physics, Taras Shevchenko National University of Kyiv</b></p>
<b>Main research activity</b>	
<b>Management of collective research projects (which received funding on a competitive basis from outside the main place of work) (no more than 5 positions in the last 10 years)</b>	<p><b>Youth project of the Ministry of Education and Science of Ukraine No. 24BF051-02M "Development of advanced phase-change composite systems for efficient use of thermal energy" (2024-2026)</b></p> <p><b>Taras Shevchenko National University of Kyiv, 7 participants</b></p> <p><b><a href="https://mon.gov.ua/ua/npa/pro-zatverdzhennya-pereliku-proyektiv-fundamentalnih-naukovih-doslidzhen-prikladnih-naukovih-doslidzhen-ta-naukovo-tehnichnih-eksperimentalnih-rozrobok-molodih-vchenih-yaki-pracyuyut-navchayutsya-uzakladah-vishoyi-osviti-ta-naukovih-ustanovah">https://mon.gov.ua/ua/npa/pro-zatverdzhennya-pereliku-proyektiv-fundamentalnih-naukovih-doslidzhen-prikladnih-naukovih-doslidzhen-ta-naukovo-tehnichnih-eksperimentalnih-rozrobok-molodih-vchenih-yaki-pracyuyut-navchayutsya-uzakladah-vishoyi-osviti-ta-naukovih-ustanovah</a></b></p>
<b>Participation in collective research projects (no more than 5 positions in the last 10 years)</b>	
<b>Individual research projects (which received funding on a competitive basis from a third party) (no more than 5 positions in the last 10 years)</b>	<b>name of the project, period of implementation, name of the grant and donor; if available: a link to the website or a scan of the document</b>
<b>Main scientific achievements</b>	

**Published scientific works\***  
**(no more than 10 positions in the last 10 years)**

Pavlo Lishchuk, Alina Vashchuk, Sergiy Rogalsky, Lesia Chepela, Mykola Borovy, David Lacroix & Mykola Isaiev (2023) Thermal transport properties of porous silicon filled by ionic liquid nanocomposite system, *Scientific Reports*, volume 13, Article number: 5889

<https://www.nature.com/articles/s41598-023-32834-8>  
1.377

Mykola Isaiev, Gauhar Mussabek, Pavlo Lishchuk, Kateryna Dubyk, Nazym Zhylkybayeva, Gulmira Yar-Mukhamedova, David Lacroix, Vladimir Lysenko (2022) Application of the Photoacoustic Approach in the Characterization of Nanostructured Materials. *Nanomaterials*, 2022, 12(4), 708

<https://doi.org/10.3390/nano12040708>  
1.09

Gauhar Mussabek, Nazym Zhylkybayeva, Ivan Lysenko, Pavlo O. Lishchuk, Saule Baktygerez, Dana Yermukhamed, Yerzhan Taurbayev, Gani Sadykov, Alexander N. Zaderko, Valeriy A. Skryshevsky, Vladyslav V. Lisnyak, Vladimir Lysenko (2022) Photo- and Radiofrequency-Induced Heating of Photoluminescent Colloidal Carbon Dots. *Nanomaterials*

<https://doi.org/10.3390/nano12142426>  
1.09

Vashchuk A., Motrunich S., Lishchuk P., Demchenko V., Isaiev M., Iurzhenko M. (2022) Thermal Conductivity and Mechanical Properties of Epoxy Vitrimer Nanocomposites Reinforced with Graphene Oxide. *Applied Nanoscience*

<https://link.springer.com/article/10.1007/s13204-022-02587-3> (14):2426  
0.78

Litvinenko, S., Lishchuk, P., Lysenko, V., Isaiev, M. (2021) Bi-modal photothermal/optical microscopy for complementary bio-imaging with high resolution and contrast. *Applied Physics B: Lasers and Optics*, 127(10), 139  
<https://doi.org/10.1007/s00340-021-07686-7>  
0.89

Lishchuk P., Isaiev M., Osminkina L., Burbelo R., Nychyporuk T., Timoshenko V. (2019) Photoacoustic characterization of nanowire arrays formed by metal-assisted chemical etching of crystalline silicon substrates with different doping level // *Physica E: Low-dimensional Systems and Nanostructures* – Vol. 107 – P. 131-136  
<https://www.sciencedirect.com/science/article/pii/S1386947718303837>  
0.858

K. Dubyk, L. Chepela, P. Lishchuk, A. Belarouci, D. Lacroix, M. Isaiev (2019) Features of photothermal transformation in

	<p>porous silicon based multilayered structures // <i>Applied Physics Letters</i> – Vol. 115 – 021902 1-5  <a href="https://aip.scitation.org/doi/abs/10.1063/1.5099010?journalCode=apl">https://aip.scitation.org/doi/abs/10.1063/1.5099010?journalCode=apl</a>  1.252</p>
<b>Other significant scientific achievements (no more than 5 positions in the last 10 years)</b>	<p><i>Patent</i>  Ліщук П.О., Бурбело Р.М., Ісаєв М.В. Спосіб зменшення теплопровідності напівпровідникових структур на основі кремнію : пат. 130023. Україна. У 2018 о4935; заявл. 04.05.2018; опубл. 26.11.2018, Бюл. № 22 (кн..1), С. 125</p> <p><i>Ali Assy, Severine Gomes, Pavlo Lishchuk, and Mykola Isaiev, in Amorphization and thermal properties of nanostructures, edited by K. Termentzidis (CRC Press, Boca Raton, 2017).</i></p>
<b>Presentation of scientific results</b>	
<b>Key (plenary) reports at nationwide or international conferences (except for conferences that were always held by correspondence)</b>	-
<b>Personal speeches outside of Ukraine on the invitation of higher education institutions, research institutions or professional associations (except CIS countries) (no more than 10 positions in the last 10 years)</b>	-
<b>Reports at scientific conferences* (seminars, symposia, etc.) (no more than 10 positions in the last 10 years)</b>	<p>Fabrication and Photoacoustic Characterization of Multilayered Structures Based on Porous Silicon. 2022 IEEE 41st International Conference on Electronics and Nanotechnology (ELNANO), 10 – 14 October 2022, Kyiv, Ukraine.</p> <p>Thermal conductivity evaluation of the carbon-based nanofluids with photoacoustic approach. 2022 IEEE 12th International Conference “Nanomaterials: Applications &amp;</p>

Properties" (IEEE NAP-2022), 11- 16 September 2022, Krakow, Poland.

Investigation of Thermal Transport Properties of Multilayer Porous Silicon Based Hybrid Nanostructures by Photoacoustic Technique. 2022 IEEE 12th International Conference "Nanomaterials: Applications & Properties" (IEEE NAP-2022), 11-16 September 2022, Krakow, Poland.

Thermal conductivity of CsPbBr<sub>3</sub>halide perovskite: Photoacoustic measurements and molecular dynamics analysis. Thermophysics 2020, 7nd - 9th September, 2020, Smolnice, Czech Republic.

Impact of thermal annealing on photoacoustic response and heat transport in porous silicon based nanostructured materials. Thermophysics 2019, 22nd - 24th October, 2019, Smolnice, Czech Republic.

Characterization of Porous Silicon Based Composite Nanostructures by Means of Photoacoustic Technique. The 2018 IEEE 8th International Conference on Nanomaterials: Applications & Properties (NAP-2018), 9-14 September, 2018, Zatoka, Ukraine.

Features of Thermal Transport in Porous Silicon Based Multilayer Structures V International Conference. Modern problems of condensed matter. 03-06 October, 2018, Kyiv, Ukraine.

Photoacoustic technique for cell imaging. International Conference "Current Trends of Cancer Theranostics" (CTCT-2018), 1-5 July, 2018, Trakai, Lithuania.

Optical Properties of Porous Silicon p-Si (100). 6th International Conference "Structural Relaxation in Solids" (ICSRS-6), 22-24 May, 2018, Vinnytsya, Ukraine.

Evaluation of anisotropic thermal conductivity of nanomaterials by Raman technique, E-MRS Fall Meeting and Exhibit, 18-21 September 2017, Warsaw, Poland.

Features of photoacoustic transformation in multilayer silicon-based porous structures. International Research and Practice Conference "Nanotechnology and Nanomaterials" (NANO-2017), 23-26 August, 2017, Chernivtsi, Ukraine.

Thermal Conductivity Evaluation of Silicon Nanowires Arrays with Photothermal Techniques. Eurotherm Seminar No 108 "Nanoscale and Microscale Heat Transfer V", 26-30 September, 2016, Santorini, Greece.

Features of thermal transport in porous silicon based nanocomposite systems. International Conference Porous Semiconductors Science and Technology (PSST – 2016), 6-11 March, 2016, Tarragona, Spain.

Investigations of thermal transport properties in porous silicon by photoacoustic technique. Conference Photoacoustic and Photothermal Theory and Applications (CPPTA-II), 23-26 September, 2014, Warsaw, Poland.

Thermal conductivity study of nanostructured porous Si on monocrystalline Si substrate by photoacoustic technique .

Nanotechnology and Nanomaterials (NANO-2013): International research and practice conference, 25 August – 1 September, 2013, Bukovel, Ukraine.

**Promotion of scientific research**  
*(no more than 10 positions in the last 10 years)*

-

**Scientific and organizational activity**

**Participation in the organizing committees of scientific events (conferences, seminars, symposia, round tables, panel discussions, etc.)**  
*(no more than 5 positions in the last 10 years)*

-

**Participation in editorial boards of periodical scientific publications (in which mandatory anonymous peer review is carried out)**  
*(no more than 5 positions in the last 10 years)*

-

**Scientific editing (arrangement) of scientific publications**  
*(no more than 5 positions in the last 10 years)*

-

**Teaching activity**

**The main author's educational courses at Higher Education Institutions (developed on the basis of own research)**  
*(no more than 5 positions in the last 10 years)*

-

<p><b>The main author's methodical developments (textbooks, manuals, methodical materials, educational programs for higher education)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<p><b>O.O. Kalenyk, I.V. Plyushchay, T.L. Tsaregradskaya, P.O. Lischuk. Physics. Part II: Electricity and Magnetism, Optics, Atomic and Nuclear Physics: Textbook for foreign students of the preparatory departments</b> Київський національний університет імені Тараса Шевченка, ВПЦ Київський університет, 2022, 114 с.</p>
<p><b>Supervision of scientific works (scientific supervision or consulting of dissertation studies that have been successfully defended)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<p>-</p>
<p><b>Expert activity</b></p>	
<p><b>Membership in specialized academic councils for dissertation defense</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<p>-</p>
<p><b>Participation in expert councils (supervisory, advisory, expert or other councils of scientific, educational or research institutions, enterprises, cultural institutions, scientific publishing houses outside the main place of work)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<p>-</p>
<p><b>Participation in calls commissions (jury) (all-Ukrainian or international calls,</b></p>	<p>-</p>

<p><b>Olympiads, tournaments of research projects, scientific papers, etc.)</b>  <i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Scientific and expert activities for authorities (scientific and expert conclusions, comments, conclusions, etc. made at the request or order of authorities and self-government bodies, state structures, institutions, etc.)</b>  <i>(no more than 5 positions in the last 10 years)</i></p>	-
<p><b>Scientific review of publications and projects* (number of anonymous reviews of manuscripts of scientific works submitted for publication in international scientific journals over the past 5 years; author reviews of scientific publications published in specialized periodicals)</b>  <i>(no more than 5 positions in the last 5 years)</i></p>	review of 2 publications in : <i>Advanced Optical Materials,</i> <i>Journal of Applied Physics.</i>
<b>Honors and awards</b>	
<p><b>Honorary titles and statuses (honored worker of science and technology, academician, doctor honoris causa, etc.)</b></p>	-

<p><b>Laureate of a prize (awards, honors) of the international or national level, awarded on a competitive basis</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<p>Awarded with the Honorary Diploma of the Presidium of the National Academy of Sciences of Ukraine for research on the features of transport in heterogeneous nanostructured materials</p>
<p><b>Awards or honors for scientific achievements (from institutions, departments, authorities and local self-government bodies, etc.)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<p>Thanks from the Rector on the occasion of the Day of Science in Ukraine for relevant scientific research</p>
<h3>Improvement of scientific qualification</h3>	
<p><b>Additional professional schools (trainings, summer schools, educational seminars, master classes, courses, etc., to acquire relevant scientific knowledge, skills and abilities)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<p>-</p>
<p><b>Scientific internships abroad (lasting more than 2 months, in higher education institutions or research institutions, except correspondence and with the exception of CIS countries)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<p>-</p>
<p><b>Membership in independent scientific organizations (non- institutional</b></p>	<p>-</p>

<p><b>professional academic associations, societies, unions, unions of researchers, except trade unions)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Additional information on other important scientific achievements, qualifications, competences, or types of scientific activity that are significant for the implementation of the submitted research/development project</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	-
<p><b>Foreign languages skills*</b></p>	<i>English, ukrainian</i>

ПРЕЗИДІЯ  
НАЦІОНАЛЬНОЇ  
АКАДЕМІЇ НАУК  
УКРАЇНИ

НАГОРОДЖУЄ  
**ГРАМОТОЮ**

асистента кафедри  
Київського національного університету  
імені Тараса Шевченка

*кандидата фізико-математичних наук*

**ЛІЩУКА Павла Олександровича**

за дослідження особливостей транспорту в неоднорідних  
наноструктурованих матеріалах

Президент  
Національної академії наук України  
академік НАН України

В.о. головного вченого секретаря  
Національної академії наук України  
академік НАН України



23 лютого 2022 року

КІЇВСЬКИЙ НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ  
ІМЕНІ ТАРАСА ШЕВЧЕНКА



# ПОДЯКА РЕКТОРА

ЛІЩУК

Павло Олександрович

Відзначений  
з нагоди Дня науки в Україні  
та актуальні наукові дослідження

Ректор



Володимир БУГРОВ

2023

# **Project participants**

# Dr. Kuryliuk Vasyl V.

Gender	Date of birth
Male	23.07.1982
Country of Permanent Residence	Citizenship
Ukraine	Ukraine

Cell phone number	E-mail
+380661839590	kuryliuk@knu.ua

Other contact information (skype, viber, etc.)  
Viber (380661839590)

## SCIENTIFIC PROFILE

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Scientific-research profile (Orcid, Google Scholar, Scopus authors, etc) minimum two:

<https://orcid.org/0000-0003-0898-8888>

<https://www.scopus.com/authid/detail.uri?authorId=26647533300>

<https://www.webofscience.com/wos/author/record/1944712>

<https://scholar.google.com/citations?user=vzRPnWwAAAAJ&hl=ru&authuser=1>

Research experience: number of years	Total number of patents
15	0
Total number of publications	Number of publications in Q1 & Q2 quartile journals for the last 10 years
98	10
Hirsch index (SCOPUS)	Number of monographs
9	0
Obtained research grants	
Grant of the President of Ukraine to Support Scientific Research of Young Scientists 2012 (project "Engineering of mechanical stress in semiconductor heterostructures as a basis for the latest architecture of nanodevices")	
Experience as a reviewer (peer review of scholarly papers, review of research projects)	
Reviewing a scientific journal article including Journal of Applied Physics, Computational Material Science, Ukrainian Journal of Physics	

## RESEARCH ACTIVITY

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### Solid state physics

Area of expertise	Branch of science
Natural, technical sciences and mathematics	Physical and mathematical sciences
Number of publications in the field of expertise	Keywords
45	Nanostructures, quantum dots, nanowires, semiconductors, silicon, thermal conductivity, phonon properties, photovoltage properties, modeling, molecular dynamics

LIST OF SCIENTIFIC PUBLICATIONS WHICH ARE RELEVANT FOR THIS COMPETITION ( ENTER NOT MORE THAN 12 PUBLICATIONS)

[10.1063/1.5108780](https://doi.org/10.1063/1.5108780)

*Kuryliuk Vasyl, Nepochatyi Oleksii, Chantrenne Patrice, Lacroix David, Isaiev Mykola*

Thermal conductivity of strained silicon: Molecular dynamics insight and kinetic theory approach

Journal of Applied Physics (AIP Publishing), 2019

Thermal conductivity, Silicon, Molecular dynamics

<https://doi.org/10.1038/s41598-019-52654-z>

*Nadtochiy Andriy, Kuryliuk Vasyl, Strelchuk Viktor, Korotchenkov Oleg, Li Pei-Wen, Lee Sheng-Wei*

Enhancing the Seebeck effect in Ge/Si through the combination of interfacial design features

Scientific Reports (Springer Science and Business Media LLC), 2019

Quantum dots, SiGe heterostructures, Seebeck coefficient

[10.1016/j.apsusc.2015.04.009](https://doi.org/10.1016/j.apsusc.2015.04.009)

*Gorb A., Korotchenkov O., Kuryliuk V., Medvid A., Mozolevskis G., Nadtochiy A., Podolian A.*

Electron and hole separation in Ge nanocones formed on Si<sub>1-x</sub>Ge<sub>x</sub> solid solution by Nd:YAG laser radiation

Applied Surface Science (Elsevier BV), 2015

SiGe nanostructures, Surface photovoltage

[10.1016/j.physe.2017.01.021](https://doi.org/10.1016/j.physe.2017.01.021)

*Kuryliuk Vasyl V., Korotchenkov Oleg A.*

Atomistic simulation of the thermal conductivity in amorphous SiO<sub>2</sub> matrix/Ge nanocrystal composites

Physica E: Low-dimensional Systems and Nanostructures (Elsevier BV), 2017

Thermal conductivity, Molecular dynamics, Nanocrystals

[10.1039/c5cp00129c](https://doi.org/10.1039/c5cp00129c)

*Kuryliuk Vasyl, Nadtochiy Andriy, Korotchenkov Oleg, Wang Chin-Chi, Li Pei-Wen*

A model for predicting the thermal conductivity of SiO<sub>2</sub>-Ge nanoparticle composites

Physical Chemistry Chemical Physics (Royal Society of Chemistry (RSC)), 2015  
thermal conductivity, nanoparticle, strain

<https://doi.org/10.1007/s10853-019-03523-7>

*Gorelov Borys, Gorb Alla, Nadtochiy Andriy, Starokadomsky Dmitro, Kuryliuk Vasyl, Sigareva Nadia, Shulga Sergey, Ogenko Volodymyr, Korotchenkov Oleg, Polovina Oleksiy*

Epoxy filled with bare and oxidized multi-layered graphene nanoplatelets: a comparative study of filler loading impact on thermal properties

Journal of Materials Science, Springer Science and Business Media LLC, 2019

Graphene, Epoxy nanocomposites, thermal properties

<https://doi.org/10.1140/epjb/e2014-50074-8>

*Korotchenkov Oleg, Nadtochiy Andriy, Kuryliuk Vasyl, Wang Chin-Chi, Li Pei-Wen, Cantarero Andres*

Thermoelectric energy conversion in layered structures with strained Ge quantum dots grown on Si surfaces

The European Physical Journal B, Springer Science and Business Media LLC, 2014

Quantum dots, strain, thermoelectric

[10.1063/5.0148434](https://doi.org/10.1063/5.0148434)

*Isaiev Mykola, Mankovska Yuliia, Kuryliuk Vasyl, Lacroix David*

Thermal transport properties of nanoporous silicon with significant specific surface area

Applied Physics Letters, AIP Publishing, 2023

Molecular dynamics, Thermal conductivity, Thermal transport, Phonons, Transport properties, Porous media, Computer simulation, Nanomaterials, Kinetic theory

[10.1039/D2CP05185K](https://doi.org/10.1039/D2CP05185K)

*Kuryliuk Vasyl, Tyvonovych Ostap, Semchuk Sviatoslav*

Impact of Ge clustering on the thermal conductivity of SiGe nanowires: atomistic simulation study

Physical Chemistry Chemical Physics, Royal Society of Chemistry (RSC), 2023

Nanowire, Thermal conductivity, Silion, Germanium, Molecular dynamics

[10.1016/j.nanoso.2021.100822](https://doi.org/10.1016/j.nanoso.2021.100822)

*Kuryliuk V.V., Semchuk S.S., Dubyk K.V., Chornyi R.M.*

Structural features and thermal stability of hollow-core Si nanowires: A molecular dynamics study

Nano-Structures & Nano-Objects, Elsevier BV, 2021

Hollow-core nanowire; Silicon; Molecular dynamics; Structure

## EDUCATION

Taras Shevchenko National University of Kyiv

Country Ukraine	City Kyiv
Faculty (school) Physics	Specialisation Solid State Physics
Diploma number KBN№27297358	Date of issue 27.06.2005

## **EMPLOYMENT AND POSITION**

---

### **Taras Shevchenko National University of Kyiv**

Position Head of Department	Employment period 01.09.2008 - Current employment
Institution's subordination Ministry of Education and Science of Ukraine	Institutions EDRPOU code (for Ukrainian institutions only, foreign experts enter 00000000) 02070944
Country Ukraine	City Kyiv
Institution's Address 60 Volodymyrska Street, Kyiv, Ukraine, 01033	
Office phone number 044-239-31-41	

## **SCHOLARLY / RESEARCH DEGREE**

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### **Ph.D.**

Diploma number ДКН№053796	Date of issue 08.07.2009
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## **ACADEMIC RANK**

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- Assistant professor



# CURRICULUM VITAE

Kuryliuk Vasyl Vasylovych

23/07/1982

Ukraine

Contact information*	<p>Address: Glushkova av. 4, м. Kyiv, 03022 Phone: +38(044)521-33-12 Email: <a href="mailto:kuryliuk@knu.ua">kuryliuk@knu.ua</a> Personal Internet page: <a href="https://metphys.knu.ua/kurilyuk-vasil-vasilovich/">https://metphys.knu.ua/kurilyuk-vasil-vasilovich/</a></p>
Personal profiles in scientometric databases*	<p>ORCID: <a href="https://orcid.org/0000-0003-0898-8888">https://orcid.org/0000-0003-0898-8888</a> Scopus ID: <a href="https://www.scopus.com/authid/detail.uri?authorId=26647533300">26647533300</a> Publons Web of Science: <a href="https://publons.com/researcher/1944712/">1944712</a> Google Scholar: <a href="https://scholar.google.com/citations?user=VasylKuryliuk&amp;hl=en">Vasyl Kuryliuk</a></p>
Education*	<p>Taras Shevchenko National University of Kyiv, 1999-2005, specialty "Solid State Physics", diploma number <b>КВ № 27297358</b></p>
Degree*	<p>Candidate of Physical and Mathematical Sciences for the specialty "Solid State Physics", 2009, Taras Shevchenko National University of Kyiv, diploma number <b>ДКН№ 053796</b></p>
Academic status*	<p>Docent of the Department of Metal Physics, 30.06.2015, 12ДЦН№ 042928</p>
Professional work experience* (for the last 10 years)	<p>2021 – Current, Head of the Department of Metal Physics at Physics Faculty Taras Shevchenko National University of Kyiv 2013 – 2021, Associate Professor of the Department of Metal Physics at Physics Faculty Taras Shevchenko National University of Kyiv</p>

## Main research activity

Management of collective research projects (which received funding on a competitive basis from outside the main place of work) <i>(no more than 5 positions in the last 10 years)</i>	<ol style="list-style-type: none"><li>1. "Computer design, synthesis and thermal transport properties of silicon nanostructures for energy-efficient applications", Taras Shevchenko National University of Kyiv, 2020-2021, 2023, Grant of the National Research Foundation of Ukraine, registration number 2020.02/0067;</li><li>2. "Features of the stressed state of SiGe quantum dots in crystalline and amorphous matrices", Taras Shevchenko National University of Kyiv, 2016-2018, registration number 0115U000266;</li><li>3. "Analysis of mechanical stresses in semiconductor nanostructures for the photo- and thermovoltaics applications", Taras Shevchenko National University of Kyiv, 2015, registration number 0116U006916.</li></ol>
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## Participation in collective research projects

*(no more than 5 positions in the last 10 years)*

## Individual research projects (which received funding on a competitive basis from a third party) *(no more than 5 positions in the last 10 years)*

## Main scientific achievements

### Published scientific works\*

*(no more than 10 positions in the last 10 years)*

Mykola Isaiev, Yuliia Mankovska, Vasyl Kuryliuk; David Lacroix. Thermal transport properties of nanoporous silicon with significant specific surface area // Appl. Phys. Lett. – 2023.- Vol.122. – P. 172201 (4p.) (Q1).

<https://doi.org/10.1063/5.0148434>

V. Kuryliuk, O. Tyvonovych, S. Semchuk. Impact of Ge clustering on the thermal conductivity of SiGe nanowires: atomistic simulation study // Phys. Chem. Chem. Phys. – 2023.- Vol.25. – P. 6263-6269. (Q1).  
<https://doi.org/10.1039/D2CP05185K>

V.V. Kuryliuk, S.S. Semchuk, K.V. Dubyk, R.M. Chornyi Structural features and thermal stability of

*hollow-core Si nanowires: A molecular dynamics study // Nano-Structures and Nano-Objects – 2022. – Vol. 29. – P. 100822 (8p.). (Q1).*  
<https://doi.org/10.1016/j.nanoso.2021.100822>

*A. Nadtochiy, V. Kuryliuk, V. Strelchuk, O. Korotchenkov, P.-W. Li and S.-W. Lee Enhancing the Seebeck effect in Ge/Si through the combination of interfacial design features // Scientific Reports. – 2019. – V.9. – P. 16335 (11 p.). (Q1).*  
<https://doi.org/10.1038/s41598-019-52654-z>

*V. Kuryliuk, O. Nepochatyi, P. Chantrenne, D. Lacroix, and M. Isaiev Thermal conductivity of strained silicon: Molecular dynamics insight and kinetic theory approach // Journal of Applied Physics. – 2019. – V.126, №5. – P. 055109 (13 p.). (Q2).*  
<https://doi.org/10.1063/1.5108780>

*B. Gorelov, A. Gorb, A. Nadtochiy, D. Starokadomsky, V. Kuryliuk, N. Sigareva, S. Shulga, V. Ogenko, O. Korotchenkov, O. Polovina Epoxy filled with bare and oxidized multi-layered graphene nanoplatelets: a comparative study of filler loading impact on thermal properties // J. Mater. Sci. – 2019. – Vol. 54, №12. – P. 9247 – 9266. (Q1).*  
<https://doi.org/10.1007/s10853-019-03523-7>

Other significant scientific achievements  
(no more than 5 positions in the last 10 years)

### Presentation of scientific results

Key (plenary) reports at nationwide or international conferences (except for conferences that were always held by correspondence)

Personal speeches outside of Ukraine on the invitation of higher education institutions, research institutions or professional associations (except CIS countries)

<p>(no more than 10 positions in the last 10 years)</p>	
<p>Reports at scientific conferences* (seminars, symposia, etc.)  (no more than 10 positions in the last 10 years)</p>	<p><i>Mechanical properties of SiGe core-shell nanowires: molecular dynamics simulations, "International research and practice conference "Nanotechnology and Nanomaterials (NANO-2022)" - August 25-27, 2022, Lviv, Ukraine.</i></p>
<p>Promotion of scientific research  (no more than 10 positions in the last 10 years)</p>	
<h3>Scientific and organizational activity</h3>	
<p>Participation in the organizing committees of scientific events (conferences, seminars, symposia, round tables, panel discussions, etc.)  (no more than 5 positions in the last 10 years)</p>	<p>1. Member of the organizing committee, 5<sup>th</sup> International Conference "Modern problems of condensed matter", organized by Taras Shevchenko National University of Kyiv, Kyiv, Ukraine, October 3-6, 2018. <a href="http://condmat.univ.kiev.ua/index.html">http://condmat.univ.kiev.ua/index.html</a>. 2. Member of the organizing committee, 4<sup>th</sup> International Conference "Modern problems of condensed matter", organized by Taras Shevchenko National University of Kyiv, Kyiv, Ukraine, October 7-10, 2015.</p>
<p>Participation in editorial boards of periodical scientific publications (in which mandatory anonymous peer review is carried out)  (no more than 5 positions in the last 10 years)</p>	
<p>Scientific editing (arrangement) of scientific publications  (no more than 5 positions in the last 10 years)</p>	

## Teaching activity

The main author's educational courses at Higher Education Institutions (developed on the basis of own research) <i>(no more than 5 positions in the last 10 years)</i>	"Theory and modelling of nanostructures", (level II), Taras Shevchenko National University of Kyiv, 2022-2023, 30 hours.
The main author's methodical developments (textbooks, manuals, methodical materials, educational programs for higher education) <i>(no more than 5 positions in the last 10 years)</i>	1. Tovstolytkin O.I., Borovyi M.O., Kuryliuk V.V., Kunytsky Y.A. Physical fundamentals of spintronics - Vinnytsia: Nilan Ltd, 2014. - 500 p. 2. Methodical development of the course "Theory and modelling of nanostructures" - Vinnytsia: Nilan Ltd. 2017. 28 p.
Supervision of scientific works (scientific supervision or consulting of dissertation studies that have been successfully defended) <i>(no more than 5 positions in the last 10 years)</i>	

## Expert activity

Membership in specialized academic councils for dissertation defense <i>(no more than 5 positions in the last 10 years)</i>	
Participation in expert councils (supervisory, advisory, expert or other councils of scientific, educational or research institutions, enterprises, cultural institutions,	

<p>scientific publishing houses outside the main place of work)  <i>(no more than 5 positions in the last 10 years)</i></p>	
<p>Participation in calls commissions (jury) (all-Ukrainian or international calls, Olympiads, tournaments of research projects, scientific papers, etc.)  <i>(no more than 5 positions in the last 10 years)</i></p>	
<p>Scientific and expert activities for authorities (scientific and expert conclusions, comments, conclusions, etc. made at the request or order of authorities and self-government bodies, state structures, institutions, etc.)  <i>(no more than 5 positions in the last 10 years)</i></p>	
<p>Scientific review of publications and projects* (number of anonymous reviews of manuscripts of scientific works submitted for publication in international scientific journals over the past 5 years; author reviews of scientific publications published in specialized periodicals)  <i>(no more than 5 positions in the last 5 years)</i></p>	<p><i>Reviewer of scientific articles in Langmuir, Journal of the Mechanical Behaviour of Materials, Ukrainian Journal of Physics, Physics and Chemistry of Solids</i></p>
<p>Honors and awards</p>	

<p>Honorary titles and statuses (honored worker of science and technology, academician, doctor honoris causa, etc.)</p>	<p><i>Scholarship of the Cabinet of Ministers of Ukraine for Young Scientists (Resolution of the Presidium of the Committee for State Prizes of Ukraine in Science and Technology of 10 October 2016, No. 6).</i></p> <p><a href="http://www.kdpu-nt.gov.ua/uk/content/stipendiyi-prezidenta-ukrayini-ta-kabinetu-ministriv-ukrayini-dlya-molodih-vchenih"><u>http://www.kdpu-nt.gov.ua/uk/content/stipendiyi-prezidenta-ukrayini-ta-kabinetu-ministriv-ukrayini-dlya-molodih-vchenih</u></a></p>
<p>Laureate of a prize (awards, honors) of the international or national level, awarded on a competitive basis</p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p>Awards or honors for scientific achievements (from institutions, departments, authorities and local self-government bodies, etc.)</p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p>Improvement of scientific qualification</p>	
<p>Additional professional schools (trainings, summer schools, educational seminars, master classes, courses, etc., to acquire relevant scientific knowledge, skills and abilities)</p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p>Scientific internships abroad (lasting more than 2 months, in higher education institutions or research institutions, except correspondence and with the exception of CIS countries)</p>	

<p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p>Membership in independent scientific organizations (non-institutional professional academic associations, societies, unions, unions of researchers, except trade unions)</p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<p><i>Ukrainian Physical Society (all-Ukrainian), member, period of membership since 06.2023</i></p>
<p>Additional information on other important scientific achievements, qualifications, competences, or types of scientific activity that are significant for the implementation of the submitted research/development project</p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p>Foreign languages skills*</p>	<p><i>English B2; publications in a foreign language in foreign publications</i>  <i>(<a href="https://www.scopus.com/authid/detail.uri?authorId=26647533300">https://www.scopus.com/authid/detail.uri?authorId=26647533300</a>).</i></p>

# Mrs. Shevchenko Victoria Bogdanivna

Gender	Date of birth
Female	09.05.1973
Country of Permanent Residence	Citizenship
Ukraine	Ukraine
Cell phone number	E-mail
+38 (050) 445-27-34	<a href="mailto:shev.vict@gmail.com">shev.vict@gmail.com</a>
Other contact information (skype, viber, etc.)	
+38 (050) 445-27-34 viber, telegram	

## SCIENTIFIC PROFILE

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Scientific-research profile (Orcid, Google Scholar, Scopus authors, etc) minimum two:

<https://orcid.org/0000-0001-6748-1249>;

<https://www.scopus.com/authid/detail.uri?authorId=7401566721>;

[https://scholar.google.com/citations?user=B7n\\_fbwAAAAJ&hl=ru&oi=sra](https://scholar.google.com/citations?user=B7n_fbwAAAAJ&hl=ru&oi=sra)

Research experience: number of years  
25

Total number of patents  
0

Total number of publications  
48

Number of publications in Q1 & Q2 quartile journals  
for the last 10 years  
2

Hirsch index (SCOPUS)  
4

Number of monographs  
0

Obtained research grants

Project participant, "Computer design, synthesis and heat transfer properties of silicon nanostructures for energy efficient applications", National Research Foundation of Ukraine (2020-2021, 2023) ID: 2020.02/0067

Experience as a reviewer (peer review of scholarly papers, review of research projects)  
no

## RESEARCH ACTIVITY

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### Solid state physics

Area of expertise  
Natural, technical sciences and mathematics

Branch of science  
Physical and mathematical sciences

Number of publications in the field of expertise  
45

Keywords  
porous silicon, multilayer structures, thermal conductivity, photoluminescence, oxidation

LIST OF SCIENTIFIC PUBLICATIONS WHICH ARE RELEVANT FOR THIS COMPETITION (ENTER NOT MORE THAN 12 PUBLICATIONS)

[10.21272/jnep.11\(3\).03005](https://doi.org/10.21272/jnep.11(3).03005)

*Shevchenko V. B., Datsenko O. I., Kravchenko V. M., Makara V. A., Prorok V. V.*

Effect of Nucleic Acids on Oxidation and Photoluminescence of Porous Silicon

Journal of Nano- and Electronic Physics (Sumy State University), 2019

Porous silicon, Photoluminescence, Oxidation, Nucleic acid, Biosensors, Reactive oxygen species

[10.1051/epjap/2016160325](https://doi.org/10.1051/epjap/2016160325)

*Shevchenko Victoriya B., Dacenko Oleksandr, Makara Volodymyr, Golovynskyi Sergii L., Golovynska Iuliia*

Photoluminescence of porous silicon as an indicator of its interaction with nucleic acids

The European Physical Journal Applied Physics (EDP Sciences), 2016

Porous silicon, Photoluminescence, Aqueous solution, Biosensors

[10.1016/j.physe.2023.115812](https://doi.org/10.1016/j.physe.2023.115812)

*Datsenko Oleksandr I., Golovynskyi Sergii, Pérez-Jiménez Ana I., Chaigneau Marc, Golovynskyi Andrii, Golovynska Iuliia, Shevchenko Victoriya, Bosi Matteo, Seravalli Luca*

Tensile strain creates trion: Excitonic photoluminescence distribution over bilayer MoS<sub>2</sub> grown by CVD

Physica E: Low-dimensional Systems and Nanostructures, Elsevier BV, 2023

Photoluminescence, Molybdenum disulfide, Exciton, Trion, Strain

[10.21272/jnep.15\(6\).06006](https://doi.org/10.21272/jnep.15(6).06006)

*Lishchuk Pavlo, Melnyk Olexandr, Shevchenko Viktoria, Borovyi Mykola, Kuryliuk Vasyl*

The Effect of Gamma Irradiation on the Thermal Properties of Porous Silicon by Photoacoustic Technique

Journal of Nano- and Electronic Physics, Sumy State University, 2024

Porous silicon, Gamma radiation, Photoacoustic technique, Thermal conductivity

[10.1109/nap59739.2023.10310927](https://doi.org/10.1109/nap59739.2023.10310927)

*Kuryliuk Alla, Boyko Volodymyr, Gomenyuk Olga, Nedilko Serhii G., Terebilenko Kateryna, Teselko Petro, Scherbatskyi Vasyl, Sheludko Vadym, Shevchenko Viktoria, Chornii Vitalii*

Morphology and Optical Properties of Porous Silicon Filled with Luminescent Oxide Dielectric Nanoparticles

2023 IEEE 13th International Conference Nanomaterials: Applications & Properties (NAP), IEEE, 2023

luminescence, oxide, phosphate, porous silicon, praseodymium

[10.1109/nap55339.2022.9934682](https://doi.org/10.1109/nap55339.2022.9934682)

*Lishchuk Pavlo, Chepela Lesia, Kuryliuk Vasyl, Polishchuk Elysaveta, Shevchenko Viktoria, Borovyi Mykola, Lacroix David, Isaiev Mykola*

Investigation of Thermal Transport Properties of Multilayer Porous Silicon Based Hybrid Nanostructures by Photoacoustic Technique

2022 IEEE 12th International Conference Nanomaterials: Applications & Properties (NAP), IEEE, 2022

porous silicon nanostructures, multi-layered porous silicon, hybrid nanosystems, photoacoustic technique, thermal conductivity

[10.1109/elnano54667.2022.9927023](https://doi.org/10.1109/elnano54667.2022.9927023)

*Chepela Lesia, Lishchuk Pavlo, Shevchenko Viktoria, Kuryliuk Vasyl, Polishchuk Elysaveta, Kuzmich Andrey, Teselko Petro, Matushko Igor, Borovyi Mykola*

Fabrication and Photoacoustic Characterization of Multilayered Structures Based on Porous Silicon

2022 IEEE 41st International Conference on Electronics and Nanotechnology (ELNANO), IEEE, 2022

porous silicon, multilayered structure, synthesis, thermal conductivity, photoacoustic technique

[10.1109/nap59739.2023.10310942](https://doi.org/10.1109/nap59739.2023.10310942)

*Kuryliuk Vasyl, Shevchenko Viktoria*

Computational Study of the Thermal Transport Properties of Hollow-Core Si Nanowires

2023 IEEE 13th International Conference Nanomaterials: Applications & Properties (NAP), IEEE, 2023

silicon, nanowire, hollow-core, thermal conductivity

## EDUCATION

---

### Taras Shevchenko University of Kyiv

Country	City
Ukraine	Kyiv
Faculty (school)	Specialisation
Faculty of Physics	solid state physics
Diploma number	Date of issue
004388	30.06.1995

## EMPLOYMENT AND POSITION

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### Taras Shevchenko National University of Kyiv

Position	Employment period
Associate Professor	01.09.2020 - Current employment
Institution's subordination	Institutions EDRPOU code (for Ukrainian institutions only, foreign experts enter 00000000)
MES of Ukraine	02070944
Country	City
Ukraine	Kyiv
Institution's Address	
60 Volodymyrska Street, Kyiv, Ukraine, 01033	
Office phone number	
+38 (044) 239 33 33	

## SCHOLARLY / RESEARCH DEGREE

Ph.D.

Diploma number  
042391

Date of issue  
20.09.2007

## ACADEMIC RANK

- No academic rank

# CURRICULUM VITAE

## Shevchenko Viktoriia Bogdanivna

date of birth\***09/05/1973**

citizenship\* Ukraine

Contact information*	<p><b>Address:</b> 4( b.1), pr. Glushkova, Kyiv, Ukraine, 03022 <b>phone:</b> +380 44 521-33-63 <b>Email:</b> <a href="mailto:shevchenko@univ.kiev.ua">shevchenko@univ.kiev.ua</a>, <a href="mailto:victoriashevchenko@knu.ua">victoriashevchenko@knu.ua</a> <a href="https://metphys.knu.ua/shevchenko-viktoriya-bogdanivna/">https://metphys.knu.ua/shevchenko-viktoriya-bogdanivna/</a></p>
Personal profiles in scientometric databases*	<p><a href="https://orcid.org/0000-0001-6748-1249">https://orcid.org/0000-0001-6748-1249</a> <a href="https://www.scopus.com/authid/detail.uri?authorId=7401566721">https://www.scopus.com/authid/detail.uri?authorId=7401566721</a> <a href="https://publons.com/researcher/3751581/victoria-shevchenko/">https://publons.com/researcher/3751581/victoria-shevchenko/</a> <a href="https://scholar.google.com/citations?user=B7n_fbwAAAAJ&amp;hl=ru&amp;oi=sra">https://scholar.google.com/citations?user=B7n_fbwAAAAJ&amp;hl=ru&amp;oi=sra</a></p>
Education*	<p><b>Kyiv Taras Shevchenko University, 1990-1995,</b> <b>specialty “Solid State Physics”, diploma number 004388</b></p>
Degree*	<p><b>Candidate of Physical and Mathematical Sciences,</b> <b>specialty “Solid State Physics”, 2007/04/23, Kyiv Taras Shevchenko National University, diploma number 042391</b></p>
Academic status*	<p><b>none</b></p>
Professional work experience* <i>(for the last 10 years)</i>	<p><b>01/09/2020 – Current, Associate Professor of the Department of Metal Physics at Physics Faculty Kyiv Taras Shevchenko National University</b> <b>01/09/2011 – 31/08/2020, Assistant Professor of the Department of Metal Physics at Physics Faculty Kyiv Taras Shevchenko National University</b></p>
Main research activity	

<p><b>Management of collective research projects (which received funding on a competitive basis from outside the main place of work)</b>  <i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Participation in collective research projects</b>  <i>(no more than 5 positions in the last 10 years)</i></p>	<p><b>Project participant (executor), “Computer design, synthesis and heat transfer properties of silicon nanostructures for energy efficient applications” (all-Ukrainian), National Research Foundation of Ukraine, 2020-2021, 2023, ID: 2020.02/0067</b></p>
<p><b>Individual research projects (which received funding on a competitive basis from a third party)</b>  <i>(no more than 5 positions in the last 10 years)</i></p>	
<h3>Main scientific achievements</h3>	
<p><b>Published scientific works*</b>  <i>(no more than 10 positions in the last 10 years)</i></p>	<ol style="list-style-type: none"> <li>1. Yu. F. Zabashta; M. M. Lazarenko; A. N. Alekseev; K. S. Yablochkova; V. B. Shevchenko; L. A. Bulavin “Gibbs equilibrium conditions and the thermodynamic limit”, <i>Chemical Physics</i>, <b>579</b>, 112193 (2024). DOI: <a href="https://doi.org/10.1016/j.chemphys.2024.112193">10.1016/j.chemphys.2024.112193</a>. Q2.</li> <li>2. V. B. Shevchenko, O. I. Nizhelska, A. S. Shirinyan, S. I. Voychuk, P. O. Teselko, A. M., Kuryliuk and E. M. Polishchuk “Features of formation and structure of bacterial cellulosecarbon nanotube composites”, <i>Molecular Crystals and Liquid Crystals</i>, <b>768</b>, 9 (2024). DOI: <a href="https://doi.org/10.1080/15421406.2023.2231240">10.1080/15421406.2023.2231240</a>. Q4.</li> <li>3. O. I. Datsenko, S. Golovynskyi, A. I. Pérez-Jiménez, M. Chaigneau, A. Golovynskyi, I. Golovynska, V. Shevchenko, M. Bosi, L. Seravalli “Tensile strain creates trion: Excitonic photoluminescence distribution over bilayer MoS<sub>2</sub> grown by CVD”, <i>Physica E: Lowdimensional Systems and Nanostructures</i>, <b>154</b>, 115812 (2023). DOI: <a href="https://doi.org/10.1016/j.physe.2023.115812">10.1016/j.physe.2023.115812</a>. Q2.</li> <li>4. P. Lishchuk, O. Melnyk, V. Shevchenko, M. Borovyi, V. Kuryliuk “The Effect of Gamma Irradiation on the Thermal Properties of Porous Silicon by Photoacoustic Technique”, <i>Journal of Nano- and Electronic Physics</i>. <b>15</b>, N 6, .06006 (2023). DOI: <a href="https://doi.org/10.21272/jnep.15(6).06006">10.21272/jnep.15(6).06006</a>. Q4.</li> </ol>

5. V. Kuryliuk; V. Shevchenko. "Computational Study of the Thermal Transport Properties of Hollow-Core Si Nanowires", Proceedings of the 2023 IEEE 13<sup>th</sup> International Conference "Nanomaterials: Applications and Properties" (NAP 2023), TPNS031 (2023). DOI: [10.1109/nap59739.2023.10310942](https://doi.org/10.1109/nap59739.2023.10310942).  
<https://ieeexplore.ieee.org/document/10310942>.
6. A. Kuryliuk; V. Boyko; O. Gomenyuk; S. G. Nedilko; K. Terebilenko; P. Teselko; V. Scherbatskyi; V. Sheludko; V. Shevchenko; V. Chornii "Morphology and Optical Properties of Porous Silicon Filled with Luminescent Oxide Dielectric Nanoparticles", Proceedings of the 2023 IEEE 13<sup>th</sup> International Conference "Nanomaterials: Applications and Properties" (NAP 2023), NSS171 (2023). DOI: [10.1109/nap59739.2023.10310927](https://doi.org/10.1109/nap59739.2023.10310927).  
<https://ieeexplore.ieee.org/document/10310927>.
7. Lishchuk P., Chepela L., Kuryliuk V., Polishchuk E., Shevchenko V., Borovyi M., Lacroix D., Isaiev M. "Investigation of Thermal Transport Properties of Multilayer Porous Silicon Based Hybrid Nanostructures by Photoacoustic Technique", Proceedings of the 2022 IEEE 12<sup>th</sup> International Conference "Nanomaterials: Applications and Properties" (NAP 2022), TPNS03 (2022). DOI: [10.1109/nap55339.2022.9934682](https://doi.org/10.1109/nap55339.2022.9934682)  
<https://ieeexplore.ieee.org/document/9934682>.
8. Chepela L., Lishchuk P., Shevchenko V., Kuryliuk V., Polishchuk E., Kuzmich A., Teselko P., Matushko I., Borovyi M. "Fabrication and Photoacoustic Characterization of Multilayered Structures Based on Porous Silicon", 2022 IEEE 41<sup>st</sup> International Conference on Electronics and Nanotechnology, ELNANO 2022 - Proceedings, 178 (2022). DOI: [10.1109/elnano54667.2022.9927023](https://doi.org/10.1109/elnano54667.2022.9927023)  
<https://ieeexplore.ieee.org/document/9927023>
9. V. B. Shevchenko, O.I. Datsenko, V.M. Kravchenko, V.A. Makara "Effect of nucleic acids on oxidation and photoluminescence of porous silicon", Journal of Nano- and Electronic Physics. 11, N3, 03005 (2019). DOI: [10.21272/jnep.11\(3\).03005](https://doi.org/10.21272/jnep.11(3).03005) Q3.
10. Shevchenko V., Dacenko O., Makara V., Golovynskyi S., Golovynska I. "Photoluminescence of porous silicon as an indicator of its interaction with nucleic acids", Eur. Phys. J. Appl. Phys., 76, 30401 (2016). DOI: [10.1051/epjap/2016160325](https://doi.org/10.1051/epjap/2016160325) Q3.

**Other significant scientific achievements  
(no more than 5 positions in the last 10 years)**

## Presentation of scientific results

<b>Key (plenary) reports at nationwide or international conferences (except for conferences that were always held by correspondence)</b>	
<b>Personal speeches outside of Ukraine on the invitation of higher education institutions, research institutions or professional associations (except CIS countries)</b> <i>(no more than 10 positions in the last 10 years)</i>	
<b>Reports at scientific conferences* (seminars, symposia, etc.)</b> <i>(no more than 10 positions in the last 10 years)</i>	<p>1. "Computational Study of the Thermal Transport Properties of Hollow-Core Si Nanowires", 2023 IEEE 13th International Conference "Nanomaterials: Applications and Properties" (IEEE NAP 2023); організатори Institute of Electrical Engineering Slovak Academy of Sciences Slovak University of Technology in Bratislava Sumy State University IEEE Nanotechnology Council. Bratislava, Slovakia, September 10–15, 2023. <a href="https://ieeenap.org/data/IEEE_NAP2023_Program.pdf">https://ieeenap.org/data/IEEE_NAP2023_Program.pdf</a>.</p> <p>2."Morphology and Optical Properties of Porous Silicon Filled with Luminescent Oxide Dielectric Nanoparticles", 2023 IEEE 13th International Conference "Nanomaterials: Applications and Properties" (IEEE NAP 2023); організатори Institute of Electrical Engineering Slovak Academy of Sciences Slovak University of Technology in Bratislava Sumy State University IEEE Nanotechnology Council. Bratislava, Slovakia, September 10–15, 2023. Bratislava, Slovakia, September 10–15, 2023. <a href="https://ieeenap.org/data/IEEE_NAP2023_Program.pdf">https://ieeenap.org/data/IEEE_NAP2023_Program.pdf</a>.</p> <p>3."Surface Modification of Luminescent Porous Silicon by Aqueous Solutions of Amino Acids", Proceedings of the 2022 IEEE 12<sup>th</sup> International Conference "Nanomaterials: Applications and Properties" (NAP 2022), організатори IEEE Nanotechnology Council, Silesian University of Technology, Sumy State University. Krakow, Poland 11-16 September, 2022. <a href="https://ieeenap.org/data/IEEE_NAP-2022_Program.pdf">https://ieeenap.org/data/IEEE_NAP-2022_Program.pdf</a>.</p>

4. "Photoluminescence of porous silicon as an indicator of its interaction with nucleotide solutions", 5th International Conference "Modern problems of condensed matter", organized by Kyiv Taras Shevchenko National University, Kyiv, Ukraine, October 3-6, 2018

<http://condmat.univ.kiev.ua/index.html>

## Promotion of scientific research

(no more than 10 positions in the last 10 years)

## Scientific and organizational activity

### Participation in the organizing committees of scientific events (conferences, seminars, symposia, round tables, panel discussions, etc.) (no more than 5 positions in the last 10 years)

Member of the organizing committee, 5th International Conference "Modern problems of condensed matter", organized by Kyiv Taras Shevchenko National University, Kyiv, Ukraine, October 3-6, 2018

<http://condmat.univ.kiev.ua/index.html>.

Member of the organizing committee, 4th International Conference "Modern problems of condensed matter", organized by Kyiv Taras Shevchenko National University, Kyiv, Ukraine, October 7-10, 2015

### Participation in editorial boards of periodical scientific publications (in which mandatory anonymous peer review is carried out) (no more than 5 positions in the last 10 years)

### Scientific editing (arrangement) of scientific publications (no more than 5 positions in the last 10 years)

## Teaching activity

### The main author's educational courses at Higher Education Institutions (developed on the basis of own research)

"Physics of nanostructured materials" (I level), Kyiv Taras Shevchenko National University, 2023-2024, 22 ac. hours.

"Nanostructured silicon: properties and uses" (II level), Kyiv Taras Shevchenko National University, 2023-2024 (from 2017-18), 30 ac. hours.

<https://www.phys.univ.kiev.ua>

<p><b>(no more than 5 positions in the last 10 years)</b></p>	
<p><b>The main author's methodical developments (textbooks, manuals, methodical materials, educational programs for higher education)</b></p> <p><b>(no more than 5 positions in the last 10 years)</b></p>	<p>1. Shevchenko V.B. "Porous silicon: synthesis, properties, use", "Nilan-LTD", 2019, 132 pages. Electronic version: <a href="https://metphys.knu.ua/wp-content/uploads/2022/07/Poruvatyj_kremnij_syntez_vlastyvosti_vykorystannya.pdf">https://metphys.knu.ua/wp-content/uploads/2022/07/Poruvatyj_kremnij_syntez_vlastyvosti_vykorystannya.pdf</a></p> <p>2. Isaev M.V., Shevchenko V.B., Voitenko K.V. "Synthesis and methods of controlling the parameters of porous silicon", "Nilan-LTD", 2017, 128 pages.</p>
<p><b>Supervision of scientific works (scientific supervision or consulting of dissertation studies that have been successfully defended)</b></p> <p><b>(no more than 5 positions in the last 10 years)</b></p>	
<p><b>Expert activity</b></p>	
<p><b>Membership in specialized academic councils for dissertation defense</b></p> <p><b>(no more than 5 positions in the last 10 years)</b></p>	
<p><b>Participation in expert councils (supervisory, advisory, expert or other councils of scientific, educational or research institutions, enterprises, cultural institutions, scientific publishing houses outside the main place of work)</b></p> <p><b>(no more than 5 positions in the last 10 years)</b></p>	

<p><b>Participation in calls commissions (jury) (all-Ukrainian or international calls, Olympiads, tournaments of research projects, scientific papers, etc.)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Scientific and expert activities for authorities (scientific and expert conclusions, comments, conclusions, etc. made at the request or order of authorities and self- government bodies, state structures, institutions, etc.)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Scientific review of publications and projects* (number of anonymous reviews of manuscripts of scientific works submitted for publication in international scientific journals over the past 5 years; author reviews of scientific publications published in specialized periodicals)</b></p> <p><i>(no more than 5 positions in the last 5 years)</i></p>	
<p><b>Honors and awards</b></p>	
<p><b>Honorary titles and statuses (honored worker of science and technology,</b></p>	

<p><b>academician, doctor honoris causa, etc.)</b></p>	
<p><b>Laureate of a prize (awards, honors) of the international or national level, awarded on a competitive basis</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Awards or honors for scientific achievements (from institutions, departments, authorities and local self-government bodies, etc.)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<h3>Improvement of scientific qualification</h3>	
<p><b>Additional professional schools (trainings, summer schools, educational seminars, master classes, courses, etc., to acquire relevant scientific knowledge, skills and abilities)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<p><i>Light for Ukraine – synchrotron online workshop at SOLARIS, 23.02.2023- 24.02.2023, Poland</i></p> <p><a href="https://indico.solaris.edu.pl/event/3/timetable/#20230223"><u>https://indico.solaris.edu.pl/event/3/timetable/#20230223</u></a></p>
<p><b>Scientific internships abroad (lasting more than 2 months, in higher education institutions or research institutions, except correspondence and with the exception of CIS countries)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	

<p><b>Membership in independent scientific organizations (non-institutional professional academic associations, societies, unions, unions of researchers, except trade unions)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<p><b><i>Ukrainian Physical Society (all-Ukrainian), member, period of participation from 07.2023</i></b></p>
<p><b>Additional information on other important scientific achievements, qualifications, competences, or types of scientific activity that are significant for the implementation of the submitted research/development project</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Foreign languages skills*</b></p>	<p><b><i>English, B2, certificate No. 4875, issued by the Center of Foreign Languages (Taras Shevchenko National University of Kyiv) on 09.12.2023, publications 1-10 in the section "Published scientific works"</i></b></p>

КІЇВСЬКИЙ НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ  
ІМЕНІ ТАРАСА ШЕВЧЕНКА  
Центр іноземних мов



TARAS SHEVCHENKO  
NATIONAL UNIVERSITY OF KYIV  
Language Center

АНГЛІЙСЬКА МОВА

ENGLISH

## СЕРТИФІКАТ

№ 4845

ЦЕЙ СЕРТИФІКАТ ВИДАНИЙ

Шевченко

Вікторія Богданівна

який(а) склав(ла) кваліфікаційний екзамен  
і здобув(ла) рівень мовної компетентності B2

аудіювання B2 читання B2

письмо B2 мовлення B2

Проректор з науково-педагогичної роботи  
/Vice-Rector for Education

Директор/Director



м. Київ/Kyiv 2013

## CERTIFICATE

No. 4845

THIS IS TO CERTIFY THAT

Viktoria

Shevchenko

passed the exam and achieved  
the following overall CEFR B2

Listening B2 Reading B2

Writing B2 Speaking B2

Андрій ГОЖИК / Andrii GOZHYK

Ольга Яшенкова / Olga YASHENKOVA

# Prof. Borovyi Mykola Olexandrovich

Gender

Male

Date of birth

26.02.1957

Country of Permanent Residence

Ukraine

Citizenship

Ukraine

Cell phone number

+380672880028

E-mail

[nborovoy1@gmail.com](mailto:nborovoy1@gmail.com)

Other contact information (skype, viber, etc.)

viber +380672880028

## SCIENTIFIC PROFILE

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Scientific-research profile (Orcid, Google Scholar, Scopus authors, etc) minimum two:

<https://www.scopus.com/authid/detail.uri?authorId=6508240131>

<https://scholar.google.com.ua/citations?user=JBirum8AAAAJ&hl=ru>

<https://orcid.org/0000-0002-2501-8616>

Research experience: number of years

41

Total number of patents

0

Total number of publications

84

Number of publications in Q1 & Q2 quartile journals  
for the last 10 years

8

Hirsch index (SCOPUS)

8

Number of monographs

2

Obtained research grants

- project №16БФ051-01 "Formation and physical properties of nanostructured composite materials and functional surface layers based on carbon, semiconductor and dielectric components», Ministry of Education and Science of Ukraine – Taras Shevchenko National University of Kyiv (MESU-KNU), 2016 - 2018;
- collaborative projects "Structure and thermal properties of silicon composites", Limited Liability Company «Asist Research» (Kyiv, Ukraine) – National Institute of Applied Sciences of Lyon (INSA, Lyon, France): contract №17/10-2016/1 of 17.10.2016; contract №08/02-2017/1 of 08.02.2017; contract №27/02-2017/1 of 27.02.2017; contract №30/05-2017/1 of 30.05.2017; contract №20 /09-2017/1 of 20.09.2017;
- project №11БФ051-01 "Comprehensive study of the physical properties of semiconductor and carbon nanomaterials and their composites of various structures and dimensionality", MESU-KNU, 2011 - 2015;
- project №06БФ051-04 "Experimental and theoretical study of the structure and physical properties of low-dimensional systems based on semiconductor structures, various modifications of carbon and composites", MESU-KNU, 2006-2010;
- project №01БФ051-09 "Experimental and theoretical study of the formation of nanocrystalline compositions based on amorphous and carbon materials", MESU-KNU, 2001 - 2005

Experience as a reviewer (peer review of scholarly papers, review of research projects)  
Reviewer of Ukrainian Journal of Physics (2014, 2020)  
Expert of Ministry of Education and Science of Ukraine projects (2013 -2015)  
crystal and electron structure of metals and semiconductors, materials science

## RESEARCH ACTIVITY

### Solid state physics

Area of expertise	Branch of science
Natural, technical sciences and mathematics	Physical and mathematical sciences
Number of publications in the field of expertise	Keywords
82	crystal, electron structure, phase transitions, carbon composites, intercalated graphite compounds, X-ray diffraction analysis, X-ray spectroscopy

### LIST OF SCIENTIFIC PUBLICATIONS WHICH ARE RELEVANT FOR THIS COMPETITION ( ENTER NOT MORE THAN 12 PUBLICATIONS)

#### [10.3390/nano9121720](#)

*Matzui, Trukhanov, Yakovenko, Vovchenko, Zagorodnii, Oliynyk, Borovoy, Trukhanova, Astapovich, Karpinsky, Trukhanov*

Functional Magnetic Composites Based on Hexaferrites: Correlation of the Composition, Magnetic and High-Frequency Properties

Nanomaterials, MDPI AG, 2019

magnetic composites; polymer-matrix composites (PMCs); magnetic properties; high-frequency properties

#### [10.15407/mfint.41.11.1421](#)

*Borovyi M. O., Gololobov Yu. P.*

Near-Threshold \$KL\$-Ionization of Al Metal Atoms under Electron Bombardment

METALLOFIZIKA I NOVEISHIE TEKHOLOGII, National Academy of Sciences of Ukraine (Co. LTD Ukrinformnauka), 2019

X-ray KaL1, KaL1 lines, electron impact, two-electron ionization, triplet, singlet term

#### [10.21272/jnep.11\(4\).04002](#)

*Ovsienko I. V., Len T. A., Prokopov O. I., Borovoy M. O., Matzui L. Yu., Syvolozhskyi O. A.*

The Structural Studies of Phase Transitions in the Graphite Intercalation Compounds with Iodine Chloride and Bromine

Journal of Nano- and Electronic Physics, Sumy State University, 2019

Graphite intercalation compound, X-ray diffraction method, Phase transition, Intercalate layer

[10.1121/1.4950367](#)

*Ostrovskii Igor, Korotchenkov Oleg, Borovoy Nikolaj, Nadtochiy Andriy, Chupryna Roman, Chatterjee Chandrima*

Nonstructural acousto-injection luminescence in metalized lithium niobate

The Journal of the Acoustical Society of America, Acoustical Society of America (ASA), 2016

Acousto-luminescence, carrier injection, lithium niobate, rf-vibration

[10.1002/pssb.202000556](#)

*Mykola Borovyi, Yurii P. Gololobov, Karyna Isaieva, Mykola Isaiev*

The Effect of X-Ray Irradiation on Conductivity of C and 2 C Polytype TlInS<sub>2</sub> Ferroelectrics

Physica status solidi (b), 2021

TlInS<sub>2</sub>, electrical conductivity, ferroelectrics, commensurate, incommensurate phases,

[10.1007/s10853-020-04661-z](#)

*Petro Tesel'ko, A. V. Trukhanov, K.A. Astapovich, O. S. Yakovenko, S. V. Trukhanov, M. O. Borovoy, O. V. Lozitsky, Ludmila Matzui, Ludmila Vovchenko, Oleksandra Lazarenko*

Effect of Ga content on magnetic properties of BaFe<sub>12-x</sub>GaxO<sub>19</sub>/epoxy composites

Journal of Materials Science, Springer Science and Business Media LLC, 2020

Keywords: : magnetic composites BaFeGaO/epoxy, magnetic properties, hysteresis loops , Mechanical Engineering, General Materials Science

[10.1080/15421406.2021.1905272](#)

*Mandrolko V. M., Borovyi M. O., Ovsienko I. V., Len T. A., Matzui L. Yu., Gomon O. O., Naumova D. D.*

Peculiarities of phase transformations in graphite intercalation compounds with bromine

Molecular Crystals and Liquid Crystals, Informa UK Limited, 2021

Bromine, graphite intercalation compound, phase transition, X-ray diffraction

[10.1016/j.mseb.2022.115776](#)

*Yakovenko Olena S., Yu. Matzui Ludmila, Syvolozhskyi Oleksii A., Vovchenko Ludmila L., Lazarenko Oleksandra A., Ischenko Olena V., G.Dyachenko Alla, Vakaliuk Anna V., Oliynyk Victor V., Zagorodnii Vol*

Epoxy composites filled with graphite nanoplatelets modified by FeNi nanoparticles: Structure and microwave properties

Materials Science and Engineering: B, Elsevier BV, 2022

Microwave properties, Permittivity, Shielding efficiency, Epoxy composite, Structure, Decorated graphite nanoparticles

[10.1016/j.physe.2022.115463](#)

*Vovchenko L.L., Matzui L.Yu, Yakovenko O.S., Lozitsky O.V., Len T.A., Oliynyk V.V., Galaburda M.V., Borovoy M.O., Syvolozhskyi O.A.*

Electrical and shielding properties of epoxy composites with Ni-C and Co-C core-shell nanoparticles

[10.1038/s41598-023-32834-8](https://doi.org/10.1038/s41598-023-32834-8)

*Lishchuk Pavlo, Vashchuk Alina, Rogalsky Sergiy, Chepela Lesia, Borovyi Mykola, Lacroix David, Isaiev Mykola*

Thermal transport properties of porous silicon filled by ionic liquid nanocomposite system

Scientific Reports, Springer Science and Business Media LLC, 2023

Thermal transport, Ionic liquid confined inside porous silicon matrix, Photoacoustic approach in gas-microphone configuration

[10.1002/pssb.201600340](https://doi.org/10.1002/pssb.201600340)

*Nikolaienko A. V., Zloi O. S., Isaiev M. V., Gololobov Yu. P., Borovoy N. A.*

The effect of X-ray irradiation on formation and decay of the incommensurate phase in TlInS<sub>2</sub> crystals

physica status solidi (b), Wiley, 2016

X-ray irradiation, reciprocal space, Incommensurate phase satellites, Defect density waves

#### LIST OF PATENTS WHICH ARE RELEVANT FOR THIS COMPETITION (NO MORE THAN 12)

ISBN 978-617-7706-25-9, 2018: Semiconductor heterostructures and nanocomposites sonochemical reaction, semiconductor heterostructures, photoacoustic effect, X-ray spectrum

978-3-319-56244-5, 2017: Peculiarities of Charge Transfer in Graphite Intercalation Compounds with Bromine and Iodine

Fine crystalline graphite, Graphite intercalated compound, Bromine resistivity

#### EDUCATION

##### Taras Shevchenko State University of Kyiv

Country	City
United States	Kyiv

Faculty (school)	Specialisation
Physical Faculty	Physics

Diploma number	Date of issue
A-I №939774	22.06.1979

#### EMPLOYMENT AND POSITION

##### Taras Shevchenko National University of Kyiv

Position	Employment period
Head of the Department of General Physics	01.09.2001 - Current employment
Institution's subordination	Institutions EDRPOU code (for Ukrainian institutions only, foreign experts enter 00000000)
Ministry of Education and Science of Ukraine	02070944
Country	City
Ukraine	Kyiv
Institution's Address	
64/13 Volodymyrska Street, Kyiv, Ukraine, 01601	
Office phone number	
044 521 32 72	

## SCHOLARLY / RESEARCH DEGREE

Doctor

Diploma number Date of issue  
ДД №000445 22.12.2011

## ACADEMIC RANK

- Professor



# CURRICULUM VITAE

## Borovyi Mykola Olexandrovich

26.02/1957

Ukraine

<b>Contact information*</b>	64/13 Volodymyrska Street, Kyiv 01601  521- 3272, 526-4567, 526-45-47 +38067 288 00 28  <a href="mailto:nborovoy1@gmail.com">nborovoy1@gmail.com</a> <a href="https://gen.phys.univ.kiev.ua/170-borovyi/">https://gen.phys.univ.kiev.ua/170-borovyi/</a>
<b>Personal profiles in scientometric databases*</b>	<a href="https://orcid.org/0000-0002-2501-8616">https://orcid.org/0000-0002-2501-8616</a> <a href="https://www.scopus.com/authid/detail.uri?authorId=6508240131">https://www.scopus.com/authid/detail.uri?authorId=6508240131</a> <a href="https://www.webofscience.com/wos/author/record/2032419">https://www.webofscience.com/wos/author/record/2032419</a> <a href="https://scholar.google.com.ua/citations?user=JBirum8AAAJ&amp;hl=ru">https://scholar.google.com.ua/citations?user=JBirum8AAAJ&amp;hl=ru</a>
<b>Education*</b>	Kyiv State University named after T.G. Shevchenko, 1974-1979, physicist, cryogenic materials science, teacher, А-І №939774
<b>Degree*</b>	Doctor of physics and mathematics 01.04.07 – physics of solid state, 26.09.2011, Taras Shevchenko National University of Kyiv ДД №000445
<b>Academic status*</b>	Professor of the Department of General Physics 05.07.2018, АП №000450

<p><b>Professional work experience*</b> <i>(for the last 10 years)</i></p>	<p>from 01.09.2001 to today, the Head of the Department of General Physics, Faculty of Physics, Taras Shevchenko National University of Kyiv</p>
<p><b>Main research activity</b></p>	
<p><b>Management of collective research projects (which received funding on a competitive basis from outside the main place of work) (no more than 5 positions in the last 10 years)</b></p>	<p>Co-head of the project No. 16BF051-01, "Formation and physical properties of nanostructured composite materials and functional surface layers based on carbon, semiconductor and dielectric components" Taras Shevchenko National University of Kyiv 2016-2018, 12 participants, Ministry of Education and Science of Ukraine</p> <p>Head of the project No. 11BF051-01-4 "The complex study of the physical properties of semiconductor and carbon nanomaterials and their composites of different structures and dimensions", Taras Shevchenko National University of Kyiv 2011-2015, 14 participants, Ministry of Education and Science of Ukraine</p>
<p><b>Participation in collective research projects (no more than 5 positions in the last 10 years)</b></p>	<p>Performer (w/p), project (No. 22BF051-05) "Physical and chemical properties nanostructured carbon-containing and semiconductor thin-film structures for the needs of renewable hydrogen energy" Taras Shevchenko National University of Kyiv Prof. Korotchenkov O.O., 2022 - 2024, Ministry of Education and Science of Ukraine</p> <p>Performer (w/p), project No. 19BF051-05 "The development of physical principles of functionalization of nanostructured materials based on carbon, semiconductor heterostructures and porous silicon", Taras Shevchenko National University of Kyiv Prof. Korotchenkov O.O., 2019 - 2021, Ministry of Education and Science of Ukraine</p>

**Individual research projects (which received funding on a competitive basis from a third party) (no more than 5 positions in the last 10 years)**

Researcher at the collaborative projects, Limited Liability Company «Asist Research» (Kyiv, Ukraine) – National Institute of Applied Sciences of Lyon (INSA, Lyon, France) "Structure and thermal properties of silicon composites", contract №17/10-2016/1 of 17.10.2016; contract №08/02-2017/1 of 08.02.2017; contract №27/02-2017/1 of 27.02.2017

## Main scientific achievements

**Published scientific works\***

(no more than 10 positions in the last 10 years)

1. P. Lishchuk, A. Vashchuk, S. Rogalsky, L. Chepela, M. Borovyi, D. Lacroix, M. Isaev. Thermal transport properties of porous silicon filled by ionic liquid nanocomposite system. *Scientific Reports*, 2023 April; 13(1): [10.1038/s41598-023-32834-8](https://doi.org/10.1038/s41598-023-32834-8) **Q1**
2. L.L. Vovchenko, L.Yu. Matzui, O.S. Yakovenko, O.V. Lozitsky, T.A. Len, V.V. Oliyniyk, M.V. Galabutda, M.O. Borovoy. Electrical and shielding properties of epoxy composites with Ni-C and Co-C core-shell nanoparticles. *Physica E: Low-dimensional Systems and Nanostructures*, 2022, 144, 115463. [doi.org/10.1016/j.physe.2022.115463](https://doi.org/10.1016/j.physe.2022.115463) **Q2**
3. Olena S.Yakovenko, Ludmila Yu.Matzui, Oleksii A.Syvolozhskyi, Ludmila L.Vovchenko, Mykola O.Borovoy. Epoxi composites filled with graphite nanoparticles modified by FeNi nanoparticles; Structure and microwave properties. *Materials Science and Engineering:B*, 2022, 283, 115776. <https://doi.org/10.1016/j.mseb.2022.115776> **Q2**
4. Mandrolko V. M., Borovyi M. O., Ovsienko I. V., et al. Peculiarities of phase transformations in graphite intercalation compounds with bromine. *Molecular Crystals and Liquid Crystals*, 2021, 721(1), 17. [10.1080/15421406.2021.1905272](https://doi.org/10.1080/15421406.2021.1905272) **Q3**
5. Mykola Borovyi, Yurii P. Gololobov, Karyna Isaieva, Mykola Isaev. The Effect of X-Ray Irradiation on Conductivity of C and 2 C Polytype  $TlInS_2$  Ferroelectrics. *Physica status solidi (b)*, 2021, 258(5), 202000556. [10.1002/pssb.202000556](https://doi.org/10.1002/pssb.202000556) **Q3**
6. Petro Tesel'ko, A.V. Trukhanov, M. O. Borovoy, et al. Effect of Ga content on magnetic properties of  $BaFe_{12-x}Ga_xO_{19}$ /epoxy composites. *Journal of Materials Science*, 2020, 55, 9385. [10.1007/s10853-020-04661-z](https://doi.org/10.1007/s10853-020-04661-z) **Q2**
7. Matzui L.Yu, Trukhanov A.V., Borovyi M. O. et al. Functional Magnetic Composites Based on Hexaferrites: Correlation of the Composition, Magnetic and High-

- Frequency Properties. *Nanomaterials*, 2019, 9(12), 1720. [10.3390/nano9121720](https://doi.org/10.3390/nano9121720) Q1
8. Nikolaenko A.V., Zloi O.S., IsaevM.V., Gololobov Yu.P., Borovoy M.O. The effect of X-ray irradiation on formation and decay of the incommensurate phase in TlInS<sub>2</sub> crystals. *Physica Status Solidi (B)*, 2017, v.254, N4, 1600340. [doi.org/10.1002/pssb.201600340](https://doi.org/10.1002/pssb.201600340) Q2
  9. Borovoy N., Ostrovskii I., Korotchenkov O.. Nadtochiy A. Nonstructural acousto-injection luminescence in metalized lithium niobate. *The journal of the Acoustical Society of America*, 2016, vol.139, №4, p. 2153 <https://doi.org/10.1121/1.4950367> Q1
  - 10.Nikolaienko A. V., Zloi O. S., Isaiev M. V., Gololobov Yu. P., Borovoy N. A. The effect of X-ray irradiation on formation and decay of the incommensurate phase in TlInS<sub>2</sub>crystals. *Physica status solidi (b)*, 2016, 254(4), [10.1002/pssb.201600340](https://doi.org/10.1002/pssb.201600340) Q1

**Other significant scientific achievements**  
*(no more than 5 positions in the last 10 years)*

### Presentation of scientific results

**Key (plenary) reports at nationwide or international conferences (except for conferences that were always held by correspondence)**

**Personal speeches outside of Ukraine on the invitation of higher education institutions, research institutions or professional associations (except CIS countries)**

*(no more than 10 positions in the last 10 years)*

**Reports at scientific conferences\* (seminars, symposia, etc.)**  
*(no more than 10 positions in the last 10 years)*

1. Lishchuk, P. Chepela L., Kuryliuk V., Kuzmich A., Borovyi M. Investigation of Thermal Transport Properties of Multilayer Porous Silicon Based Hybrid Nanostructures by Photoacoustic Technique. in *Proceedings of the 2022 IEEE 12th International Conference ‘Nanomaterials: Applications and Properties, NAP 2022* (2022), Sept. 11-16, Kraków, Poland [doi:10.1109/NAP55339.2022.9934682](https://doi.org/10.1109/NAP55339.2022.9934682)
2. Chepela L., Lishchuk P., Kuryliuk V., Kuzmich A., Borovyi M. Photothermal transformation in the porous silicon-based brag mirrors. *2023 31st International Materials Research Congress 2023, August 13 – 18, Cancun, Mexico, Book of Abstracts*, p.78.
3. Chepela L., Lishchuk P., Kuzmich A., Borovyi M., Isaiev M. Photothermal transformation in silicon based nanomaterials. *2023 11th International Conference “Nanotechnology and nanomaterials” (NANO-2023), August 16 – 19, Bukovel, Ukraine, Book of Abstracts*, p.182.
4. Mandrolko V.M. 1 , Borovoy M.O. 1 , Ovsienko I.V. 1 , Len T.A. 1 , Matzui L.Yu. 1 , Gomon O.O. 1 , Naumova D.D. Peculiarities of Phase Transformations in Graphite Intercalation Compounds with Non-polar Intercalates. *Nanotechnology and Nanomaterials (NANO-2020), 26-29 August 2020, Lviv, Ukraine, book of abstracts*, p.58.
5. O.Yakovenko, L.Matzui, Ludmila L.Vovchenko, M. O.Borovoy. Effect of magnetic fillers and their orientation on the electromagnetic properties of BaFe<sub>12-x</sub>GaxO<sub>19</sub> (x=0.1-1.2)-epoxy composites within GHz range. *Nanotechnology and Nanomaterials (NANO-2019), 27-30 August 2019, Lviv, Ukraine, book of abstracts*, p.147.
6. T. Len, I. Ovsienko, O. Syvolozhskyi, L. Matzui, A. Dyachenko, O. Ischenko, M. Borovoy. Electro-transport properties of nanocarbon structures modified with nickel and iron. *Nanotechnology and Nanomaterials (NANO-2019), 27-30 August 2019, Lviv, Ukraine, book of abstracts*, p.146.

7. A.V. Nikolaienko, N.A. Borovoy, Yu.P. Gololobov. The Features of Conductivity of TlInS<sub>2</sub> Ferroelectric C- and 2C-Polytypes. *XXIII Galyna Puchkovska International School-Seminar Spectroscopy of molecules and crystals, September 20 – 25, 2017: book of abstracts – Kyiv, Ukraine, 2017* – P. 61
8. Prokopov O.I., Nikolaienko A. Ovsienko I., Borovoy N.A. Structural and Phase Transformation In Layers Of Intercalate In Graphite Intercalations Compounds With Iodine Chloride. *Nanotechnology and Nanomaterials (NANO-2017), 23-26 August 2017, Chernivtsi, Ukraine, book of abstracts, p.802*
9. A. Nikolaienko, O. Zloi, M. Isaiev, Yu. Gololobov, N. Borovoy. The creation of static atomic displacement waves in irradiated TlInS<sub>2</sub> crystal. *XXII Polish-Czech seminar Structural and Ferroelectric Phase Transitions, May 16 – 20, 2016: book of abstracts. – Hucisko, Poland, 2016.* – P. 97
10. A. Nikolaienko, O. Zloi, Yu. P. Gololobov and N. A. Borovoy, Nikolaienko A. Peculiarities of the incommensurate phase in the TlInS<sub>2</sub> ferroelectric under X-ray irradiation. *Functional Materials and Nanotechnologies October 5 – 8, 2015: abstract book. – Vilnius, Lithuania, 2015.* – P. 66

**Promotion of scientific research**

*(no more than 10 positions in the last 10 years)*

**Scientific and organizational activity**

**Participation in the organizing committees of scientific events (conferences, seminars, symposia, round tables, panel discussions, etc.)**

*(no more than 5 positions in the last 10 years)*

**Participation in editorial boards of periodical scientific publications (in which mandatory**

<p><b>anonymous peer review is carried out)</b>   <i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Scientific editing (arrangement) of scientific publications</b>   <i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Teaching activity</b></p>	
<p><b>The main author's educational courses at Higher Education Institutions (developed on the basis of own research)</b>   <i>(no more than 5 positions in the last 10 years)</i></p>	<p><b>Experimental methods of nanosystem research</b> (II level), Taras Shevchenko National University of Kyiv, since 2017, 30 Acad. hours,  <a href="https://gen.phys.univ.kiev.ua/accreditation/robochi-programi/robochi-programi-2023/">https://gen.phys.univ.kiev.ua/accreditation/robochi-programi/robochi-programi-2023/</a></p>
	<p><b>Theory of X-ray scattering and methods of X-ray structural analysis</b> (I level), Taras Shevchenko National University of Kyiv, since 2019, 74 Acad. hours,  <a href="https://gen.phys.univ.kiev.ua/wp-content/uploads/2023/12/VK8.-Teoriya-rozsiyannya-rentgenivskih-promeniv-ta-metodi-rentgenostruktturnogo-analizu2023..pdf">https://gen.phys.univ.kiev.ua/wp-content/uploads/2023/12/VK8.-Teoriya-rozsiyannya-rentgenivskih-promeniv-ta-metodi-rentgenostruktturnogo-analizu2023..pdf</a></p>
	<p><b>Electricity and magnetism</b> (I level), Taras Shevchenko National University of Kyiv, since 2012, 44 Acad. hours,  <a href="https://phys.knu.ua/wp-content/uploads/2022/09/ok-8.-elektrika-ta-magnetizm.pdf">https://phys.knu.ua/wp-content/uploads/2022/09/ok-8.-elektrika-ta-magnetizm.pdf</a></p>
	<p><b>Crystalline structure of solids</b> (I level), Taras Shevchenko National University of Kyiv, since 2016, 44 Acad. hours,  <a href="https://gen.phys.univ.kiev.ua/wp-content/uploads/2023/12/VK4.-Kristalichna-budova-tverdih-til2023.pdf">https://gen.phys.univ.kiev.ua/wp-content/uploads/2023/12/VK4.-Kristalichna-budova-tverdih-til2023.pdf</a></p>
<p><b>X-ray spectroscopy and X-ray electron spectroscopy</b></p>	

(II level), Taras Shevchenko National University of Kyiv,  
from 2007 to 2018,  
32 Acad. hours

**Physics course for students of the Faculty of  
Chemistry (mechanics, thermodynamics, electricity,  
optics, elements of atomic physics and quantum  
mechanics)istry (mechanics, thermodynamics,  
electricity, optics, elements of atomic physics and  
quantum mechanics)**

(I level), Taras Shevchenko National University of Kyiv,  
from 2007 to 2018,  
144 Acad. hours.

**The main author's  
methodical  
developments  
(textbooks, manuals,  
methodical materials,  
educational programs  
for higher education)  
(no more than 5 positions in  
the last 10 years)**

Borovyi M.O., Olykh O.Ya., Tsaregradska T.L., Ovsienko I.V., Podolyan A.O., Kozachenko V.V. General physics for chemists. Collection of tasks. Part 3: optics, elements of quantum mechanics, atomic and nuclear physics. Tutorial. Vinnytsia, "Works", 2022. 186 p.  
[https://gen.phys.univ.kiev.ua/wp-content/uploads/2022/10/Opt\\_Qm\\_At\\_Yad\\_2022\\_02\\_2.pdf](https://gen.phys.univ.kiev.ua/wp-content/uploads/2022/10/Opt_Qm_At_Yad_2022_02_2.pdf)

Borovyi M.O., Olykh O.Ya., Tsaregradska T.L., Ovsienko I.V., Podolyan A.O., Kozachenko V.V. General physics for chemists. Collection of tasks. Part 2: Electricity and magnetism. Tutorial. Vinnytsia, "Works", 2019. 155 p.  
<https://gen.phys.univ.kiev.ua/wp-content/uploads/2020/11/ElecMagFinal.pdf>

Borovyi M.O., Ovsienko I.V. The X-ray diffractometry of nanostructured materials. Tutorial. Vinnytsia "Niland", 2018, 86 p.  
<https://gen.phys.univ.kiev.ua/wp-content/uploads/2022/02/Rentgenivska-difraktometriya-nanostrukturnih-materialiv.pdf>

Borovyi M.O., Olykh O.Ya., Tsaregradska T.L., Ovsienko I.V., Podolyan A.O., Kozachenko V.V. General physics for chemists. Collection of tasks. Part 1. Mechanics. Molecular physics and thermodynamics. Tutorial. Vinnytsia "Niland", 2018, 155 p.

<https://gen.phys.univ.kiev.ua/wp-content/uploads/2013/02/ZbirnykChem.pdf>

Borovyi M.O., Kunytskyi Yu.A., Kalenyk O.O., Ovsienko I.V. Nanomaterials, nanotechnologies, nanodevices. Tutorial. Kyiv, "Interservice", 2015, 350 p

**Supervision of scientific works (scientific supervision or consulting of dissertation studies that have been successfully defended)**  
*(no more than 5 positions in the last 10 years)*

**Ishchenko Ruslan Mykolayovych.**

The peculiarities of autoionization processes in L– and M– electron shells of atoms of 3d– and 5d– elements, 01.04.07. - solid state physics, Taras Shevchenko KNU. 30.10.2006.

**Nikolayenko Alina Volodymyrivna.**

The influence of irradiation on the transformation of modulated structures in ternary chalcogenide ferroelectrics. 01.04.07. - solid state physics, Taras Shevchenko KNU. 18.04.2018.

**Al-Omari Mohammad Abdullah Mohammad.**

The peculiarities of parametric X-ray radiation and ionization of atoms during the propagation of high-energy electrons in crystals. 01.04.07. -solid state physics, V.G. Kurdyumov Institute for Metal Physics, the National Academy of Sciences of Ukraine 28.12.2018

**Expert activity**

**Membership in specialized academic councils for dissertation defense**  
*(no more than 5 positions in the last 10 years)*

Specialized Academic Council D 26.001.23 at Taras Shevchenko National University of Kyiv, The vice-chairman of the Academic Council from 2017 to the present

**Participation in expert councils (supervisory, advisory, expert or other councils of scientific, educational or research institutions, enterprises, cultural institutions, scientific publishing houses outside the main place of work)**  
*(no more than 5 positions in the last 10 years)*

<p><b>Participation in calls commissions (jury) (all-Ukrainian or international calls, Olympiads, tournaments of research projects, scientific papers, etc.)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Scientific and expert activities for authorities (scientific and expert conclusions, comments, conclusions, etc. made at the request or order of authorities and self- government bodies, state structures, institutions, etc.)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Scientific review of publications and projects* (number of anonymous reviews of manuscripts of scientific works submitted for publication in international scientific journals over the past 5 years; author reviews of scientific publications published in specialized periodicals)</b></p> <p><i>(no more than 5 positions in the last 5 years)</i></p>	
<p><b>Honors and awards</b></p>	
<p><b>Honorary titles and statuses (honored worker of science and technology,</b></p>	

<p><b>academician, doctor honoris causa, etc.)</b></p>	
<p><b>Laureate of a prize (awards, honors) of the international or national level, awarded on a competitive basis</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Awards or honors for scientific achievements (from institutions, departments, authorities and local self-government bodies, etc.)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Improvement of scientific qualification</b></p>	
<p><b>Additional professional schools (trainings, summer schools, educational seminars, master classes, courses, etc., to acquire relevant scientific knowledge, skills and abilities)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Scientific internships abroad (lasting more than 2 months, in higher education institutions or research institutions, except correspondence and with the exception of CIS countries)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	

<p><b>Membership in independent scientific organizations (non-institutional professional academic associations, societies, unions, unions of researchers, except trade unions)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<p>Academician of the Academy of Sciences of the Higher School since 2014</p>
<p><b>Additional information on other important scientific achievements, qualifications, competences, or types of scientific activity that are significant for the implementation of the submitted research/development project</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Foreign languages skills*</b></p>	<p>Russian (free), English (B2)</p>

# Prof. Olikh Oleg Yaroslavovich

Gender	Date of birth
Male	05.06.1974
Country of Permanent Residence	Citizenship
Ukraine	Ukraine

Cell phone number	E-mail
+380673169020	olikh@univ.kiev.ua

Other contact information (skype, viber, etc.)

Viber: +380673169020

Telegram: @ooleg\_knu

## SCIENTIFIC PROFILE

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Scientific-research profile (Orcid, Google Scholar, Scopus authors, etc) minimum two:

<https://www.scopus.com/authid/detail.uri?authorId=6506623724>;

<https://scholar.google.com.ua/citations?hl=ru&user=9M07CQ0AAAAJ>;

<https://orcid.org/0000-0003-0633-5429>;

<https://publons.com/researcher/4762206/oleg-olikh/>

Research experience: number of years	Total number of patents
25	0

Total number of publications	Number of publications in Q1 & Q2 quartile journals for the last 10 years
93	15

Hirsch index (SCOPUS)	Number of monographs
9	0

Obtained research grants

Grant of the National Research Foundation of Ukraine (registration number 2020.02/0036)

Experience as a reviewer (peer review of scholarly papers, review of research projects)

scientific paper review:

modeling of semiconductor systems (Physica B: Condensed Matter, 2023); influence of defects on the electrophysical properties of silicon structures (Radiation Physics and Chemistry, 2018; Jacobs Journal of Materials Science, 2017); characterization of semiconductor barrier structures by current-voltage characteristics (Journal of Applied Physics, 2017; Solid-State Electronics, 2017; Physica B: Condensed Matter, 2016, 2023 Ukrainian Journal of Physics 2023), ultrasonic non-destructive testing (Ultrasonics, 2017); reviewing the report on the implementation of completed scientific and technical work on the development of functional electronics devices (2019)

## RESEARCH ACTIVITY

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## Solid state physics

Area of expertise	Branch of science
Natural, technical sciences and mathematics	Physical and mathematical sciences
	Keywords
	ультразвук, кремній, дефекти, вольт-амперні характеристики, бар'єрні структури, машинне навчання; ultrasound, silicon, defects, current-current characteristics, barrier structures, machine learning

Number of publications in the field of expertise  
93

### LIST OF SCIENTIFIC PUBLICATIONS WHICH ARE RELEVANT FOR THIS COMPETITION (ENTER NOT MORE THAN 12 PUBLICATIONS)

#### [10.1063/1.5001123](#)

*Olikh O. Ya., Gorb A. M., Chupryna R. G., Pristay-Fenenkov O. V.*

Acousto-defect interaction in irradiated and non-irradiated silicon n+-p structures

Journal of Applied Physics, AIP Publishing, 2018

ultrasound, silicon, acousto-defect interaction, current-voltage characteristics

#### [10.1016/j.spmi.2019.106309](#)

*Olikh O.Ya.*

Relationship between the ideality factor and the iron concentration in silicon solar cells

Superlattices and Microstructures, Elsevier BV, 2019

Silicon solar cell, SCAPS simulator, Ideality factor, Iron concentration

#### [10.1016/j.ultras.2014.10.008](#)

*Olikh O.Ya.*

Reversible influence of ultrasound on  $\gamma$ -irradiated Mo/n-Si Schottky barrier structure

Ultrasonics, Elsevier BV, 2014

Dynamic ultrasonic influence, Schottky barrier, Gamma-ray effect, Silicon

#### [10.1063/1.4926420](#)

*Olikh O. Ya.*

Review and test of methods for determination of the Schottky diode parameters

Journal of Applied Physics, AIP Publishing, 2015

Schottky diode, parameters extraction, current-voltage characteristics, analytical methods, numerical methods, evolutionary methods

#### [10.1016/j.spmi.2018.03.027](#)

*Olikh O.Ya.*

Acoustically driven degradation in single crystalline silicon solar cell

Superlattices and Microstructures, Elsevier BV, 2018

Silicon, Solar cells, Ultrasound influence

[10.1016/j.ultras.2015.12.001](https://doi.org/10.1016/j.ultras.2015.12.001)

*Olikh Oleg, Voytenko Katerina*

On the mechanism of ultrasonic loading effect in silicon-based Schottky diodes

Ultrasonics, Elsevier BV, 2015

Shottky diode, Silicon, Ultrasound influence features, Current–voltage characteristics

[10.1063/1.4906844](https://doi.org/10.1063/1.4906844)

*Olikh O. Ya., Voytenko K. V., Burbelo R. M.*

Ultrasound influence on I–V–T characteristics of silicon Schottky barrier structure

Journal of Applied Physics, AIP Publishing, 2015

Ultrasound, Acoustically induced modification, Shottky diode, Silicon

[10.1016/j.sse.2019.107712](https://doi.org/10.1016/j.sse.2019.107712)

*Gorb A.M., Korotchenkov O.A., Olikh O.Ya., Podolian A.O., Chupryna R.G.*

Influence of  $\gamma$ -irradiation and ultrasound treatment on current mechanism in Au-SiO<sub>2</sub>-Si structure

Solid-State Electronics, Elsevier BV, 2019

MOS structures, Si-SiO<sub>2</sub> interface, Ultrasound treatment,  $\gamma$ -rays

[10.1063/5.0073135](https://doi.org/10.1063/5.0073135)

*Olikh O., Kostylyov V., Vlasiuk V., Korkishko R., Olikh Ya., Chupryna R.*

Features of FeB pair light-induced dissociation and repair in silicon  $n^{+}-p^{+}$  structures under ultrasound loading

Journal of Applied Physics, AIP Publishing, 2021

Ultrasound, silicon, solar cells, acousto-defect interaction

[10.1007/s10854-022-08252-3](https://doi.org/10.1007/s10854-022-08252-3)

*Olikh Oleg, Kostylyov Vitaliy, Vlasiuk Victor, Korkishko Roman, Chupryna Roman*

Intensification of iron–boron complex association in silicon solar cells under acoustic wave action

Journal of Materials Science: Materials in Electronics, Springer Science and Business Media LLC, 2022

Ultrasound, silicon, solar cells, acousto-defect interaction

[10.1088/1361-6641/ac6f17](https://doi.org/10.1088/1361-6641/ac6f17)

*Olikh Oleg, Lytvyn Petro*

Defect engineering using microwave processing in SiC and GaAs

Semiconductor Science and Technology, IOP Publishing, 2022

Microwave, defect, SiC, GaAs

10.1002/pip.3539

Olikh Oleg, Lozitsky Oleg, Zavhorodnii Oleksii

Estimation for iron contamination in Si solar cell by ideality factor: Deep neural network approach

Progress in Photovoltaics: Research and Applications, Wiley, 2022

Ideality factor, iron contamination, machine learning, n+-p-p+ structure, SCAPS, silicon

## EDUCATION

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### Taras Shevchenko University of Kyiv

Country	City
Ukraine	Kyiv
Faculty (school)	Specialisation
Physics Faculty	Physics of solid state
Diploma number	Date of issue
ЛТ BENº001760	28.06.1996

## EMPLOYMENT AND POSITION

---

### Taras Shevchenko National University of Kyiv

Position	
Associate Professor at the General Physics Department	Employment period 02.04.1998 - Current employment
Institution's subordination	Institutions EDRPOU code (for Ukrainian institutions only, foreign experts enter 00000000)
Ministry of Education and Science of Ukraine	02070944
Country	City
Ukraine	Kyiv
Institution's Address	
64/13 Volodymyrska Street, Kyiv, Ukraine, 01601	
Office phone number	
(044) 5213363	

## SCHOLARLY / RESEARCH DEGREE

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Doctor

Diploma number

ДД №008094

Date of issue

18.12.2018

## ACADEMIC RANK

- Professor

# CURRICULUM VITAE

## Olikh Oleg Yaroslavovych

date of birth\***5 June 1974**

citizenship\* Ukraine

Contact information*	<b>64/13, Volodymyrska Street, Kyiv, 01033</b> <b>0445213363</b> <b>olegolikh@knu.ua</b> <b><a href="https://gen.phys.univ.kiev.ua/280-olikh/">https://gen.phys.univ.kiev.ua/280-olikh/</a></b>
Personal profiles in scientometric databases*	<b><a href="https://orcid.org/0000-0003-0633-5429">https://orcid.org/0000-0003-0633-5429</a></b> <b><a href="https://www.scopus.com/authid/detail.uri?authorId=6506623724">https://www.scopus.com/authid/detail.uri?authorId=6506623724</a></b> <b><a href="https://publons.com/researcher/4762206/oleg-olikh/">https://publons.com/researcher/4762206/oleg-olikh/</a></b> <b><a href="https://scholar.google.com.ua/citations?user=9Mo7CQoAAAAJ&amp;hl=ua">https://scholar.google.com.ua/citations?user=9Mo7CQoAAAAJ&amp;hl=ua</a></b>
Education*	<b>Taras Shevchenko Kyiv University, Faculty of Physics, 1991-1996, Solid State Physics, ЛТ BEN №001760</b>
Degree*	<b>doctor of physical and mathematical sciences, solid state physics, 18.12.2018, Taras Shevchenko National University of Kyiv, ДД №008094</b>
Academic status*	<b>professor of the General Physics Department, 23.12.2022, АП №004651</b>
Professional work experience* <i>(for the last 10 years)</i>	<b>01.07.2021 – present, professor at the general physics department, physics faculty, Taras Shevchenko National University of Kyiv, Kyiv (Ukraine)</b> <b>25.11.2002 – 30.06.2021, associate professor at the general physics department, physics faculty, Taras Shevchenko National University of Kyiv, Kyiv (Ukraine)</b>

## Main research activity

<b>Management of collective research projects (which received funding on a competitive basis from outside the main place of work)</b> <i>(no more than 5 positions in the last 10 years)</i>	<b><i>Development of physical principles of acoustically controlled modification and machine-oriented characterization of silicon solar cells", Taras Shevchenko Kyiv National University, 2020-2021, 4, grant of the National Research Foundation of Ukraine (registration number 2020.02/0036)</i></b>
<b>Participation in collective research projects</b> <i>(no more than 5 positions in the last 10 years)</i>	
<b>Individual research projects (which received funding on a competitive basis from a third party)</b> <i>(no more than 5 positions in the last 10 years)</i>	

## Main scientific achievements

<b>Published scientific works*</b> <i>(no more than 10 positions in the last 10 years)</i>	<p>Olikh O., Lozitsky O., Zavhorodnii O. «Estimation for iron contamination in Si solar cell by ideality factor: Deep neural network approach», <i>Progress in Photovoltaics: Research and Applications</i>, 2022, vol.30, is.6, p. 648-660; <a href="https://doi.org/10.1002/pip.3539">https://doi.org/10.1002/pip.3539</a> Q1</p> <p>Olikh O., Lytvyn P. «Defect engineering using microwave processing in SiC and GaAs», <i>Semiconductor Science and Technology</i>, 2022, vol.37, is.7, 075006, <a href="https://doi.org/10.1088/1361-6641/ac6f17">https://doi.org/10.1088/1361-6641/ac6f17</a> Q2</p> <p>Olikh O., Kostylyov V., Vlasiuk V., Korkishko R., Chupryna R. «Intensification of iron–boron complex association in silicon solar cells under acoustic wave action», <i>Journal of Materials Science: Materials in Electronics</i>, 2022, vol.33, is.13, P. 13133-13142, <a href="https://doi.org/10.1007/s10854-022-08252-3">https://doi.org/10.1007/s10854-022-08252-3</a> Q2</p> <p>Olikh O., Kostylyov V., Vlasiuk V., Korkishko R., Olikh Ya., Chupryna R. «Features of FeB pair light-induced dissociation</p>
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*and repair in silicon n+-p-p+ structures under ultrasound loading», Journal of Applied Physics, 2021, vol.130, is.23, 235703;  
<https://doi.org/10.1063/5.0073135>*  
Q2

*Gorb A.M., Korotchenkov O.A., Olikh O.Ya., Podolian A.O., Chupryna R.G. «Influence of  $\gamma$ -irradiation and ultrasound treatment on current mechanism in Au-SiO<sub>2</sub>-Si structure», Solid State Electronics, 2020, vol.165, 107712;  
<https://doi.org/10.1016/j.sse.2019.107712>*  
Q2

*Olikh O.Ya. «Relationship between the ideality factor and the iron concentration in silicon solar cells», Superlattices and Microstructures, 2019, vol.136, 106309;  
<https://doi.org/10.1016/j.spmi.2019.106309>*  
Q2

*Olikh O.Ya. «Acoustically driven degradation in single crystalline silicon solar cell», Superlattices and Microstructures, 2018, vol.117, p. 173-188;  
<https://doi.org/10.1016/j.spmi.2018.03.027>*  
Q2

*Olikh O.Ya., Voytenko K.V. «On the mechanism of ultrasonic loading effect in silicon-based Schottky diodes», Ultrasonics, 2016, vol.66, p. 1-3;  
<https://doi.org/10.1016/j.ultras.2015.12.001>*  
Q1

*Olikh O.Ya. «Review and test of methods for determination of the Schottky diode parameters», Journal of Applied Physics, 2015, vol.118, is.2, 024502;  
<https://doi.org/10.1063/1.4926420>*  
Q2

*Olikh O.Ya. «Reversible influence of ultrasound on  $\gamma$ -irradiated Mo/n-Si Schottky barrier structure», Ultrasonics, 2015, vol.56, p. 545-550;  
<https://doi.org/10.1016/j.ultras.2014.10.008>*  
Q1

**Other significant scientific achievements  
(no more than 5 positions in the last 10 years)**

**Teaching activity**

<p><b>The main author's educational courses at Higher Education Institutions (developed on the basis of own research)</b>  <i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>The main author's methodical developments (textbooks, manuals, methodical materials, educational programs for higher education)</b>  <i>(no more than 5 positions in the last 10 years)</i></p>	<p><b>Olikh O.Ya.</b> "Defect research methods", Vinnytsia: "Nilan-LTD" LLC, 2020, 60 p. ISBN 978-966-924-841-1 <a href="https://gen.phys.univ.kiev.ua/wp-content/uploads/2022/09/Metodi-doslidzhennya-defektiv-A5.pdf">https://gen.phys.univ.kiev.ua/wp-content/uploads/2022/09/Metodi-doslidzhennya-defektiv-A5.pdf</a></p> <p><b>Olikh O.Ya.</b> "Defects in semiconductor and dielectric crystals", Vinnytsia: FOP Korzun D.Yu., 2015, 152 p. <a href="https://gen.phys.univ.kiev.ua/wp-content/uploads/2022/09/Olih-Defekti-A5.pdf">https://gen.phys.univ.kiev.ua/wp-content/uploads/2022/09/Olih-Defekti-A5.pdf</a></p> <p><b>Olikh O.Ya.</b> "Modern computer technologies. Principles of building computer networks", Kyiv: VOC "Kyiv University", 2015, 479 p. ISBN 978-966-439-740-4 <a href="https://gen.phys.univ.kiev.ua/wp-content/uploads/2022/09/Fz5_Olikh_s-ISBN-190815.pdf">https://gen.phys.univ.kiev.ua/wp-content/uploads/2022/09/Fz5_Olikh_s-ISBN-190815.pdf</a></p> <p><b>Borovy M.O., Olikh O.Ya., Tsaregradska T.L., Ovsienko I.V., Podolyan A.O., Kozachenko V.V.</b> "General physics for chemists. Tasks collection. Part 3. Optics, elements of quantum mechanics, atomic and nuclear physics", Vinnytsia: "TVORY", 2022, 188 p. ISBN 978-617-552-055-0 <a href="https://gen.phys.univ.kiev.ua/wp-content/uploads/2022/10/Opt_Qm_At_Yad_2022_02_22.pdf">https://gen.phys.univ.kiev.ua/wp-content/uploads/2022/10/Opt_Qm_At_Yad_2022_02_22.pdf</a></p> <p><b>Borovy M.O., Olikh O.Ya., Ovsienko I.V., Tsaregradska T.L., Kozachenko V.V., Podolyan A.O., Isaev M.V., Dubyk K.V.</b> "General physics for chemists. Tasks collection. Part 2. Electricity and magnetism", Vinnytsia: LLC "CREATIONS", 2019, 164 p. ISBN 978-966-949-195-4 <a href="https://gen.phys.univ.kiev.ua/wp-content/uploads/2020/11/ElecMagFinal.pdf">https://gen.phys.univ.kiev.ua/wp-content/uploads/2020/11/ElecMagFinal.pdf</a></p>
<p><b>Supervision of scientific works (scientific supervision or consulting of dissertation studies that have been successfully defended)</b></p>	

<p><i>(no more than 5 positions in the last 10 years)</i></p>	
<h3>Expert activity</h3>	
<p><b>Membership in specialized academic councils for dissertation defense</b>  <i>(no more than 5 positions in the last 10 years)</i></p>	<p><b>D 26.001 .23</b>  <b>01.04.05 "Optics, laser physics",</b>  <b>01.04.07 "Solid State Physics"</b>  <b>Shevchenko National University of Kyiv</b>  <b>06/20/2023 - 06/20/2026</b>  <a href="https://scc.knu.ua/storinka-spetsializovanoi-vchenoi-rady?id=3887">https://scc.knu.ua/storinka-spetsializovanoi-vchenoi-rady?id=3887</a></p>
<p><b>Participation in expert councils (supervisory, advisory, expert or other councils of scientific, educational or research institutions, enterprises, cultural institutions, scientific publishing houses outside the main place of work)</b>  <i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Participation in calls commissions (jury) (all-Ukrainian or international calls, Olympiads, tournaments of research projects, scientific papers, etc.)</b>  <i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Scientific and expert activities for authorities (scientific and expert conclusions, comments, conclusions, etc. made at the request or order of authorities and self-</b></p>	

<p><b>government bodies, state structures, institutions, etc.)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Scientific review of publications and projects* (number of anonymous reviews of manuscripts of scientific works submitted for publication in international scientific journals over the past 5 years; author reviews of scientific publications published in specialized periodicals)</b></p> <p><i>(no more than 5 positions in the last 5 years)</i></p>	<p><b>scientific paper review:</b></p> <p><b>modeling of semiconductor systems (<i>Physica B: Condensed Matter</i>, 2023); influence of defects on the electrophysical properties of silicon structures (<i>Radiation Physics and Chemistry</i>, 2018; <i>Jacobs Journal of Materials Science</i>, 2017); characterization of semiconductor barrier structures by current-voltage characteristics (<i>Journal of Applied Physics</i>, 2017; <i>Solid-State Electronics</i>, 2017; <i>Physica B: Condensed Matter</i>, 2016, 2023 <i>Ukrainian Journal of Physics</i> 2023), ultrasonic non-destructive testing (<i>Ultrasonics</i>, 2017);</b></p> <p><b>reviewing the report on the implementation of completed scientific and technical work on the development of functional electronics devices (2019)</b></p>
<h3>Honors and awards</h3>	
<p><b>Honorary titles and statuses (honored worker of science and technology, academician, doctor honoris causa, etc.)</b></p>	
<p><b>Laureate of a prize (awards, honors) of the international or national level, awarded on a competitive basis</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<p><b>I. Puluj Prize of the National Academy of Sciences of Ukraine for the implementation of controlled acoustic field influence on processes of defect reordering in semiconductors and surface barrier structures</b></p>
<p><b>Awards or honors for scientific achievements (from institutions, departments, authorities and local self-government bodies, etc.)</b></p>	

*(no more than 5 positions in  
the last 10 years)*

## Improvement of scientific qualification

**Membership in independent scientific organizations (non-institutional professional academic associations, societies, unions, unions of researchers, except trade unions)**

*(no more than 5 positions in  
the last 10 years)*

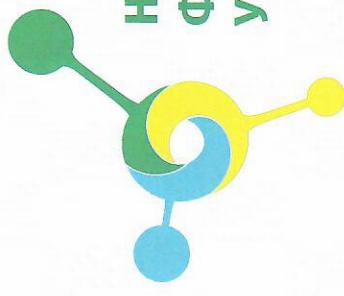
*member of the Ukrainian Physical Society*

**Additional information on other important scientific achievements, qualifications, competences, or types of scientific activity that are significant for the implementation of the submitted research/development project**

*(no more than 5 positions in  
the last 10 years)*

**Foreign languages skills\***

*English, B2, the presence of more than 10 articles published in English in periodicals that are included in the Scopus scientometric database and are not translations from other languages*



**КОНКУРС**  
**«ПІДТРИМКА ДОСЛІДЖЕНЬ**  
**ПРОВІДНИХ ТА МОЛОДИХ УЧЕНИХ»**

НАЦІОНАЛЬНИЙ  
ФОНД ДОСЛІДЖЕНЬ  
УКРАЇНИ

**СЕРТИФІКАТ № 02/087**

Цей сертифікат засвідчує, що проект

**2020.02/0036**

Розробка фізичних зasad акусто-керованої модифікації та машинно-орієнтованої характеризації кремнієвих сонячних елементів

**Науковий керівник: ОЛІХ ОЛЕГ ЯРОСЛАВОВИЧ**

**Установа:** Київський національний університет імені Тараса Шевченка

є переможцем конкурсу із виконання наукових досліджень і розробок «Підтримка досліджень провідних та молодих учених» у 2020 році

**ЛЕОНІД ЯЦЕНКО**  
Голова Фонду

**ОЛЬГА ПОЛОЦЬКА**  
Виконавча директорка Фонду



The Editors of Physica B: Condensed Matter

in recognition of the review contributed to the journal

**OLEG OLIKH**

presented to

Awarded for 8 reviews between May 2016 and November 2023

# Certificate of Reviewing

Physica B: Condensed Matter





Radiation Physics and Chemistry

# Certificate of Reviewing

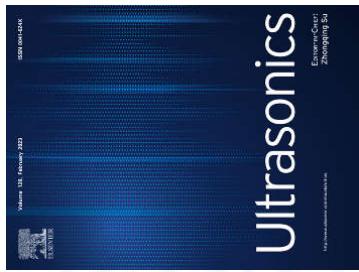
Awarded for 1 review in July 2018  
presented to

**OLEG OLIKH**

in recognition of the review contributed to the journal

The Editors of Radiation Physics and Chemistry





Ultronics

# Certificate of Reviewing

Awarded for 2 reviews between May 2017 and July 2017  
presented to

**OLEG OLIKH**

in recognition of the review contributed to the journal



The Editors of Ultronics

# ДИПЛОМ

## ПРЕЗИДІЯ НАЦІОНАЛЬНОЇ АКАДЕМІЇ НАУК УКРАЇНИ

На своєму засіданні 3 лютого 2021 року присудила

### премію імені І.П. Пулюя

доктору фізико-математичних наук

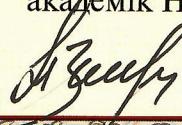
### Оліху Ярославу Михайловичу

доктору фізико-математичних наук

### Оліху Олегу Ярославовичу

за реалізацію керованого впливу акустичного поля  
на процеси перебудови дефектів у напівпровідниках  
та поверхнево-бар'єрних структурах

Президент  
Національної академії наук  
України  
академік НАН України

 А.Г. Загородній

Головний учений секретар  
Національної академії наук  
України  
академік НАН України

 В.Л. Богданов

## Mrs. Chepela Lesia -

Gender	Date of birth
Female	13.06.1997
Country of Permanent Residence	Citizenship
Ukraine	Ukraine

Cell phone number  
+380634579427

E-mail  
[lesia.chepela97@gmail.com](mailto:lesia.chepela97@gmail.com)

Other contact information (skype, viber, etc.)  
viber: +380634579427

## SCIENTIFIC PROFILE

---

Scientific-research profile (Orcid, Google Scholar, Scopus authors, etc) minimum two:

- [1. https://orcid.org/0000-0003-2690-9207](https://orcid.org/0000-0003-2690-9207)
- [2. https://www.researchgate.net/profile/L-Chepela](https://www.researchgate.net/profile/L-Chepela)
3. Scopus authors 57209801121

Research experience: number of years	Total number of patents
3	0
Total number of publications	Number of publications in Q1 & Q2 quartile journals for the last 10 years
3	2
Hirsch index (SCOPUS)	Number of monographs
2	0
Obtained research grants	
none	

Experience as a reviewer (peer review of scholarly papers, review of research projects)  
none

## RESEARCH ACTIVITY

---

### Solid state physics

Area of expertise	Branch of science
Natural, technical sciences and mathematics	Physical and mathematical sciences
Number of publications in the field of expertise	Keywords

5

теплопровідність, поруватий кремній,  
кремнієви  
нанонитки, фотоакустичні методи

LIST OF SCIENTIFIC PUBLICATIONS WHICH ARE RELEVANT FOR THIS COMPETITION ( ENTER NOT MORE THAN 12 PUBLICATIONS)

[10.1038/s41598-023-32834-8](#)

*Lishchuk Pavlo, Vashchuk Alina, Rogalsky Sergiy, Chepela Lesia, Borovyi Mykola, Lacroix David, Isaiev Mykola*

Thermal transport properties of porous silicon filled by ionic liquid nanocomposite system

Scientific Reports, Springer Science and Business Media LLC, 2023

thermal transport, nanocomposite system, thermal conductivity, ionic liquid, porous silicon matrix

[10.1063/1.5099010](#)

*Dubyk K., Chepela L., Lishchuk P., Belarouci A., Lacroix D., Isaiev M.*

Features of photothermal transformation in porous silicon based multilayered structures

Applied Physics Letters, AIP Publishing, 2019

Thermal conductivity, Electromagnetic radiation, Maxwell equations, Photoacoustic testing, Thermodynamic states and processes, Photoacoustic effects

[10.21272/jnep.12\(4\).04033,](#)

*Alain Géloën, Vladimir Lysenko, A. G. Kuzmich, Sergei Alekseev, Mykola Isaiev, Aleksey Rozhin, , Volodymyrska St., Kyiv, Ukraine, Lesia Chepela, Olga Levinson, K. Dubyk, Boris Zousman*

Some Types of Carbon-based Nanomaterials as Contrast Agents for Photoacoustic Tomography

Journal of Nano- and Electronic Physics, HAL CCSD, 2020

Materials science, /Bioengineering/Imaging, фотоакустична томографія, Nanotechnology, photoacoustic tomography, /Materials, 3D-зображення, 3D imaging, Carbon based nanomaterials, фантоми тканин, tissu

[10.1109/ELNANO54667.2022.9927023](#)

*Chepela Lesia, Lishchuk Pavlo, Shevchenko Viktoria, Kuryliuk Vasyl, Polishchuk Elysaveta, Kuzmich Andrey, Teselko Petro, Matushko Igor, Borovyi Mykola*

Fabrication and Photoacoustic Characterization of Multilayered Structures Based on Porous Silicon

2022 IEEE 41st International Conference on Electronics and Nanotechnology (ELNANO), IEEE, 2022

porous silicon, multilayered structure, synthesis, thermal conductivity, photoacoustic technique

[10.1109/NAP55339.2022.9934682](#)

*Lishchuk Pavlo, Chepela Lesia, Kuryliuk Vasyl, Polishchuk Elysaveta, Shevchenko Viktoria, Borovyi Mykola, Lacroix David, Isaiev Mykola*

Investigation of Thermal Transport Properties of Multilayer Porous Silicon Based Hybrid Nanostructures by Photoacoustic Technique

2022 IEEE 12th International Conference Nanomaterials: Applications & Properties (NAP), IEEE, 2022

porous silicon nanostructures, multi-layered porous silicon, hybrid nanosystems, photoacoustic technique, thermal conductivity

## EDUCATION

---

### Taras Shevchenko National University of Kyiv

Country	City
Ukraine	Kyiv
Faculty (school)	Specialisation
Faculty of Physics	Physics and Astronomy

---

### Taras Shevchenko National University of Kyiv

Country	City
Ukraine	Kyiv
Faculty (school)	Specialisation
Faculty of Physics	Physical Material

---

## EMPLOYMENT AND POSITION

---

### Taras Shevchenko National University of Kyiv

Position	Employment period
PhD	01.10.2020 - Current employment
Institution's subordination	Institutions EDRPOU code (for Ukrainian institutions only, foreign experts enter 00000000)
-	02070944
Country	City
Ukraine	Kyiv
Institution's Address	
60 Volodymyrska Street, Kyiv, Ukraine, 01033	

Office phone number

-

## SCHOLARLY / RESEARCH DEGREE

### **No scholarly / research degree**

Diploma number

1234

Date of issue

14.01.2024

## ACADEMIC RANK

- No academic rank

# CURRICULUM VITAE

## Lesia Chepela

date of birth\***13/06/97**

citizenship\* Ukrainian

<b>Contact information*</b>	<i>46 Symona Petliury, Apt 5, Boyarka, Kyiv region, 08151 +380634579427 <a href="mailto:lesia.chepele97@gmail.com">lesia.chepele97@gmail.com</a></i>
<b>Personal profiles in scientometric databases*</b>	<i><a href="https://orcid.org/0000-0003-2690-9207">https://orcid.org/0000-0003-2690-9207</a> <a href="https://www.researchgate.net/profile/L-Chepela">https://www.researchgate.net/profile/L-Chepela</a> <a href="https://www.scopus.com/authid/detail.uri?authorId=57209801121">https://www.scopus.com/authid/detail.uri?authorId=57209801121</a></i>
<b>Education*</b>	<i>Taras Shevchenko National University of Kyiv, 2014-2018, physical materials, B18 №123846 Taras Shevchenko National University of Kyiv, 2018-2020, physics and astronomy, physysics of nanosystems M20 №079192</i>
<b>Degree*</b>	<i>none</i>
<b>Academic status*</b>	<i>none</i>
<b>Professional work experience* (for the last 10 years)</b>	<i>Physics of Laboratory 07.2019–12.2019 Taras Shevchenko National University of Kyiv, Faculty of Physics (Kyiv, Ukraine) 09.2018–12.2018 Taras Shevchenko National University of Kyiv, Faculty of Physics (Kyiv, Ukraine)</i>

<b>Main research activity</b>	
<b>Management of collective research projects (which received funding on a competitive basis from outside the main place of work) (no more than 5 positions in the last 10 years)</b>	<i>none</i>
<b>Participation in collective research projects (no more than 5 positions in the last 10 years)</b>	<i>laboratory assistant, project name: No. 18BF051-01m: "Features of photothermal and photoacoustic processes in low-dimensional semiconductor systems based on silicon" [in Ukrainian] (state registration number 0118U000242), project level: all-Ukrainian, project executor, period of implementation: from 09.2018 to 12.2018, source of funding: 7713 - state budget funds. (Annex 1)</i>
<b>Individual research projects (which received funding on a competitive basis from a third party) (no more than 5 positions in the last 10 years)</b>	<i>none</i>
<b>Main scientific achievements</b>	
<b>Published scientific works* (no more than 10 positions in the last 10 years)</b>	<ol style="list-style-type: none"> <li>1. Dubyk, K.; Chepela, L.; Lishchuk, P.; Belarouci, A.; Lacroix, D.; Isaiev, M. <i>Features of photothermal transformation in porous silicon based multilayered structures.</i> <i>Applied Physics Letters</i>, 2019, 115(2), 021902. <a href="https://doi.org/10.1063/1.5099010">https://doi.org/10.1063/1.5099010</a> (Scopus, Q1)</li> <li>2. Dubyk, K.; Chepela, L.; Alekseev, S.; Kuzmich, A.; Zousman, B.; Levinson, O.; Rozhin, A.; Geloen, A.; Isaiev, M.; Lysenko, V. <i>Some types of carbon-based nanomaterials as contrast agents for photoacoustic tomography,</i> <i>Journal of Nano- and Electronic Physics</i>, 2020, 12(4), 04033. DOI: 10.21272/jnep.12(4).04033 (Scopus, Q3)</li> <li>3. L. Chepela et al., "Fabrication and Photoacoustic Characterization of Multilayered Structures Based on Porous Silicon," <i>2022 IEEE 41st International</i></li> </ol>

	<p><i>Conference on Electronics and Nanotechnology (ELNANO), Kyiv, Ukraine, 2022, pp. 178-181, doi: 10.1109/ELNANO54667.2022.9927023</i></p> <p>4. <i>P. Lishchuk et al., "Investigation of Thermal Transport Properties of Multilayer Porous Silicon Based Hybrid Nanostructures by Photoacoustic Technique," 2022 IEEE 12th International Conference Nanomaterials: Applications &amp; Properties (NAP), Krakow, Poland, 2022, pp. 01-04, doi:10.1109/NAP55339.2022.9934682</i></p> <p>5. <i>Lishchuk P.; Vashchuk A.; Rogalsky S.; Chepela L.; Borovyi M.; Lacroix D.; Isaiev M. Thermal transport properties of porous silicon filled by ionic liquid nanocomposite system. Scientific Reports 2023, 13, 5889. <a href="https://doi.org/10.1038/s41598-023-32834-8">https://doi.org/10.1038/s41598-023-32834-8</a> (Scopus, Q1)</i></p>
<b>Other significant scientific achievements (no more than 5 positions in the last 10 years)</b>	<i>none</i>
<b>Presentation of scientific results</b>	
<b>Key (plenary) reports at nationwide or international conferences (except for conferences that were always held by correspondence)</b>	<i>none</i>
<b>Personal speeches outside of Ukraine on the invitation of higher education institutions, research institutions or professional associations (except CIS countries) (no more than 10 positions in the last 10 years)</b>	<i>none</i>
<b>Reports at scientific conferences* (seminars, symposia, etc.) (no more than 10 positions in the last 10 years)</b>	<ol style="list-style-type: none"> <li><i>Chepela L., Lishchuk P., Kuryliuk V., Kuzmich A., Borovyi M. Photothermal transformation in the porous silicon-based brag mirrors. 2023 31st International Materials Research Congress 2023, August 13 – 18, Cancun, Mexico <a href="https://www.mrs-mexico.org.mx/imrc2023/">https://www.mrs-mexico.org.mx/imrc2023/</a></i></li> <li><i>Chepela L., Lishchuk P., Kuzmich A., Borovyi M., Isaiev M. Photothermal transformation in silicon based</i></li> </ol>

	<p><i>nanomaterials. 2023 11th International Conference “Nanotechnology and nanomaterials” (NANO-2023), August 16 – 19, Bukovel, Ukraine</i>  <a href="https://nano-conference.iop.kiev.ua/en/">https://nano-conference.iop.kiev.ua/en/</a></p> <p>3. <i>Chepela L., Lishchuk P., Shevchenko V., Kuryliuk V., Polishchuk E., Kuzmich A., Teselko P., Matushko I., Borovyi M. Fabrication and Photoacoustic Characterization of Multilayered Structures Based on Porous Silicon.</i> (accepted for oral presentation) 2022 IEEE 41st International Conference on Electronics and Nanotechnology (ELNANO), October 10 – 14, 2022 in Kyiv, Ukraine  <a href="https://kpi.ua/en/2022-elnano">https://kpi.ua/en/2022-elnano</a></p> <p>4. <i>Lishchuk P., Chepela L., Polishchuk E., Shevchenko V., Kuryliuk V., Borovyi M., Lacroix D., Isaiev M. Investigation of Thermal Transport Properties of Multilayer Porous Silicon Based Hybrid Nano-structures by Photo-acoustic Technique.</i> 2022 IEEE 12th International Conference “Nanomaterials: Applications &amp; Properties” (IEEE NAP-2022), Sept. 11-16, 2022, Krakow, Poland <a href="https://ieeenap.org/ieee-nap22/">https://ieeenap.org/ieee-nap22/</a></p>
<p><b>Promotion of scientific research</b>  <i>(no more than 10 positions in the last 10 years)</i></p>	none
<b>Scientific and organizational activity</b>	
<p><b>Participation in the organizing committees of scientific events (conferences, seminars, symposia, round tables, panel discussions, etc.)</b>  <i>(no more than 5 positions in the last 10 years)</i></p>	none
<p><b>Participation in editorial boards of periodical scientific publications (in which mandatory anonymous peer review is carried out)</b>  <i>(no more than 5 positions in the last 10 years)</i></p>	none

<b>Scientific editing (arrangement) of scientific publications</b> <i>(no more than 5 positions in the last 10 years)</i>	<i>none</i>
<b>Teaching activity</b>	
<b>The main author's educational courses at Higher Education Institutions (developed on the basis of own research)</b> <i>(no more than 5 positions in the last 10 years)</i>	<i>none</i>
<b>The main author's methodical developments (textbooks, manuals, methodical materials, educational programs for higher education)</b> <i>(no more than 5 positions in the last 10 years)</i>	<i>none</i>
<b>Supervision of scientific works (scientific supervision or consulting of dissertation studies that have been successfully defended)</b> <i>(no more than 5 positions in the last 10 years)</i>	<i>none</i>
<b>Expert activity</b>	
<b>Membership in specialized academic councils for dissertation defense</b> <i>(no more than 5 positions in the last 10 years)</i>	<i>none</i>

<p><b>Participation in expert councils (supervisory, advisory, expert or other councils of scientific, educational or research institutions, enterprises, cultural institutions, scientific publishing houses outside the main place of work)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<i>none</i>
<p><b>Participation in calls commissions (jury) (all-Ukrainian or international calls, Olympiads, tournaments of research projects, scientific papers, etc.)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<i>none</i>
<p><b>Scientific and expert activities for authorities (scientific and expert conclusions, comments, conclusions, etc. made at the request or order of authorities and self-government bodies, state structures, institutions, etc.)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<i>none</i>
<p><b>Scientific review of publications and projects* (number of anonymous reviews of manuscripts of scientific works submitted for publication in international scientific journals over the past 5 years; author reviews of scientific publications)</b></p>	<i>none</i>

<p><b>published in specialized periodicals)</b>  <i>(no more than 5 positions in the last 5 years)</i></p>	
<h3>Honors and awards</h3>	
<p><b>Honorary titles and statuses (honored worker of science and technology, academician, doctor honoris causa, etc.)</b></p>	<i>none</i>
<p><b>Laureate of a prize (awards, honors) of the international or national level, awarded on a competitive basis</b>  <i>(no more than 5 positions in the last 10 years)</i></p>	<i>none</i>
<p><b>Awards or honors for scientific achievements (from institutions, departments, authorities and local self-government bodies, etc.)</b>  <i>(no more than 5 positions in the last 10 years)</i></p>	<i>none</i>
<h3>Improvement of scientific qualification</h3>	
<p><b>Additional professional schools (trainings, summer schools, educational seminars, master classes, courses, etc., to acquire relevant scientific knowledge, skills and abilities)</b>  <i>(no more than 5 positions in the last 10 years)</i></p>	<i>none</i>

<p><b>Scientific internships abroad (lasting more than 2 months, in higher education institutions or research institutions, except correspondence and with the exception of CIS countries)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<p>Academic mobility program ERASMUS+, <i>Central School of Lyon, F LYON11, Ліон, Франція, 21.01.2019-30.06.2019</i></p> <p>Academic mobility program ERASMUS+, <i>University of Lorraine, F Nancy 43, Nancy, France, 01.02.2023-30.06.2023</i></p>
<p><b>Membership in independent scientific organizations (non-institutional professional academic associations, societies, unions, unions of researchers, except trade unions)</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	<p><i>none</i></p>
<p><b>Additional information on other important scientific achievements, qualifications, competences, or types of scientific activity that are significant for the implementation of the submitted research/development project</b></p> <p><i>(no more than 5 positions in the last 10 years)</i></p>	
<p><b>Foreign languages skills*</b></p>	<p><i>English B2 (Annex 2)</i></p>

## Реєстраційна картка НДДКР

Державний реєстраційний номер: 0118U000242

Відкрита

Дата реєстрації: 14-02-2018

Статус виконавця: 17 – головний виконавець



### 1. Загальні відомості

**Підстава для проведення робіт:** 34 - договір (замовлення) з центральним органом виконавчої влади, академією наук (головними розпорядниками бюджетних коштів на проведення НДДКР)

**КПКВК:** 2201040

**Напрям фінансування:** 2.1 - фундаментальні дослідження

#### Джерела фінансування

**7713 - кошти держбюджету**

**Загальний обсяг фінансування (тис. грн.):** 1290.5

**У тому числі по роках (тис. грн.):**

Рік	Фінансування
2018	387.1
2019	451.7
2020	451.7

### 2. Замовник

**Назва організації:** Міністерство освіти і науки України

**Код ЄДРПОУ/ПН:** 38621185

**Адреса:** просп. Перемоги, буд. 10, м. Київ, Київська обл., 01135, Україна

**Підпорядкованість:** Кабінет Міністрів України

**Телефон:** 380444813221

**E-mail:** mon@mon.gov.ua

### 3. Виконавець

**Назва організації:** Київський національний університет імені Тараса Шевченка

**Код ЄДРПОУ/ПН:** 02070944

**Підпорядкованість:** Міністерство освіти і науки України

**Адреса:** вул. Володимирська, буд. 60, м. Київ, Київська обл., 01033, Україна

**Телефон:** 380442393141

**Телефон:** 380442898691

**E-mail:** nau\_ch@mail.univ.kiev.ua

**WWW:** <http://www.univ.kiev.ua>

## 4. Співвиконавець

### 5. Науково-технічна робота

#### Назва роботи (укр)

Особливості фототермічних та фотоакустичних процесів в низькорозмірних напівпровідникових системах на основі кремнію

#### Назва роботи (англ)

Features of photothermal and photoacoustic processes in low-dimensional semiconductor silicon-based systems

#### Мета роботи (укр)

Отримання фізичних закономірностей фототермічного перетворення та формування отоакустичного відгуку в неоднорідних напівпровідникових системах з пониженою розмірністю

#### Мета роботи (англ)

**Пріоритетний напрям науково-технічної діяльності:** Фундаментальні наукові дослідження з найважливіших проблем розвитку науково-технічного, соціально-економічного, суспільно-політичного, людського потенціалу

**Стратегічний пріоритетний напрям інноваційної діяльності:**

**Вид роботи:** 39 - фундаментальна

**Очикувані результати:** експериментальні дані

**Галузь застосування:** 72. Наукові дослідження та розробки

## 6. Етапи виконання

Номер	Початок	Закінчення	Звітний документ	Назва етапу
1	01.2018	12.2018	Проміжний звіт	Експериментальні дослідження фототермічного та фотоакустичного перетворення в мультишарових структурах на основі поруватого кремнію та в шарах кремнієвих нанониток.
2	01.2019	12.2019	Проміжний звіт	Моделювання фототермічного та фотоакустичного перетворення в мультишарових структурах на основі низьковимірних напівпровідників.
3	01.2020	12.2020	Остаточний звіт	Експериментальні дослідження фототермічного перетворення в низьковимірних напівпровідникових системах типу «ультратонкий шар кремнію на ізоляторі» та кремнієвих нанониток з застосуванням методу комбінаційного розсіяння світла. Моделювання теплофізичних властивостей низьковимірних напівпровідникових систем.

## 7. Індекс УДК тематичних рубрик НТІ

**Коди тематичних рубрик НТІ:** 29.19.07

**Індекс УДК:** 538.913-405, 534.1; 536.2

## 8. Заключні відомості

**Керівник організації:**

Жилінська Оксана Іванівна (д. е. н., професор)

### **Керівники роботи:**

Дубик Катерина Володимирівна (к. ф.-м. н.)

**Відповідальний за подання документів:** Катасонова В.В. (Тел.: +38 (044) 239-31-88)

## Керівник відділу реєстрації наукової діяльності УкрІНТЕІ

Юрченко Т.А.





## LANGUAGE PROFICIENCY ASSESSMENT FORM FROM HOME UNIVERSITY

**LANGUAGE TO BE ASSESSED:** English

Name of Applicant: Lesia CHEPELA

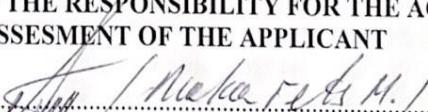
Level of the Applicant: Undergraduate   
 Master   
 Doctorate   
 Post-Doctorate   
 Staff

Home University: Taras Shevchenko National University of Kyiv

Country: Ukraine

Hereby it is confirmed that the applicant has language proficiency of B2 level according to the Common European Framework of Reference for Languages.

**HOME UNIVERSITY IS UNDERTAKING THE RESPONSIBILITY FOR THE ACCURATE AND FAIR LANGUAGE PROFICIENCY ASSESSMENT OF THE APPLICANT**

Name of signatory: .....Mykola MAKARETS..... 

Position at the University: Language Teacher

International Office Representative   
 Head of Department/Faculty/University

Signature : .....

Date : .....31.10.2016.....



Stamp of the Home University

# **Appendix**

# **References**

МІНІСТЕРСТВО  
ОСВІТИ І НАУКИ  
УКРАЇНИ

КІЇВСЬКИЙ  
НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ  
ІМЕНІ ТАРАСА ШЕВЧЕНКА

вул. Володимирська, 64/13  
м. Київ, 01601, Україна



MINISTRY  
OF EDUCATION AND SCIENCE  
OF UKRAINE

TARAS SHEVCHENKO  
NATIONAL UNIVERSITY  
OF KYIV

64/13 Volodymyrska St,  
Kyiv, 01601, Ukraine

19.01.2024 № 013/54

На №

Національний фонд  
досліджень України

Київський національний університет імені Тараса Шевченка  
(найменування підприємства/установи/організації)  
в особі проректора з наукової роботи Толстанової Ганни Миколаївни  
(посада, прізвище, ім'я, по-батькові керівника установи)

надає згоду на реалізацію проекту «Розробка принципів створення та машинно-орієнтованої характеризації поруватих кремнієвих наноструктур з оптимальними теплогранспортними властивостями»  
(назва проекту)

в період з серпня 2024 року по грудень 2026 року  
( строки реалізації проекту)

на базі фізичного факультету

Київського національного університету імені Тараса Шевченка  
(найменування підприємства/установи/організації)

у разі визначення переможцем за результатами конкурсу проектів із виконання наукових досліджень і розробок «Передова наука в Україні»  
(назва конкурсу)

Заявка на участь в Конкурсі та передбачувані наукові результати не містять інформації, зміст якої становить державну таємницю (згідно з Законом України «Про державну таємницю»).

Проректор з наукової роботи  
(посада керівника установи)



Ганна ТОЛСТАНОВА  
(прізвище, ім'я, по-батькові)

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### ЗАЯВА

щодо відповідності учасника конкурсу Національного фонду досліджень вимогам  
пункту 5 Критеріїв оцінки допустимості державної допомоги суб'єктам  
господарювання на проведення наукових досліджень, технічний розвиток та  
інноваційну діяльність

Я, Толстанова Ганна Миколаївна, що є проректором з наукової роботи Київського національного університету імені Тараса Шевченка, яка подала заявку на одержання грантової підтримки в рамках конкурсу Національного фонду досліджень України «Передова наука в Україні»

цією заявою підтверджую, що установа відповідає вимогам пункту 5 Критеріїв оцінки допустимості державної допомоги суб'єктам господарювання на проведення наукових досліджень, технічний розвиток та інноваційну діяльність, затверджених постановою Кабінету Міністрів України від 7 лютого 2018 р. № 118, та не належить до суб'єктів господарювання:

- яких визнано банкрутами;
- стосовно яких порушено справу про банкрутство;
- які перебувають на стадії ліквідації;
- які мають прострочену більш як шість місяців заборгованість перед державним (місцевим) бюджетом, Пенсійним фондом України та фондами загальнообов'язкового державного соціального страхування, що підтверджується відповідними органами державної влади;
- які втратили більш як половину статутного капіталу через накопичені збитки чи з інших причин;
- обсяг зобов'язань яких (крім суб'єктів малого та/або середнього підприємництва) за останні два роки більш як у 7,5 раза перевищує обсяг власного капіталу;
- прибуток яких до оподаткування без вирахування відсотків за користування кредитами (позиками) та амортизації є меншим за витрати на сплату відсотків за кредитами (позиками) відповідного періоду;
- кредитний рейтинг яких характеризується низькою та дуже низькою кредитоспроможністю порівняно з іншими українськими позичальниками або борговими інструментами згідно з Національною рейтинговою шкалою.

«19» січн 2024 р.



Проректор з наукової роботи  
Київського національного університету  
імені Тараса Шевченка

Ганна ТОЛСТАНОВА