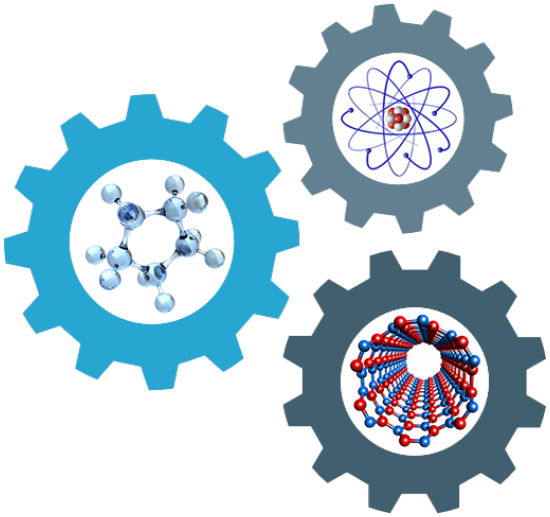
CONFERENCE PROGRAMME



4th International Conference on Innovative Materials and NanoEngineering (IMNE'2024)

September 13-16, 2024
Dovgoluka, Ukraine

TABLE OF CONTENT

ORGANIZED BY

Center of Excellence for Innovative Technologies and NanoEngineering, Department of Applied Physics and Nanomaterials Science
Lviv Polytechnic National University
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Nowowiejska 15/19
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Private Enterprise Softpartners
97 Yevhena Konovaltsja str.,
79057 Lviv, Ukraine

IN TECHNICAL CO-SPONSORSHIP

This conference has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 778156

TRAVEL ARRANGEMENT

The IMNE-2024 conference will be held in Dovholuka village, Stryi district, within the Lviv region of Ukraine. Attendees will be accommodated at the Relax Complex “Shepilska,” located between the renowned Morshyn and Truskavets resorts, offering an ideal setting for both relaxation and academic pursuits. The venue is nestled in the picturesque Carpathians alongside Lake Shepilska and is just a 20-minute drive from Stryi.

Shuttle services for groups are being considered for ease of transportation, but participants should coordinate with the organizing committee in advance to secure arrangements. The accommodation at “Shepilska” includes rooms designed in soothing tones and cottages with elegant wooden finishes, ensuring a comfortable stay. The on-site restaurant provides a delightful fusion of Ukrainian and European cuisines, catering to the diverse tastes of conference attendees.

HOTEL ADDRESS

Relax Complex Shepilska

Urochische Shepil'ske 1, Dovgoluka, Lviv region
Ukraine
Telephone: 095 260 50 10
Telephone: 098 342 18 00
Website: https://shepilska.com.ua/

Welcoming Message from the Conference Chairman

Dear Colleagues,

With immense pride and excitement, I welcome you to the 4th International Conference on Innovative Materials and NanoEngineering (IMNE-2024). As we gather here in the tranquil and picturesque setting of the Carpathian Mountains at the Relax Complex "Shepilska" in Dovholuka village, Stryi District, Lviv Region, Ukraine, I am reminded of how far we have come since the inception of this conference.

IMNE-2024 began as an initiative under the European Union's IMAGE project, a cornerstone of innovative research under the Horizon 2020 program. What started as a focused effort within the IMAGE project has rapidly grown, attracting the attention of some of the brightest minds in science and engineering, both in Ukraine and abroad. This growth is a testament to the importance and relevance of our work in materials science and nanoengineering. We are incredibly proud to include outstanding participants from France, Germany, Poland, Ukraine, and the USA, demonstrating our work's international appeal and significance in materials science and nanoengineering.

This year, we have again adapted to the challenges posed by the ongoing full-scale russian war against Ukraine, which has impacted every facet of our lives, including the scientific community. Despite these challenges, our resolve to advance science and technology remains unshaken. The conference continues in a hybrid format, enabling participation from esteemed scientists across Ukraine, Poland, Germany, France, and other EU countries. This diverse gathering symbolizes our collective resilience and dedication to fostering collaboration, even in adversity.

The IMNE conference has become a vibrant platform for exchanging ideas, innovations, and potential collaborations. Here, we push the boundaries of knowledge in manufacturing, optical, and quasi-optical research, exploring pioneering materials and emerging nanotechnologies. Our attendees, who include academic leaders, industry innovators, and private sector pioneers, have the unique opportunity to share and gain insights that can propel their work to new heights.

Our mission is to present research and ignite discussions that address the challenges, opportunities, and practical applications within micro- and nanoelectronics. Our dedicated organizing committee has worked tirelessly to ensure that IMNE-2024 meets the highest international standards and provides an environment conducive to intellectual and personal growth.

As we embark on this journey together, I am confident that IMNE-2024 will catalyze new ideas, groundbreaking research, and enduring collaborations. On behalf of the entire organizing committee, I congratulate each of you for being part of this significant endeavor and wish you a truly enlightening and inspiring experience at IMNE-2024.

Sincerely,

Anatoliy Andrushchak

IMNE Conference Chairman

https://imne.lpnu.ua

ORGANIZING COMMITTEE

Chairman:	**Prof. Anatoliy Andrushchak,** Lviv Polytechnic National University, UKRAINE
Vice-chairmen:	**Prof. Andriy Kityk,** Czestochowa University of Technology, POLAND **Prof. Bouchta Sahraoui** University of Angers, FRANCE **Prof. Yevhen Yashchyshyn** Warsaw University of Technology, POLAND
Conference Secretary:	**Dr. Nazariy Andrushchak,** Lviv Polytechnic National University, Private Enterprise Softpartners, UKRAINE
Publication Chair:	**Dr. Nazariy Andrushchak,** Lviv Polytechnic National University, Private Enterprise Softpartners, UKRAINE

MEMBERS OF THE ORGANIZING COMMITTEE

Dr. Bohdan Venhryn	Lviv Polytechnic National University, UKRAINE
Dr. Oksana Balaban	Lviv Polytechnic National University, UKRAINE
Andrii Danylov	Lviv Polytechnic National University, UKRAINE
Dr. Zinoviy Kohut	Lviv Polytechnic National University, UKRAINE
Dr. Roman Shvets	Lviv Polytechnic National University, UKRAINE
Dr. Andrii Bendak	Lviv Polytechnic National University, UKRAINE

INTERNATIONAL PROGRAM COMMITTEE

Prof. Andrushchak A.	Lviv Polytechnic National University, UKRAINE **(Chairman)**
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Prof. Buryy O.	Lviv Polytechnic National University, UKRAINE
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Prof. Sahraoui B.	University of Angers, FRANCE **(Vice-chairman)**
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Prof. Strelchuk V.	V.E. Lashkaryov Institute of Semiconductor Physics, UKRAINE
Prof. Tkachuk V.	Ivan Franko National University of Lviv, UKRAINE
Prof. Vakiv M.	Scientific research company Carat – branch enterprise of PJSC Concern-Electron (CARAT), Ukraine
Prof. Vitusevich S.	Forshungszentrum Julich GmbH, GERMANY
Prof. Yashchyshyn Ye.	Warsaw University of Technology, POLAND **(Vice-chairman)**

4th International Conference on Innovative Materials and NanoEngineering (IMNE'2024)

IMNE'2024 Conference Program Agenda

	Friday (September 13, 2024)
13^{00}-15^{00}	Registration of participants
15^{00}-16^{40}	**Plenary Session** **Link:** https://us06web.zoom.us/j/86785109280?pwd=GeDqBVAfLUmc9uw6xPOWlYhz25O1HK.1 **Passcode:** imne2024 Chairman: **Prof. Anatoliy Andrushchak** Vice-chairman: **Dr. Nazariy Andrushchak**
16^{40}-17^{00}	Coffee Break
17^{00}-19^{00}	**Session 1** **Link:** https://us06web.zoom.us/j/84175290632?pwd=tr6uuFNyTbal9dm0PqGt0HURFlhfMg.1 **Passcode:** imne2024 Chairman: **Prof. Bouchta Sahraoui** Vice-chairman: **Prof. Oleh Buryy**
19^{00}-22^{00}	Barbeque Dinner

	Saturday (September 14, 2024)
10^{00}-13^{30}	**Session 2** **Link:** https://us06web.zoom.us/j/82429625008?pwd=azDKfW03teIfLqk5tr0SVhPUthajR9.1 **Passcode:** imne2024 Chairman: **Prof. Yaroslav Shchur** Vice-chairman: **Andriy Danylov**
12^{00}-12^{30}	Coffee Break
13^{30}-14^{30}	Lunch time
14^{30}-18^{30}	**Session 3** **Link:** https://us06web.zoom.us/j/83994079013?pwd=0DrcBidgGwBPJTq18auB78dO5ugleI.1 **Passcode:** imne2024 **Chairman: Prof. Yevhen Yashchyshyn** **Vice-chairman: Prof. Marian Kyryk**

16^{30}-17^{00}	Coffee Break
18^{30}-19^{00}	Scientific Discussions, Free time
19^{00}-22^{00}	Banquet

	Sunday (September 15, 2024)
10^{00}-11^{30}	**Session 4** **Link:** https://us06web.zoom.us/j/89300246090?pwd=rbGphov78rvq05GOX7SDuGdiMBikmT.1 **Passcode:** imne2024 **Chairman: Prof. Andriy Kityk** **Vice-chairman: Dr. Oksana Balaban**
13^{30}-14^{30}	Lunch time

	Monday (September 16, 2024)
9^{00}-11^{00}	General Discussion, Conference Closing

TIME OF PRESENTATIONS

Oral presentation at the plenary session – 25 min.

Oral presentation at the regular session – 10 min.

Discussion, questions – up to 5 min.

REGISTRATION

Friday, September 13 13^{00}-15^{00}

Registration of participants.

PLENARY SESSION

Friday, September 13 15^{00}-16^{40}	
Chairman: Prof. Anatoliy Andrushchak **Vice-chairman: Dr. Nazariy Andrushchak**	
SPEECH OF THE CONFERENCE ORGANIZER	
15^{00}-15^{10}	**WELCOMING MESSAGE OF THE CONFERENCE CHAIRMAN** **Head of Center of Excellence for Innovative Technologies and Nanoengineering at Lviv Polytechnic National University** *Anatoliy Andrushchak*
INVITED LECTURES	
15^{10}-15^{40}	**Experience in the Development of Sub-THz Controllable Structures Based on $LiNbO_3$** Y. Yashchyshyn, J. Sobolewski, V. Haiduchok, B. Kopko, M. Vakiv
15^{40}-16^{10}	**Experimental and Theoretical Investigations of Nanocomposite Materials Based on Si and SiO_2 Porous Matrices** Ya. Shchur, A. V. Kityk, V. Adamiv, S. Vitusevich, A. Andrushchak
16^{10}-16^{40}	**Confinement Effect in *p*SiO_2:CB*n*CB and *p*Al_2O_3:CB*n*CB (n=7,9) Nanocomposites: Optical Polarimetry Study** A. Maksym, Y. Shchur, A. Andrushchak, R. Wielgosz, O. Kityk, M. Lelonek, P. Kula, P. Huber, A. V. Kityk

SESSION 1

Friday, September 13 17^{00}-19^{00}	
Chairman: Prof. Bouchta Sahraoui **Vice-chairman: Prof. Oleh Buryy**	
17^{00}-17^{15}	**Investigation of the Properties of Low-Temperature GaAs Doped with Rare Earth and Isovalent Elements Obtained by the LPE Method** M. Vakiv, S. Krukovskyi, V. Arikov, A. Voronko, D. Novikov, D. Verbitskiy

17^{15}-17^{30}	**Heat Treatment Effects on Structural Peculiarities of "Inverse" $MgAl_2O_4$ and "Normal" $ZnAl_2O_4$ Spinel Synthesized by Sol-Gel Method** V. Hreb, V. Stadnik, A. Pieniążek, Ya. Zhydachevkyy, L. Vasylechko, S. Ubizskii
17^{30}-17^{45}	**Polymer-Based Trends in the Development of Hybrid Polymer-Inorganic Nanocomposites for a Wide Range of Applications** O. Zaichenko, N. Mitina, O.Izhyk, V.Storozh, Y. Yashchyshyn, Kh. Harhay, O. Balaban, A.Voloshinovskii
17^{45}-18^{00}	**Substrate Effect on Silver Nanoparticle Extinction Cross Section** O. Ilin, Y. Smachylo, Y. Mysyuk, Kh. Ivaniuk, T. Bulavinets, V. Fitio, P. Stakhira, I. Yaremchuk
18^{00}-18^{15}	**Interfacial Microgel Catalysts for Fine Control of Oxidation Reactions** A. Pavliuk, O. Fiukowski, J. Wagner, V. Ivasiv, R. Nebesnyi, U. Schnakenberg, A. Pich
18^{15}-18^{30}	**Studying the Correlation Between Molecular Structure and Nonlinear Optical Properties in Selected Organic and Organometallic Compounds** S. Taboukhat, A. Aamoum, D. Guichaoua, R. Wielgosz, A. Andrushchak, B. Sahraoui
18^{30}-18^{45}	**Magnetic Properties of Nanostructured Bismuth-Containing Dielectrics in Pores of Synthetic Opals** V. Moiseienko, M. Derhachov, B. Abu Sal
18^{45}-19^{00}	**Application of Macroporous Silicon Structures for Sub-THz Waveguides** J. Sobolewski, P. Bajurko, P. Pawlik

SESSION 2

Saturday, September 14 10^{00}-13^{30}	
Chairman: Prof. Yaroslav Shchur Vice-chairman: Andriy Danylov **INVITED LECTURES**	
10^{00}-10^{30}	**Unveiling All-Optical Switching Phenomenon in Some Selected Advanced Functionalised Compounds** B. Sahraoui, S. Taboukhat, A. Aamoum, D. Guichaoua, R. Wielgosz, A. Andrushchak, A. Kityk

10^{30}-11^{00}	**MXenes and the Future of Technology** Yu. Gogotsi
11^{00}-11^{30}	**Laser-Induced Periodic Surface Structures on Metals and MXenes** I. Gnilitskyi
SESSION 2 PRESENTATIONS	
11^{30}-11^{45}	**Growth of the Nanoporous Alumina on Surfaces of Various Geometry** M. Lelonek, H. Knispel, T. Münzner
11^{45}-12^{00}	**Synthesis and Application of Magnetically Sensitive Carbon Nanocomposites for Environmental Clean-Up from Contamination Caused by Military Operations** I. Bordun, M. Malovanyy, N. Nahurskyi, D. Calus, E. Szymczykiewicz
12^{00}-12^{30}	**Coffee Break**
12^{30}-12^{45}	**Nonlinear Optical Enhancement and Morphological Characterization of ZnO-Integrated PMMA Composites** H. El Karout, A. Marjanowska, M. Lelonek, A. Andrushchak, B. Sahraoui
12^{45}-13^{00}	**Effect of Chemical Etching of Mechanically Treated Monocrystalline Germanium Wafers on Their Modulation Abilities in the Sub-THz Range** N. Andrushchak, R. Bukliv, B. Venhryn, V. Haiduchok, D. Afanassyev, A. Andrushchak
13^{00}-13^{15}	**Estimation of Saturable Absorption Properties of YAG:Cr^{4+} Epitaxial Films Using Z-Scan Technique** I. Syvorotka, D. Guichaoua, O. Shpotyuk, B. Sahraoui
13^{15}-13^{30}	**Photophysical Analysis of 2,3-Diphenyl Quinoxaline Thin Films for Applications in Optoelectronics** D. Guichaoua, I. E. Ouedghiri-Idrissi, Z. Sofiani, A. Talbi, Y. El Kouari, A. Andrushchak, D. Shulha, R. Wielgosz, P. Płociennik, S. Taboukhat, A. Zawadzka, B. Sahraoui

SESSION 3

Saturday, September 14 **14^{30}-18^{30}**
Chairman: Prof. Yevhen Yashchyshyn **Vice-chairman: Prof. Marian Kyryk** **INVITED LECTURE**

14^{30}-15^{00}	**Exotic Properties of Condensed Matter Under High Pressure From *ab initio* Computer Simulations** T. Bryk
15^{00}-15^{30}	**Studies of the Geometric Properties of Weighted Quantum Graph States with Quantum Programming** Kh. Gnatenko
15^{30}-16^{00}	**The Luminescence Properties Peculiarities of the YAlO3:Bi Powder Storage Phosphor** O. Poshyvak, V. Hreb, M. Baran, V. Stasiv, S. Ubizskii, L. Vasylechko, Ya. Zhydachevskyy
SESSION 3 PRESENTATIONS	
16^{00}-16^{15}	**Modeling of Formation and Functioning of Photogenerated Diffraction Grating for Sub-THz Spectral Region** O. Buryy, D. Shulha, A. Andrushchak
16^{15}-16^{30}	**Effect of Visible Range Radiation on Photomodulation of Subterahertz Radiation by Single Crystal Germanium** O. Balaban, R. Bukliv, A. Danylov, I. Sen'ko, B. Venhryn, D. Vynnyk
16^{30}-17^{00}	**Coffee Break**
17^{00}-17^{15}	**Structure and Electrophysical Properties of Nanocomposites of the GaInSn-$NiFe_2O_4$ System** S. Mudry, I. Shtablavyi, M. Marć, A. Drzewiński, W. Wolak, M. R. Dudek
17^{15}-17^{30}	**Microscopic Description of the Quantum Capacitance and the Specific Energy in Quasi-2D Crystals** D. Matulka, B. Lukiyanets
17^{30}-17^{45}	**Non-Electrochemical Storage of Electrical Energy in Supramolecular Clathrates** F. Ivashchyshyn, D. Calus, V. Maksymych, Z. Kohut, P. Chabecki, R. Shvets
17^{45}-18^{00}	**Analysis of Electrophysical Parameters of Semiconductors** O. Balaban, D. Vynnyk, I. Sen'ko, B. Venhryn, A. Danylov, A. Andrushchak
18^{00}-18^{15}	**Elemental Composition and Optical Properties of Nanoporous Matrices with Al_2O_3** R. Bukliv, V. Adamiv, I. Teslyuk, A. Andrushchak

18^{15}-18^{30}	**Lattice Dynamics Peculiarities of $Bi_{12}GeO_{20}$ Crystal: Experiment and Theory** Ya. Shchur, N. Andrushchak, A. V. Kityk, A. Andrushchak

SESSION 4

Sunday, September 15 10^{00}-11^{30}	
Chairman: Prof. Andriy Kityk Vice-chairman: Dr. Oksana Balaban **SESSION 4 PRESENTATIONS**	
10^{00}-10^{15}	**Unveiling the Potential of Optically Active Crystals for Acousto-Optic Applications** O. Mys, D. Adamenko, R. Vlokh
10^{15}-10^{30}	**Enhancement of the Efficiency of Acousto-Optic Diffraction Due to the Ellipticity of Eigen Optical Waves, Caused by a Faraday Effect and the Electro-Gyration Effect** O. Mys, D. Adamenko, R. Vlokh
10^{30}-10^{45}	**Self-Organization in Metallic Glasses at Nanotechnology Processes** Y. Nykyruy, S. Mudry, B. Venhryn
10^{45}-11^{00}	**Topological Reactions Between Vector-Vortex Acoustic and Optical Beams in the Course of Acousto-Optic Interaction** M. Kostyrko, I. Skab, R. Vlokh
11^{00}-11^{15}	**Synthesizing Rb_2SO_4 Crystals and Studying the Birefringence Dependence** Z. Kohut, V. Stadnyk, I. Pryshko
11^{15}-11	**Low-Temperature Luminescence of LiB_3O_5 Glass - Analogue of the Human Body Tissue-Equivalent Absorption Coefficient** V. Adamiv, I. Medvid, I. Koflyuk, U. Dutchak, I. Teslyuk, R. Gamernyk

FINAL SESSION

Monday, September 16 9^{00}-11^{00}

1. Concluding reports of Section Chairman.
2. Conference summary and closing.

SPONSORS

This conference has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 778156

IMAGE

Project "MAGE" – Innovative Optical/Quasioptical Technologies and Nano Engineering of Anisotropic Materials for Creating Active Cells with Substantially Improved Energy Efficiency

UNDER THE AUSPICES OF

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

LVIV POLYTECHNIC NATIONAL UNIVERSITY