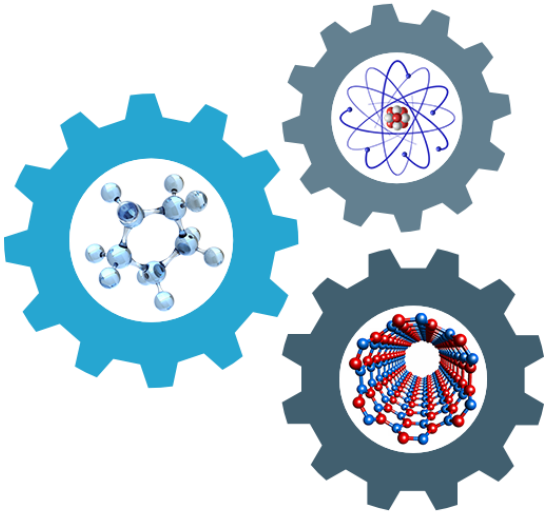
CONFERENCE PROGRAMME



2nd International Conference on Innovative Materials and NanoEngineering (IMNE'2022)

November 11-13, 2022
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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Faculty of Electrical Engineering
Czestochowa University of Technology
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Institute of Sciences and Molecular Technologies of Angers
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40 Rue de Rennes, Angers Cedex 01,
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Sub-Terahertz Technology Division Institute of Radioelectronics and Multimedia Technology
Warsaw University of Technology
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

IMNE-2022 conference will be held in the Dovholuka village, Stryi district, Lviv region, Ukraine. Organizers might organize the shuttle for groups, but the participants have to contact the organizing committee in advance.

All the delegates will be accommodated in Relax Complex "Shepilska," located near the Carpathians between the Morshyn and Truskavets resorts and are the best place for relaxation and scientific conferences. This hotel is located in a quiet location on Lake Shepilska, a 20-minute drive from the city of Stryi. All rooms of the "Shepilska" recreation complex are decorated in light colors, and the cottages are decorated with wood. The restaurant of the Shepilska complex serves Ukrainian and European cuisine.

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,

I am pleased to welcome all the participants of the 2nd International Conference on Innovative Materials and NanoEngineering (IMNE'2022). The location of our conference was chosen to be a picturesque area at the foot of the Carpathian Mountains in the Relax Complex "Shepilske Urochishche," which is located in the village of Dovgoluka, Stryi District, Lviv Region in Ukraine.

Although initially as part of the IMAGE project, our conference was planned to be held in 2020 at the University of Angers (France). However, due to the COVID-19 epidemic, and now due to the full-scale russian war against Ukraine, we were forced to hold our conference in Ukraine. We all hope and sincerely believe that the armed forces of Ukraine will soon expel the russian invaders from the Ukrainian land, and we will all have to restore both Ukraine itself and Ukrainian science.

The ongoing hostilities in the south and east of Ukraine made it necessary to conduct our conference in a hybrid format, involving scientists from different areas to attend conference sessions while keeping our participants safe. Despite that, it will allow us to exchange experience with scientists from Ukraine, Poland, Germany, France, and other European countries, primarily within the framework and with the support of the current IMAGE project of the European Union No. 778156 (H2020-MSCA-RISE-2017 program). The main goal of the IMNE conference is to share knowledge about a wide range of innovative materials and nanoengineering, in particular, in the field of manufacturing and optical and quasi-optical research of new materials and novel nanotechnologies, establishing closer ties between researchers in the field of application of created materials.

Conference participants will be able to discover new opportunities for cooperation and discuss innovative approaches to researching new materials and creating nanocomposites. Furthermore, the participants, represented by academic scientists from Ukrainian, Polish, German and French universities and large scientific centers, as well as businessmen from several private companies-beneficiaries of the IMAGE project, can attend the conference in person or online to present their novel scientific results or technological developments, as well as to gain knowledge and achieve success in their field of scientific research or their field of practical activity.

We have involved scientists, managers, and engineers who have experience in developing and producing elements based on innovative materials and who create devices from these materials for their further application. Thus, exciting discussions

can arise regarding the problems and opportunities of development and optical or quasi-optical research of innovative materials, as well as the possibilities of their practical application in new devices or systems of micro- and nanoelectronics.

Our organizing committee has made every effort to ensure the highest quality and compliance with international conference standards. Our best reward will be your new ideas and further cooperation between participants. On behalf of all organizing committee members, I sincerely congratulate you and wish you a pleasant stay at the IMNE'2022 conference.

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. Roman Shvets	Lviv Polytechnic National University, UKRAINE
Dr. Andrii Bendak	Lviv Polytechnic National University, UKRAINE
Andrii Danylov	Lviv Polytechnic National University, UKRAINE
Dr. Zenoviy Kogut	Lviv Polytechnic National University, UKRAINE

INTERNATIONAL PROGRAM COMMITTEE

Prof. Andrushchak A.	Lviv Polytechnic National University, UKRAINE **(Chairman)**
Prof. Buryy O.	Lviv Polytechnic National University, UKRAINE
Dr. Goering P.	SmartMembranes GmbH, GERMANY
Prof. Huber P.	Hamburg University of Technology, GERMANY
Dr. Sci. Ivashchyshyn F.	Lviv Polytechnic National University, UKRAINE
Prof. Kityk A.	Czestochowa University of Technology, POLAND **(Vice-chairman)**
Prof. Mytsyk B.	Karpenko Physico-Mechanical Institute of the National Academy of Sciences of Ukraine, UKRAINE
Prof. Pawlik P.	Czestochowa University of Technology, POLAND
Prof. Sahraoui B.	University of Angers, FRANCE **(Vice-chairman)**
Prof. Shchur Ya.	Institute for Condensed Matter Physics NAS Ukraine, Private Enterprise SoftPartners, UKRAINE
Prof. Strelchuk V.	V.E. Lashkaryov Institute of Semiconductor Physics, 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)**

2nd International Conference on Innovative Materials and NanoEngineering (IMNE'2022)

IMNE'2022 Conference Program Agenda

	Friday (November 11, 2022)
13^{00}-15^{00}	Registration of participants
15^{00}-16^{40}	**Plenary Session** **Link**: https://zoom.us/j/99336640401?pwd=RnV3SlplWjR0OUtuenZoZk55YWFudz09 **Passcode:** imne2022 Chairman: **Prof. Anatoliy Andrushchak** Vice-chairman: **Dr. Nazariy Andrushchak**
16^{40}-17^{00}	Coffee Break
17^{00}-19^{00}	**Session 1** **Link**: https://zoom.us/j/93878735705?pwd=NHg0U2kxM3JyVWg1YkVRdnFWNDZSQT09 **Passcode:** imne2022 Chairman: **Prof. Bouchta Sahraoui** Vice-chairman: **Prof. Oleh Buryy**
19^{00}-22^{00}	Barbeque Dinner

	Saturday (November 12, 2022)
10^{00}-12^{00}	**Session 2** **Link**: https://zoom.us/j/96324895386?pwd=Z0dXZUdIaVRvRWNZR0xBYVZZeG05QT09 **Passcode:** imne2022 Chairman: **Prof. Yevhen Yashchyshyn** Vice-chairman: **Prof. Marian Kyryk**
12^{00}-12^{30}	Coffee Break

12^{30}-13^{30}	**Session 3** **Link**: https://zoom.us/j/99152085330?pwd=dDRtUTFtK0daWFVTQVZQNEhsR0dvQT09 **Passcode:** imne2022 Chairman: **Prof. Andriy Kityk** Vice-chairman: **Dr. Zenoviy Kogut**
13^{30}-14^{30}	Lunch time
14^{30}-16^{45}	**Session 4** **Link**: https://zoom.us/j/95881603466?pwd=UVQxMGlzdnlsME5kcmlHQWxsZWNFUT09 **Passcode:** imne2022 Chairman: **Prof. Yaroslav Shchur** Vice-chairman: **Andriy Danylov**
16^{45}-19^{00}	Scientific Discussions, Free time
19^{00}-22^{00}	Banquet

	Sunday (November 13, 2022)
9^{00}-11^{00}	**General Discussion, Conference Closing** **Link**: https://zoom.us/j/96522661390?pwd=RFgrQXZDNVZXT1FNakhSVTBFVWQxUT09 **Passcode:** imne2022

TIME OF PRESENTATIONS

Oral presentation at the plenary session – 25-30 min.

Oral presentation at the regular session – 10 min.

Discussion, questions – up to 5 min.

REGISTRATION

Friday, November 11 13^{00}-15^{00}

Registration of participants.

PLENARY SESSION

Friday, November 11 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}	**Nonlinear Optics as a Powerful Tool for the Diagnostic of Advanced Materials Including Magnetic Advanced Ones** *B. Sahraoui, D. Guichaoua, I. Syvorotka, H. El Karout, S. Taboukhat, R. Wielgosz, N. Syvorotka, A. El-Ghayoury, A. Andrushchak*
15^{40}-16^{10}	**Design and Simulation Analysis of Optically Controlled Switch for Terahertz Frequency Range** *Ye. Yashchyshyn, J. Sobolewski, D. Vynnyk, V. Haiduchok, S. Krukovsky, N. Andrushchak, P. Bajurko, A. Andrushchak*
16^{10}-16^{40}	**Towards Femtosecond Laser-Induced Periodic Structures in Developing Functional Surface Properties** *I. Gnilitskyi*

SESSION 1

Friday, November 11 17^{00}-19^{00}	
Chairman: Prof. Bouchta Sahraoui **Vice-chairman: Prof. Oleh Buryy** 	
17^{00}-17^{15}	**Raman Scattering and X-ray Diffraction Study of Benzil $(C_6H_5CO)_2$ Nanocrystals Embedded to Porous Silica Matrix** *Ya. Shchur, A. Kityk, A. Bendak, N. Andrushchak, G. Beltramo, S. Vitusevich, A. Andrushchak, J. Jędryka, Y. Slyvka*

17^{15}-17^{30}	**Nonlinear Optical Studies of Europium and Gadolinium Complexes** *H. El Karout, B. Sahraoui, D. Guichaoua, I. Syvorotka, S. Taboukhat, R. Wielgosz, N. Syvorotka, A. El-Ghayoury, A. Andrushchak*
17^{30}-17^{45}	**Femtosecond Laser Induced Second Harmonic Generation in Nanocomposites** *A. Andrushchak, A. Danylov, I. Sen'ko*
17^{45}-18^{00}	**Software and Electronics for Accurate and Reliable Characterization of Refraction Properties of Optical Nanocomposites** *I. Karbovnyk, A. Ratych, N. Andrushchak*
18^{00}-18^{15}	**Microgels as Innovative Smart Catalysts** *R. Nebesnyi, I. Demydov, V. Ivasiv, A. Pich*
18^{15}-18^{30}	**Optical and Structural Characteristics of Copper Sulfides Nanoparticles** *I. Yaremchuk, T. Bulavinets, P. Stakhira, V. Fitio*
18^{30}-18^{45}	**Peculiarities of Raman Mapping of Nanocomposite Materials** *Ya. Shchur, A. Bendak, A. Kityk, A. Andrushchak*
18^{45}-19^{00}	**Determination of Optimal Conditions of Second Harmonic, Sum and Difference Frequency Generation in Crystalline Materials by Extreme Surfaces Method** *O. Buryy, D. Shulha, A. Andrushchak*

SESSION 2

Saturday, November 12 **10^{00}-12^{00}**	
Chairman: Prof. Yevhen Yashchyshyn **Vice-chairman: Prof. Marian Kyryk** **INVITED LECTURES**	
10^{00}-10^{30}	**Organic-Inorganic Crystalline Nanocomposites for NLO Applications** *A. Kityk, H. El Karout, B. Sachraoui, Y. Shchur, A. Andrushchak, R. Wielgosz, O. Kityk, M. Lelonek, J. Jędryka, Y. Slyvka*
10^{30}-11^{00}	**Lattice Dynamics of Nanosized KH_2PO_4 and $Ba(NO_3)_2$ Crystals Confined in Porous SiO_2 Matrix: Raman Spectroscopy and *ab initio* Lattice Dynamics Analysis** *Ya. Shchur, V. Strelchuk, A. Nikolenko, A. Kityk, G. Beltramo, S. Vitusevich, N. Andrushchak, V. Adamiv, I. Teslyuk, A. Andrushchak*

11^{00}-11^{30}	**Peculiarities of the Phosphorescence Decay and Optically Stimulated Luminescence Kinetics of the Becquerel Type in YAP:Mn crystals and ceramics** *S. Ubizskii, O. Buryy, V. Degoda, H. Podust*
SESSION 2 PRESENTATIONS	
11^{30}-11^{45}	**Acousto-Optical Diffraction of Laser Irradiation in $CaWO_4$ Crystals** *D. Vynnyk, I. Senko, B. Venhryn, D. Afanassyev, A. Bendak, A. Andrushchak*
11^{45}-12^{00}	**The Impact of Mechanical Treatment of the Al_2O_3 Nanomatrices Surface on their Optical Parameters with and without KDP Crystals Inclusion** *N. Andrushchak, D. Vynnyk, B. Kopko, V. Haiduchok, V. Adamiv, A. Andrushchak*

SESSION 3

Saturday, November 12 12^{30}-13^{30}	
Chairman: Prof. Andriy Kityk **Secretary: Andriy Danylov**	
INVITED LECTURE	
12^{30}-13^{00}	**Studies of Tunneling of Spin-1 on IBM's Quantum Computer** *V. Tkachuk, Kh. Gnatenko*
SESSION 3 PRESENTATIONS	
13^{00}-13^{15}	**Free-volume Evolution in Nanostructured Spinel Ceramics** *H. Klym, A. Andrushchak*
13^{15}-13^{30}	**Nitrogen-Doped Porous Carbon Material for Supercapacitors Derived From Gelatin** *V. Maksymych, D. Calus, A. Borysiuk, I. Bordun, P. Chabecki, F. Ivashchyshyn*

SESSION 4

Saturday, November 13 14^{30}-16^{30}	
Chairman: Prof. Yaroslav Shchur **Vice-chairman: Andriy Danylov**	
INVITED LECTURE	
14^{30}-15^{00}	**Studies of Properties of Graphs with Programming on a Quantum Computer** *Kh. Gnatenko, H. Laba, V. Tkachuk*
SESSION 4 PRESENTATIONS	
15^{00}-15^{15}	**Quantum Capacitance in Bi-Layered Structures of Quasi-2D-Crystals** *B. Lukiyanets, D. Matulka*
15^{15}-15^{30}	**Experimental and Theoretical Study of Photoelastic Properties of Langasite Group Crystals for Electromagnetic Radiation Control Devices** *N. Demyanyshyn, B. Mytsyk, P. Shchepanskyi, A. Erba, J. Maul*
15^{30}-15^{45}	**Experimental Verification of the Indicative Surfaces for Photoelasticity on the Example of $LiNbO_3$:MgO Crystals** *A. Andrushchak, N. Demyanyshyn, M. Kyryk, B. Mytsyk*
15^{45}-16^{00}	**Surface-Active Polymer with Terminal Phosphate Group as Templates for Synthesis Calcium Phosphate Nanoparticles** *K. Volianiuk, N. Mitina, Kh. Harhay, O. Hevus, A. Zaichenko*
16^{00}-16^{15}	**Electro-Optical Parameters in the $LiTaO_3$ Crystals** *B. Olchovyk, Z. Kohut*
16^{15}-16^{30}	**Magnetic Properties of an Anisotropic Nanosized Fe-Cr-Co Alloy** *A. Kondyr, A. Borysiuk, V. Shuvarik*
16^{30}-16^{45}	**Experimental Determination of all Photoelastic Tensor Components in $LiNbO_3$ Crystals** *I. Senjko, I. Martynyuk-Lototska, A. Bendak, D. Shulha, A. Andrushchak*

FINAL SESSION

Sunday, November 13 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