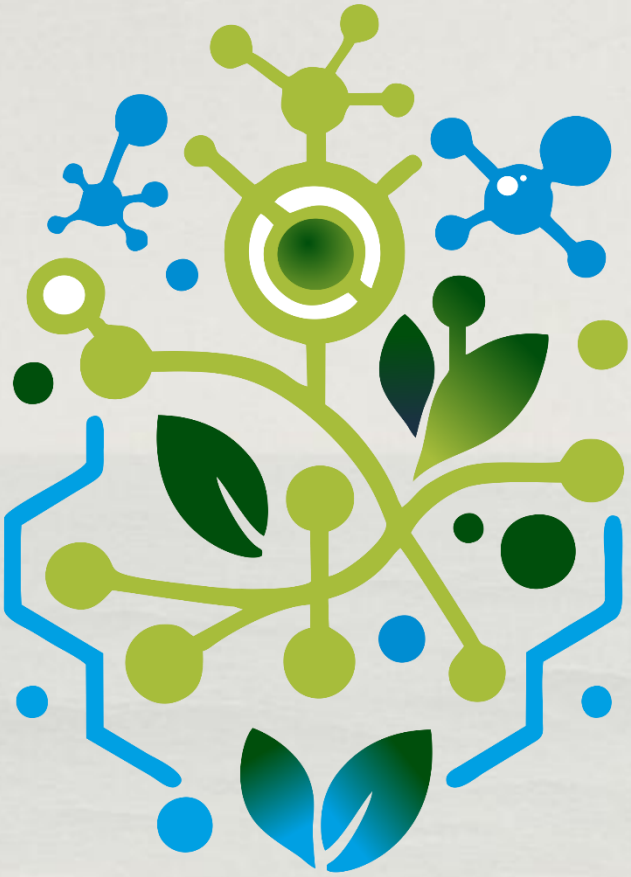

NATURAL SCIENCE
BALTIC CONFERENCE

10-11.05.2025

Event report

nsbc.ug.edu.pl

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Prologue

Dear Colleagues,

On behalf of Student's Science Club for Chemistry at the University of Gdańsk, the Student's Science Club for Chemistry, the Students' Self-Government Council of the Faculty of Chemistry, Center of Student and Doctoral activity and the Doctoral Council of the Doctoral School of Natural Sciences of the University of Gdansk I extend my heartfelt appreciation to everyone who attended the Natural Science Baltic Conference which is a continuation of the Baltic Chemistry Conference.

Our esteemed event united bright minds from across the globe in the fields of chemistry, biomedical chemistry, biochemistry, environmental protection, and ecology. The insightful lectures delivered by PhD Agnes Klar from the University of Zurich and PhD Eng. Paweł Mazierski from University of Gdańsk, set a high bar for the scientific exchange and created a vibrant atmosphere of innovation.

We express our gratitude to our patrons for their generosity and support, which was instrumental in creating an enriching platform for all our participants. The conference not only facilitated the presentation of ground breaking research but also fostered international collaborations and professional relationships. It is our hope that the insights gained and connections made during this conference will continue to inspire and influence your work.

As we reflect on the success of the Natural Science Baltic Conference, let's revisit the abstracts enclosed in this book and continue the discussions that were started. Each one represents the dedication, passion, and innovation of our global scientific community.

Thank you once again for your engagement and contributions to the success of this event. Here's to the advancement of science and to future collaborations.

Until we meet again at the next Natural Science Baltic Conference!

On behalf of the organizers of Natural Science Baltic Conference

MSc Mateusz A. Baluk

The Baltic Sea:

Europe's Unique Body of Water

The Baltic Sea, often simply called the Baltic, is a unique body of water with a range of distinctive features and environmental conditions. Located in Northern Europe, it stretches from the western shores of Denmark to the eastern edges of Russia and is bordered by nine countries: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia, and Sweden.

Spanning approximately 1,600 kilometers (990 miles) in length, the Baltic Sea covers an area of about 377,000 square kilometers (146,000 square miles), making it one of the largest brackish inland seas by area in the world. Its average depth is 55 meters, with the deepest point being the Landsort Deep near Sweden, reaching 459 meters (1,506 feet).

One of the most intriguing aspects of the Baltic Sea is its brackish nature. Unlike most marine environments, the Baltic Sea has a low salinity level. This is due to its semi-enclosed nature, limited water exchange with the North Sea, and significant freshwater input from numerous rivers. The salinity level varies across the Baltic but averages about 0.8% at the surface, much lower than the average salinity of ocean waters, which is typically around 3.5%.

The low salinity, combined with the colder climate of Northern Europe, creates a unique ecosystem. Various species adapted to these specific conditions inhabit the Baltic Sea. The Baltic herring and cod are particularly notable, having been vital to the region's fishing industry for centuries. The sea is also an important resting and breeding ground for many bird species, and its coastal regions host diverse flora and fauna.

Economically, the Baltic Sea is crucial for the surrounding countries. It has been a vital trade route for hundreds of years, linking major ports such as Kiel, Riga, Stockholm, and Gdansk. The sea provides valuable resources, including fish and, more recently, offshore wind energy.

Scientifically, the Baltic Sea is a significant focus of research due to its unique properties. It offers valuable insights into marine biology, oceanography, and environmental science. Its sensitivity to environmental changes makes it a key indicator of climate change. Topics like eutrophication, plastic pollution, and the impact of human activity on marine ecosystems are critical areas of study in the Baltic region.

However, the Baltic Sea faces substantial environmental challenges. Its limited water exchange with other bodies of water, coupled with industrial and agricultural runoff, has led to severe eutrophication problems. This process involves an excess of nutrients causing harmful algal blooms and subsequent oxygen depletion in the water, endangering marine life.

In conclusion, the Baltic Sea is a uniquely brackish marine environment with rich ecological diversity and significant economic and scientific value. Its unique characteristics make it an interesting subject for various scientific studies. At the same time, it is under considerable environmental stress, underscoring the need for sustainable practices and ongoing research to address and mitigate these challenges.

Author: Mateusz A. Baluk

About the conference

The Natural Science Baltic Conference was a continuation of the Baltic Chemistry Conference, which boasted great popularity. The Natural Science Baltic Conference was an online international conference for students and postgraduates that aimed to enhance the scientific potential of young scientists. The conference was completely free for speakers and passive participants. During NSBC, young speakers from different countries (students, doctoral students and young scientists) presented the results of their research or a problem on popular science topics. During the conference, members of the Scientific Committee evaluated individual presentations and posters to award the best ones.

Due to its interdisciplinary nature, the conference was divided into three panels related to different scientific fields: chemistry, biology and physics panel. In chemistry panel, we hosted speakers in the fields of chemical sciences, environmental sciences, ecology and nanotechnology. In biology panel we hosted speakers in the field of biological sciences, biotechnology. Last, but not least, in physics panel, we hosted speakers in the fields of physical and mathematical science.

The Natural Science Baltic Conference (10-11.05.2025) is a free international conference for students, PhD students and postgraduates that aims to enhance the scientific potential of young scientists. The conference was attended by 236 participants, and 114 communications: presentations (56) and posters (58) were showcased by speakers from 37 different research centers in 13 countries.

From Poland, 23 scientific centers took part, such as: the Jagiellonian University (4), the University of Gdańsk (23), the University of Kielce(2), the Gdańsk University of Technology (10), the Medical University of Białystok (2), the Warsaw University of Life Sciences (9), the University of Białystok (2), the University of Wrocław (1), the University of Szczecin (2), the Adam Mickiewicz University in Poznań (10), the Lodz University of Technology (3), the Cracow University of Technology (2),, the Nicolaus Copernicus University in Toruń (4), the University of Silesia (1), the University of Łódź (2), the Medical University of Wrocław (1), the Military University of Technology in Warsaw (1), the University of Rzeszów (1), the University of Wrocław (1), the Maria Curie-Skłodowska University in Lublin (1), the University of Siedlce (1), the Poznań University of Technology (2), the University of Warsaw (1).

14 foreign scientific centers participated including: the University of Vienna (1), the University of Bejaia (1), the National University of Kyiv (1), the Leibniz Institute of Catalysis (1), the University of Coimbra (2), the University of Cadiz (2), the Moldova State University (2), the University of Belgrade (2), the Universidade of Algarve (2), the SRM Institute of Science and Technology of Kattankulathur (3), the Yachay Tech University (8), the Institute of Petrochemical Processes named after Acacemician Y.H. Mammadaliyev of the Minjstry of Science and Education (1), the Tripura University (1) and the University of Zurich (1).

Organizing committee

The Baltic Chemistry Conference was organized by an agreement of four organizations from the University of Gdansk - the Student's Science Club for Chemistry, the Students' Self-Government Council of the Faculty of Chemistry, Center of Student and Doctoral activity and the Doctoral Council of the Doctoral School of Natural Sciences of the University of Gdansk.

The Organising Committee is composed of:

MSc Mateusz A. Baluk as chairman- Head of organizational activities

MSc Daria Łada as chairwoman of registration and contact

MSc Kamil Klimkowski as chairman of science

Dawid Strzelecki as chairman of administration

Julia Dunajska as chairman of contacts & sponsors

Krzysztof Polacek as chairman of the conference proceedings

MSc Adrianna Kosiróg-Ceynowa as chairwoman of graphics & advertisting

MSc Lidia Banaszczyk

MSc Sebastian Barczak

MSc Łukasz Bień

MSc Ewelina Boguszewska

MSc Dominika Kapuścińska

MSc Damian Makowski

MSc Łucja Ptach-Styn

MSc Edyta Raczuk

MSc Kacper Pobłocki

MScNatalia Wyźlic

MSc Marcin Zakrzewski

MSc Jakub Mazur Eng. Wiktor Czyżów

Aleksandra Perzanowska Aliks Ugniewska

Dominika Rakowska Marcin Gontarek

Kacper Sąsiadek Jakub Donat

Kacper Wiśniewski Anita Ćwiklińska

Patrons of the conference

We would like to thank sincerely our patrons, thanks to their support our conference has become known in the international scientific world.

Scientific committee

Anna Aksmann, PhD, Assoc. Prof.

University of Gdańsk, PL

As the head of the Department of Plant Experimental Biology and Biotechnology at the University of Gdansk (Poland), she brings an interdisciplinary approach to my work. As a plant physiologist, researcher, and academic teacher, she has dedicated her career to investigating the toxic effects of anthropogenic contaminants on plant organisms, with a particular focus on green microalgae. Her current research interests, which span plant physiology, environmental science, and toxicology, are primarily focused on the phytotoxicity of non-steroidal anti-inflammatory drugs and nanoplastic particles present in aquatic environments. This interdisciplinary approach enables me to gain a deeper understanding of the complex interactions between plants and their environment.

Henry Pinto, PhD, Assoc. Prof.

Yachay Tech University, ECUA

Henry Pinto is an Associate Professor at the School of Physical Sciences and Nanotechnology at Yachay Tech University and the head of the CompNano Group. He obtained his PhD in Physics in Condensed Matter Physics and Quantum Mechanical simulations at the Department of Physics at the National University of Ireland in Cork and Tyndall National Institute, Ireland, in 2006. During his PhD studies, he won the BOC Postgraduate Bursary Award for his research. Throughout his scientific career, Dr. Pinto has been doing research in world-class centers like Aalto University, Finland; Nagoya University, Japan; and Liverpool University, UK. From 2010 until 2016, Dr. Pinto was a Research Professor at the Interdisciplinary Center for Nanotoxicity at Jackson State University, USA.

Summary of Interests

Dr. Pinto's main scientific interests are in Condensed Matter Physics and Computational Materials Science, applying cutting-edge theoretical and computational methods and the best available computing resources. He has a special interest in understanding the nanoworld phenomena from a theoretical perspective in close collaboration with experimentalists. His main research topics include electronic structure calculations, magnetism, strongly correlated systems, mineral and metal-oxide surfaces and interfaces, polymers and metal/polymer interfaces, scanning tunneling microscopy simulations, nanomanipulation, molecular electronics, point defects, and high-performance computing.

Agnieszka Chylewska, PhD, Assoc. Prof.

University of Gdańsk

Dr. Agnieszka Chylewska was born in 1981 in Elbląg, Poland. She commenced her studies in chemistry in 2000 at the University of Gdańsk (UG), Poland, and completed her Master's degree in 2004. Her MSc thesis was recognized with an award from the Gdańsk Branch of the Polish Chemical Society in 2005. In the same year, she began her PhD studies at the University of Gdańsk under the supervision of Professor Lech Chmurzyński. Her doctoral research focused on the synthesis and structural characterization of d-block trivalent metal ion complexes with bio-ligands, including vitamins, aminosugars, and heterocyclic diamines. She investigated their acid-base properties, kinetic reactions, and potential applications as sensing detectors for carbon dioxide derived from biological materials. Her work led to the development of novel complexes and innovative carbon dioxide detection methods, which were published in scientific journals. In 2008, she earned her PhD degree and subsequently joined the University of Gdańsk as an assistant professor. University grants for young researchers have supported Dr. Chylewska's research. After maternity leave in 2013, she resumed her laboratory work with renewed dedication. Her current scientific interests are centered on coordination compounds of di- or trivalent metal ions with organic bio-ligands, particularly their interactions with biomolecules and microorganisms, including pathogens. Her contributions to the field have been acknowledged in the *Journal of Coordination* Chemistry (2016, DOI: 10.1080/00958972.2016.1178465).

Dr. Agnieszka Chylewska is a faculty member at the Department of Bioinorganic Chemistry, Faculty of Chemistry, University of Gdańsk, and has held the title of Doctor habilitatus in chemical sciences since 2019. She serves as the Head of the Laboratory of Intermolecular Interactions, an editor for the *Journal of Coordination Chemistry*, and a senator of the University of Gdańsk. In addition to her academic and research responsibilities, she actively contributes as an ambassador and mentor in the „*Girls into Science*!" project initiated by the Perspektywy Educational Foundation. Dr. Chylewska is a member of the Polish Chemical Society and the Polish Society of Calorimetry and Thermal Analysis. She also supervises the Scientific Chemistry Student Association at the University of Gdańsk, which provides her with valuable leadership experience. The diversity of her professional roles makes her scientific career an engaging and dynamic journey.

Marta Kolanowska, PhD, Assoc. Prof.

University of Łódź, PL

She is an associate professor at the University of Lodz (PL) and head of the Department of Geobotany and Plant Ecology. Her scientific research focuses on the taxonomy and biogeography of Orchidaceae. She has discovered more than 400 new orchid species. She carries out extensive revisions of herbarium specimens deposited in various institutions around the world and conducts intensive fieldwork focusing on the biodiversity of the northern Andes.

She also analyzes the effects of global warming on rare and endangered orchids and their ecological partners – pollinators, phorophytes and mycorrhizal fungi. She integrates data on the occurrence of different organisms with simulations of future climate conditions to predict changes in the distribution of suitable niches for different species. Based on her research, it is possible to estimate the location of climatic refugia that will remain relatively buffered from contemporary climate change over time, allowing the most valuable species to persist. She is also using machine learning techniques to assess the potential spread of invasive plants and fungi under global warming.

Katarzyna Wiktorska, PhD, Assoc. Prof.

Warsaw University of Life Science, PL

She is a professor at the Department of Physics and Biophysics at the Institute of Biology, Warsaw University of Life Science – SGGW. Formerly, she worked at the National Medicines Institute and was president and co-founder of OncoBoost sp. z o.o, a company dedicated to finding new pharmacological solutions for cancer prevention and therapy. Her research focuses on innovative pharmacological solutions, particularly for breast cancer, involving natural compounds and their combinations with drugs. Her expertise lies in confocal microscopy, which she applies to explore the cancer treatment mechanisms such as the intracellular dynamics of drugs and their interactions with the xenobiotic metabolism system through Nrf2-dependent pathways.

Illia Serdiuk, PhD, Assoc. Prof.

University of Gdansk, PL

Dr. Illia E. Serdiuk is an Associate Professor at the University of Gdańsk, Poland, specializing in organic and hybrid materials for optoelectronics, photocatalysis, and bioimaging. His research focuses on thermally activated delayed fluorescence (TADF) materials including investigations of vibronic and heavy-atom effects, excited-state proton transfer systems, photosensitizers, and redox-active organic compounds. He has extensive experience in organic synthesis, quantum chemical calculations, and advanced spectroscopic techniques. Dr. Serdiuk has led several national and international research projects, including collaborations with industry. His work has been recognized with multiple prestigious awards, including the Polish Minister of Science Scholarship for outstanding young scientists.

Iwona Jędrzejczyk, PhD Eng., Assoc. Prof.

Bydgoszcz University of Science and Technology, PL

Iwona Jędrzejczyk is an associate professor at the Bydgoszcz University of Science and Technology, is a scientist specializing in plant biotechnology. She focuses on the use of flow cytometry to determine the nuclear DNA content and ploidy levels in plants. Her research also involves the application of molecular DNA markers for plant species identification and assessment of genetic diversity. As the head of the Department of Biotechnology at the Faculty of Agriculture and Biotechnology, she actively participates in organizing scientific and educational events, promoting biotechnology in the Kuyavian-Pomeranian region. For over 20 years, together with her team of educators, she has popularized biotechnological knowledge among the local community through meetings, workshops, lectures, and scientific conferences. Iwona Jędrzejczyk is also an academic teacher and supervisor of the Biotechnology Student Scientific Association BioX, where students can develop their skills in plant biotechnology.

Dawid Zych, PhD Eng., Assoc. Prof.

University of Opole, PL

Dawid Zych is an associate professor, chemist, and educator, currently affiliated with the Faculty of Chemistry at the University of Opole. His scientific work focuses on the synthesis and characterisation of organic materials, particularly substituted pyrene and azapyrene derivatives, as well as terpyridine-based systems. His research aims to elucidate the relationship between molecular structure and the resulting optical, electrochemical, and thermal properties, with potential applications in materials science and molecular electronics. Professor Zych is also deeply engaged in the advancement of sustainable chemistry. Through his research projects and laboratory practices, he actively promotes environmentally conscious approaches to chemical synthesis and education, integrating green chemistry principles into both experimental design and academic discourse. Beyond the laboratory, he is passionate about science communication and education. He works to inspire curiosity about chemistry among pupils and students, combining scientific insight with historical context to dispel the myth of chemistry as an inaccessible or overly technical field.

Katarzyna Węgrzyn, PhD, Dsc

University of Gdansk, PL

I am an assistant professor at the Intercollegiate Faculty of Biotechnology at the University of Gdansk and the Medical University of Gdansk. I hold a degree in biotechnology. My research focuses on the structure and function of nucleoprotein complexes, particularly during the DNA replication process and the metabolism of extrachromosomal elements (plasmids) in bacterial cells. In my research, I employ techniques enabling the investigation of protein-protein, protein-DNA, and protein-ligand interactions, e.g., electrophoretic mobility shift assay (EMSA), surface plasmon resonance (SPR), microscale thermophoresis (MST), biolayer interferometry (BLI).

Judith Mary Hariprakash, PhD

University of Copenhagen, DK

Dr. Judith Mary Hariprakash is a computational biologist specializing in cancer genomics at the University of Copenhagen, where she investigates extrachromosomal circular DNA in colorectal and lung cancer. She combines innovative computational approaches with experimental validation techniques to understand cancer progression mechanisms. Dr. Hariprakash earned her PhD from IFOM-ETS in Milan, developing frameworks for identifying enhancers and reconstructing regulatory networks in cancer. Beyond research, she teaches molecular biology and bioinformatics, mentors students, and actively engages in science communication through events like Pint of Science and Famelab.

João Manuel Ferreira Gomes, PhD

University of Coimbra, PT

João Gomes has a PhD in Chemical Engineering, which he finished in 2019, based on the advanced oxidation process for the contaminants of emerging concern removal through photocatalysis and ozonation based processes. His thesis was awarded with the "Willy Masschelein Prize 2019" by the International Ozone Association with a unanimous jury agreement expressing an impressive positive judgment. His current research is focused on the photocatalyst development to be active under visible light and to be coupled with ozone to perform the photocatalytic ozonation process. Alternatively, to this material development, he also considers the application of materials provided from different fields but with interesting properties for photocatalytic purposes. The application of these processes focuses on wastewater reuse for agriculture irrigation and the disinfection of drinking water to reduce the generation of disinfection by-products. Moreover, his research work was already recognized by the University of Coimbra in 2022, awarded with the Honorable mention by the Scientific Publication Impact of the Faculty of Science and Technology from the University of Coimbra, according to the Web of Science database for 2021. As research activities, he has more than 80 peer review articles published. During the last years, he supervised more than 25 students with master's and PhD in chemical and environmental engineering, as well as teaching in the chemical engineering field. Over the years, he has performed more than 170 peer reviews for the chemical and environmental engineering fields. He led different special issues as a guest editor for MDPI journal, and he now working as an associate editor in two different journals (Pollutants from MDPI and Environmental, Development and Sustainability of Springer. Recently, he was selected for the Early Career Editorial Board from the Journal of Environmental and Chemical Engineering of Elsevier.

Agata Kućko, PhD

Warsaw University of Life Science, PL

She is an Associate Professor in the Department of Plant Physiology (WULS-SGGW, Poland). Her research primarily focuses on the phytohormonal mechanisms underlying organ abscission in plants, with a particular emphasis on species of economic significance. She also investigates how crops respond to stress conditions, aiming to deepen our understanding of plant-environment interactions. Additionally, she explores the potential of phytohormones to enhance crop tolerance to abiotic factors. In her teaching, she covers various aspects of plant physiology and ecophysiology.

Monika Majewska, PhD

University of Gdansk, PL

Assistant at the Department of Experimental Plant Biology and Biotechnology at the Faculty of Biology, University of Gdańsk. She is a graduate of the Bachelor's and Master's studies in Biology and in 2024, she completed her PhD studies in Biology, Ecology, and Microbiology at the University of Gdańsk, where she defended her doctoral dissertation on the interaction of diclofenac with the photosynthetic apparatus.

Her scientific activity focuses on studying the toxic effects of anthropogenic pollutants on plants, their physiological adaptation mechanisms, as well as exploring methods for their neutralization in the environment. At present, she is conducting research on the mechanisms of interaction between the photosynthetic apparatus and non-steroidal anti-inflammatory drugs (NSAIDs), which are among the most frequently detected pharmaceutical substances in the environment and their impact on plant cells largely remains unknown. The aim of this research is to better understand the mechanisms of their action and potential consequences for plants and ecosystems.

Małgorzata Gutkowska-Stronkowska, PhD

Warsaw University of Life Science, PL

Assistant professor at the Department of Biochemistry and Microbiology, Institute of Biology, Warsaw University of Life Sciences (SGGW). Previous places of employment include: the Lipid Biochemistry Laboratory at the Institute of Biochemistry and Biophysics of the Polish Academy of Sciences in Warsaw; the Cell Biology Laboratory at the Institute of Experimental Botany of the Czech Academy of Sciences in Prague; and the Molecular Biology Laboratory at the International Institute of Molecular and Cell Biology in Warsaw. Currently, she works in the field of plant biology, studying intracellular transport in the model plant Arabidopsis thaliana, focusing on the functioning of plant cells. She is also involved in more biochemistry-oriented projects concerning the biosynthetic pathways of isoprenoid lipids in plants. Additionally, she investigates the effects of disturbances in the synthesis of these compounds and intracellular transport on pollen and seed development.

Małgorzata Kapusta, PhD

University of Gdansk, PL

She is a plant embryologist and currently serve as an Assistant Professor at the Bioimaging Laboratory, University of Gdańsk. She has experience in fluorescence and confocal microscopy, applied to a wide range of biological materials including plant, animal, and human tissues, as well as fungi and bacteria. Her research focuses on the dynamics of the cytoskeleton and cell wall architecture during gametophyte development, with a particular emphasis on pollen grain and pollen tubes of geophytes. Additionally, her current work explores the effects of climate change on plant development, with particular attention to cold snap-induced stress.

Dawid Wnuk, PhD

Jagiellonian University, PL

Dr Dawid Wnuk is an assistant professor at the Department of Cell Biology, Faculty of Biochemistry, Biophysics and Biotechnology at the Jagiellonian University. His research interests include the role of intracellular signaling pathways in phenotypic changes of cells during tissue fibrosis, as well as the use of plant-derived compounds to counteract fibrosis of tissues and organs. He is also interested in the implementation of quality management systems (ISO 9001, GMP, GDP, GLP) in the production of advanced therapy medicinal products (ATMPs). For several years, he worked at a certified Cell Bank and Advanced Therapy Medicinal Product Manufacturing Facility, where he prepared autologous epidermal cells for the treatment of burn wounds in over 30 patients. He is a recipient of a scholarship from the Minister of Science and Higher Education and has received numerous Rector's awards and scholarships from the Jagiellonian University for his scientific and teaching achievements. He has also been awarded several scientific scholarships (including the Etiuda doctoral scholarship from the National Science Centre), pro-quality scholarships, and two travel grants from the Federation of European Biochemical Societies (FEBS). He is the co-author of over 30 scientific publications and more than 60 conference abstracts. He has co-organized dozens of science popularization events and serves as an expert for the National Centre for Research and Development, as well as a consultant for the translation of popular science books (*Moonshot*, *The Code Breaker*). He is a member of several scientific societies: the European Academy of Allergy and Clinical Immunology, the European Respiratory Society, the Polish Society for Lung Diseases, the Polish Society for Cell Biology, and the Polish Biochemical Society, where he serves as the Chair of the Young Scientists' Section: FEBS Junior Poland.

Magdalena Miodyńska-Melzer, PhD

University of Gdansk, PL

Dr. Magdalena Miodyńska-Melzer is an assistant professor at the Department of Environmental Technology, Faculty of Chemistry, University of Gdańsk. Her research interests focus on photocatalysis, nanomaterials, and advanced environmental technologies, particularly in the areas of water purification and hydrogen production.

She is the co-author of numerous high-impact scientific publications featured in leading journals such as *Materials Horizons*, *Scientific Reports*, *Chemical Engineering Journal*, and *Applied Surface Science*. Her scientific work involves:

- The design of advanced photocatalysts for hydrogen generation and CO_2 photoreduction, including perovskite-based hybrids and metal-organic frameworks (MOFs),
- The removal of environmental contaminants, pathogenic microorganisms, and antibiotic resistance genes through photocatalysis enhanced by ozonation and peroxone processes,
- Stabilization of lead-free bismuth halide perovskites under oxidizing and humid conditions for sustainable applications,

Dr. Miodyńska-Melzer actively participates in international research projects and conferences (e.g., in Porto and Almería), presenting outcomes of projects such as H_2OforAll, aimed at ensuring safe and sustainable drinking water treatment. Her interdisciplinary and innovative research contributes significantly to the development of green technologies in environmental protection.

Maria Madej, PhD

Jagiellonian University, PL

Maria Madej is a PhD researcher in the Department of Analytical Chemistry at the Faculty of Chemistry, Jagiellonian University in Kraków, Poland. She received her PhD degree in 2021. Her research focuses on the development of voltammetric (bio)sensors for the detection of antipsychotic drugs in both environmental and biological samples. A key aspect of her work involves the exploration of innovative materials for the modification of solid electrodes, including zeolites, metal-organic frameworks (MOFs), and polymer nanofilms deposited via cold plasma enhanced chemical vapor deposition.

Bartosz Szymczak, PhD

Nicolaus Copernicus University in Torun, PL

Doctor of Biological Sciences. His research interests focus on purinergic signaling in normal and cancer cells and immobilization of enzymes on carbon nanomaterials.

In his previous work related to purinergic signaling, he pays particular attention to P2X7 receptor isoforms, their variable expression in different tumor cells under induced differentiation conditions and the use of the resulting changes as a potential adjunct therapy to existing treatment strategies.

The research on carbon nanomaterials is based on studying the biocompatibility of the newly developed materials in vitro, as well as their potential use as carriers for enzymes with potential therapeutic applications, taking into account the nature of protein-substrate interactions.

Maria Kochaniec, PhD Eng.

Warsaw University of Technology, PL

Maria Kochaniec received her Ph.D. degree from the Gdansk University of Technology, Poland, in 2018. Maria conducted research in Poland and abroad (Germany, United Kingdom and South Korea) to gain experience in scientific and R&D projects. She is currently an Assistant Professor at Warsaw University of Technology, Poland. She is interested in the batteries systems through design of novel and innovative electrode materials, including but not limited to carbonaceous framework received from biomass processing, and their further catalytic applications for green energy conversion, and storage devices. Her recent research is being conducted through the CELISE (celise.unican.es) project – European Union's Horizon 2020 research and innovation program, Marie Skłodowska-Curie Actions – RISE and IDUB 1820/95/Z01/2023 of 03.04.2023/Research funded by the Warsaw University of Technology within the Excellence Initiative: Research University (IDUB) programme.

Darya Harshkova, PhD

University of Gdansk, PL

Dr Harshkova focuses on the phytotoxicity of pharmaceuticals, particularly diclofenac, using *Chlamydomonas reinhardtii* as a model organism. Her research demonstrated that diclofenac affects mitochondrial function, disrupts the cell cycle, and induces oxidative stress in algae, which could have profound implications for aquatic ecosystems. PhD degree received on 2024 year. As a principal investigator of the PRELUDIUM grant (NCN) (2021-2024), she examined the mitochondrial toxicity of NSAIDs at the cellular level. Additionally, as a co-investigator in two OPUS grants (NCN) (2017-2024), she investigated the sensitivity and remediation potential of planktonic green algae exposed to pharmaceutical pollutants. Her six-month research stays at ALGATECH – The Centre of Algal Biotechnology in Třeboň, Czech Republic (2020-2021), supported by the Wilhelmina Iwanowska Scholarship (NAWA), allowed her to refine her methodologies in algal physiology and expand international collaborations. Currently Darya Harshkova works as a assistant at the Department of Plant Experimental Biology and Biotechnology and she is the author and co-author of over 30 scientific publications and conference reports.

Artur Piróg, PhD

University of Gdańsk, PL

He is working at International Centre for Cancer Vaccine Science at University of Gdansk as a senior postdoctoral researcher. Before that, he has completed a PhD in field of protein biochemistry at Intercollegiate Faculty of Biotechnology UG&GUMED. At present he is mostly involved in research concerning various applications of peptidome and proteome analysis, including classical protein expression analysis, peptide biomarker discovery and antigen presentation analysis. One of his specific interests is analysis of protein degradation pathways and how various drugs and stimuli can affect this processes – he has developed and he is constantly improving LC/MS-computational workflow for direct identification and quantification of protein degradation products. He also has good background and ongoing interest in various aspects of protein homeostasis and influence of protein turnover mechanisms on the cell biology.

Monika Rewers, PhD Eng.

Bydgoszcz University of Science and Technology, PL

Dr. Monika Rewers is an Assistant Professor at the Department of Biotechnology at the Bydgoszcz University of Science and Technology (PolitechnikaBydgoskaim. Jana iJędrzejaŚniadeckich). Her research focuses on the study of endoreduplication processes in plants, as well as the application of advanced techniques such as flow cytometry and molecular markers for the identification and analysis of phylogenetic relationships among plant species. Since the beginning of her professional career, dr. Rewers has been actively popularizing biotechnology, organizing workshops, conferences, and other educational events for children, youth, and adults. She has received numerous awards for both her scientific achievements and her commitment to science communication and outreach.

Special Guests

Paweł Mazierski, PhD Eng.

University of Gdańsk, PL

A young scientist actively engaged in research and development in the fields of nanotechnology and renewable energy sources. Author of two book chapters published by leading international publishers (Springer, Elsevier), holder of six patents (including two international PCT) and four additional patent applications. He has published over 65 original and review articles in peer-reviewed journals listed in the Web of Science. He has completed research internships at top scientific institutions worldwide, including the University of Paris-Sud (France), the Catalysis Research Center at Hokkaido University (Japan), the Leibniz Institute for Catalysis (LIKAT, Germany), and the Weizmann Institute of Science (Israel). Recipient of the Rector's Award, scholarships from the Polish Ministry of Science and Higher Education, and the prestigious START scholarship from the Foundation for Polish Science in recognition of outstanding scientific achievements. Co-developer of innovative prototypes for photocatalytic air purification devices, awarded gold medals at international invention fairs. Since 2014, he has actively collaborated with the industrial sector to support the commercialization of photocatalytic technologies. Principal investigator of three nationally funded research projects and key contributor to two implementation projects. Co-founder of the startup *NanoSci*, which develops photocatalytic technologies for air purification and extending the shelf life of fruits and vegetables.

Agnes Klar, PhD

University of Zurich, CH

PI graduated from the University of Konstanz, Germany with a master degree in Biological Sciences in 2009, and received her PhD from the University of Zurich in 2014. She leads her own group at the Tissue Biology Research Unit at the University Children's Hospital Zurich since 2019. PI is a specialist in the field of regenerative medicine focusing on skin tissue engineering, wound healing, and skin diseases. In particular, her research interests are characterization and application of human skin cell-based analogs. In particular, her innovations contributed significantly to establish a tissue-engineered skin substitute containing autologous keratinocytes and fibroblasts. This analog has recently started phase III clinical trials for burn injuries.

Moreover, her research group conducts also studies combining aspects related to skin healing and scarring, during skin regeneration following graft transplantation. Her scientific track record includes 49 peer-reviewed scientific publications, and the current Hirsch index is 22 (1604 citations).

Opening lecture by PhD Eng. Paweł Mazierski

Theme: Photocatalysis in 21st century: fundamentals and applications

Abstract: Photocatalysis has emerged as a very important technology in the 21st century,providing solutions to address urgent global issues in energy, environmental sustainabilityand chemical production. This presentation will provide a comprehensive overview of thefundamental principles of various photocatalytic processes, including light absorption,charge carrier dynamics, and surface redox reactions (Fig. 1) [1]. Special emphasis will beplaced on the advanced photocatalytic materials, such as heterojunctions, metal-organicframeworks, plasmonic nanostructures and hybrid systems, tailored for improving efficiency, selectivity and stability. Recent achievements in applications will be highlightedin view of hydrogen generation, CO2 reduction, air purification as well as organic synthesis.Case studies will illustrate the integration of photocatalysis in new technologies. Finally,the presentation will address current challenges and future directions to unlock the fullpotential of photocatalysis.

Opening lecture by PhD Agnes Klar

Theme:A Next-Generation Dermo-Epidermal Skin Graft: Vascularized, Pigmented, and Fat-Enhanced.

Abstract: Extensive skin loss due to trauma, burns, or disease presents a critical therapeutic challenge,particularlyin patients with limited donor sites for autologous grafting. To address this, we developed andcharacterized a novel bioengineered dermo-epidermal skin substitute (DESS) designed for clinical application 1,2. These skin constructs, composed of a stratified epidermis and a supportive dermal matrix, closely mimicthe structure and function of native human skin 3-5. Recently, DESS has successfully progressed to Phase 3clinical trials, underscoring its translational potential. To further enhance its clinical utility and physiologicalrelevance, we engineered an advanced skin construct incorporating a vascular component 6, 7for improved graft integration, melanocytes for pigmentation 8-10 (Fig. 1), and a third hypodermal fat layer 11to replicate full-thickness skin architecture. This next-generation, vascularized, pigmented, and fat-containing skin substitute offers a promising therapeutic option for patients with severe wounds, representing a significant advancement in regenerative medicine and skin reconstruction.

Best live presentation, recorded presentation and poster

Best presentation:

First Award – Lizaveta Rusakovich for her presentation entitled:
“Biochemical properties of lipases of oil bodies of germinated jojoba seeds”

Second Award – Katarzyna Wierzchowska for her presentation entitled:
“Microbial lipids from Yarrowialipolytica: a sustainable approach to vegan food innovation”

Third Award –Karolina Beton-Mysur for her presentation entitled:
“Tracking cholesterol's role in colon cancer via Raman imaging, fluorescence, AFM, and chemometrics”

Best poster:

First Award – Katarzyna Kowalik for her poster entitled:
“Multifaceted effect of metabolites and EVs secreted by probiotic strains on Candida albicans pathogenic activity and host-microbe dynamics”

Second Award – Karolina Mierzyńska for her poster entitled:
“The Role of the Natural Anastomosing Narew River in Mitigating Microplastic Flow”

Third Award – Dominika Nawrot for her poster entitled:
“The use of benzimidazole derivatives to increase plant tolerance to soil salinity”