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List of potential supervisors at the BioMedChem Doctoral School of the UL and Lodz Institutes of the Polish Academy of Sciences in the academic year 2025/2026 in the chemical sciences

Name of academic staff member	Area of scientific and research interests/ Proposed topics for the doctoral thesis
Prof. dr hab. Piotr Bałczewski Centre of Molecular and Macromolecular Studies Polish Academy of Sciences in Łódź / Jan Długosz University in Częstochowa ✉ piotr.balczewski@cbmm.lodz.pl ☎ +48 42 680 32 13 **ORCID:** https://orcid.org/0000-0001-5981-551X *Leading discipline - chemical sciences*	Area of scientific and research: organic and heteroorganic chemistry, materials chemistry, pharmaceutical chemistry, ecotoxicological chemistry. Proposed topics for the doctoral thesis: Synthesis of pharmaceutical formulations containing cardiovascular drugs and natural chemical compounds
Dr hab. Marek Brzeziński, prof. CMMS PAS Centre of Molecular and Macromolecular Studies Polish Academy of Sciences in Lodz ✉ marek.brzezinski@cbmm.lodz.pl ☎ +48 42 68 03 328 **ORCID:** https://orcid.org/0000-0001-7620-4438 *Leading discipline - chemical sciences*	Area of scientific and research: polymer chemistry, polymer micro- and nanoparticles, biodegradable polymers, supramolecular chemistry, drug delivery systems, anticancer therapy, antibacterial materials. Proposed topics for the doctoral thesis: Supramolecular nanoparticles able to block calcium channels in cancer cells.

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Prof. dr hab. Arkadiusz Chworoś Centre of Molecular and Macromolecular Studies Polish Academy of Sciences in Lodz ✉ arkadiusz.chworos@cbmm.lodz.pl ☎ +48 42 680 32 20 **ORCID:** https://orcid.org/0000-0001-9924-0503 *Leading discipline - chemical sciences*	Area of scientific and research: Structural nucleic acids (DNA, RNA), bionanomaterials, RNA modifications, RNA-protein and protein-ligand interactions in theoretical and experimental studies Proposed topics for the doctoral thesis:
Dr hab. Kacper Drużbicki Centre of Molecular and Macromolecular Studies Polish Academy of Sciences in Lodz ✉ kacper.druzbicki@cbmm.lodz.pl ☎ +48 42 68 03 324 **ORCID:** https://orcid.org/0000-0003-1759-2105 *Leading discipline - chemical sciences*	Area of scientific and research: Physical chemistry; chemical physics; theoretical chemistry; crystallography; optical and neutron vibrational spectroscopy (IR, Raman, INS); solid-state nuclear magnetic resonance spectroscopy (ssNMR); terahertz spectroscopy (THz); X-ray and neutron diffraction; neutron scattering methods; crystal lattice dynamics; phonons; density functional theory (DFT); *ab initio* molecular dynamics simulations (AIMD); nuclear quantum effects (NQEs); High-Performance Computing (HPC). Proposed topics for the doctoral thesis: *to be determined* (hybrid organic-inorganic materials for optoelectronics and photovoltaics: a combined experimental and theoretical approach).
Dr hab. Marta Dudek, prof. CBMM Centre of Molecular and Macromolecular Studies Polish Academy of Sciences in Lodz ✉ marta.dudek@cbmm.lodz.pl ☎ + 48 42 680 32 39 **ORCID:** https://orcid.org/0000-0003-3412-0177 *Leading discipline - chemical sciences*	Area of scientific and research: Understanding of polymorphism of organic molecular crystals and crystallization processes, crystal structure prediction (CSP) calculations, solid-state and crystalline structure of organic compounds, design and synthesis of pharmaceutical cocrystals, solid-state NMR spectroscopy as a part of NMR crystallography approach. Proposed topics for the doctoral thesis: 1. Understanding of crystallization preferences of pharmacologically active compound using crystal structure prediction calculations 2. Do monomorphic molecules exist? – theoretical and experimental evaluation of potentially monomorphic systems

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Akademii Nauk w Łodzi

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Prof. dr hab. Anna Kowalewska Centre of Molecular and Macromolecular Studies Polish Academy of Sciences in Lodz ✉ anna.kowalewska@cbmm.lodz.pl ☎ 42 68 03 350 **ORCID:** https://orcid.org/0000-0002-3197-8015 *Leading discipline - chemical sciences*	Area of scientific and research: Materials chemistry and nanotechnology (hybrid materials with advanced antimicrobial properties), organometallic chemistry, organic chemistry, polymer chemistry. Proposed topics for the doctoral thesis: Novel hybrid coatings with advanced antimicrobial properties for surface modification in atmospheric water harvesting systems. Preparation and characterization of hybrid nanostructured (super)hydrophilic polysilsesquioxane coatings (mono- and multicomponent); analysis of their morphology with special focus on their phase separation and surface properties.
Dr hab. Agnieszka Krakowiak, assistant prof. CMMS PAS Centre of Molecular and Macromolecular Studies Polish Academy of Sciences in Lodz ✉ agnieszka.krakowiak@cbmm.lodz.pl ☎ +48 42 680 32 72 ORCID: https://orcid.org/0000-0002-0273-2972 *Leading discipline - chemical sciences (75%)* *biological sciences 25%*	Area of scientific and research: Interdisciplinary research in the field of chemistry, biochemistry and cellular studies of nucleosides, nucleotides and nucleic acids and their analogs and the possibility of their action as drugs, e.g. anticancer drugs, study of their transport into eukaryotic cells and search for new carriers for them, including nanoparticles. Molecular biology; enzymology, in particular proteins from the histidine triad family (HIT proteins): method of isolation and purification, mechanism of action, course of reactions catalyzed by the enzyme studied, substrates, inhibitors, kinetics of enzymatic reactions, function of the enzymes studied in the cell. Proposed topics for the doctoral thesis: Study on the effect of new selenium nucleotide derivatives on the induction of reductive stress and redox balance and on the viability of cancer cells.

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Akademii Nauk w Łodzi

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Dr hab. Tomasz Makowski, prof. CMMS Centre of Molecular and Macromolecular Studies Polish Academy of Sciences in Lodz ✉ tomasz.makowski@cbmm.lodz.pl ☎ +48 42 68 03 333 **ORCID:** https://orcid.org/0000-0001-6480-6108 *Leading discipline - chemical sciences*	Area of scientific and research: The research conducted in my group focuses on various aspects of organic and polymeric materials, with particular emphasis on their modification, physicochemical properties, and applications in advanced technologies. The main research directions include: 1. Modification of biodegradable polymer surfaces – analysis of the effects of chemical and physical methods on the properties of agricultural-based materials. 2. Biodegradable nonwovens – development of fabrication methods and investigation of the properties of nonwovens based on biodegradable polymers. 3. Oriented organic layers – studies on the physicochemical properties of thin layers, including phase transitions and electrical properties. 4. Surface analysis of organic layers – application of X-ray techniques and atomic force microscopy (AFM) to examine the structure of thin layers. 5. Highly oriented organic layers – fabrication and analysis of small-molecule and polymer layers exhibiting anisotropic optical properties and nonlinear optical effects. These studies are crucial for the development of modern functional materials, including biocompatible polymers and advanced optoelectronic coatings. Proposed topics for the doctoral thesis: Multifunctional Modification of Fibrous Materials: Properties and Applications of Nonwovens Based on Polymers from Natural Raw Materials.
Dr hab. Beata Miksa, prof. CMMS PAS Centre of Molecular and Macromolecular Studies Polish Academy of Sciences in Lodz ✉ miksa@chemia.uni.lodz.pl ☎ +48 42 680 32 18 **ORCID:** https://orcid.org/0000-0003-1288-4125 *Leading discipline - chemical sciences*	Area of scientific and research: The research focuses on designing drug carriers for targeted therapy using polysaccharide capsules. Studies are also being conducted on the encapsulation of proteins and enzymes using biomimetic liposome structures and polysaccharide capsules. The synthesis of conjugates based on a phenazine scaffold, to which anticancer compounds are attached, is planned. The research aims to develop modern therapy related to diagnostics and pharmacology. Proposed topics for the doctoral thesis: Encapsulation of anticancer compounds in polysaccharide capsules for targeted therapy. Synthesis of modern anticancer drugs with theranostic properties.

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Dr hab. Urszula Mizerska, prof. CMMS PAS Centre of Molecular and Macromolecular Studies Polish Academy of Sciences in Lodz ✉ urszula.mizerska@cbmm.lodz.pl ☎ + 48 42 68 03 203 ORCID: https://orcid.org/0000-0003-3507-5486 *Leading discipline - chemical sciences*	Area of scientific and research: 1. Organosilicon polymeric materials forming linear, branched or cross-linked nano- and microstructures 2. Surface properties of materials 3. Coating materials for photovoltaic panels 4. Porous, hybrid, pre-ceramic and ceramic materials Proposed topics for the doctoral thesis: 1. Synthesis of composite materials containing silicon carbide ceramic microspheres 2. Advanced coating materials for photovoltaic panel glass
prof. dr hab. Marcin Palusiak University of Lodz, Faculty of chemistry ✉ marcin.palusiak@chemia.uni.lodz.pl ☎ + 48 42 635 57 37 **ORCID:** https://orcid.org/0000-0002-0032-0878 *Leading discipline - chemical sciences*	Area of scientific and research: Structural Chemistry, Computational Chemistry, X-ray, Crystallography, High-Performance Computer Modeling. Proposed topics for the doctoral thesis: Synthesis and structural studies of crystals of biologically active compounds.
Dr hab. Tomasz Pawlak Centre of Molecular and Macromolecular Studies Polish Academy of Sciences in Lodz ✉ tomasz.pawlak@cbmm.lodz.pl ☎ + 48 42 68 03 306 **ORCID:** https://orcid.org/0000-0002-0350-6395 *Leading discipline - chemical sciences*	Area of scientific and research: Structural chemistry Proposed topics for the doctoral thesis: Undiscovered solid state forms of drugs - new challenges to structural chemistry.

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Akademii Nauk w Łodzi

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Dr hab. Łukasz Półtorak, prof. UŁ University of Lodz, Faculty of Chemistry, Department of Inorganic and Analytical Chemistry ✉ lukasz.poltorak@chemia.uni.lodz.pl ☎ +48 789 258 794 ORCID https://orcid.org/0000-0002-8799-8461 *Leading discipline - chemical sciences*	Area of scientific and research: My scientific interests revolve around electrochemistry. Specifically, I am interested in the production of electrochemical systems, the application of electrochemistry in energy conversion, phase boundaries such as liquid-liquid interfaces, electrochemistry of biomimetic systems, 3D printing, miniaturization for electrochemistry and electrochemical miniaturization, membrane-based techniques, electrochemical synthesis of new materials including electrochemically assisted deposition reaction, and the design of electrochemical sensors. Proposed topics for the doctoral thesis: Direct Ink Writing for bioelectrochemical applications. 3D printed electrodes for energy storage and conversion applications.
Dr hab. Artur Różański, prof. CMMS PAS Centre of Molecular and Macromolecular Studies Polish Academy of Sciences in Lodz ✉ artur.rozanski@cbmm.lodz.pl ☎ +48 42 68 03 228 **ORCID:** https://orcid.org/0000-0001-7545-6246 *Leading discipline - chemical sciences*	Area of scientific and research: Physicochemistry of semicrystalline polymers, including biodegradable and/or derived from renewable sources; the role of the micro-/nanostructure of the amorphous and crystalline phases; barrier, mechanical, and thermo-mechanical properties of polymer systems Proposed topics for the doctoral thesis: The role of the microstructure of the amorphous phase in the barrier and mechanical properties of semicrystalline polymers.
Dr hab. Iurii Vozniak, prof. CBMiM PAN Centre of Molecular and Macromolecular Studies Polish Academy of Sciences in Lodz ✉ iurii.vozniak@cbmm.lodz.pl ☎ + 48 42 68 03 317 **ORCID:** https://orcid.org/0000-0002-8123-0689 *Leading discipline - chemical sciences*	Area of scientific and research: Polymers, Nanocomposites, Polymer Blends, Plastics Engineering, Materials Science, Polymer Structure Analysis, Solid State Physics, Shape Memory Effect, Plastic Deformation, Lattice Structure, 3D/4D Printing, Finite Element Analysis. Proposed topics for the doctoral thesis: Effect of Severe Plastic Deformation on Crystallinity and Mechanical Properties of Biodegradable Polymer Systems; Development of Hierarchical Lattice Structures from Polymer Blends for Energy Absorption Applications; Controlled Crazing in PHA-Based Systems: Mechanism, Morphological Evolution, and

	Functional Property Enhancement.

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