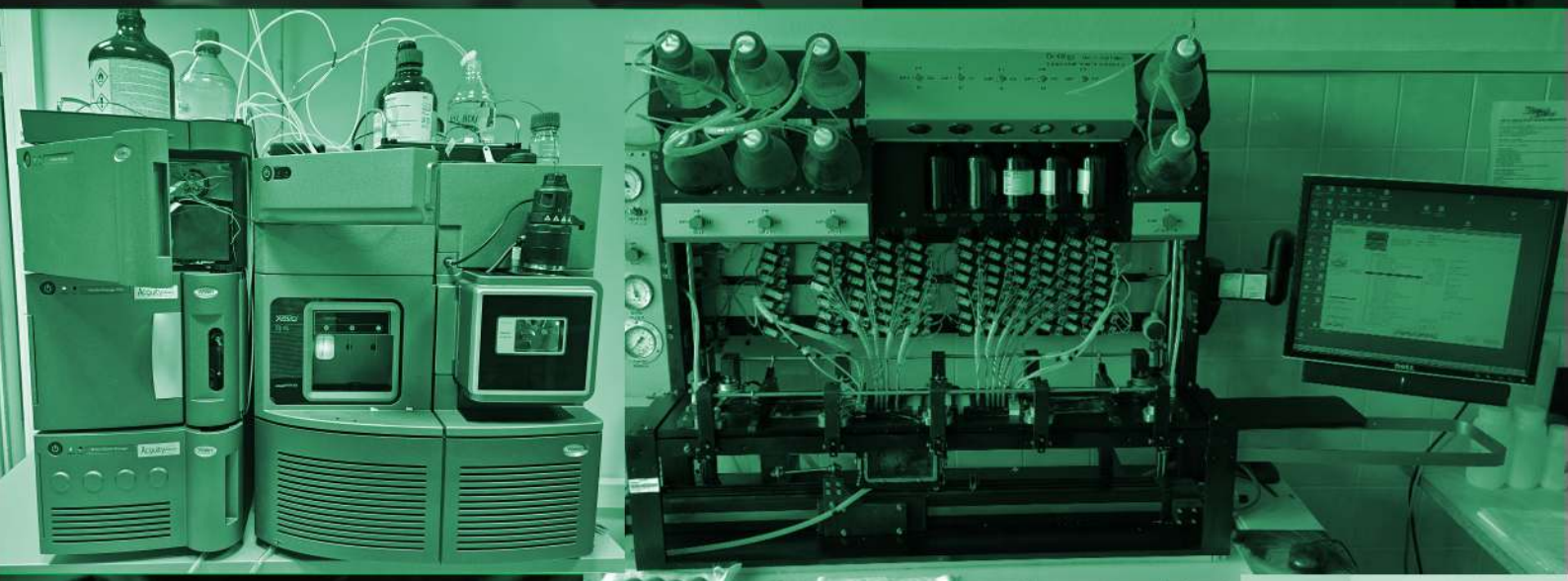
CORE FACILITIES AND SUPPORT DEPARTMENTS



INSTITUTE
OF BIOCHEMISTRY
AND BIOPHYSICS
POLISH ACADEMY
OF SCIENCES

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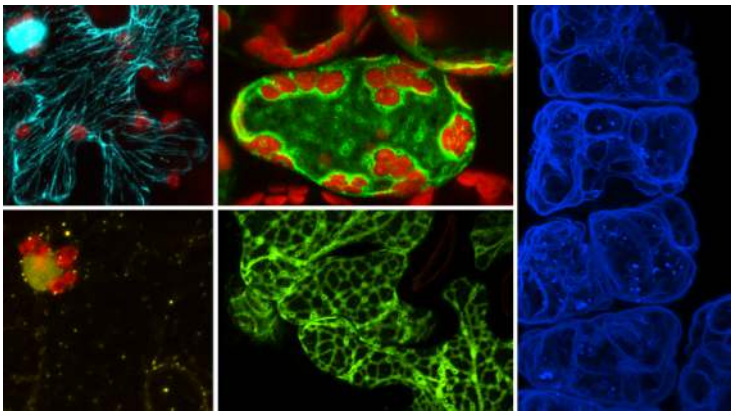
Fluorescence Microscopy Facility



We offer access to widefield, confocal and super--resolution microscopy for imaging cells and tissues, including live-cell studies. Users can obtain training, assisted imaging, or complete imaging services with expert consultation.

Microscopy techniques:

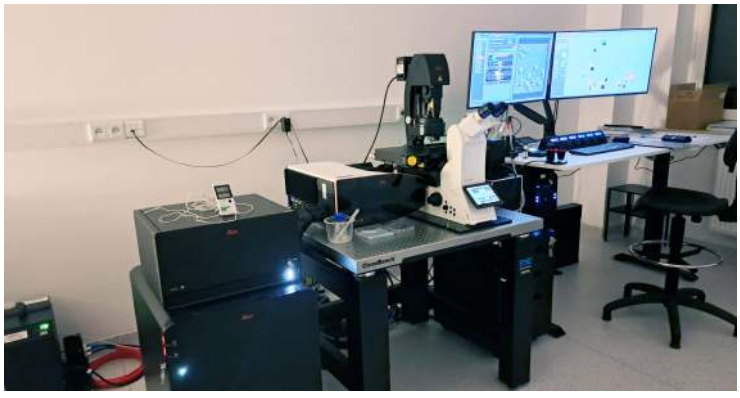
- Bright field, DIC and polarisation microscopy
- Widefield fluorescence imaging
- Confocal and spectral imaging
- Fluorescence lifetime imaging (FLIM)
- Super-resolution (STED)
- Live-cell imaging

Applications and expertise:

- Visualisation of labelled structures and organelles
- Real-time study of cellular responses and dynamics
- Protein interaction analysis
- Quantitative cellular measurements
- Separation of overlapping fluorophores
- Consultancy on imaging study design and analysis

Equipment:

- Nikon E800 upright microscope (widefield fluorescence, cameras)
- Leica M205 FCA stereomicroscope (DAPI, CFP, GFP, YFP, RFP, mCherry, camera, Z-stack)
- Nikon EZ-C1 inverted confocal microscope (408, 488, 543, 633, three fluorophores at once, deconvolution)
- Leica Stellaris 8 Falcon confocal microscope with OKOLab chamber (white laser, spectral detectors, FRAP, FRET, FLIM, advanced analysis, 3D)
- Abberior STEDYCON compact confocal with STED mode (405, 488, 561, 640 and 775,Nikon TiE platform, OKOLab chamber)
- Data analysis with ImageJ/FIJI and commercial packages (Lucia, NIS-Elements AR, Leica LasX, Huygens)



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MSLab – Mass Spectrometry Facility

We provide comprehensive proteomic and metabolomic services using state-of-the-art mass spectrometry platforms. Backed by 25 years of experience and a qualified team of analysts, we support projects from fundamental research through translational applications to implementation, further strengthened by our accredited medical laboratory supporting clinical practice.

High-throughput proteomics and metabolomics:

- Global protein identification and quantification studies
- Global lipidomics and metabolomics, including targeted kits (e.g. Biocrates)
- Metabolomics and pharmacokinetics with LC-MS and GC-MS
- Therapeutic drug monitoring (e.g. immunosuppressants in transplant patients)
- Targeted protein and metabolite quantification (MRM, PRM, SureQuant)
- HDX andmobility MS for protein conformation, dynamics, and interaction D)

Expertise and services:

- Large-scale biomarker discovery in plasma, cells, and other materials
- Quantitative assays for proteins, small molecules, lipids, and PTMs
- Medical diagnostic analyses
- Drug-effect, off-target studies and surface protein mapping
- Multiomics integration for diagnostic panel development
- Development and validation of analytical methods
- Collaboration with multiple academic and industrial partners

Equipment:

- Thermo Orbitrap Astral + Evosep One
- Thermo Orbitrap Exploris 480 + Evosep One
- 2 x Orbitrap QExactive + Waters UPLC
- 2 x Waters SYNAPT G2 + Waters UPLC
- 5 x Waters Xevo TQ-S / TQ-XS / TQ-MS + Waters UPLC
- Thermo TSQ9000 GC-MS
- Precellys Evolution homogeniser, Labconco SpeedVac and other sample preparation equipment

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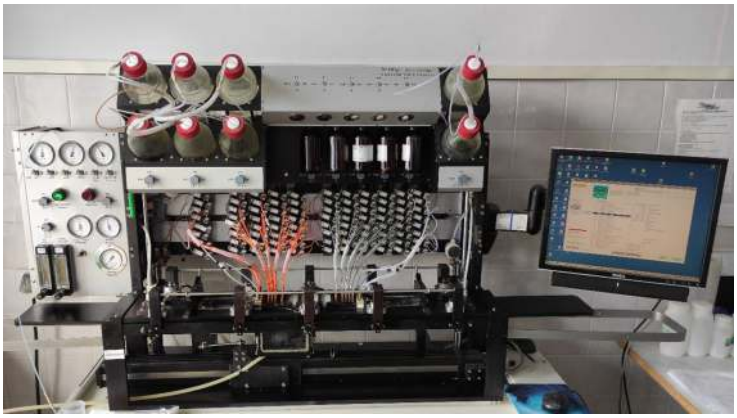
oligo.pl - DNA Sequencing and Synthesis Facility



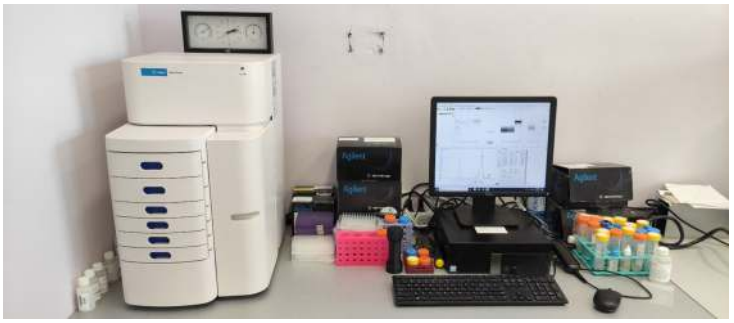
We offer DNA/RNA sequencing and oligonucleotide synthesis services. Our technologies include first-generation Sanger sequencing and fragment analysis, second-generation Illumina sequencing, and third-generation long-read nanopore sequencing. Our expert team supports the entire workflow—from sample prep to data analysis—in a fully equipped lab.

High-throughput DNA/RNA sequencing, synthesis, and analysis:

- Sanger sequencing (plasmids, PCR products, BACs) and fragment analysis (GeneScan)
- Oligonucleotide synthesis for PCR, qPCR, and mutagenesis with fast turnaround (24–48 h)
- DNA barcoding using 16S, ITS, and COI marker genes

Expertise in bacterial, viral, fungal, and algal WGS and metagenomics:

- *De novo* whole genome sequencing, resequencing (mutation detection)
- Targeted amplicon sequencing (16S/18S/ITS)
- Metagenome sequencing, RNA-Seq, and Tn-Seq
- Sample preparation, quality control, and data analysis on customer demand
- Participation in grants and services for IBB and other Polish institutions



Equipment:

- ABI3730 & ABI3730xl (1st-gen Sanger, fragment analysis)
- Dr. Oligo 96 (hightroughput oligo synthesis)
- NextSeq 550 & MiSeq (2nd-gen Illumina NGS)
- MinION, GridION, PromethION (3rd-gen long-read sequencing)
- Agilent FemtoPulse, PippinPulse (DNA/RNA QC, femtogram sensitivity)
- BluePippin (DNA/RNA size selection)
- Roche LightCycler 96 (qPCR)
- 10x Genomics Chromium (single-cell analysis)
- Opentrons OT-2 (liquid handling robot)

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Cell Culture and Protein Production Facility

We provide access to a BSL2 laboratory, specialised equipment, and support for mammalian and insect cell research. Its main focus is recombinant protein production using the baculovirus–insect cell system, ensuring correct post-translational modifications and biological activity. Expertise includes production of functional proteins, large complexes, and virus-like particles.

Protein production services:

- Baculovirus–insect cell expression system
- Generation of biologically active proteins and complexes
- Production of virus-like particles and large assemblies

Applications and expertise:

- Mammalian and insect cell research support
- *In vitro* cytotoxicity testing for drug discovery
- PAMPA and Caco-2 permeability assays (oral absorption prediction)
- Training and consultancy in recombinant protein production

The facility is also a **EU-OPENSCREEN ERIC** partner site, offering physicochemical measurements and ADME profiling (Absorption, Distribution, Metabolism, and Excretion).

Equipment:

- 5 class II biological safety cabinets, 4 CO_2 incubators
- HypoxyLab bench-top incubator and workstation (Oxford Optronix)
- CKX41 inverted fluorescence microscope (Olympus)
- Automated cell counter (Invitrogen)
- 5810R centrifuge (Eppendorf)
- Multitron Pro and Ecotron shaking incubators (Infors HT)
- ÄKTA FPLC system (Amersham Biosciences)
- Liquid nitrogen refrigerator LS6000 (Worthington)
- BD FACSCalibur cell analyser and sorter

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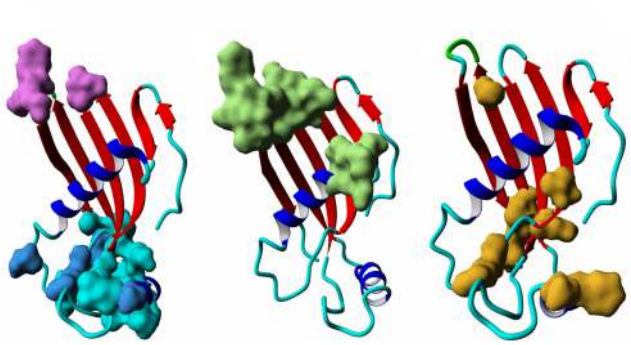
Biological NMR Facility



We provide access to multidimensional NMR spectroscopy for biomolecular research in solution. The facility has strong expertise in structural and dynamic studies of proteins, peptides, nucleic acids and their complexes, including high-resolution 3D structure determination and conformational dynamics from ^15N relaxation experiments.

NMR methodologies:

- 3D structure determination of proteins and peptides in solution
- Conformational dynamics from ^15N relaxation and relaxation dispersion experiments
- Multidimensional NMR of proteins, peptides, nucleic acids, and biomolecular complexes
- Chemical shift mapping for ligand–protein interactions
- Routine analysis of synthetic compounds with NMR spectroscopy in various solvents

Applications and expertise:

- Ligand binding assays and inhibitor development
- Structural biology of proteins, nucleic acids and carbohydrates
- Consulting and collaboration in biomolecular research projects
- Verification of compound purity and composition

Equipment:

- Varian Inova 400 MHz NMR spectrometer (9.6 T, 5 channels incl. ^19F and ^2H)
- Varian Inova 500 MHz NMR spectrometer (11.7 T, 3 channels)
- Both instruments equipped with ^1H/^13C/^15N triple-resonance probeheads with inverse detection and z-gradient units
- Suitable for multidimensional NMR of uniformly ^13C,^15N-labelled and non-labelled peptides and proteins in solution

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Microarray Analysis Facility

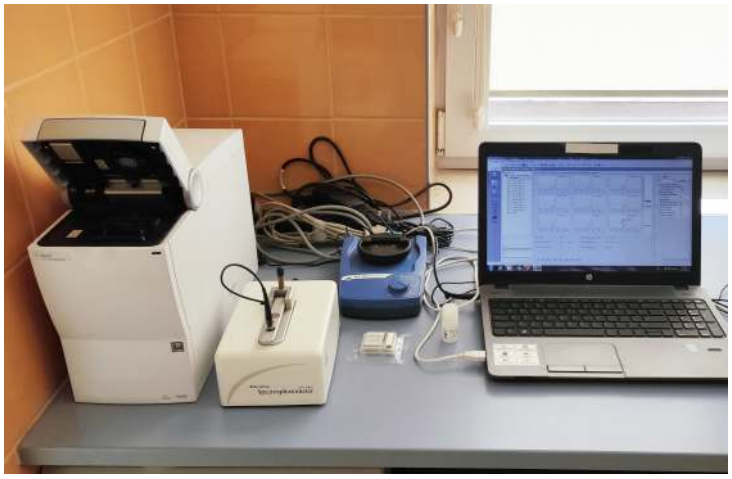
We deliver transcriptomic, genomic and epigenetic profiling using Thermo Fisher and Illumina microarrays, complemented by direct RNA sequencing with Oxford Nanopore. Our services include RNA/DNA quality control, qPCR analysis, consulting in study design, performance and data interpretation.

Profiling technologies:

- Clariom D whole-transcript arrays
- Clariom S arrays
- 3' expression arrays for gene-level analysis
- miRNA arrays for small RNA profiling
- Direct RNA sequencing with Oxford Nanopore
- Illumina Infinium MethylationEPIC v2.0 arrays

Applications and expertise:

- Analysis of coding and non-coding RNAs, isoforms and alternative splicing
- Epigenetic studies with single-nucleotide resolution
- RNA/DNA QC with Agilent Bioanalyzer
- qPCR design, optimisation and preliminary quantitative analysis
- Guidance in transcriptomic study design and data interpretation



Equipment:

- Affymetrix GeneChip platform: 640 Hybridization Oven, 2 × 450 Fluidics Station, 3000 7G Scanner
- Methylation Array Analytical System
- Oxford Nanopore MinION sequencer
- Roche LightCycler 480 (qPCR)
- Agilent Bioanalyzer, Nanodrop, Qubit for nucleic acid QC and quantification

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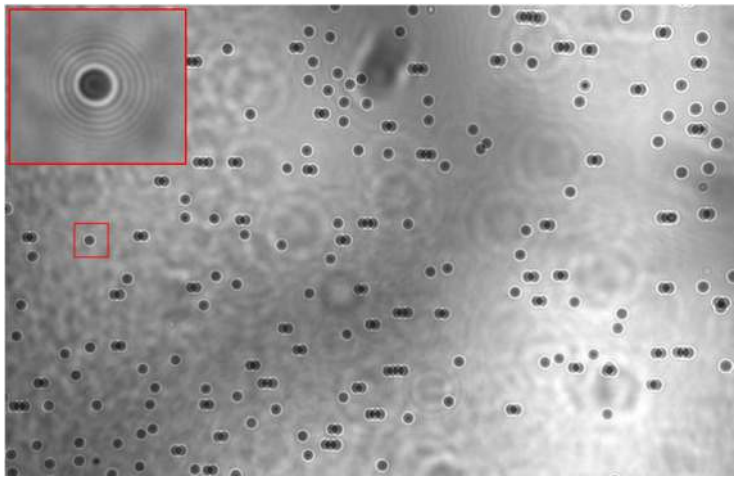
Single-Molecule Biophysics Facility



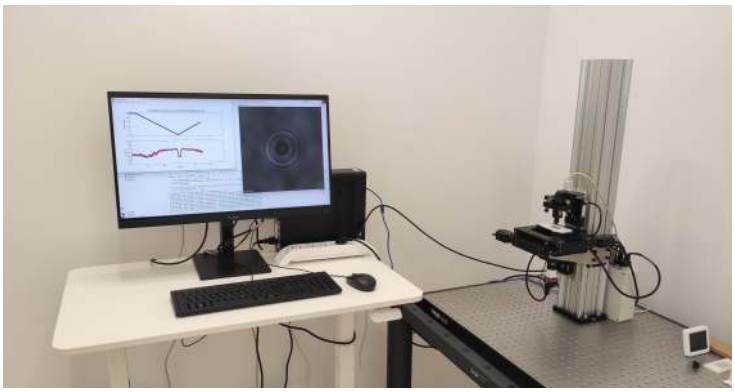
We probe single DNA, RNA, and protein complexes with cutting-edge molecular tweezers. Our force spectroscopy platform enables real-time manipulation and imaging of single biomolecules with nanometer precision. By capturing rapid, short-lived molecular events inaccessible to ensemble measurements, we provide a mechanistic view that complements biochemistry and structural biology.

Single-molecule workflows:

- Functionalizing biomolecules for trapping in tweezers
- Stretching and supercoiling the tethered substrates
- Quantifying force-dependent dynamics
- Imaging DNA/RNA-protein interactions using fluorescent dyes
- Monitoring stepwise assembly and disassembly of complex substrates

Applications and expertise:

- Unzipping DNA/RNA duplexes and hairpins
- Probing chromatin folding under force and torque
- Monitoring DNA-processing enzymes in real time
- Developing novel single-molecule assays with diverse substrates
- Providing end-to-end support: from experimental design to data analysis
- Training and supervised instrument use



Equipment:

- High-throughput magnetic tweezers – tether DNA or RNA molecules between a surface and paramagnetic beads
- Magnetic field control - apply calibrated forces and twist to biomolecules
- Custom flow cell chambers – single use design for flexible sample preparation
- Advanced bead tracking – custom algorithm enabling parallel monitoring of many molecules for robust statistics
- Optical tweezers integrated with fluorescence and microfluidics – available soon!

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Henryk Arctowski Polish Antarctic Station

The Henryk Arctowski Polish Antarctic Station is a Large Research Facility (SPUB) managed by IBB PAS. Established in 1977 on King George Island, it has been operating continuously, providing research, technical and logistical support for Polish and international expeditions. It also serves as an informal Polish embassy in the Antarctic.

Research at the Station covers **biology, zoology, botany, microbiology, ecology, oceanography, hydrology, geology, geomorphology, glaciology and meteorology**, supported by long-term ecological, glaciological, hydrological and meteorological monitoring. Each year, around 15 Polish and foreign institutions use its infrastructure.

Services:

- Support for Antarctic expeditions
- Logistic and technical assistance
- Access to laboratories and field facilities
- Guidance in permits and preparation
- Collaboration with Polish and international partners

Infrastructure:

- Research laboratories and technical buildings
- Residential and social facilities
- Storage halls and supply warehouses
- Marine transport boats

Modernisation

Since 2020, the Station has been undergoing **comprehensive modernisation** under the **ARCTOWSKI – PolarPOL** project. Key upgrades include a new main building, two warehouse and garage halls, modernised energy and water systems, and a helicopter landing site. Completion is planned for **2027**.

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Doctoral School of Molecular Biology and Biological Chemistry

PhD students are a vital part of our research community. The Doctoral School offers training in biological sciences and chemical sciences, with about 80-100 students from Poland and abroad. We provide advanced scientific training combined with transferable skills, preparing young researchers for careers in academia, medicine, and industry.

What we offer

- **Disciplines:** biological sciences and chemical sciences
- **Courses:** protein structure and function, molecular medicine, model organisms, inorganic and medicinal chemistry, microscopy, microbiology, mathematical modelling
- **Soft skills training:** scientific writing, communication, research ethics, grant preparation, commercialisation, intellectual property
- **Community**: weekly IBB seminars, PhD seminars, annual Scientific Symposium
- **PhD Student Council:** support, integration events, peer networking

Funding and opportunities

- **Travel budget:** up to 12 000 PLN per student
- Mini-grants: up to 20 000 PLN for independent projects
- **External funding:** NSC Preludium, NAWA scholarships
- **Free foreign language courses:** French, German, Italian, English and Polish for foreigners
- **Outcomes:** ~50 publications annually (average IF 5), 20–30 PhD degrees awarded each year

Why choose us?

- International and diverse student body
- Strong mentoring and annual progress evaluations
- Access to Biocentrum Ochota – one of Poland's largest biomedical campuses
- Graduates pursue academic and R&D careers worldwide

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