

CATALOG OF RESEARCH SERVICES

BIOTECHNOLOGY
BIOENGINEERING



Warsaw University of Technology
Centre for Advanced Materials and Technologies
CEZAMAT



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Dear Customers,

We present the current offer of services proposed by the Center for Advanced Materials and Technologies CEZAMAT of Warsaw University of Technology in the field of biotechnology and bioengineering. In addition, based on our unique experience, highly specialized personnel and research facilities, we can also undertake other work previous consultation. We invite you to contact us.

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1 ISOLATION AND PURIFICATION OF PROTEINS

An efficient process of isolation and purification of proteins through careful monitoring of the process (parameters and speed) followed by separation techniques based on chromatographic methods.

The service includes techniques related to:

- development of methods for the isolation and purification of recombinant proteins using low-pressure chromatography LPLC,
- visualization of protein profiles by SDS-PAGE electrophoresis,
- plasmid DNA isolation.

PROTEIN ISOLATION, PROTEIN PURIFICATION, RECOMBINANT PROTEINS, SDS-PAGE, PLASMID DNA, WESTERN BLOT

2 GENOMIC AND PROTEOMIC ANALYSES

Among the genomic and proteomic research, we offer:

- analysis of next-generation sequencing data (e.g., RNA-seq, DNA-seq, Hi-C, NanoGAM, meta-genomic analysis);
- predicting protein structure and function through bioinformatics analysis (including the impact of mutations on protein structure);
- prediction of interactions between proteins and small molecular partners (including molecular docking, molecular dynamics simulation).

NGS, ONT, RNASEQ, DNASEQ, MOLECULAR DOCKING, HI-C, GAM, METAGENOMICS.

3 ANALYSIS OF ANTI-MICROBIAL ACTIVITY

We offer a complete process to determine antimicrobial activity in materials and substances, including antifungal, antibacterial and antiviral activity. We have a library of reference and clinical strains.

The service includes:

- analysis of cell metabolic activity (MTS, ATP), flow cytometry and ELISPOT;



- antimicrobial susceptibility testing:
 - diffusion-disc method;
 - minimal inhibitory concentration (MIC) in the continuous dilution procedure;
 - minimum bactericidal concentration (MBC) and minimum fungicidal concentration (MFC) in agarose method;
- testing resistance genes expression level (RT-qPCR, dPCR);
- virus load: according to. Kärber/Kärber-Spearman (TCID50), spectrophotometric and RT-qPCR method, determination of the number of particles/virus copies (virus particles/mL)

MICROBIAL BIOBANK, ANTIMICROBIAL ACTIVITY, PATHOGEN RESISTANCE PROFILE, RT-QPCR, MIC, MBC, MFC, VIRAL LOAD

4 IDENTIFICATION OF PATHOGENS

We provide a service to identify bacteria, fungi and viruses using conventional microbiology and molecular biology methods.

The service includes:

- culture in selective growth media;
- molecular analysis: RT-qPCR-HRM, ddPCR and NGS (for example, RNA-seq, DNA-seq, GAM, metagenomics).

IDENTIFICATION OF PATHOGENS, RT-QPCR-HRM, DDPCR, NGS, ONT, METAGENOMICS

5 CLINICAL STUDY OF MATERIAL – TESTING OF CLINICAL MATERIAL

Isolation, differentiation and culture of cells derived from clinical material (e.g. peripheral blood cells, nervous system cells, tissue biopsy, circulating DNA).

In terms of service we offer:

- analysis of cells metabolic activity (MTS, ELISPOT, western-blot);
- immunofluorescence/luminescence (ATP, fluoSPOT, flow cytometry);
- RNA-seq, DNA-seq, GAM, Hi-C;
- predicting the structure and function of proteins using bioinformatics analysis (including the impact of mutations on the structure of proteins);
- predicting interactions between proteins and small molecular partners (including molecular docking, molecular dynamics simulations).

CELL METABOLISM, PHENOTYPING, NGS, ONT, ELISPOT, FLOW CYTOMETRY, DDPCR, WESTERN-BLOT

6 IN VITRO, EX VIVO IMMUNE RESPONSE TEST

A comprehensive study of the immune response to the test agents.

The service includes techniques:

- 2D and 3D cell culture in the co-culture: PBMC (B, T, monocytes) and mast cells (e.g. 3D model – pulmonary alveolar on insert, air-liquid culture);
- stimulation of cells with immunogenic factors (e.g. antigens, adjuvants, microorganisms, viruses, vaccines);
- analysis of the cytopathic effect with full photo documentation;
- immunophenotyping of cells (e.g. analysis of population and subpopulation of CD4⁺, CD8⁺, CD19⁺ lymphocytes and profile of immunoglobulins, cytokines);
- immunoenzymatic/immunofluorescence (ELISPOT) and genetic (RT-qPCR) analysis;
- analysis of the level of pro-inflammatory gene expression and analysis of NGS data (among others RNA-seq, DNA-seq, GAM).

2D AND 3D CULTURES, VACCINES, DRUGS, CYTOKINES, PHENOTYPING, FLOW CYTOMETRY, NGS, ONT, RNASEQ, DNASEQ, ELISPOT FLOW CYTOMETRY, DDPCR

7 PROFILING DRUGS

A comprehensive genomic analysis of rare mutations correlated with the effects of drugs.

The service includes techniques:

- liquid biopsy (ddPCR);
- identification of single nucleotide polymorphism in treatment - personalized analysis (RT-qPCR-HRM);
- RNA-seq, DNA-seq, GAM, NGS, ONT.

LIQUID BIOPSY, DDPCR, TR-QPCR, DRUGS, NGS, ONT, RNASEQ, DNASEQ

8 STUDY OF BIOCOMPATIBILITY AND CYTOTOXICITY OF MEDICAL DEVICES AND BIOMATERIALS (INCLUDING NANOMATERIALS)

Analysis of cell metabolism, cell viability and proliferation, investigation of cytotoxicity and biocompatibility of biomaterials and medical devices. Studies using normal and neoplastic cells (breast, ovarian, lung, skin, vascular cells, bone) and primary cells (including stem cells).

During the service we perform:

- analysis using tests such as MTT test, differential fluorescent staining CAM/PI, XTT test, AlamarBlue test, LDH test;
- immunoenzymatic tests for detection of specific proteins, detection of the presence of proteins in the tested material by colorimetric tests (BCA tests, Lowry and others);
- application of flow cytometry to quantitative measurements of cell viability, determination of protein expression level;

- determination of changes in expression of selected genes using RT-PCR technique in the materials isolated from cells grown on the tested materials (e.g. nanofiber mats, natural and synthetic membranes, hydrogels, scaffolds) and in flow-microsystems.

CYTOTOXICITY, BIOCOMPATIBILITY, BIOMATERIALS, VIABILITY TESTS, FLOW CYTOMETRY, RT-PCR



9

STUDY OF CYTOTOXICITY OF BIOLOGICALLY ACTIVE COMPOUNDS AND DRUGS

We offer services in the field of:

- analysis of cytotoxicity (IC_{50}) of compounds, drugs and their new forms using i.e. normal and cancerous (breast, ovary, lung, skin, vascular cells) cell culture;
- cytotoxicity analyzes using: MTT, XTT, Alamar Blue, LDH tests;
- application of flow cytometry to quantitative measurements of cell viability (analysis of cell cycle, type of cell death).

CYTOTOXICITY, BIOLOGICALLY ACTIVE COMPOUNDS, TOXICITY TESTS, FLOW CYTOMETRY

10

IMAGING AND MICROSCOPIC CHARACTERIZATION OF BIOLOGICAL SAMPLES AND CELL CULTURES

The services we offer include:

- microscopic analysis of cell culture, bacterial culture, fungi, yeast, small organisms and fragments of tissues, live and fixed preparations;
- imaging of cells in contact with biomaterials;
- real-time analysis of morphological changes and cell migration, survival analysis of culture state;
- transient light and phase contrast imaging;
- scanning confocal imaging and super-resolution imaging (e.g. evaluation of cell viability, testing of cell cycle processes, immunofluorescence stained protein imaging and identification of other labeled cell markers);
- real-time microscopic imaging in standard and hypoxic cultivation conditions;
- imaging of two- and three-dimensional cell structures (cell monolayers, suspension cultures, cell units, spheroid, hydrogel culture, organoids, scaffold) scanning in Z-stack mode;

- research of subcellular accumulation of compounds;
- analysis of co-location.

OPTICAL MICROSCOPY, FLUORESCENCE MICROSCOPY, CONFOCAL MICROSCOPY, SUPER-RESOLUTION IMAGING, ACCUMULATION AND CO-LOCATION ANALYSIS

11

COMPARATIVE ANALYSES USING THREE-DIMENSIONAL (3D) AND FLOW CELL CULTURES

The comparative services include:

- 3D cell culture (including cell multilayers, spheroids, aggregates) in flow-through microsystems and multi-well plates;
- cell culture, cell visualization, viability and proliferation and cytotoxicity studies under static and dynamic (flow) conditions;
- comparative analysis of 2D and 3D cultures and micro- and macro-scale cultures.

3D CELL CULTURES, FLOW-THROUGH MICROSYSTEMS, MICRO- AND MACRO-SCALE ANALYSIS

12

COMPLETE PROTOTYPING OF MICRODEVICES FOR CELL CULTURE AND CELLULAR ANALYSIS

As a part of the prototyping service, we provide the following possibilities:

- design of microstructure geometries in CAD programs (AutoCAD, Solidworks, Fusion);
- computer simulations of culture conditions in designed microstructures (Ansys, Solidworks);
- prototyping of microstructures (50 μm - 200 μm) using photolithographic methods (photosensitive capillary films);

- bonding of thin layers of polymer materials (PDMS, PMMA, PC, PET) and glass materials using a plasma system or alternative methods (bioadhesives, tapes);
- fabrication of enclosed microstructures and ready-to-use microsystems by 3D printing (based on biocompatible polymer resins).

MICROSTRUCTURE DESIGN, MICROSTRUCTURE PROTOTYPING, PHOTOLITHOGRAPHY, 3D PRINTING



13 DESIGN, FABRICATION, PURIFICATION AND CHARACTERIZATION OF ORGANIC, METALLIC, METAL OXIDE NANOSTRUCTURES

We offer a wide scope of services related to the manufacture of a variety of nanomaterials including:

- design of nanostructures (nanoparticles) depending on size, type of material and surface chemistry;
- wet methods manufacturing (nanoprecipitation, emulsification, solvent exchange solvent);
- synthesis of organic (including polymeric), metallic (Au, Ag, Cu) and metal oxides (Fe_xO_y , CuO) nanoparticles;
- purification (centrifugation, nanofiltration, dialysis);
- characterization using DLS, FTIR, UV-Vis and SEM/STEM techniques.

NANOPARTICLES, ELECTRON MICROSCOPY, NANOSHELLS, DRUG DELIVERY, DIAGNOSTICS, SENSORS

14 CHROMATOGRAPHY ANALYSIS (HIGH PERFORMANCE LIQUID CHROMATOGRAPHY HPLC)

Quantification analysis of chemical substances including small-molecule drugs as well as development of a testing method and its verification.

Basic parameters of the equipment for conducting the analyses :

- photodiode array (PDA) detector with a wavelength range of 190 - 790 nm;
- thermostatic separation module - thermostat range 25 °C - 90 °C;
- autosampler - with a Peltier system operating in the temperature range 4 °C - 40 °C;
- gradient pump, 4-component with gradient formation on the low pressure side, flow range from 0.01 to 10.0 ml/min.

LIQUID CHROMATOGRAPHY, COLUMN CHROMATOGRAPHY, QUANTITATIVE ANALYSIS, HPLC

15 DESIGN AND MANUFACTURE OF MICROFLUIDIC DEVICES FOR BIOCHEMICAL AND BIOANALYTICAL APPLICATIONS

The service includes the following options:

- design of microstructure geometries in CAD software (SolidWorks);
- computer simulation of flows using the finite element method (COMSOL Multiphysics);
- fabrication of microstructures using micromilling in aluminum and plastics (PMMA, PEEK, PC, PVC, etc.);
- fabrication of microstructures using laser treatment in PET films;
- 3D imaging of the fabricated microstructures and topographical analysis;
- bonding of layers of polymeric materials (PMMA, PC, PET) using low-temperature lamination and solvent bonding.

LAB-ON-A-CHIP, μ TAS, MICROSYSTEM, CAD, MICROMILLING, LASER CUTTING

16 LYOPHILIZATION - SUBLIMATION DRYING OF SAMPLES

We provide sample preparation processes for sublimation drying.

Below are the key process parameters:

- freezing down to -50 °C;
- fully automatic freeze-drying process, according to programmed temperature requirements;
- efficiency - up to 2 kg of water per 24 h;
- possibility to adjust vacuum during the process in the range from 0.002 to 1.65 mBar (values depending on the size of the sample);
- possibility of freeze-drying directly in glass vessels (width of necks ½”

- and 3/4”) or directly on freeze-dryer shelves;
- freeze-drying chamber and spiral made of stainless steel, possibility of freeze-drying also from selected organic solvents and their mixtures with water;
- process report generated at the end of the device cycle.

PROTEINS, FOOD, PRESERVATION, DRYING, DEHYDRATION

17 NONCONTACT APPLICATION OF ULTRA-LOW PORTIONS OF LIQUID

Liquid samples are applied to the material using a micro-volume liquid pipetting system. The liquid deposition process is characterized by high accuracy, repeatability and the ability to create accurate patterns on a substrate.

The specification of the service can be found below:

- deposition of nano-volume liquid portions on plastic substrates (in the form of plates or films), as well as on substrates made of glass or metals;
- substrates with maximum dimensions of 588 × 420 mm;
- deposition of aqueous solutions and mixtures of specified chemical and physical parameters (limitations are due to viscosity and chemical nature of liquids/solutions);
- droplets of volume from 0.5 nl according to the scheme prepared in the program;
- high resolution of the process;
- possibility for applying several solutions at the same point;
- accuracy, repeatability and ability to create precise patterns.

MICROARRAYS, SOLUTION, RECEPTOR LAYER, DROPLETS



18 ELEMENTAL ANALYSIS OF SOLID MATERIALS AND COATINGS

The research is carried out using KEYENCE INTERNATIONAL (BELGIUM) EA-300 series equipment; The elemental analyzer head is designed for use with VHX-7000 series microscopes.

The main objectives of the research method:

- analysis using LIBS (Laser Induced Breakdown Spectroscopy) technique;
- no need for sample preparation;
- possible analysis of coatings of at least 5 μm in thickness;
- determination of a large group of elements - also C, H, O, N, Li, Be, F;
- possibility of imaging samples and selecting fragments for analysis (testing of heterogeneity of materials);
- not suitable for trace elements analysis.

LIBS, LASER MICRO- SAMPLING, EMISSION SPECTROMETER, ELEMENTAL MAPPING

19 MEASUREMENT OF SURFACE CONTACT ANGLE

Tests of the surfaces contact angle (from highly hydrophobic to highly hydrophilic) performed using a KEYENCE INTERNATIONAL microscope. It allows a smooth change of the objective angle in the range of 90 degrees and the use of illumination with variable intensity and angle of light.

Below are the characteristics and conditions of measurement:

- the measurement results of the tested surface are accompanied by high-resolution photography;
- the smallest possible volume of the applied droplet is 0.5 μ l;
- the minimum sample size of the tested material is 5x5 mm (in a case of testing a highly hydrophilic surface, a larger sample may be necessary);
- maximum sample size 200x200 mm;
- in the case of liquid-absorbing samples, it is possible to obtain a sequence of images (photos) visualizing the process of wetting as well as absorption.

Please contact us for details or if you are measuring non-standard samples.

HYDROPHILICITY, HYDROPHOBICITY, WETTING ANGLE, MATERIALS CHARACTERIZATION

20 INTERACTION STUDY AND SURFACE CHARACTERIZATION BY SURFACE PLASMON RESONANCE TECHNIQUE- SPR

Studies are performed using the MP-SPR Navi™ 200 OTSO (BioNavis), a versatile two-channel surface plasmon resonance spectroscopy analyzer with mobile liquid phase and gas phase capabilities.

We offer:

- study of various types of interactions of mobile phase components with the surface, among others: adsorption processes on surfaces,

desorption/degradation of predefined layers, interactions of biological nature (e.g., antibody-antigen, DNA-DNA);

- study of kinetics and thermodynamics of interactions in real time in label-free mode;
- study of the effects of electrochemical processes on surface phenomena using an electrochemical cell (and electrochemical techniques as references);
- possibility of using transducers with metallic (including Au, Ag, Pt) and oxide (at least SiO₂, TiO₂, ITO) surfaces, as well as their further modification. We have large in the modification of gold transducers with thiol/bioreceptor monolayers;
- preparation: assistance in the preparation of layers intended for analysis (surface preparation, selection of immobilization technique).

SPR, KINETICS OF INTERACTIONS, THERMODYNAMICS OF INTERACTIONS, NUCLEIC ACIDS, INHIBITORS, PROTEINS, ANTIBODIES, RECEPTORS

21 STUDIES OF INTERACTIONS USING ELECTROCHEMICAL TECHNIQUES

Tests are conducted on 600E and 1030 C electrochemical stations (CH Instruments) allowing measurements by a variety of techniques, including potentiometric, amperometric (DPA, CA), voltametric (CV, LSV, DPV, SWV, ACV, HMV), coulometric (CC) and impedance (EIS, IMPT).

- electrochemical testing, including determination of electrochemical surfaces, electrochemical cleaning, etc. in aqueous and non-aqueous electrolytes;
- electrochemical analysis of layers and monolayers (including layers of biological origin), study of adsorption/desorption/degradation processes, determination of surface densities of DNA monolayers;
- preparation - surface modification of electrodes (including gold, silver, platinum, glassy carbon) and their electrochemical characterization. We have significant experience in the fabrication and characterization of

(bio)receptor layers on the surface of electrodes and the ability to use a complementary reference technique - surface plasmon resonance (SPR).

It is possible to provide all the accessories necessary for the measurement (set of working electrodes, reference electrodes (Ag/AgCl), auxiliary electrodes, measuring dishes, basic electrolytes, accessories for surface cleaning, etc.).

In the case of sensitive samples, it is possible to prepare for measurement on location (available, among others, high-speed centrifuges, vortexes, ultrasonic bath). It is possible to conduct measurements in an atmosphere of neutral gas.

VOLTAMMETRY, AMPEROMETRY, POTENTIOMETRY, NUCLEIC ACIDS, SENSORS, DETECTION

22 MEASUREMENTS OF SURFACE TOPOGRAPHY OF MATERIALS - CONTACT PROFILOMETRY

We have a Bruker DektakXT instrument with three-axis positioning and the ability to test also soft materials. We perform profiles of single measurement lines, automated sequences, as well as 3D visualizations of surface topography. We perform surface topography measurements by contact method to measure coating thickness, roughness, stresses and defects with contact profilometry technology.

Range of functionality:

- numerically controlled X/Y table, providing 200/200 mm travel with motorized rotation in the range of 0-360°;
- maximum length of a single scan: 55 mm. Possibility to increase the scan length up to 200 mm with profile stitching function;
- maximum height (thickness) of the sample on the measuring table: 50 mm;
- 200 mm diameter vacuum table suitable for measuring silicon wafers;
- microporous vacuum table with dimensions of 150 mm x 150 mm;
- profilometer is placed on a pneumatic anti-vibration table to reduce measurement noise.

Parameters of the measuring head:

- probe force from 10-147 μN with the possibility to reduce it down to 0.3 μN for particularly delicate samples or soft materials;
- vertical measuring range (step height): 1 mm;
- resolution of measured height from 15 nm in the range of 0-1 mm to 0.1 nm in the range of 0-6.5 μm ;
- measuring needle with a rounding radius of 2 μm ;
- measuring needle with a rounding radius of 12.5 μm ;
- optical system that allows viewing the scanning needle during measurement and observation of the sample surface.

Data processing and analysis:

- calculation of roughness and topology parameters: Ra, Rq, Wa, ASH and many others;
- ability to filter macro-geometric artefacts: slope, waviness, roundness;
- automatic degree detection function;
- ability to automate measurement sequence based on sample markers;
- ability to make 3D maps of surface topography with transverse stitching resolution up to 1 μm .

SURFACE TOPOGRAPHY, MATERIAL TESTING, SURFACE STRUCTURE, ROUGHNESS, LAYER THICKNESS

23 TESTES IN A CLIMATE CHAMBER

Exposure of samples to different types of conditions by regulating humidity and temperature. Temperature tests and climate tests can be conducted.

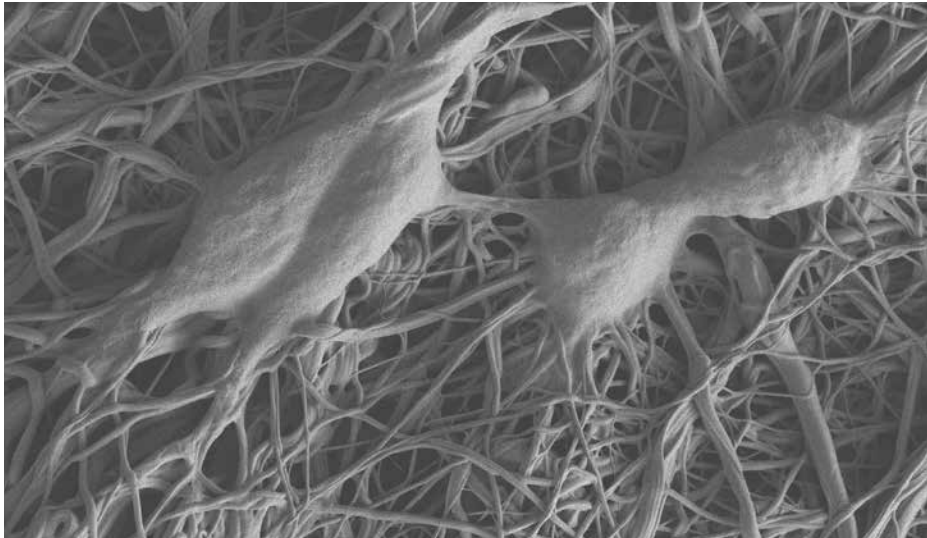
Temperature tests:

- temperature range: from -70 $^{\circ}\text{C}$ to +180 $^{\circ}\text{C}$;
- average heating rate according to IEC 60068-3-5 is 4.0 K/min;
- average cooling speed in accordance with IEC 60068-3-5 is 4.0 K/min;
- temperature fluctuation of no more than 0.3 K.

Climate tests:

- temperature range: from 10 °C to +95 °C;
- humidity range: from 10% to 98%;
- I range of dew point temperature: from 7 °C to +94 °C;
- II range of dew point temperature: from -10 °C to +7 °C;
- temperature fluctuation not greater than 0.3 K;
- humidity fluctuation not greater than 1.5% relative humidity in the temperature range from +7 °C to +94 °C;
- humidity fluctuation of not more than 1.5 % relative humidity in the temperature range from -10 °C to +7 °C.

Internal dimensions (W x H x D): 650x750x400 mm; Capacity: 200 l



24 SEM IMAGING AND SPUTTERING

Studies are performed on a Hitachi SU8230 ultra-high resolution scanning electron microscope.

We perform:

- imaging in scanning mode (SEM);
- imaging in transmission mode (STEM);
- imaging using IL preparation;
- imaging of frozen samples in Cryo-SEM mode.

Samples for observation in Cryo-SEM mode should be booked in advance (min. 2 weeks).

We offer the possibility to deposit metal layers using the Quorum Q150 TS plasma sputtering machine. The sputtering machine is dedicated to the preparation of samples for SEM, but any solid samples can be sputtered. The maximum size of the object introduced into the chamber of the sputtering machine - about 10 x 10 cm.

We offer sputtering of layer thicknesses from several to tens of nanometers:

- gold;
- gold-palladium alloy;
- offers future sputtering with platinum, silver, chromium and nickel.

SCANNING ELECTRON MICROSCOPE, SEM IMAGES, BIOMATERIALS, NANOMATERIALS

25 ANALYSIS OF PARTICLE SIZE/ ZETA POTENTIAL (ELECTROPHORETIC MOBILITY)

We offer measurements using equipment Zetasizer Nano ZS (Malvern) - a multifunctional particle size/molecular weight/zeta potential analyzer for measuring colloidal dispersions (nanoparticles and microparticles, proteins, polymers, etc.) and films (surface zeta potential).

We offer:

- measurement of hydrodynamic diameter/molecular mass of particles in solutions (macromolecules, nanoparticles, microparticles) by dynamic light scattering (DLS) technique in the range of 1 nm - 5 μ m;

- studies of colloidal stability, dispersion; analysis of aggregation processes in multi-angle detection mode;
- measurement of surface charge (zeta potential) of dispersions (also in concentrated samples up to 40% v/v) and macroscopic planar films with dimensions of about 4 x 5 mm (polymers, composite mats, etc.).

Tests are possible in aqueous solutions and organic solvents, in samples from 50 μL (hydrodynamic diameter) or 800 μL (zeta potential) in the temperature range from 0 to 90 °C. It is available to provide consumable accessories for measurement and sample preparation (syringe filters, disposable cuvettes, cells and tables for zeta potential measurement). In the case of sensitive samples, it is possible to prepare them on site, directly before the measurement (available, among others, high-speed centrifuges, vortexes, ultrasonic bath).

STING, DIGITAL MODELING, SIMULATION, SOFTWARE DLS, MICROEMULSIONS, NANOPARTICLES, NANOMATERIALS, NANOGELS, LIPOSOMES, HYDRODYNAMIC DIAMETER, ZETA POTENTIAL

26 AUTOMATION OF LABORATORY TESTES

We offer automation services for typical tests and work performed in chemical, biotechnological or microbiological laboratories. The service consists of the design of a device that performs specific processes, optimization of the processes and dedicated software. Depending on the process or research that is to be automated, it is possible to develop a device that will work fully autonomic or perform specific operator commands, or it will work in a mixed mode.

The benefits of introducing automation in the laboratory are particularly evident in the case of procedures that are frequently repeated, or long-term processes with precise individual steps. This results in less involvement of personnel in these processes, but also minimizes the risk of making mistakes, e.g. due to routine. The ability to schedule long-lasting processes that will have to be carried out when the laboratory is not staffed (e.g., holidays) is also of great significance.

BIOTECHNOLOGY AND BIOENGINEERING AT CEZAMAT WUT

LABORATORY:

ISO6 Bio - 484 m², ISO6 - 193 m², ISO7 - 1110 m²

RESEARCH TEAMS:

- Department of Microbiology Molecular Genetics and Genomics,
Prof. Monika Staniszewska PhD.
- Department of Medical Biotechnology,
Prof. Elżbieta Jastrzębska PhD. Eng.
- Department of Medical Diagnostics,
Prof. Mariusz Pietrzak PhD. Eng.
- Department of Printed Electronics, Textronics and Assembly,
Prof. Małgorzata Jakubowska PhD. Eng.

TECHNOLOGY EXAMPLES:

- Molecular and genetic analyses: oncolytic adenovirus engineering, gene expression testing (RT-qPCR), liquid biopsy (digital droplet PCR).
- Immunoenzymatic tests: e.g. ELISA, ELISpot, flow cytometry, fluorescent staining.
- Analysis of the sequence and three-dimensional structure of the genome of eukaryotic organisms, analysis of the inheritance of the three-dimensional structure of the genome and its variation.
- Analysis of genomic data including Chip, RNAseq, DNaseq. Computational techniques: homology modeling, molecular docking, molecular dynamics and machine learning methods.
- Lab-on-a-chip, Cancer-on-a-chip, Organ-on-a-chip microsystems and advanced cell culture modeling.
- Biomaterial-cell interaction studies, in vitro cytotoxicity test.

- Tissue scaffolds, biocompatible and hemocompatible surfaces.
- Bioactive substance delivery systems.
- Biosensors and bioassays for clinical and environmental applications, application of label-free techniques to study receptor(ligand)-analyte (antigen, inhibitor) interactions.
- Polymeric multifunctional materials responsive to external stimuli such as temperature, pH changes, magnetic field or UV radiation.
- Disposable ECG electrodes for intraoperative open heart work.

EXAMPLE EQUIPMENT:

- BD FACS Lyric flow cytometer and Beckman-Coulter CytoFlex,
- EliSpot tests,
- Droplet Digital PCR (ddPCR),
- Real Time (qPCR),
- Zeiss Axio Observer 7 microscope with LSM 900 confocal recording attachment and Airyscan detector,
- SwitchSENSE Dynamic Biosensors system, proFire Dynamic Biosensors module,
- Perkin-Elmer HPLC,
- SEM microscope with cryo attachment (Hitachi 8230),
- Nano-Plotter NP2.1 liquid micro-volume pipetting system (Gesim),
- multi-parameter surface plasmon resonance analyzer (MP-SPR),
- 3D printer (CADworks3D Pr-110-385), precision micro-milling machine and CO₂ laser systems VLS 2.30 and ULTRA x6000 with vision system.

CONTACT:

We invite you to cooperation and contact
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