SERVICES PORTFOLIO

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It is time to introduce our full offer. It has been divided into specialized services within which it is possible to carry out specific works.

If you have any questions, doubts or are interested in the offer, feel free to contact us at:

OFFER@IBMM.PL

IBMM
INSTITUTE OF BIOTECHNOLOGY
AND MOLECULAR MEDICINE

In response to the globally growing research and development needs, the Institute of Biotechnology and Molecular Medicine has decided to provide access to its technological and human resources.

The Institute is known as an important industrial associate. With many years of experience, we are able to short-circuit the research process while maintaining high quality and reasonable cost of the project. We execute complementary research and production activities in the field of veterinary medicine, chemistry, biotechnology, electronics and medicine, at every stage of project development.

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CHEMISTRY, BIOTECHNOLOGY AND MICROBIOLOGY SERVICES

1. ORGANIC SYNTHESIS

Our qualified employees offer specialist knowledge in the production of both unmodified and modified peptides. The IBMM offer includes the synthesis of peptides of various lengths and in a wide range of synthesis scales.

We obtain peptides chemically by solid support synthesis (SPPS). For syntheses, we use high-quality polymer resins that enable the production of peptides in the form of both acid and amide (2-chlorotrityl resin, RAM amide resin). We perform our syntheses with the use of a modern automatic microwave peptide synthesizer. We purify the peptides by reversed-phase high-performance liquid chromatography (RP-HPLC). Peptide analyzes are performed based on the chromatographic technique (RP-HPLC) and the mass spectrometry (MS) technique.

We offer a wide range of peptide modifications:

- N-terminal modification such as acetylation, PEGylation, biotinylation, attachment of fatty acid residues to the peptide molecule;
- labelling with fluorescent markers, such as FITC, AMC;
- labelling with fluorescent dyes of the FRET pair type, such as ABZ / Tyr (NO2);
- introducing non-standard amino acids.

We guarantee excellent quality of synthesized products on a scale of 1 mg in various purity ranges (<98%), which is confirmed by RP-HPLC and MS analyzes.

We deliver the product in the form of a lyophilisate. The resulting peptides are in the form of trifluoroacetates. At the client's request, the peptide can be obtained in the form of acetates or hydrochlorides. Additionally, the peptide may be left on a solid support or have side group covers, which can be used for further modification.

The cost of synthesis depends on: the length of the peptide, amino acid composition, applied modifications, degree of product purity.

2. PRODUCTION OF RECOMBINANT PROTEINS IN PROKARYOTIC SYSTEMS

We provide the service of obtaining recombinant proteins on a laboratory scale (up to 2 mg) using an *E. coli* host.

The offer includes the design of the protein overproduction process and optimization of its isolation. We use affinity chromatography with popular tags such as HisTAG, GST, MBP, SUMO, StrepTAG.

3. EXPRESSION OF RECOMBINANT PROTEINS (INSECTS, MAMMALS, BACTERIA)

We offer comprehensive services in the field of protein expression, purification and production - from genes to fully characterized proteins.

This service is based on an easily adaptable approach to perfectly meet your needs and consists of:

- production and purification of recombinant proteins in bacteria;
- small-scale expression and purification in mammalian cell cultures;
- production in bioreactors;
- design, optimization and validation of constructs;
- analysis of various conditions and optimization of expression;
- protein modifications, tagging, labelling;
- protein optimization - solubility, folding, stability;
- protein identity analysis and confirmation - size exclusion chromatography (SEC), dynamic light scattering (DLS).

4. PRODUCTION OF BIOMASS, PROTEINS AND ENZYMES (POLYMERASES, REVERSE TRANSCIPTASES)

IBMM offers the production of enzymes in a prokaryotic expression system. We use basic polymerases in diagnostics and molecular biology: Taq and Pwo - in PCR reaction and Bst polymerase - in isothermal amplification (e.g. LAMP). Additionally, we produce modified M-MuLV reverse transcriptase, which can be successfully used in one- and two-step RT-PCR or RT-LAMP reactions.

5. OPTIMIZATION OF ENZYME WORKING CONDITIONS

We offer optimization of the conditions of enzyme activity, mainly polymerases, reverse transcriptase, RNases and DNases. The scope of optimization includes, among others: the selection of the optimal temperature of enzyme operation, the composition of the reaction buffer, the concentration of the cofactor, time and reaction profile. It is also possible to determine the basic characteristics of enzymes, i.e. thermostability, activity, reaction rate, etc.

6. PRODUCTION OF POLYCLONAL ANTIBODIES

We perform the synthesis of polyclonal antibodies, from the production of the antigen to the purification of the obtained product. At each stage, we offer a wide range of options, from immunization with synthetic peptide or protein antigen, through ELISA screening, scaling, to final affinity purification.

In addition, we provide additional services on demand such as epitope design, additional screening and Western Blot analysis.

7. QUANTITATIVE AND QUALITATIVE ANALYSIS OF PROTEINS

IBMM performs protein quantification in a sample using the Bradford and BCA methods. We provide a service of protein electrophoretic analysis and immunoblotting. We analyze samples to detect specific protein markers using an ELISA test.

8. DISTRIBUTION OF VIRAL MATERIAL

We offer a wide range of human upper respiratory viruses; such as Influenza A and B; RSV, EBV and Rhinovirus. Viruses are available in an inactivated form in individually selected buffers or in the form of lyophilizates.

9. HPLC ANALYSIS AND CHROMATOGRAPHIC ANALYSIS OF UV-VIS SAMPLES

The laboratory conducts HPLC and chromatographic analyzes using high-performance liquid chromatography with UV-Vis detection. Samples can be analyzed directly or according to the provided derivatization protocol. In the absence of a chromatographic method or a method of sample preparation, we offer the services of preparing complete protocols of proceedings along with the analysis.

10. DIAGNOSTIC SYSTEMS DESIGN (PCR, LAMP)

We create kits for the identification of any human, animal or plant pathogens based on molecular techniques. Detection is based on the use of PCR or an isothermal real-time amplification reaction using genetic material. Thanks to the use of proprietary, patented, fusion enzymes in the designed systems, it is possible to create systems for quick and direct identification, with partial or complete omission of the genetic material isolation stage.

11. EPITOPE MAPPING

Epitope mapping is the process of experimentally identifying an antibody's binding site on its target antigen (usually a protein). By providing information on the mechanism of action of antibodies, epitope mapping is a key element in the development of therapeutic monoclonal antibodies (mAbs). The identification and characterization of antibody binding sites aids in the discovery and development of new drugs, vaccines and diagnostic methods. It was a key step during the development of vaccines against lethal viral pathogens such as Chikungunya, Dengue, Ebola and Zika virus.

Characterization of epitopes can also help elucidate the binding mechanism of an antibody and can enhance the intellectual property protection (patent) of the developed antibodies. In our offer, we use bacteriophage libraries, which enables the performance of high-throughput analysis.

12. CYTOTOXICITY, BIOCIDAL ACTIVITY AND VIRUCIDAL ACTIVITY TESTING

Cytotoxicity tests of chemical compounds and products for medical applications (performed in accordance with ISO 10993-5: 2009 and ISO 10993-12: 2012) include:

1. determination of the cytotoxic activity of chemotherapeutic agents against neoplastic cells
2. studies of the cytotoxicity of nanoparticles in the in vitro models
3. proliferation studies (formazan salts, MTT test)
4. LDH test (lipoclastic activity)
5. study of ROS activity

We offer cell models based on the reference human cell lines used in toxicological research: cells of the digestive, respiratory, nervous, urinary, reproductive, skeletal systems, as well as skin cell models.

The laboratory performs a biological assessment of medical devices according to the PN-EN ISO 10993 standard in in vitro conditions (on extracts PN-EN ISO 10993-5, PN-EN ISO 10993-12; in direct contact with PN-EN ISO 10993-5, PN-EN ISO 10993-12; filter diffusion PN-EN ISO 10993-5, PN-EN ISO 10993-12).

13. ANTIMICROBIAL AND ANTIVIRAL TESTING

We test the virucidal capacity of chemical compounds and medical devices using the following methods:

1. QPCR test
2. TCID 50 test
3. ELISA test
4. haemagglutination / haemagglutination inhibition test
5. NAI test

All of the above tests are performed in accordance with PN-EN ISO 14885, PN-EN ISO 14476 + A2: 2019-08.

14. MICROBIOLOGICAL TESTS IDENTIFYING THE PATHOGENS (FOOD, COSMETICS)

The laboratory conducts microbiological analysis for pathogen identification, using classical methods (breeding on selective media). The offer also includes analysis of microbiological purity, in accordance with Polish and European standards.

15. *IN VITRO* CULTIVATION OF PLANTS

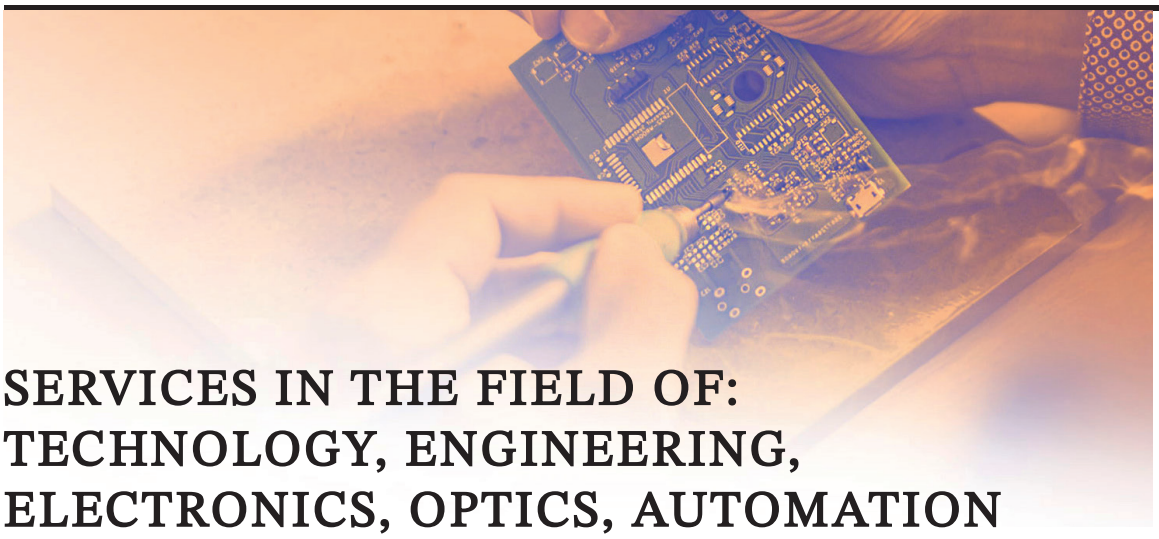
The laboratory offers *in vitro* cultivation of plants and the introduction of plant material for *in vitro* cultivation (both from explants and seeds). The cultivation takes place on solid substrates or in periodically flooded reactors. We offer the selection of breeding substrates, various options of lighting conditions, elicitation and rescaling of breeding.

16. CULTURES / MICROBIOLOGICAL CULTURES

Our biotechnology laboratory also specializes in the cultivation of prokaryotic microorganisms belonging to the second category of microbiological hazard. We have the necessary equipment and experience in cultivating many pathogenic bacteria, including: *Streptococcus pyogenes, Streptococcus agalactiae, Staphylococcus aureus, Haemophilus influenzae, Bordetella pertussis, Acinetobacter baumanni, Klebsiella pneumoniae, Pseudomonas aeruginosa.*

17. FREEZE-DRYING

Our offer includes freeze-drying in aqueous solutions of individual substances, e.g. enzymes and whole mixtures with a high number of components. The offer includes freeze-drying and sealing the product in an inert gas atmosphere (nitrogen or argon) and, if necessary, in vacuum packaging of the product.



SERVICES IN THE FIELD OF: TECHNOLOGY, ENGINEERING, ELECTRONICS, OPTICS, AUTOMATION

1. ELECTRONICS DESIGN (SCHEMATICS AND PRINTED CIRCUITS)

We specialize in designing electronic devices, including digital circuits, analogue circuits, power supply, data acquisition. We design device schematic diagrams from scratch. What follows is the implementation and economic analysis of a given project. We also design printed circuit boards (PCB), along with a complete set of production documentation, alternative elements necessary for production and price analysis.

2. OPTICAL / OPTOELECTRONIC SYSTEMS DESIGN

We are highly experienced in designing optical systems destined for detecting optical parameters such as absorption, reflectance, spectral characteristics, and colourimetry. Service scope also includes the adjustment of optical paths to the sensors as well as the design of the electronic part of the measurement paths. We also select appropriate light sources: LEDs, lasers, filament elements, along with the design of control systems.

3. DEVICE PROTOTYPING

We implement comprehensive prototypes of devices using experienced construction staff, thanks to which we are able to create a device from scratch. During prototyping, we verify construction models, checking their durability and operating parameters. The models are also tested under changing environmental conditions in the climatic chamber so that the customer can be sure of the high quality of the received prototype.

4. MICROCONTROLLERS AND MICROSYSTEMS PROGRAMMING

We have a team of expert programmers who specialize in programming microcontrollers from the following groups: STM32, PIC32, ESP32. Our programmers perform detailed coding analysis and its optimization beyond the scope available for free solutions. In addition, we integrate microsystems of the Raspbery PI Compute Module type in order to create efficient and compact solutions for measuring systems, in compliance with the applicable standards.

5. HIGH-LEVEL APPLICATIONS PROGRAMMING

A team of skilled programmers creates applications for end-users that work on platforms such as Windows, Android, IOS. Technologies used include Delphi, C++, C#, dot-NET, JAVA. The most popular cross-platform solution that we use is the Xamarin platform. We integrate measuring devices with computer interfaces using USB, Bluetooth and WiFi interfaces.

6. ANNEALING IN A 1700°C FURNACE

Annealing is a process of heat treatment of metals consisting of heating the material to an appropriate temperature, maintaining this temperature and subsequent slow cooling. Its usual goal is to bring the material condition closer to equilibrium.

Our high-temperature furnaces allow for excellent material handling and, combined with easy service, make them ideal for research and laboratory purposes. They are also perfect for sintering technical ceramics, e.g. zirconium oxide dental bridges.

The full window of activity includes:

- technological tests and research
- production of zircon and other ceramics (both decorative and industrial)
- prosthetics
- strength tests
- determination of the dry matter and water content, determination of ash content (e.g. in flour, tea), determination of moisture content in solids
- determination of total sulfur in a sample using the Eschka method
- determination of sulfur from sulphates (VI) in fuel
- determination of pyrite sulfur in fuels

7. ANTIBACTERIAL SURFACES PRODUCTION

The laboratory provides expert opinions and assistance in the preparation of surfaces with antibacterial properties using both organic and inorganic substances. The parameters of the solution corresponding to the end use of the surface are selected during the research.

8. CNC MILLING

We have a laboratory where we deal with CNC machining. The materials in which we perform milling are aluminium, copper, steel, wood, POM-C, ABS. The availability of 4 axes allows working with an accuracy of 50um in each axis. Available cutters 1 mm - 12 mm allow for precise selection for a given application and optimal use.

9. LASER MILLING - SOFT MATERIALS

The available laser milling machines allow for precise cutting of any shape in soft materials. Our milling machines support a working area up to 1x1m. Furthermore, the available lasers have powers of up to 40 W. Consequently, we can create masks for the production of integrated circuits and for cutting thin wooden panels.

10. GAS SHIELDED WELDING

Welding with a non-consumable electrode in an inert gas (nitrogen) shield of steel and aluminium (TIG). TIG welding allows connecting metal elements of small thickness. The obtained joint is characterized by high cleanliness and aesthetics and is very durable.

11. 3D PRINTS

We offer prototype 3D prints in FDM and SLA technologies.

In the case of FDM (Fused Deposition Modeling) technology, we use proven materials with different physical properties. In addition, we can print the filament in many different colours. In the case of SLA technology printing, we rely on both colourless and coloured resins. Consequently, we can perform accurate modelling, not only of mechanical but also optical elements.

3D printing services performed in our studio:

1. 3D prints in FDM technology
2. precise 3D prints from photosensitive resins in SLA technology
3. 3D prints of models with the use of multiple colours
4. printing models that imitate metal or wood
5. prints of models from flexible and transparent materials
6. prints of models with metal powders for sintering in the oven

CONSULTING SERVICES IN R&D PROJECTS

1. CONSULTING ON R&D PROJECTS

IBMM offers its advice on the implementation, financing, research and development of various projects, including technological, business, strategic and financial ones. Consulting allows to identify potential risks, precisely define the audience and propose administrative processes that will facilitate the implementation of activities. The elements of the advisory process may be independent of each other, depending on the needs and advancement of the R&D project.

2. PREPARATION OF REPORTS AND MARKET ANALYSIS

We conduct research on current market trends, market valuation and projection analysis of the market growth. Based on data analysis, we create complementary technology and market reports.

3. COMPREHENSIVE PROJECT MANAGEMENT

We comprehensively support and supervise the R&D projects using the SCRUM methodology and cloud-based administration tools.

4. RESEARCHING THE STATE OF THE ART

Includes research of the current patent databases, i.e. UPRP, Espacenet, Google Patents, WPIO Patentscope, Sciencemag, Science Direct, Elsevier, Google Scholar in order to analyze existing solutions and examine the patent purity of innovation to be implemented.

5. PREPARATION OF APPLICATIONS FOR CO-FINANCING (NCBR, PARP, HORYZONT)

By analyzing the project, we prepare financial proposals that are in line with the requirements of institutions such as the National Center for Research and Development, PARP and the European Commission under Horizon 2021-2027. We also take care of all the necessary documents and assist during their submission.

6. ADVISING ON THE EVALUATION OF R&D PROJECTS CO-FINANCED BY GOVERNMENT AND EU FUNDS

We supervise the preparation of evaluation reports concerning the implementation of milestones and completed stages of research and development.

WE LOOK FORWARD TO COOPERATING WITH YOU!

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