

GENERAL INFORMATION

Information submitted for Publicity: April, 27, 2020

1. NAME OF THE CENTER AND LOCATION	
<i>Name and Location</i>	CENTRE OF TECHNOLOGIES PLOVDIV UNIVERSITY “PAISII HILENDARSKI” 24, Tsar Assen, Street, Plovdiv, 4000, Bulgaria
2. TYPE OF THE RESEARCH INFRASTRUCTURE AND/OR SCIENTIFIC EXPERTISE	
<i>Identify the Type of the Research Infrastructure (RI), Equipment/ Facilities/ Specific Research, and in particular linked to COVID-19.</i>	<p>RESEARCH INFRASTRUCTURE/FACILITIES: The available Research Infrastructure (RI) is as it follows:</p> <ul style="list-style-type: none"> ➤ Laboratory: MOLECULAR BIOMARKERS OF THE MICROBIOTA OF THE GASTROINTESTINAL TRACT ➤ Laboratory: IMMUNOBIOMARKERS FOR TUMOR AND AUTOIMMUNE DISEASES ➤ Laboratory: BIOCATALYSIS AND NATURAL BIOACTIVE SUBSTANCES ➤ Laboratory: BIOPOLYMERS AND NEW MATERIALS ➤ Laboratory: BIOSENSORS <p>RESEARCH EQUIPMENT & SPECIFIC RESEARCH:</p> <ul style="list-style-type: none"> ➤ Automated system for in vitro studying of the functional parameters of intestinal microbiome. ➤ Automated sterile colony picking system for screening of mutant colonies. ➤ Automated system for incubation and phenotypic identification and study of metabolic flux of microorganisms bacteria, yeasts and molds. ➤ Bioreactors for submerged cultivation of enzyme producing microbial strains. ➤ Real-Time PCR equipped with at least six filters, computer system and software and all of the necessary reagents and consummative for multiplex PCR. ➤ High Performance Liquid Chromatography (HPLC) System equipped with colonies for analyzes of different bioactive substances, oligosaccharides and other metabolites. ➤ Encapsulator for sterile production of various micro- beads with enzymes, microbial cells and bioactive substances.

	<ul style="list-style-type: none"> ➤ Laboratory Spray Dryer for pulverization drying of enzymes and other bioactive substances. ➤ Microplate Reader for various bioactivities testing procedures, ➤ Laboratory System for Membrane Filtration for purification and concentration of enzymes, proteins and polysaccharides produced by microbial fermentation. ➤ Pilot system FPLC for purification of enzymes and bioactive compounds. <p>KEY WORDS: personalized medicine, anti-viral activity, rapid screening kits, microbiota; biofilms, biosensors</p>
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3. TYPE OF THE RESEARCH

<p><i>Provide Information on the Research carried on or Planned in regard with COVID-19 and Other Viruses</i></p>	<p><u>R& D SECTION-I. to study Anti-Viral Activity of Biological Active Substances</u> <u>(PER-MED & AVA-BAS SECTION)</u></p> <p>Development of an in vitro model system for detecting antiviral effect on various BAS, natural and after enzyme and chemically modification. The main aim is to detect the protective role of some specific strains from commensal bacteria in its interactions with viruses. It is known that on the respiratory surface, airway bacteria protect against viral infections. A very important part of our studies is the immune response to respiratory viral infection. We will use a modern in vitro system to improve the simulation in vitro ex vivo more accurately the conditions of microbiome in vivo virome interactions.</p> <p>PER-MED & AVA-BAS GOALS:</p> <ul style="list-style-type: none"> ○ Development of genetically based rapid screening kits for the presence of certain viruses :The laboratories have the ability to develop rapid detection assays for certain viruses based on their genetic material (especially RNA nucleotide sequences). The mechanism of the test will be based on the complementary rule for the binding of individual nucleotides. ○ Development of an in vitro model system for detecting antiviral effect on various BAS, including biofilms: Laboratories have the ability to perform standard antiviral activity assays for different BAS using virus cultivation on different cell lines and reading the lysed sections of the cell monolayer after treating the viruses with antiviral agents. Reduced lysis is an indicator of high antiviral activity. ○ Development of membrane coatings with immobilization Bio Active Compound in them and their testing for retention of viral particles: The aim is the development and testing of membrane coatings and biofilms based on natural and synthesized polysaccharides and biopolymers to immobilize Bio Active
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	<p>Compound with proven antiviral and antimicrobial activity. The laboratories have the necessary equipment and scientific capacity to carry out the planned study prior to the production of a prototype to be tested in vitro for both diagnostic purposes and the manufacture of specialized protective products.</p> <p><u>R&D SECTION II. Bio-Informatic Modeling of the Mechanisms of Anti-Viral Activity of Biologically Active Substances (BITMM & AVA-BAS SECTION)</u></p> <p>1) Part of the scientific tasks in the PERIMED laboratories are based on preliminary bioinformatic analysis and subsequent control of the results obtained, which is related to the introduction of the “Directed Evolution” method for the production of overproducts of enzymes and BAS.</p>
<p>4. WEBSITE</p>	
<p>Provide the Internet Address:</p>	<p>http://pu-technocentre.eu</p>
<p>5. BACKGROUND, PUBLICATIONS & OPEN DATA REPOSITORY</p>	
<p>Leading Research Team AND Scientific Publications of the Research Group on the Topics related to Corona Viruses Research Results; Links to Open Data Repository;</p>	<p>LEADING RESEARCH TEAM: Prof. Dr. Ilia Iliev – iliev@pu-technocentre.eu Prof. Dr., Balik Dzhambazov – balik@uni-plovdiv.bg Prof. Dr. T. Yovtcheva - temiov@uni-plovdiv.bg Prof. Dr. Velizar Gochev – vgochev@uni-plovdiv.bg Assoc. Prof. dr. N. Dimcheva – ninadd@uni-plovdiv.bg and Researchers at The Centre of Technologies Plovdiv University “Paisii Hilendarski” -as a part of: THE EU-FUNDED PROJECT: CENTER OF COMPETENCY - PERSONALIZED INNOVATIVE MEDICINE (PERIMED) http://pu-technocentre.eu</p> <p>SCIENTIFIC PUBLICATIONS AND LINK TO OPEN DATA REPOSITORIES</p> <p>1) Todorov SD, Cavicchioli VQ, Ananieva M, Bivolarski VP, Vasileva TA, Hinkov AV, Todorov DG, Shishkov S, Haertlé T, Iliev I., Nero LA, Ivanova IV, <i>Expression of coagulin A with low cytotoxic activity by <i>Pediococcus pentosaceus</i> ST65ACC isolated from raw milk cheese.</i> J Appl Microbiol. 2020;128(2):458–472. doi:10.1111/jam.14492</p> <p>2) Cavicchioli, V.Q., Todorov, S.D., Iliev, I. et al. <i>Physiological and molecular insights of bacteriocin production by <i>Enterococcus hirae</i> ST57ACC from Brazilian artisanal cheese.</i> Braz J Microbiol 50, 369–377 (2019). https://doi.org/10.1007/s42770-019-00068-4</p>

- 3) Bivolarski V., Vasileva T., Gabriel V., **Iliev I.** *Synthesis of glucooligosaccharides with prebiotic potential by glucansucrase URE13–300 acceptor reactions with maltose, raffinose and lactose.* Engineering in Life Sciences, **2018**, pp. 1-10, DOI: 10.1002/elsc.201800047.
- 4) **Iliev I.**, Vasileva T., Bivolarski V., Salim A., Morel S., Rabier P., Gabriel V. *Optimization the expression of levansucrase L17 in recombinant E. coli.* Biotechnology & Biotechnological Equipment, **2018**, 32(2): 477-486.
- 5) Batsalova T, Basheva D, Bardarov K, Bardarov V, **Dzhambazov B**, Teneva I. **2019.** *Assessment of the cytotoxicity, antioxidant activity and chemical composition of extracts from the cyanobacterium Fischerella major Gomont.* Chemosphere, 218: 93-103.
- 6) Batsalova T, Kolchakova D, **Dzhambazov B.** 2018. *In vitro cytotoxicity of cyanuric acid and selected derivatives.* Toxicol. Forensic Med. Open J., 3(1): 14-21. DOI: 10.17140/TFMOJ-3-125.
- 7) Batsalova T, Moten D, Mateev B, **Dzhambazov B.** 2018. *Biofunctionalized iron oxide (II, III) nanoparticles as diagnostic tools for autoimmune diseases.* 18th International multidisciplinary scientific geoconference SGEM 2018. Conference proceedings, vol. 18, issue 6.1, pp. 83-89.doi: 10.5593/sgem2018/6.1/S24.012
- 8) Marudova, M., Bodurov, I., Sotirov, S., Uzunova, Y., Pilicheva, B., Avramova, I., **Yovcheva, T.** (2016). *Nanostructured polyelectrolyte multilayer drug delivery systems for buccal administration.* Bulgarian Chemical Communications, 48, 468-474.
- 9) **Yovcheva, T.**, Viraneva, A., Marinova, A., Sotirov, S., Exner, G., Bodurov, I., Vlaeva, I. (2018). *Insulating chitosan/casein multilayers on corona charged polylactic acid substrates.* IEEE Transactions on Dielectrics and Electrical Insulation, 25(3), 766-771.
- 10) Maria Marudova, Ginka Exner, Bissera Pilicheva, Antoaneta Marinova, Asya Viraneva, Ivan Bodurov, Sotir Sotirov, Ivanka Vlaeva, Yordanka Uzunova & **Temenuzhka Yovcheva**, *Effect of assembly pH and ionic strength of chitosan/casein multilayers on benzydamine hydrochloride release*, International Journal of Polymeric Materials and Polymeric Biomaterials, (ID: 1525727 DOI:10.1080/00914037.2018.1525727)
- 11) Exner, G., Marudova, M., Sotirov, S., Marinova, A., Viraneva, A., Pilicheva, B., **Yovcheva, T.** (2019). *Multilayered polyelectrolyte structures with potential for intracavity drug delivery systems.* Applied Surface Science, 493, 620-627..
- 12) **N. Dimcheva**, *Nanostructures of noble metals as functional materials in (protein -based) biosensors.* Current Opinion in Electrochemistry, 19 (SI Bioelectrochemistry) (pp. 35–41) 2020. DOI: 10.1016/j.coelec.2019.09.008

	<p>13) N.Dimcheva, E.Horozova, T.Dodevska, Bioelectrocatalytic method for quantitative analysis of L-ascorbic acid. Reg. Bulg. Patent No 66837 B1 28.02.2019 (Application #111733, 2014)</p> <p>14) Tharamani Chikka-Nagaiah, Dominik Schäfer, Wolfgang Schuhmann and Nina Dimcheva, Electrochemically deposited Pd-Pt and Pd-Au co-deposits on graphite electrodes for electrocatalytic H₂O₂ reduction. Analytical Chemistry 85 (2013) 7897–7903 DOI:10.1021/ac401317y.</p> <p>15) Nina Dimcheva and Elena Horozova: <i>Direct electrochemistry of Penicilliumchrysogenum catalase adsorbed on spectroscopic graphite</i>. Bioelectrochemistry 90 (2013) 1-7; DOI:10.1016/j.bioelechem.2012.09.003</p>
6. COORDINATOR	
<p><i>Full Name of the Coordinator Organization.</i></p> <p><i>Contact Person</i></p>	<p>COORDINATOR ORGANIZATION</p> <p>Center of Technologies, Plovdiv University “Paisii Hilendarski”, 24 Tsar Assen Street, 4000, Plovdiv, Bulgaria http://pu-technocentre.eu</p> <p>CONTACT PERSON:</p> <p>Professor Ilia Nikolov Iliev, PhD Director Center of Technologies Plovdiv University “Paisii Hilendarski”, iliev@pu-technocentre.eu</p>
7. POSSIBLE PARTNERS	
<p><i>Indicate the Partner Organizations</i></p>	<p>Partners in the EU-Funded Project: Personalized Innovative Medicine (PERIMED) – Center of Competency</p> <ol style="list-style-type: none"> 1. Medical University – Plovdiv; Project Leader in PERIMED; 2. Institute of Mineralogy and Crystallography, Bulgarian Academy of Sciences, Sofia; Project Partner in PERIMED;
8. IMPLEMENTED AND RUNNING PROJECTS	
<p><i>Projects related to Virology, Vaccines, Infection Diseases</i></p>	<p>We have NO publications on testing against Corona Viruses.</p>