University of Gdańsk

TECHNOLOGY OFFER


1970
2020
50 TECHNOLOGIES FOR 50 YEARS
OF THE UNIVERSITY OF GDAŃSK

The 50th anniversary of the University of Gdańsk is a unique opportunity to present its activity over the years in many different areas. One of the most important is scientific research, which initiated technological and social changes, which translated into practical cooperation with the broadly understood economy and contributed to technological and social development. This publication includes 50 of the best technologies for the 50th anniversary of our university. These are the results of the research work of the research teams from the University of Gdańsk, which constitute an important contribution to the development of technologies in various fields of application. I am proud to present them to you.

Today, the University of Gdańsk is one of the largest and most modern scientific and research centres in Poland, and our scholars conduct research at the highest level and cooperate with scientists from all over the world. Strengthened leadership in research and education is, among other things, the result of the core values that guide our University and the entire academic community. Above all, it is a rational pursuit of truth through innovative scientific research, following the best models of world science, modern education for developing civil and social development, mutual respect and trust, tolerance for diversity of opinions as well as the solidarity of the entire academic community.

Prof. Jerzy Piotr Gwizdała

Rector of the University of Gdańsk

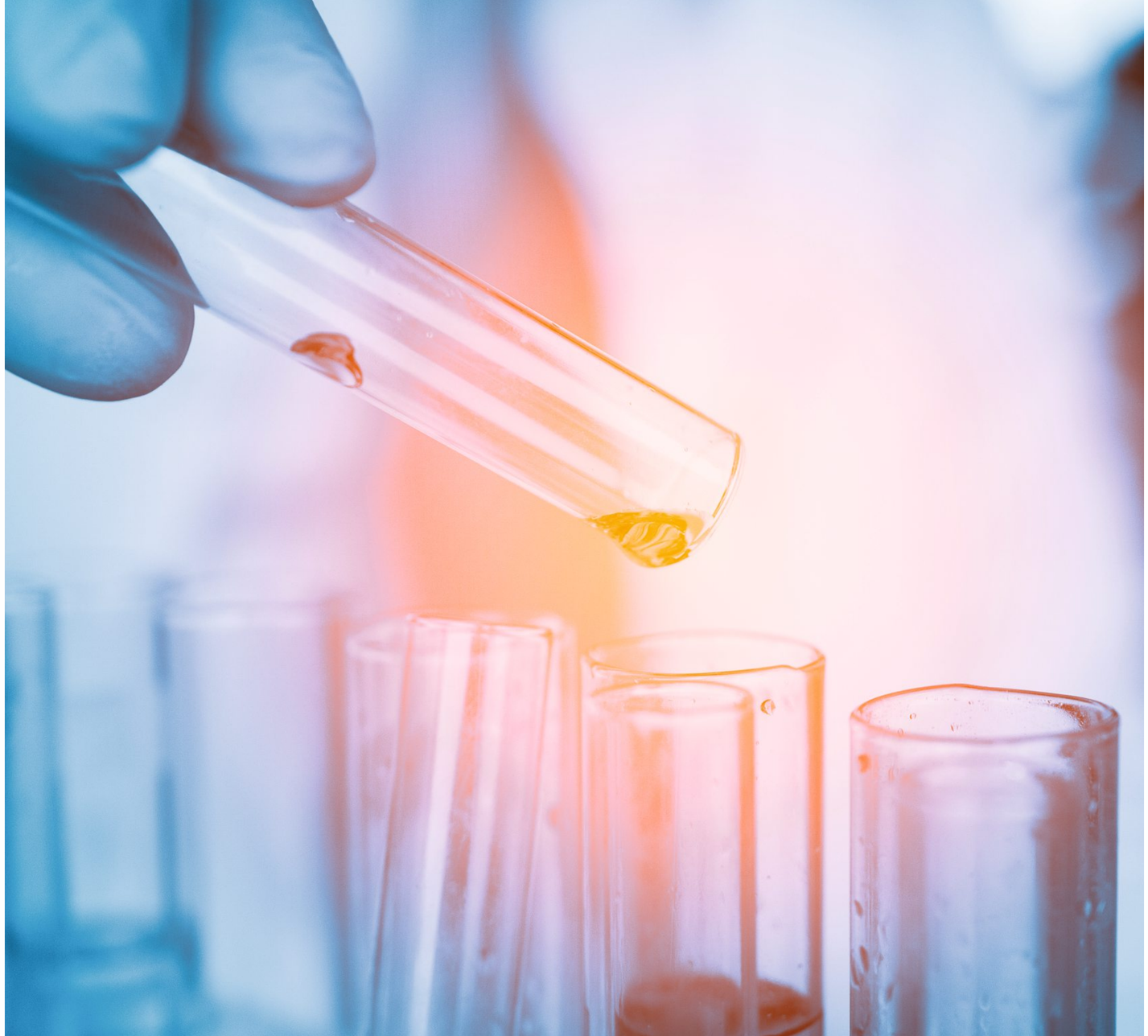
LOOPED UVEX PROBES FOR THE DETECTION OF TICK-BORNE PATHOGENS

The invention relates to a Looped UVEx type probe and its application, together with an appropriately designed pair of primers, in optimized Polymerase Chain Reaction (PCR) with Hot Start Taq DNA Polymerase. The described unique technology is used in the diagnosis of Lyme disease. It involves comprehensive detection and identification in the patient of various microorganisms transmitted by ticks.

The presented method allows for not only the identification of Lyme disease infections but also distinction from other tick-borne diseases. Use of the Looped UVEx probe in the PCR reaction enables rapid detection of reaction product by visual determination of change in reaction mixture colour. The detection of the product takes place directly in a test tube after several minutes of exposure to UV light and as a result reduces the risk of sample contamination and the waiting time for the result is less.

This technology allows for quick and inexpensive identification of various pathogens transmitted by ticks having the ability to co-infect. The developed invention can be used in a new diagnostic method for tick-caused diseases.

Patent application numbers:
P.419159
EP 17001719.8



DIAGNOSTIC MARKER FOR BLADDER CANCER DETECTION

Bladder cancer is one of the most common human tumours and its early detection is still a major problem for diagnosis. Available invasive methods like cystoscopy do not detect early stage of the tumour.

Proposed diagnostic innovative method requires only a small sample of the patient's urine to be tested. It is based on the study of protein activity, not its concentration. First of all, the test is non-invasive and significantly cheaper than other methods of bladder cancer diagnosis which are available on the market. Secondly, it is effective even in the initial phase of the disease.

The effectiveness of proposed method for bladder epithelial carcinoma detection was confirmed during tests carried out on a group of 661 patients, including almost 200 patients with diagnosed bladder epithelial cancer. Statistical study shows that the sensitivity of the diagnostic test, i.e. the probability of a positive test result vs. the histopathology report Bladder cancer is one of the most common human tumours and its early detection is still a major problem for diagnosis. Available invasive methods like cystoscopy do not detect the early stage of the tumour.

Patent application numbers:
P.422233, P.426332
EP18183815.2
PCT/PL2019/050004

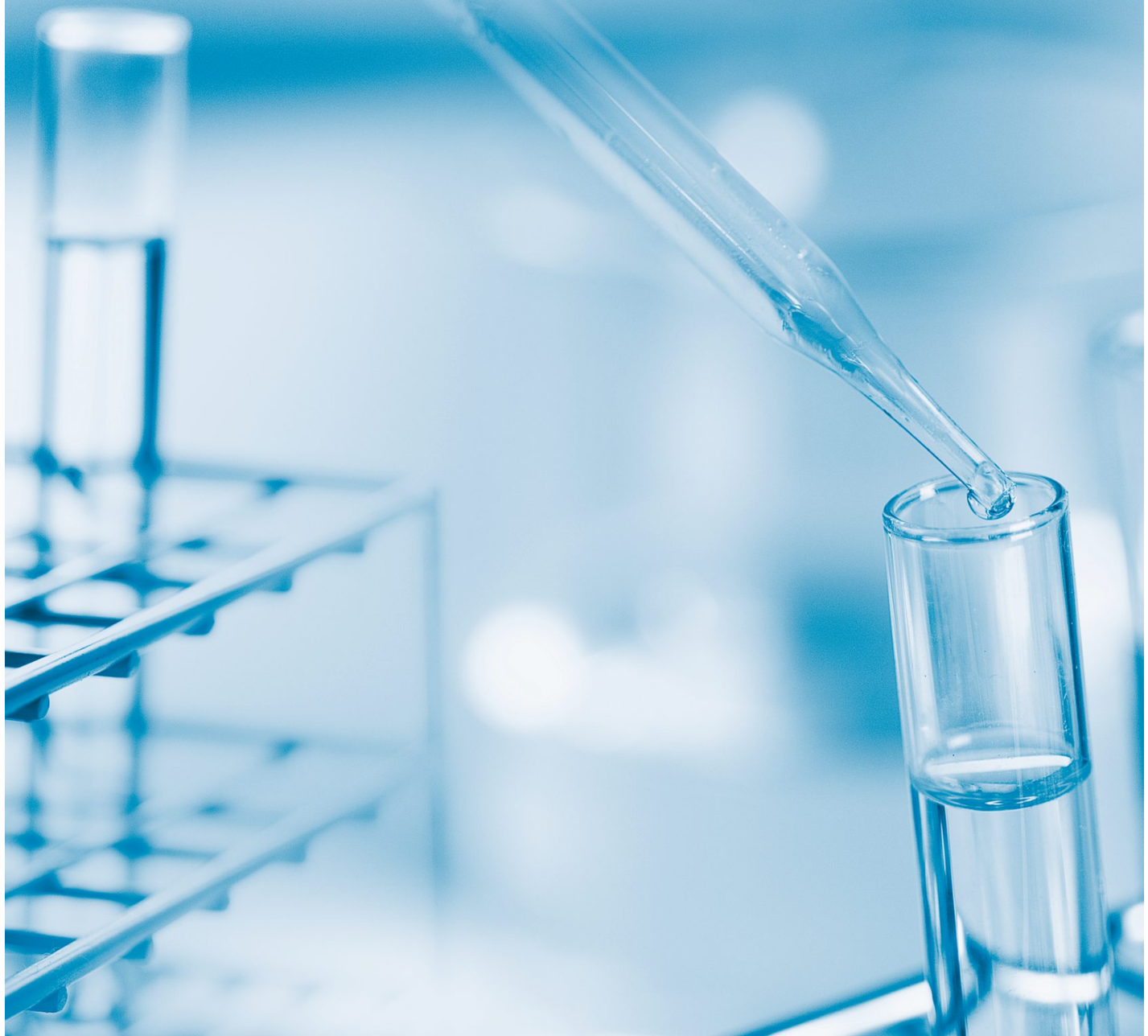
ASSAY FOR DETECTION OF PSORIASIS PATIENT RESPONSE TO GENISTEIN TREATMENT

The proposed innovative assay provides a method of identifying molecular response to genistein treatment of patients who suffer from psoriasis. The invention relates to the use of quantitative polymerase chain reaction with imaging in real-time (real-time qRT-PCR).

The method allows learning the level of expression of genes involved in the pathomechanism of psoriasis, being potential genetic markers to explore new molecular response in psoriasis patients to treatment with genistein. Alterations in the mRNA level of selected genes were performed to determine the transcriptional profile of human keratinocytes treated with genistein, and in particular to explore the expression of 30 genes involved in the pathomechanism of psoriasis. Modulation of the expression level of these genes causes inflammatory processes in the epidermis or increases keratinocytes proliferation of human affected by psoriasis.

The assay allows for a quick and reliable assessment of a patient suffering from psoriasis treated with genistein and leads to obtaining relevant information about the mechanisms of gene expression regulation in cells. This technology may be the basis for the development of a potential screening test, enabling and facilitating proper monitoring of patient treatment.

Patent application numbers:
P.410454
PCT PL2015 000198
EP 15828396.0



GENISTEIN APPLICATION IN THE TREATMENT OF ALZHEIMER'S DISEASE

The invention relates to genistein, a bioactive isoflavone and its medical application in the treatment of Alzheimer's disease. Due to the process of autophagy, induced by usage of genistein, the brain cells are stimulated to degrade toxic forms of proteins (beta-amyloid and hyperphosphorylated tau protein) accumulated in the brain. Thus, the application of genistein leads to the reduction of the main cause of the disease.

The effectiveness of the therapy is affected by the fact that genistein exceeds the blood-brain barrier. A key element of the developed technology is a high dosage of genistein used for the treatment of Alzheimer's. The dosage was carefully selected so that the autophagy process was strong enough to remove toxic forms of proteins, and at the same time, it was mild enough to prevent healthy forms of proteins from being destroyed by the organism.

Patent application numbers:
P.425832
EP 19177784.6

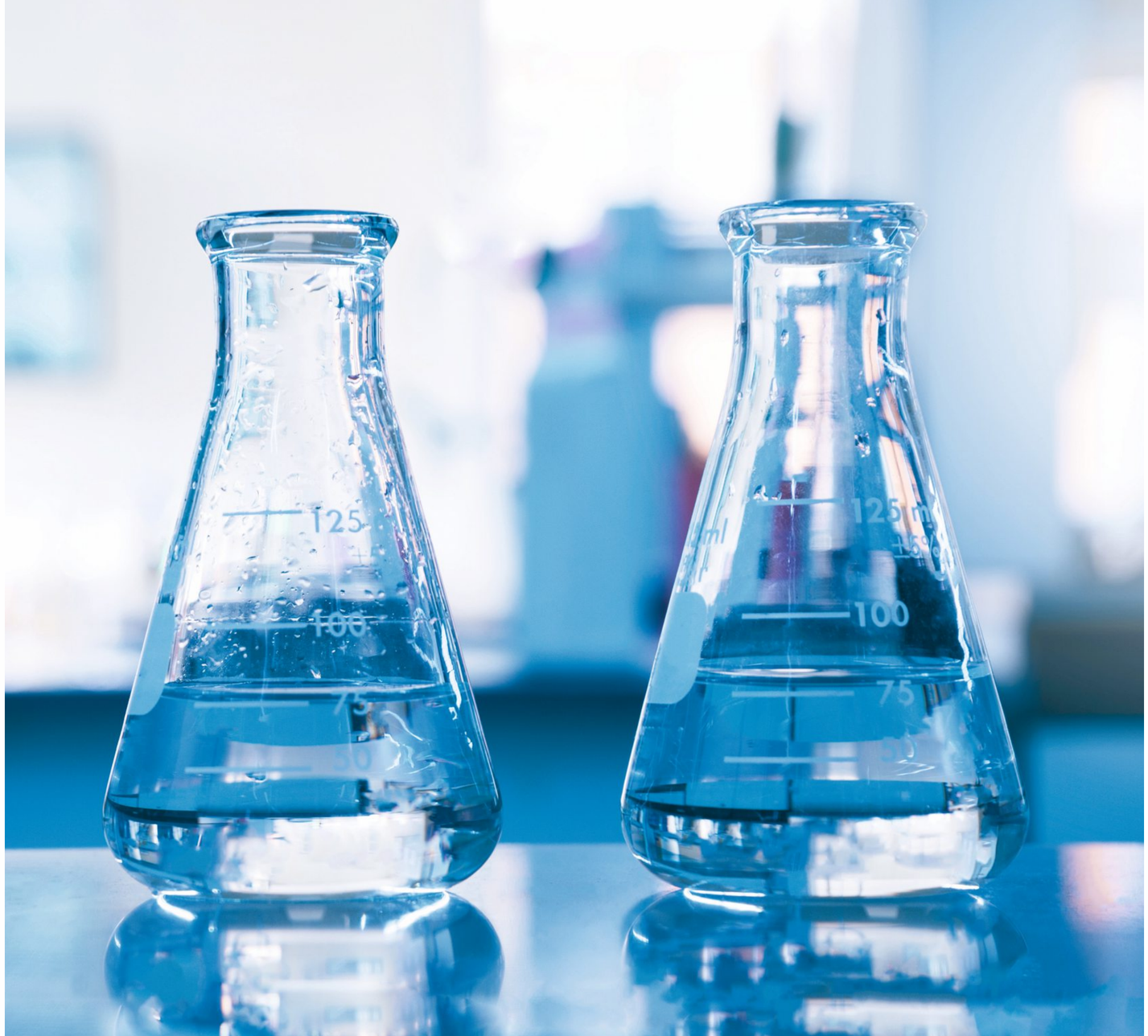
MEDICAL APPLICATIONS OF ETHYLBENZENE 2-ISOTHIOCYANATE IN HUNTINGTON'S DISEASE

Huntington's disease is an incurable, hereditary and progressive neurodegenerative disease characterized by a combination of disorders of motor functions, cognitive abilities and behaviour, leading to disability and premature death. At the molecular level, the disease results from a mutation in the IT15 (HTT) gene encoding the huntingtin protein (HTT).

Available pharmacological therapies and physiotherapies primarily serve to alleviate the symptoms of the disease such as movement disorders, personality changes, deterioration of intellectual abilities or changes in behaviour and mood (including depression, apathy, anxiety, irritability and others).

The presented technology is based on the application of Ethylbenzene 2-isothiocyanate as an active ingredient of novel formulation.
The compound causes a reduction in the size and number of protein aggregates and a decrease in the total number of mutated huntingtin forms. This, in turn, may result in significant slowing down or even complete inhibition of Huntington's disease progression. Moreover, research results show that phenylethyl isothiocyanate doesn't cause substantial changes in the viability of normal cells, thus it may be potential drug in Huntington's disease.

Patent application number:
P.421685



GENISTEIN APPLICATION IN THE TREATMENT OF HUNTINGTON'S DISEASE

The proposed technology relates to the medical use of genistein in the therapy of Huntington's disease and the manufacturing of a pharmaceutical composition which can actively stop the progression of neurodegenerative disease.
Genistein is a compound from the isoflavone group and it occurs naturally in plants.

The invention proves that genistein induces the process of autophagy – one of the main mechanisms in the degradation of misfolded proteins in cells. Due to this fact, genistein has the effect of reducing not only the size and amount of aggregates of mutant huntingtin but also the total amount of mutant protein, which is the main cause of neurodegeneration observed in Huntington's disease. Thus, genistein's action leads to the increased viability of cells.
The application of genistein may, in turn, result in a significant slowdown or even complete inhibition of Huntington's disease progression.

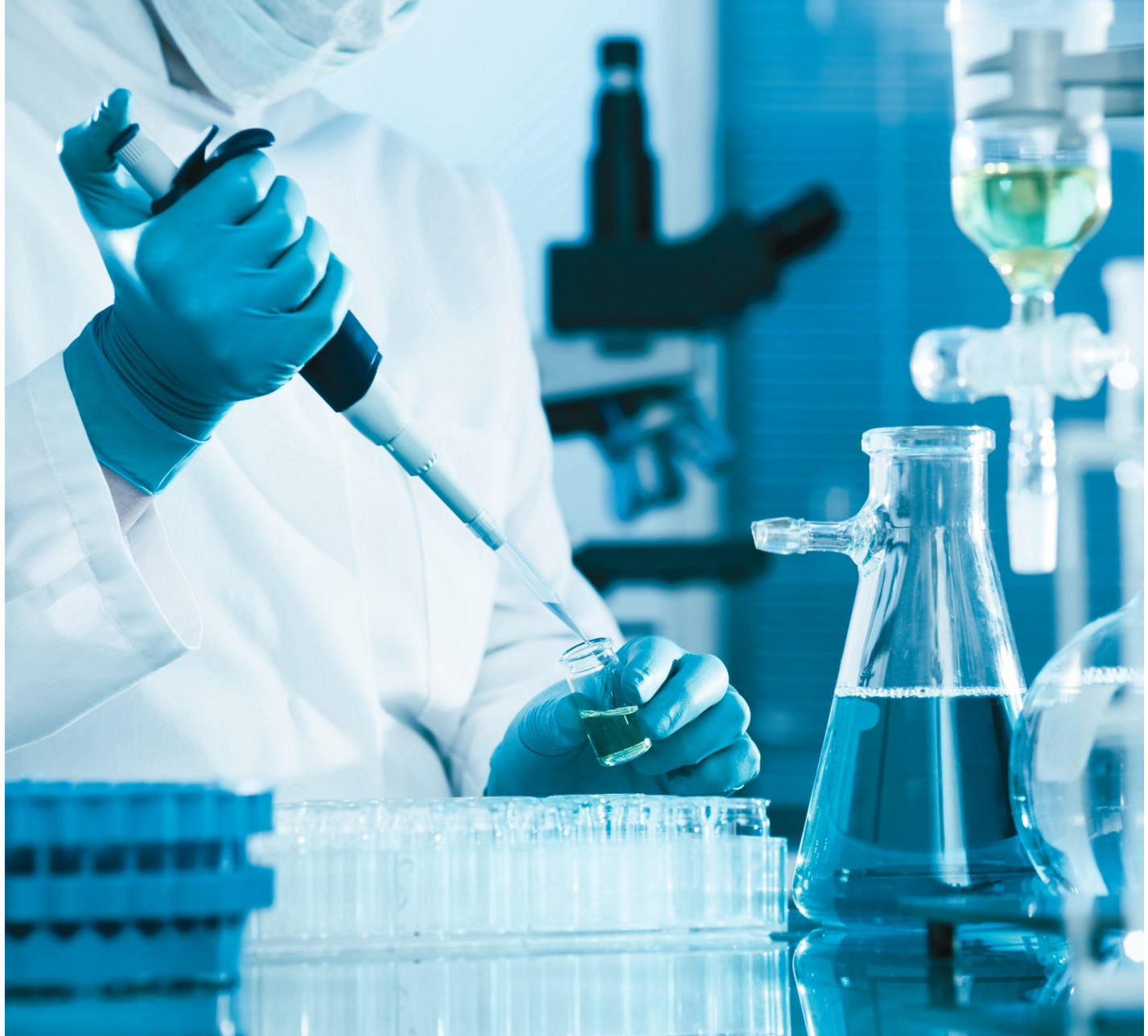
Patent application numbers:
P.417983
EP 17001178.7

ARTIFICIAL POLYSSIGNAL PROTEINS USED AS WOUND HEALING STIMULATORS

Signal molecules produced by the human body play a key role in tissue and organ regeneration. Such a signal stimulates regeneration processes at the molecular, cellular and tissue level. Some of these signals are specific proteins, such as PGDF, AGF, fragments of thymosin, cystatin C, collagen, elastin, but they can also be peptide hormones or synthetically unmodified peptides.

The creation of concatametric polymers from bioactive peptides – creating artificial ones (not existing in nature) – offers a number of advantages in terms of stimulation of regeneration, stability as well as the delivery and technological uniqueness of the new generation of drugs. The advantages are: the slowdown of in vivo signal degradation, lowering of the diffusion rate – lowering of the application to the wound, the molecular dispenser effect – gradually releasing bioactive peptides. The technology allows for the construction of concatameric proteins containing up to 500 copies of bioactive peptides. The presented polyssignal proteins can be used in various types of regeneration of cells, tissues and organs.

Patent application number:
P.427146



NEW PHARMACEUTICALS IN SKIN REGENERATION MEDICINE

Fibroblasts are capable of quickly filling large skin losses comparing to keratinocytes responsible for the epidermal creation process. The proposed innovative group of pharmaceutical technologies can find many applications in various segments of regenerative medicine: orthopaedics and musculoskeletal diseases, dermatology, cardiology, diabetology, neurology, radiology and oncology.

The offered group of technologies is based on, first of all, a new application of the epigenetic regenerative therapy in mammalian body, consisting of administering a pharmaceutical composition comprising zebularine, its pharmaceutically acceptable salt, at least one pharmaceutically acceptable carrier, a diluent and retinoic acid, retinoic acid metabolites and their pharmaceutically acceptable salts. Secondly, application of a novel composition comprising the IM peptide (i.e. hydrophilic hexapeptide of the RDKVYR sequence, being a fragment 32-37 of thymobitin hormone produced by thymus) in order to stimulate the regeneration of complex tissue or healing wounds.

The presented technology is based on the method of producing and applying to the mammalian skin regeneration new RADA peptide structures comprised only of self-assembled peptide hydrogels.

Patent application numbers:
P.425351, P.425597, P.423672
PCT/PL2018/000027
EP18000264

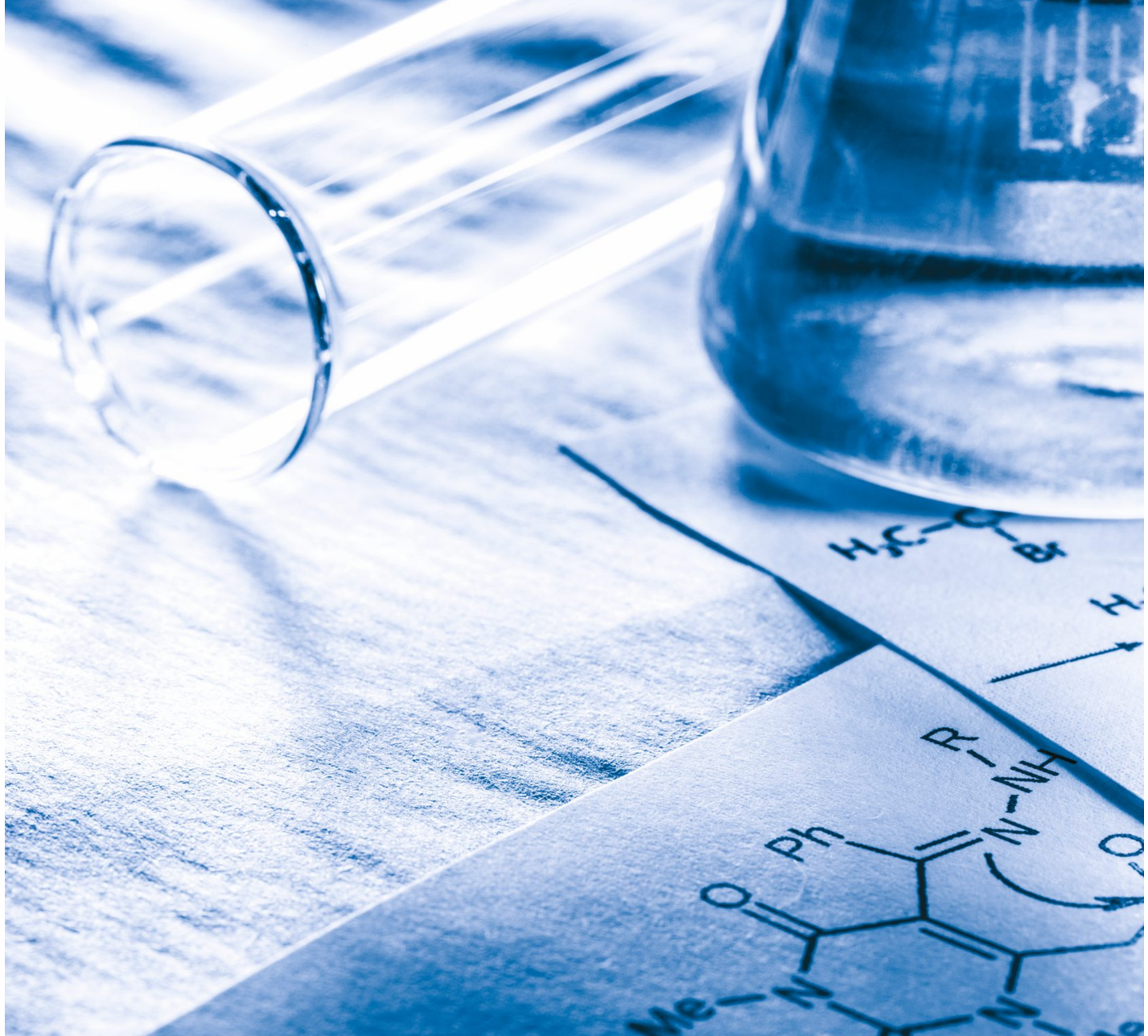
POLYRGD PEPTIDES APPLICATIONS IN THE TREATMENT OF THE CENTRAL NERVOUS SYSTEM

The proposed technology is based on peptides and concatameric proteins comprising in their structure an RGD module with a peptide sequence consisting of amino acids arginine, glycine and aspartic acid, including also a method of efficient and multifactorial determination and analysis of anti-lesion and/or neuroprotective activity of compounds with potential pharmacological activity.

The invention has properties that reduce the effects of damage in cells isolated from the brain after the use of polyRGD peptides and proteins. Researchers also proved the reduction of the effects of brain damage in the hippocampus of animals and it has a positive effect on the in vivo regeneration of peripheral nerves, where they stimulated the regrowth of nerve fibres.

Peptide containing a single RGD module, peptides being its multimers and those containing modifications in the form of the N-acetyl group as well as concatameric proteins containing polyRGD sequences may be a base for innovative preparations that eliminate the effects of spinal cord injuries and the effects of sudden damage to the nervous system.

Patent application numbers:
P.425131
EP18000319.6



PGDF PEPTIDE AND ITS DERIVATIVES IN REGENERATIVE SKIN MEDICINE

The proposed new amino acid sequences of synthetic peptides (being fragments of growth factors that positively affect wound healing using the appropriate receptor) regulate cell proliferation and differentiation – in particular, platelet-derived growth factor PDGF.

The technology includes a method of obtaining peptide derivatives of PDGF, pharmaceutical composition and use of new compounds as agents for the treatment of hard-healing wounds and skin lesions of various etiologies including wounds resulting from venous insufficiency, post-operative, after chemotherapy and radiotherapy treatments, tissue ischemia, atherosclerosis, diabetes, neurological and inflammatory diseases.

The new compounds significantly accelerate the proliferation of skin cells, intensify the process of epidermal formation and increase the thickness of created epidermis during the healing of the wound in skin and on its surface. The compounds in the wound regeneration process can be safely used directly on the skin. The invention may be the main component of a drug applied in the form of injections or tablets. The main advantage of the innovation is a wide range of applications of the substance in different forms, the small market for competitive products and the limited effectiveness of competing offers.

Patent application number:
P.425038

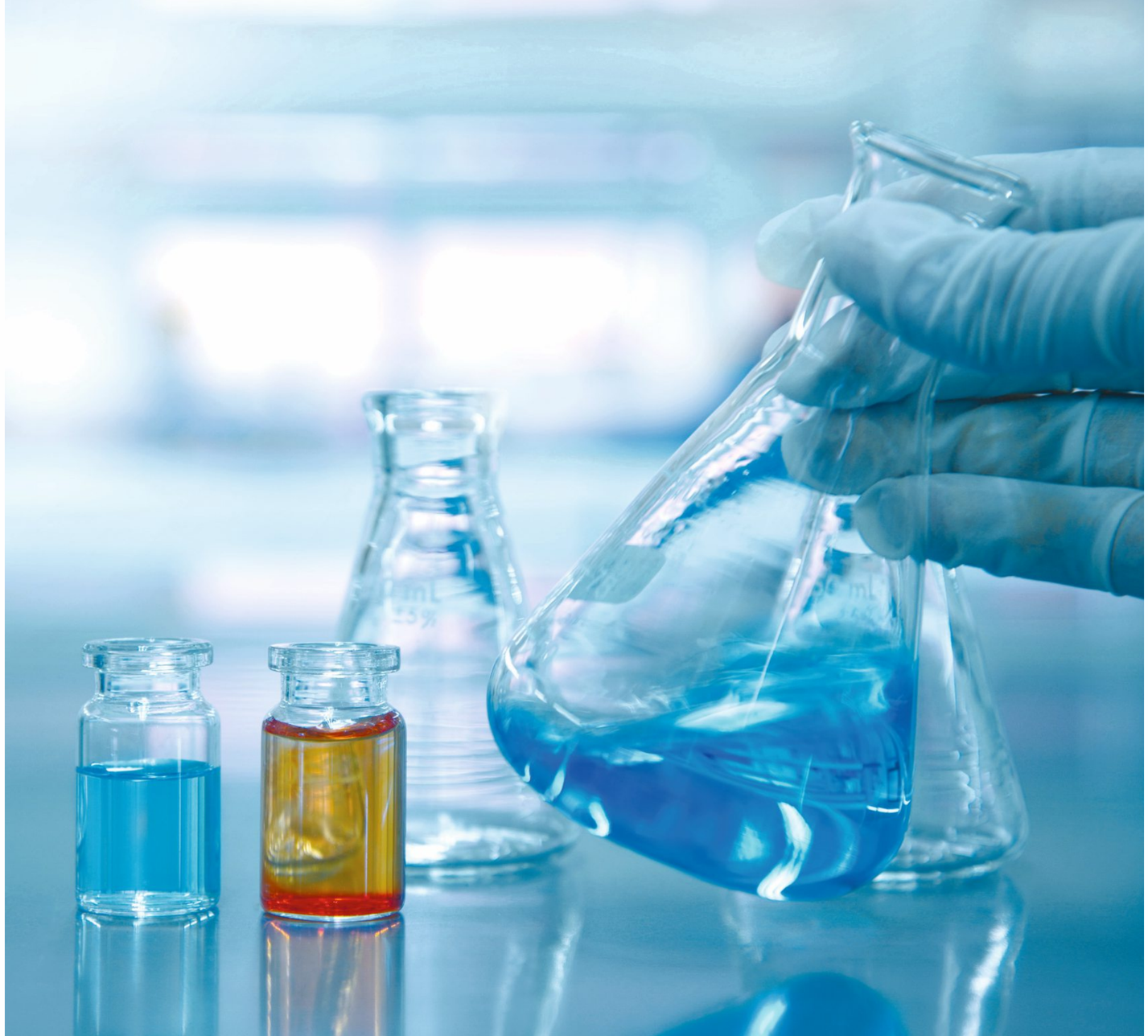
NEW VANCOMYCIN CONJUGATES IN ANTIMICROBIAL THERAPY

The proposed technology is a new conjugates of vancomycin (Van) and transportan 10 (TP10) and their antibacterial use. Vancomycin is an antibiotic often used in the treatment of infections caused by Staphylococcus aureus, Enterococcus spp. and Clostridium difficile. Particularly dangerous are infections located in brain tissue.

The effectiveness of vancomycin is insufficient due to the still increasing amount of multi-drug resistant strains of hospital bacteria. Currently, there are no alternative antibiotics to vancomycin. Therefore, there is a need for the creation of an antibiotic with better antibacterial effectiveness and better penetrating brain tissue. These features have new Van-TP10 conjugates with improved pharmacokinetic and pharmacodynamic properties compared to vancomycin alone while maintaining low cell toxicity.

Van-TP10 conjugates show better antibacterial effects and low toxicity against the clinical methicillin-resistant strains. The proposed new conjugates may be used in the pharmaceutical industry as an alternative to vancomycin.

Patent application number:
P.428782



PEPTIDES FOR THE PREVENTION AND TREATMENT OF INFLAMMATION

The human body is constantly exposed to pathogenic microorganisms, therefore in the course of evolution, it has developed a number of effective mechanisms in order to prevent and combat infections. In many cases, however, the body is not able to overcome infection, resulting in the excessive development of inflammation-causing septic shock. In such situations excessive stimulation of the immune system may have a lethal effect or cause permanent damage to internal organs.

The proposed invention discloses biologically active antimicrobial peptides that reduce excessive local inflammation caused by bacterial infections, as well as systemic inflammation, such as sepsis – accompanied by the growth of cytokines and reactive forms of nitrogen.

The effectiveness of anti-inflammatory properties of the compounds, especially in the case of inflammation caused by Gram-negative bacteria infection, was confirmed by in vitro tests and in a mouse model. The presented compounds may find their applications in anti-inflammatory drugs stimulating wound healing, e.g. in the form of creams or ointments or as a novel therapeutic agent for sepsis.

Patent application number:
P.428089

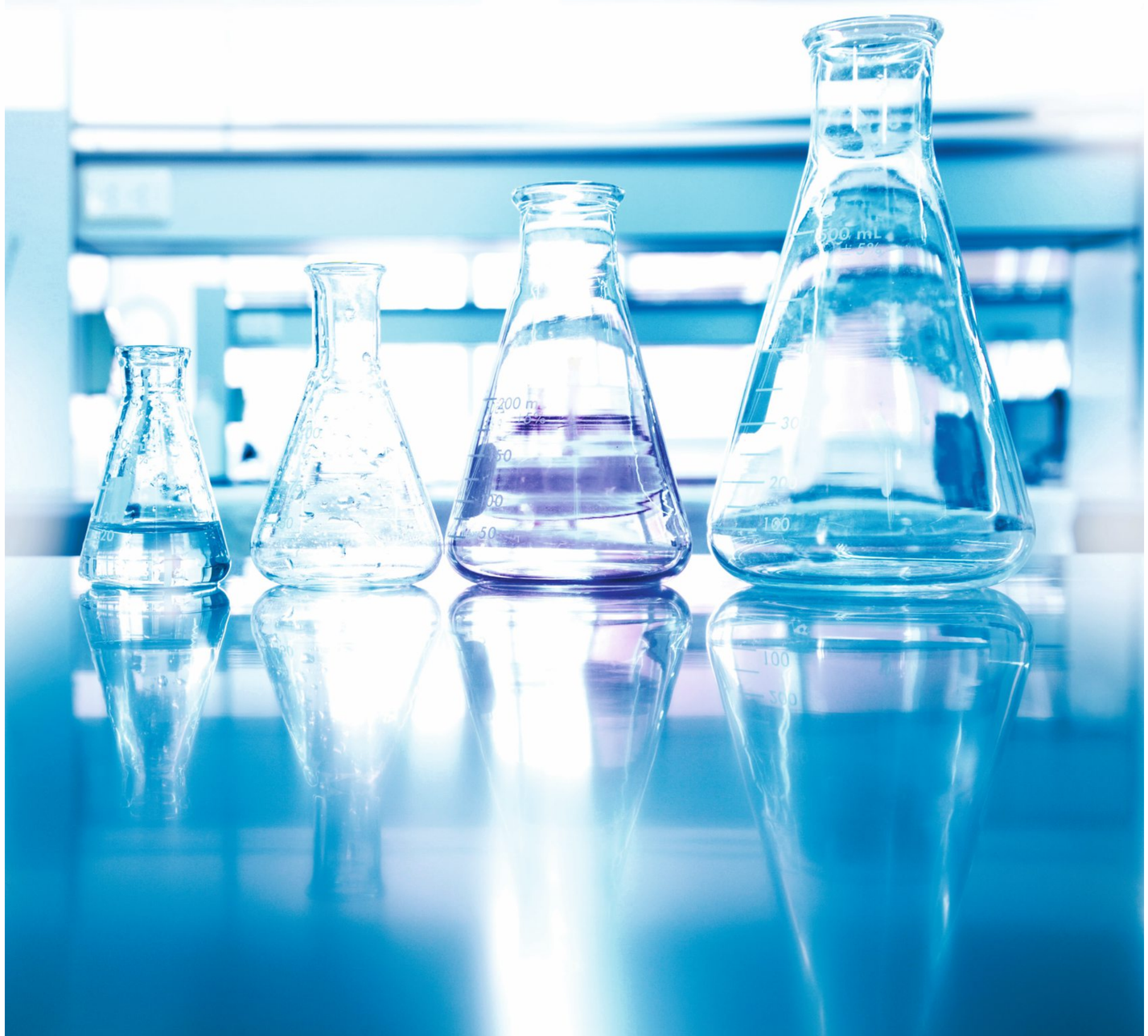
MEDICAL AND DIAGNOSTIC APPLICATION OF A NEW NAPHTHOQUINONE DERIVATIVE

Compounds containing the quinone group are one of the most commonly used compounds in cancer therapy. The interest in naphthoquinones as potential anticancer drugs results from their significant antiproliferative and anti-cancer activity proven in numerous animal models and on tumour cellular lines.

The presented unique technology is based on the use of the selective inhibition of ERK protein in breast cancer therapy. The MAPK/ERK kinase cascade is the main path for cell growth and differentiation. It plays a key role in signal transduction leading to cellular proliferation, tumour creation process and cancer development.

The new proposed naphthoquinone derivative has proved to be an effective inhibitor of ERK protein against breast cancer cells in vitro. Therefore, it can be used as an ERK protein inhibitor in the cellular lines. In addition, the invention may also be applied as a cytotoxic compound used in in vitro studies to inhibit the growth of breast cancer cellular lines. The proposed derivatives can be implemented in preclinical studies as well as in clinical trials in order to inhibit the growth of cancerous tumours.

Patent number:
PL 232283



ANTICANCER DERIVATIVES OF USNIC ACID

The presented invention relates to new chemical compounds – usnic acid derivatives obtained through the chemical synthesis and their cytotoxic activity against cancer cells of various origins.
Usnic acid is a known, biologically active compound isolated from lichens, characterized by its antiviral, antifungal, antibacterial, antiprotozoal and immunomodulatory properties.

The new innovative derivatives of usnic acid (named Raj-415 and Raj-432) induce characteristic changes in tumour cells basing on strong vacuolization, which contributes to the death of cancer cells. In cytotoxicity tests the mentioned compounds have been shown to inhibit the viability of all tumour cell lines tested while being not cytotoxic to healthy human fibroblasts.

The modifications introduced into the known structure aimed to reduce the toxicity of the original compound towards normal cells, improve the solubility and increase the selectivity of the resulting compounds against cancer cells. Due to the cytotoxic properties described above, the developed compounds may find their application as therapeutic substances for the prevention and/or treatment of breast, cervical and prostate cancers.

Patent application number:
P.413596

PIPERIDINE DERIVATIVES OF 9,10-ANTHRAQUINONE WITH ANTICANCER ACTIVITIES

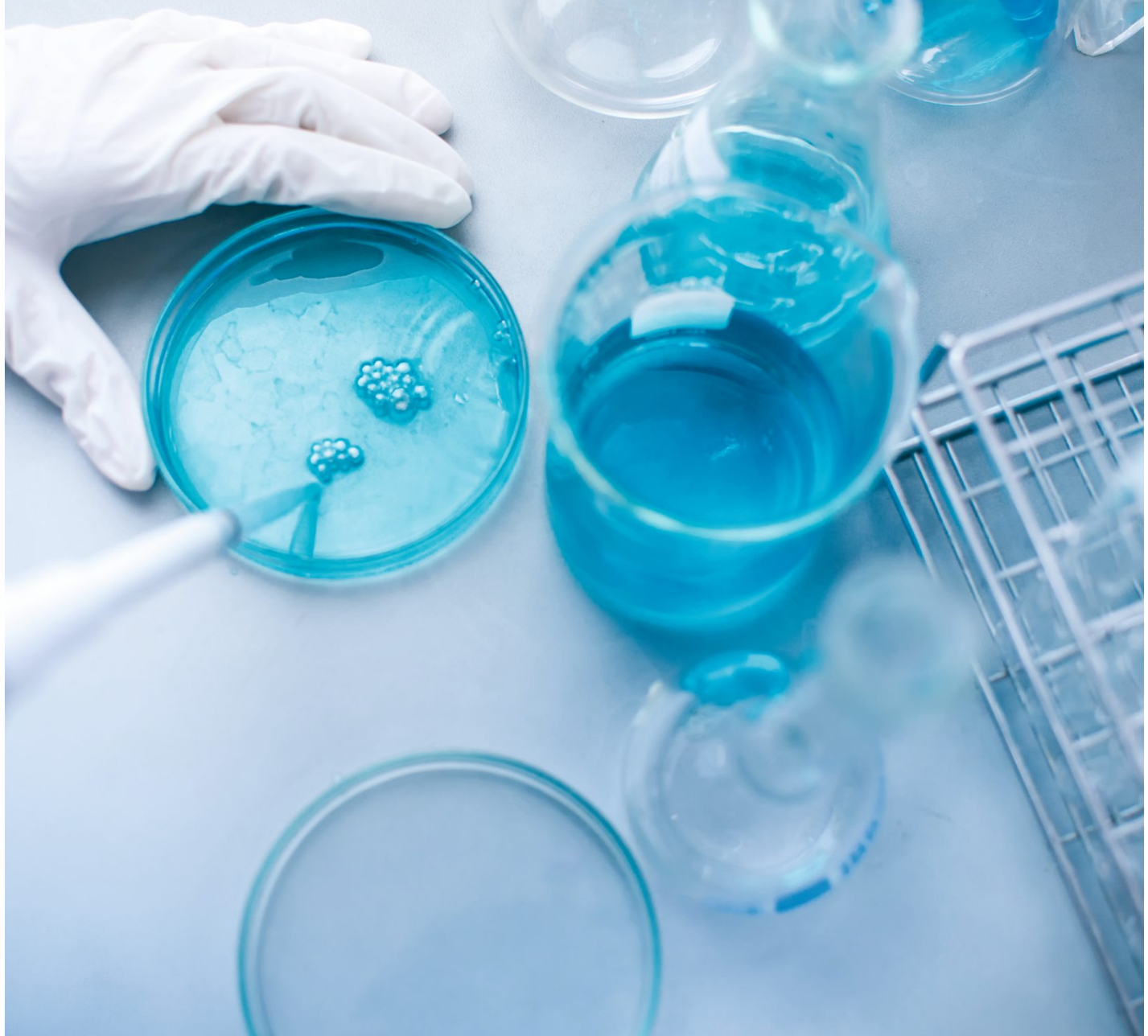
Compounds possessing the 9,10-anthraquinone skeleton in their structure are commonly used in cancer therapies, including treatment of acute leukaemia, lymphomas, solid tumours (e.g., breast, lung, thyroid, ovary) and many soft tissue tumours. The major disadvantage of anthracyclic antibiotics is their high cardiotoxicity and propensity to generate drug resistance in tumour cells treated with these compounds.

The innovative substances described herein belong to a group of antibiotics with cytostatic activity, inhibiting the division of tumour cells. The presented new compounds are based on 9,10-anthraquinone derivatives containing a heterocyclic system in the form of a piperidine ring. The obtained derivatives exhibit markedly reduced cardiotoxicity, which allows their use at higher therapeutic doses, with increased effectiveness against tumour cells and slower resistance generation.

The developed methods of synthesis enable fast and efficient production of cytostatic derivatives of anthraquinone in the pharmaceutical industry.

Patent numbers:
PL 232522, PL 232523, PL 232524

Patent application numbers:
P.408238, P.408239



CARRIER OF THE ACTIVE SUBSTANCE INCREASING PERMEABILITY TO THE CELLULAR NUCLEUS

The cellular nucleus is the main and most important component of most cells in which transcription takes place. Therefore, the transport of therapeutic substances into the cell nucleus is a challenge for many therapies.

During technology development a new type of peptidomimetics was designed and synthesized. The peptidomimetics, labelled by fluorophore moieties (5/6-carboxyflourescein), efficiently penetrate the cell membrane. They are transported directly to the nucleus of primary and transformed cell without significant toxicity. Such a compound is also resistant to protease action inside the cells and stable under cell culture conditions.

The presented technology allows the introduction of the active substance of the drug in a more targeted approach while maintaining low risk of healthy cells destruction. Use of an innovative substance gives the positive effect of accelerating the process of cancer treatment or those of dermatitis and cardiac insufficiency. Additionally, the fluorescent feature of the new chemical compound may also be used to detect substances in cellular nuclei.

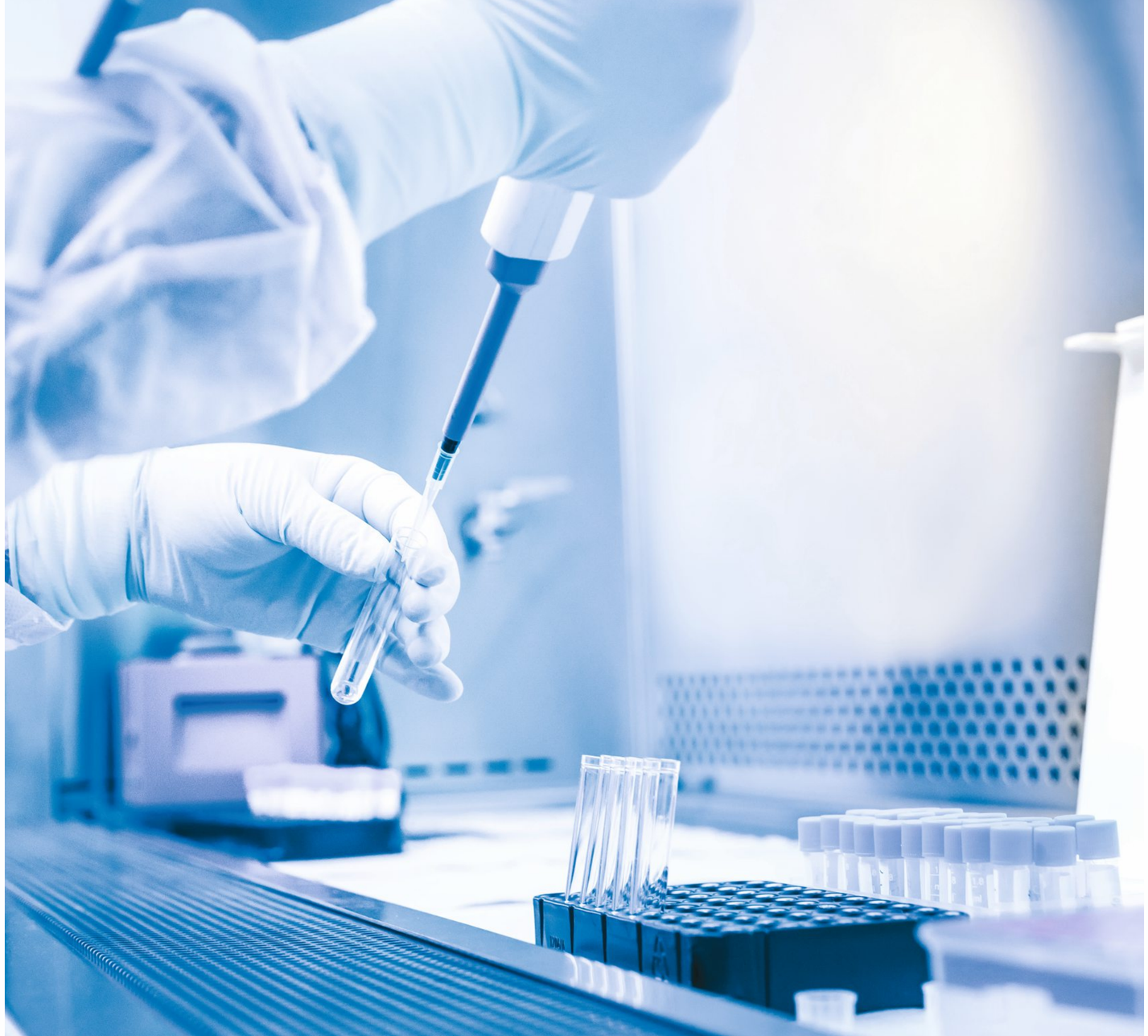
Patent application number:
P.424583

METHOD OF OBTAINING THE BCHE ENZYME IN BIOSENSORS PRODUCTION

The offered technology is a method of obtaining a biologically active recombinant enzyme of butyrylcholinesterase (BChE) and its derivatives using molecular cloning methods, genetic expression, biochemical isolation and a method for obtaining biologically active cholinesterases and butyrylcholinoestarases and their derivatives in microorganism Leichmania tarentolae.

The proposed technology allows for the BChE enzyme to be obtained at a higher efficiency, with exceptional purity and lower costs than existing isolation methods from plasma or enzyme production in transgenic plants or insect larvae.
The BChE enzyme constitutes a key element of biosensors detecting Chemical Weapon Agents (CWAs) and pesticides from the organophosphorus (OP) group. It can be used for the production of personal chemical contamination sensors or as an effective antidote after exposure to CWAs. Enzymes acetylcholinesterase (AChE) and butyrylcholinesterase (BChE) from ChE group have many civilian and military applications.

Patent application numbers:
P.423116
EP18199472.4



RADIOSENSITIZING SUBSTANCES TO IMPROVE RADIOTHERAPY

Radiotherapy, used in about every second cancer treatment, causes many side effects. However, it is possible to improve the efficacy of radiotherapy by employing radiosensitizing substances. The method allows increasing the effectiveness of radiotherapy by using respective derivatives of nucleic bases radiosensitizers, operating in a low oxygen environment, which is incorporated into cellular DNA during its biosynthesis.

5 selenocyanatouracil (SeCNU) is a promising candidate for hypoxic radiosensitizer due to its propensity for rapid decomposition by electron attachment. It is sensitive to electron attachment in an aqueous solution – confirmed by steady-state radiolysis at an ambient temperature followed by liquid chromatography-mass spectrometry (LC-MS) analysis of radiolytes. The established synthetic route enables 5-selenocyanatouracil to be chemically synthesized with a high yield and purity.

It is demonstrated to be kinetically and thermodynamically more sensitive to hydrated electron attachment than BrU – a well-known radiosensitizer. Other innovative and promising substances that may be used as radiosensitisers are 5-iodo-4-tio-2'-deoxyuridine and 5-selenocyanate-2'-deoxyuridine.

Patent application numbers:
P.419323, P.427326, P.424557

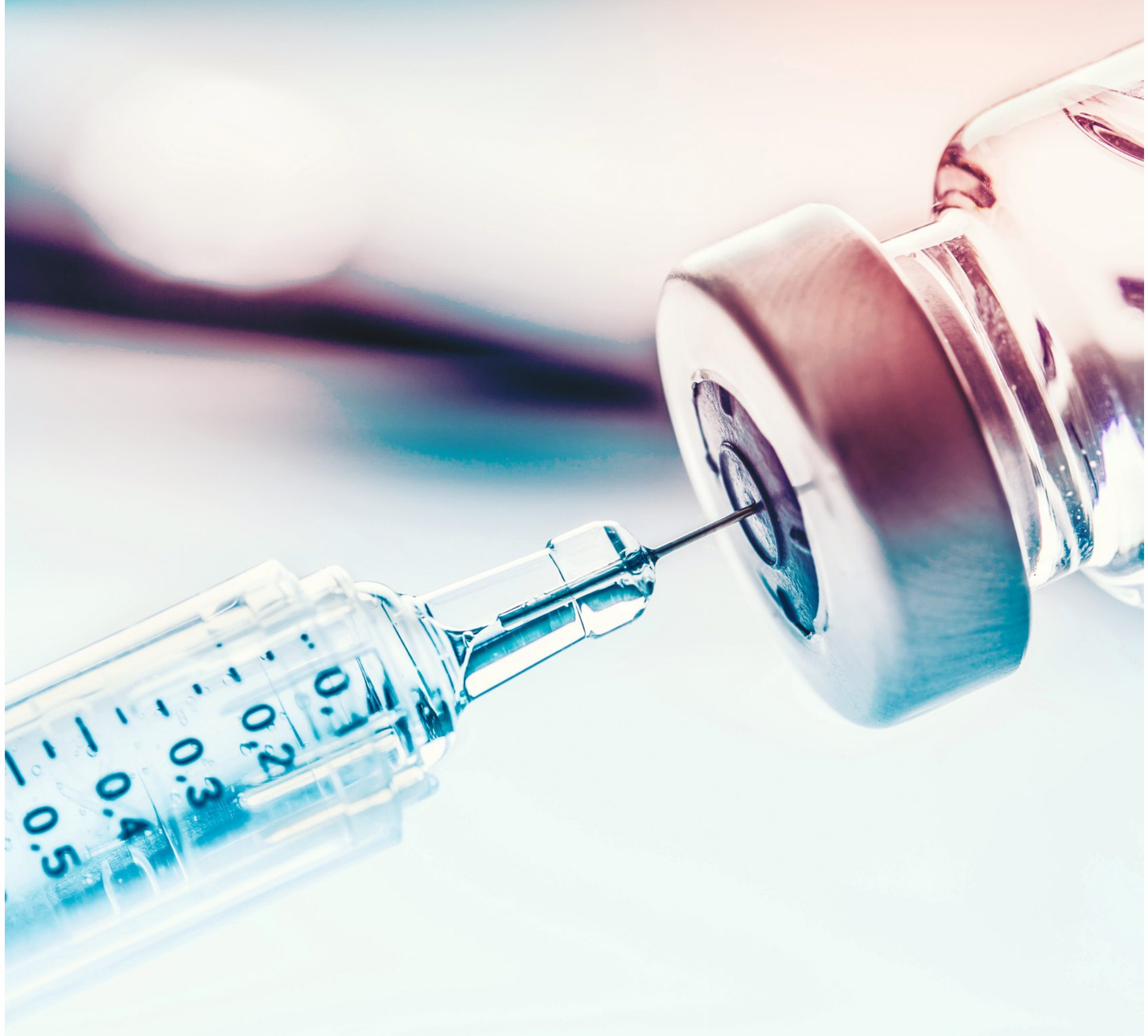
RECOMBINANT FLAVIVIRAL PROTEIN ANTIGENS

This offered technology is based on recombinant flaviviral protein antigens, which can be used as vaccine preparations against the Zika virus, as elements of diagnostic tests or as therapeutic preparations.

Recombinant flaviviral protein antigens are based on a combination of different regions of flaviviral structural proteins (Zika virus, tick-borne encephalitis virus). This combination allows for efficient overproduction of proteins in different gene expression systems in cells and also contributes to the formation of virus-like particles (VLPs) which have certain conformational epitopes on their surface. This can contribute to a strong, virus neutralising immune response when used as a flavivirus vaccine (Zika virus, Dengue virus) on humans.

The presented technology is based on purification methods of developed antigens from eukaryotic cells on a laboratory scale and can be used for purification of antigens on a semi-industrial scale.

Patent application number:
P.430234



IMMUNOGENIC VACCINE AGAINST HCV AND/OR HBV

About 80% of HCV virus infections proceed towards the chronic phase which may show no symptoms within a long period of time. The chronical phase of the disease in 20% of cases leads to severe liver damage, liver cirrhosis, and often hepatocellular carcinoma, and liver transplant does not guarantee healing. Most of the potential HCV vaccines have been classified as inactive and withdrawn due to their ineffectiveness.

The proposed invention is a vaccine based on chimeric particles 412-425_sHBsAg.
These molecules are composed of carrier proteins spontaneously formulating virus-like particles (VLP) and the highly conserved epitope 412-425 of the HCV envelope glycoprotein.
The aforementioned 412-425_sHBsAg protein is able to elicit a response directed not only against the HCV virus but against the HBV virus as well.

The presented technology could be offered not only as a preventive and prophylactic agent but also as a treatment for patients infected with both HCV and HBV.

Patent number:
PL 230663

Patent application numbers:
PCT/PL2016/000002
EP 16705838.7

COMPOSITIONS OF HCV ANTIGENIC SEQUENCES FOR USE IN THE PREVENTION OF HCV AND/OR HBV INFECTION, CHIMERIC VIRUS-LIKE MOLECULES EXPOSING HCV ANTIGENIC SEQUENCES, HCV AND/OR HBV VACCINE

The presented invention is a vaccine based on selected antigenic sequences and/or chimeric proteins which ensures that the immune response is induced by antibodies to HCV and/or HBV.

This unique technology concerns single antigen sequences and their different compositions in a system – a combination of selected antigen sequences – immunogen – containing selected epitopes of the E2 HCV glycoprotein in the application of preventive treatment of HCV and/or HBV infection.

Selected combinations of sequences as well as single antigen sequences can be used to obtain biologically active and immunogenic virus-like molecules composed of small surface protein HBV virus (HBsAg), which are characterized by high immunogenicity and excitation of a humoral immune response. The presented vaccine may be applied for the prevention and/or treatment of HBV and/or HCV infections.

Patent application number:
P.427320

ORAL VACCINE AGAINST THE INFLUENZA A VIRUS

The influenza virus due to its high virulence and adaptability is one of the most dangerous pathogens in the world. Antigenic shifts of the virus require reformulation of a vaccine every year. In consequence, vaccination against influenza is ineffective.

There are three types of influenza virus, but only type A viruses pose a serious problem, causing severe symptoms during infection. The presented technology relates to an oral vaccine against influenza A virus which uses a gram-positive strain of Bacillus subtillis comprising recombinant spores. Bacillus subtillis strains may not only serve as a carrier of influenza antigens but also cause specific antibody production without the use of supportive agents.

The invention contributes to the development of a universal vaccine against influenza virus by omitting the time-consuming and costly process of antigen purification and elimination of adjuvants.

Patent number:
PL 228594

Patent application numbers:
PCT/PL2016/000060
EP16736928.9

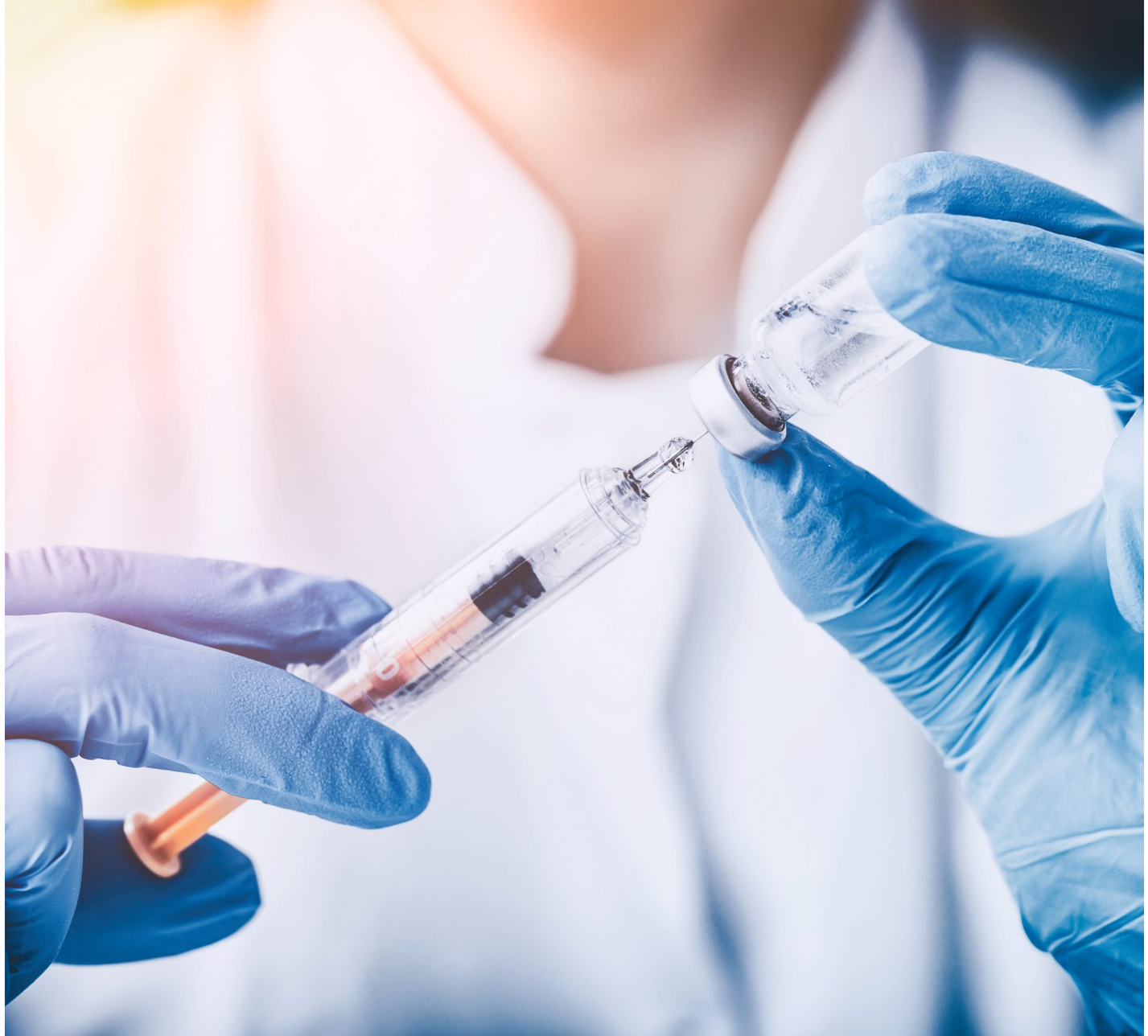
OLIGONUCLEOTIDES FOR DETECTION AND DIFFERENTIATION OF INFLUENZA VIRUS STRAINS SUSCEPTIBLE AND RESISTANT TO OSELTAMIVIR

Influenza A virus (IAV) belongs to the Orthomyxoviridae family and is one of the most common pathogens infecting millions of people and animals (especially birds) every year. Viruses are spherical or pillar-shaped and the genetic material of the virus is single-stranded segmented RNA with a negative polarity. This feature favours high genetic variability of the virus, which occurs through point mutations (antigenic drift) and reasortation (antigenic jump).

The presented invention is a qualitative diagnostic method based on real-time PCR technique, used to detect the influenza virus (Influenza Virus, IV) and determines its resistance or susceptibility to a popular antiviral drug – oseltamivir as well as nucleotides suitable for virus analysis. The subject matter of the invention is the use of nucleotides (primers and probes) to detect mutations responsible for susceptibility to oseltamivir.

The developed diagnostic method based on real-time PCR provides an effective tool for the identification of the influenza virus (IV) as well as a determination of its resistance or susceptibility to treatment.

Patent number:
PL 220139



INFLUENZA ANTIGEN AND VACCINE

Various strains of the influenza virus infect from 350 million to more than 1 billion people worldwide every year. The presented technology is a method to generate a new antigen and the construction of a recombinant vaccine based on this antigen. This novel method relies on the external production of antigen by the Pichia pastoris KM 71 and SMD 1168 strain, which can be used for manufacturing vaccines.
A highly immunogenic antigen based on haemagglutinin is obtained, without the need for contact with the whole virus.

The potential vaccine contains only purified antigen (without the virus or its parts), allowing for very high protection with minimal risk. The manufacturing method is simple and inexpensive and allows for rapid production of the vaccine against new virus strains isolated during a given season.
The antigen additionally can be used in diagnostic tests, e.g. in Western Blot and ELISA.

Patent application numbers:
P.406631
PCT/PL2014/000148

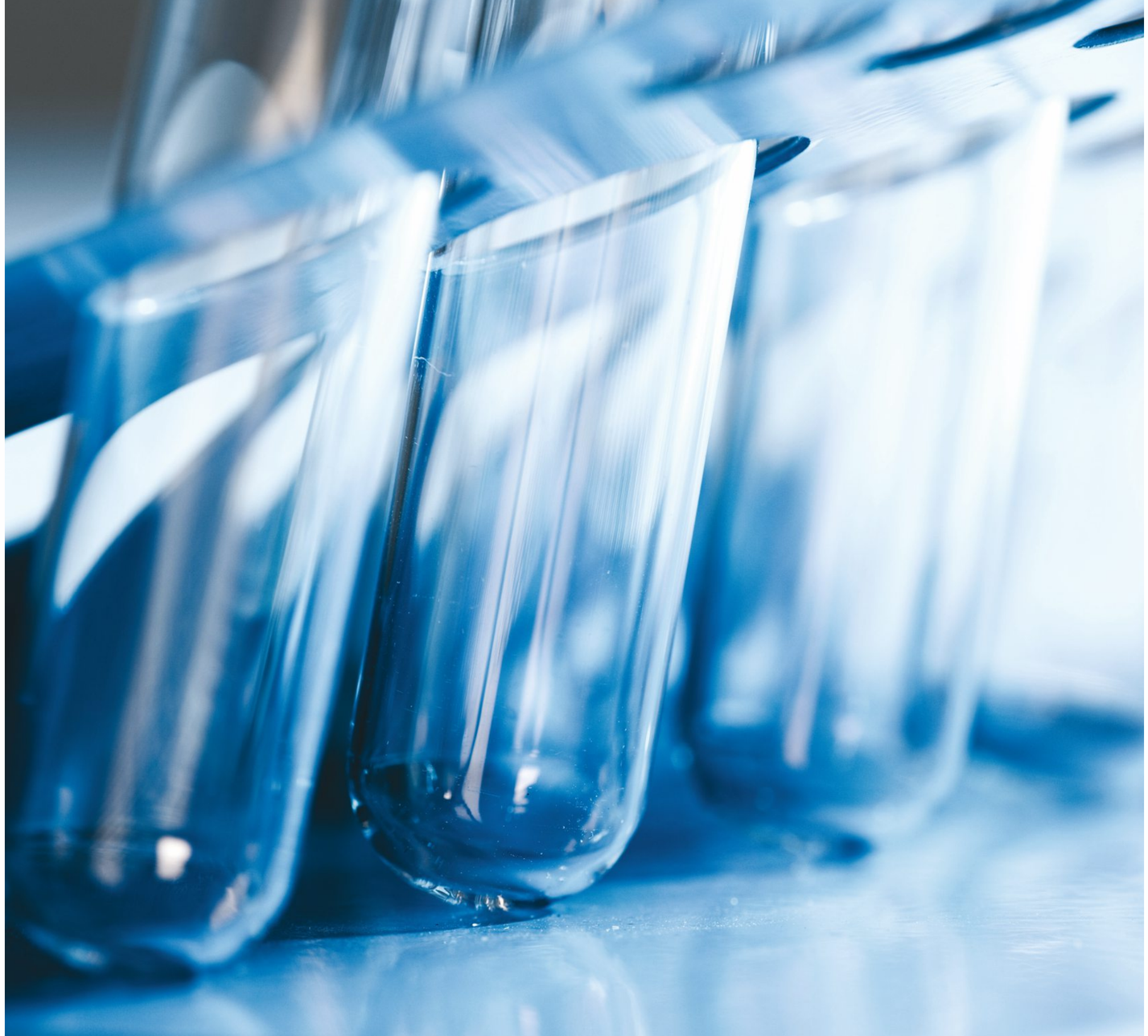
MONOCLONAL ANTIBODIES AGAINST INFLUENZA VIRUSES

Influenza viruses are characterized by high genetic variability and propensity for mutation. H5 serotypes are particularly dangerous because they have repeatedly demonstrated the ability to infect both birds and humans (e.g. the H5N1 strain responsible for "bird flu" in the early 21st century).

Rapid, sensitive and inexpensive methods of identifying and differentiating between strains of influenza virus as well as vaccines are therefore needed for the effective control of the virus and outbreak prevention. The existing methods of vaccine production are slow and insufficient, particularly in the event of an influenza pandemic. Immunization with these vaccines often results in undesirable side effects.

DNA vaccines and vaccines based on recombinant HA virus proteins offer useful alternatives. The presented unique technology based on monoclonal antibodies (Mab) against the hemagluttinin of H5 serotype viruses can be used to isolate the HA proteins necessary for the development and production of new, effective influenza vaccines. Moreover, the presented antibodies may be applied in screening tests allowing for effective differentiation between vaccinated and infected animals, which is indispensable for avian influenza prevention programs.

Patent application numbers:
P.418671
PCT/PL2017/000084



NEW HIGHLY ACTIVE CATALYSTS FOR THE POLYMERIZATION OF BETA-OLEFIN DERIVATIVES

The presented technology is synthesized new picolinate and dipicolinate complex compounds of chromium. Innovative newly-obtained non-metallocene complexes of chromium show very high catalytic activity in the polymerization of the beta-olefin derivative.

The proposed polymerization process involves newly synthesized catalysts procedures at room temperature, at atmospheric pressure and is very easy to carry out, inexpensive and efficient.
The new catalyst can be used in olefin metathesis and metathesis derivatives thereof.
The metathesis reaction allows the synthesis of numerous new chemicals with various properties.

The technology has potential industrial use of newly-obtained complexes as catalysts in the polymerization of beta-olefin derivatives. Polymers of beta-olefin derivatives are used for adhesives, substances used in the chemical industry, coatings or in particular elastomers production.

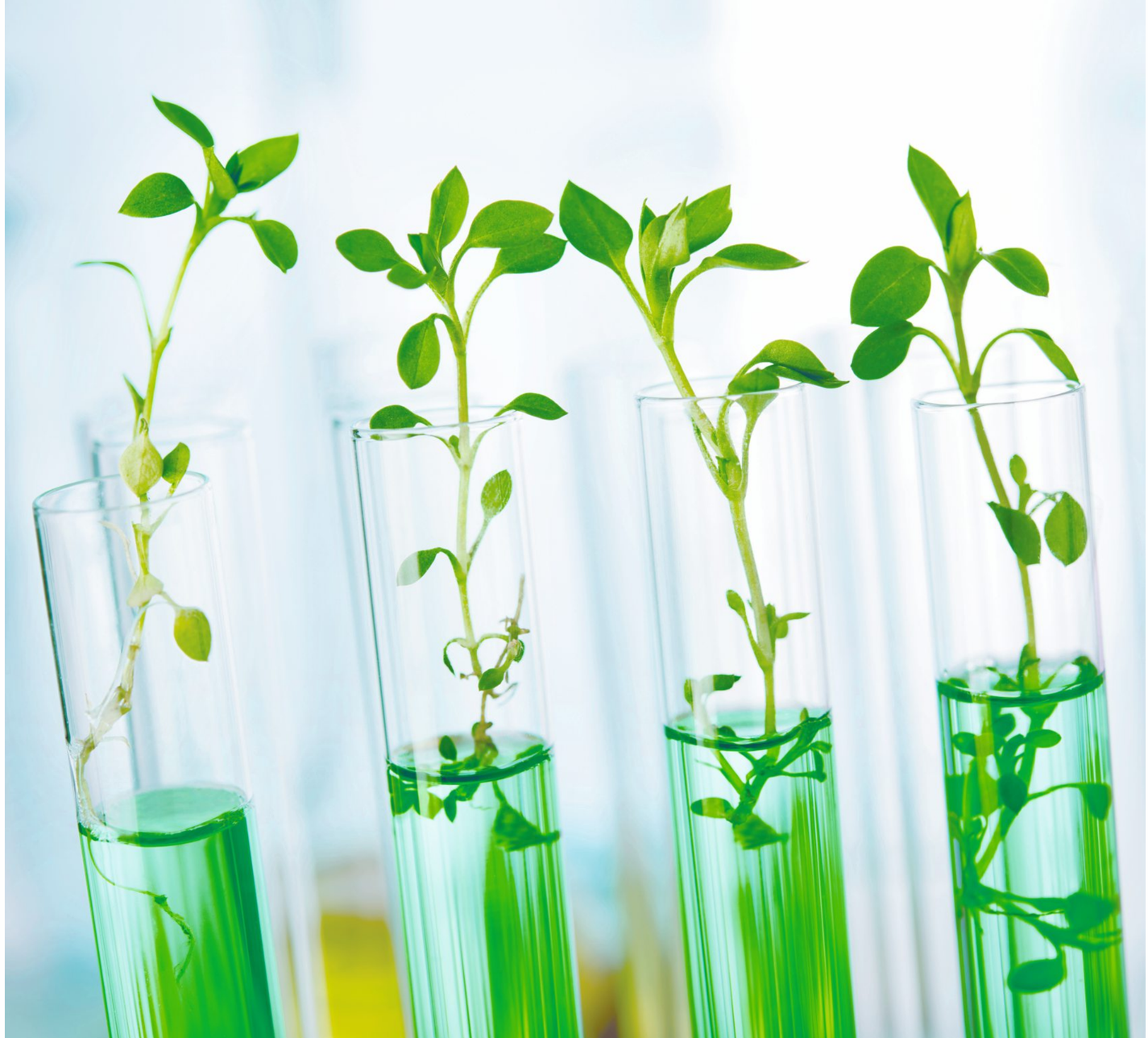
Patent application numbers:
P.423454, P.423455

METHOD OF DETECTION AND IDENTIFICATION OF BACTERIA FROM P. CAROTOVORUM, P. ATROSEPTICUM AND DICKEYA SPP.

Potato crops may be exposed to such diseases as “black leg” and “soft rot” caused by Pectobacterium and Dickeya bacteria species. Early detection of the aforementioned diseases is particularly important for potato plants, because it allows for the destruction of infected plants before planting process and vegetation period, what directly influences on the quantitative and qualitative improvement of crops. The proposed technology enables the detection and identification of infected crops and protects them against bacteria.

The proposed innovative technology is the method of detection and identification of the Pectobacterium and Dickeya bacteria, based on the multiplex PCR reaction with using primers specific for each of bacteria species listed, selected in a way allowing for easy identification of products through agarose gel electrophoresis. The described method may find application in agriculture screening tests of potato seeds towards the presence of pathogens.

Patent application number:
PL 223540



RESEARCH & DEVELOPMENT LABORATORY OF IFB UG & MUG

The Research & Development Laboratory of IFB UG & MUG was established in 2017. Its activity focuses on the development of phytopathology, plant protection, population microbiology, environmental microbiology, industrial microbiology, bacterial genetics and genomics fields.

The laboratory also provides many other services in the area of analytics, diagnostics and didactics like detection and identification of bacteria present in plant material, soil or propagated on culture media with the use of molecular, immunological and biochemical methods or analyses of genetic biodiversity within a species.

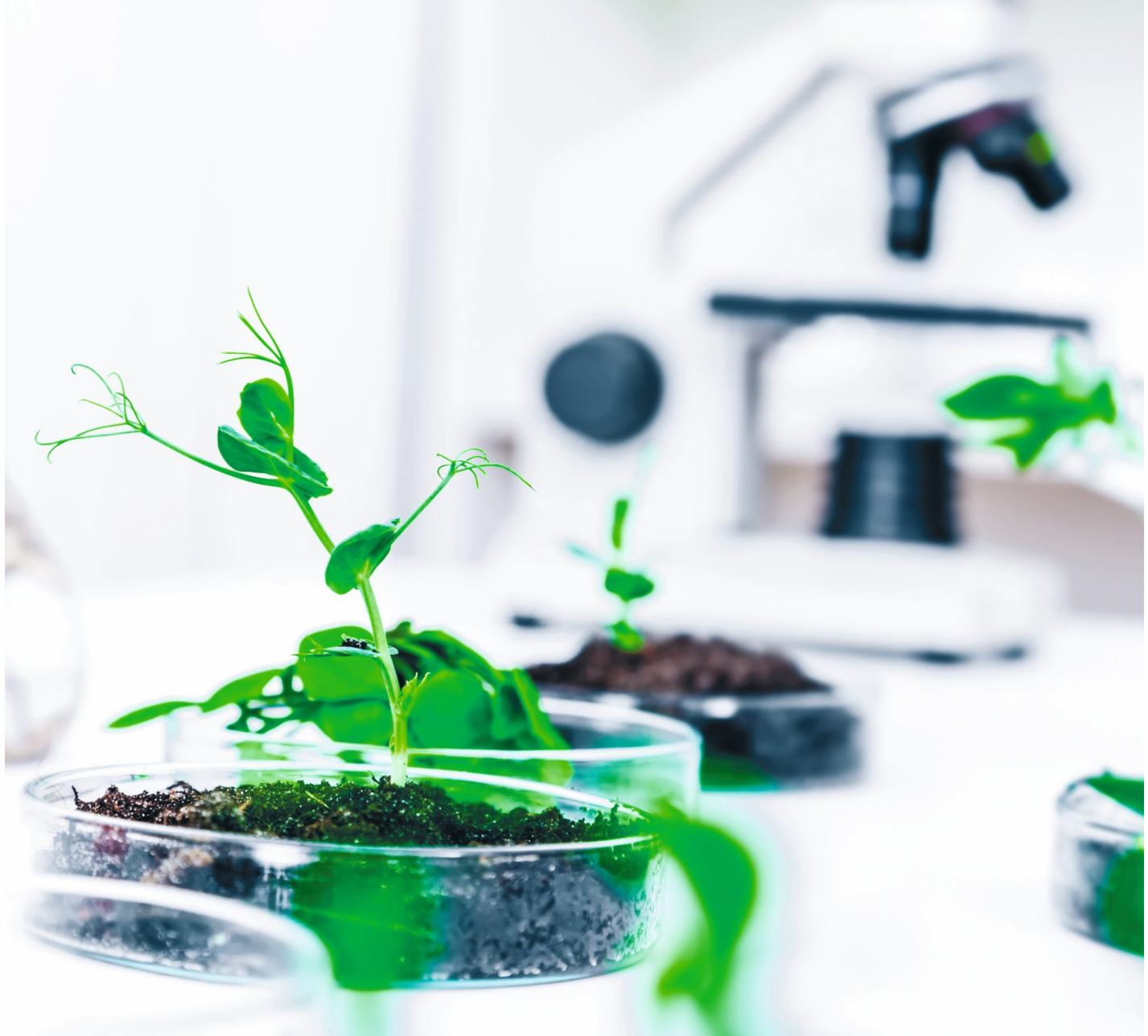
One of the services offered by the laboratory is the Multiplex PCR analytic method for the detection and identification of pathogenic bacteria Pectobacterium and Dickeya causing “black leg” and “soft rot” potato diseases. The aforementioned method allows for the detection of infected plant tissue that does not show symptoms of the disease. The method is very competitive against other methods available on the market because of the very short time of research material verification (10 hours). In the case of other methods, this time amounts to a few days or even weeks. The laboratory offers also personalized diagnostic tests tailored to the costumer's needs as well as practical trainings, theoretical and personalized courses in the field of its activity.

PLANT PROTECTION AGENT EFFECTIVE AGAINST P. ATROSEPTICUM AND DICKEYA SPP. BACTERIA

The proposed technology is a new plant protection agent against bacteria, based on the aqueous caffeine solution and the method of its production.
The substance described is effective in optimized qualitative and quantitative composition, and it inhibits growth and multiplication of bacterial cells of pathogenic plants such as: Clavibacter michiganensis subsp. sepedonicus, Dickeya spp., Pectobacterium atrosepticum, Pectobacterium carotovorum subsp. carotovorum, Pseudomonas syringae pv. tomato, Ralstonia solanacearum, Xanthomonas campestris pv. campestris.

The substance may be applied for protecting potatoes against such diseases like "black leg" and "wet rot", which cause significant losses during harvest and the storage of plants. The agent can also be used in order to protect other plants against phytopathogens. It can be applied in various forms, e.g. sprays on plants during the growing season, stored fruit, tubers or roots, and storage areas of storage rooms, and agricultural machinery.

Patent application number:
P.404115



NEW STRAINS OF ANTAGONISTIC BACTERIA AS A BIOLOGICAL PLANT PROTECTION PRODUCT

The presented technology provides a microbiological plant protection product used both in the prevention and treatment of plants infected by pectinolytic bacteria such as Pectobacterium and Dickeya, which cause soft rot and potato blackleg.
The technology can be also used to control Ralstonia and Clavibacter – bacteria responsible for brown rot and ring rot. The developed preparation contains a combination of new, selected isolates of antagonistic bacteria and it is highly effective, both in counteraction of single species of pectinolytic bacteria as well as their mixtures.

The use of naturally occurring antagonistic interactions between organisms makes the preparation a fully ecological product.
Unlike chemical or physical plant protection products, antagonistic bacteria can penetrate the infected plant and spread through all its tissues, providing the plant with adequate protection.
The advantage of the developed solution is the high viability of bacterial populations in a wide range of temperature conditions and the stability of a potential biological plant protection product.

Patent application numbers:
P.423806
EP 18210901.7

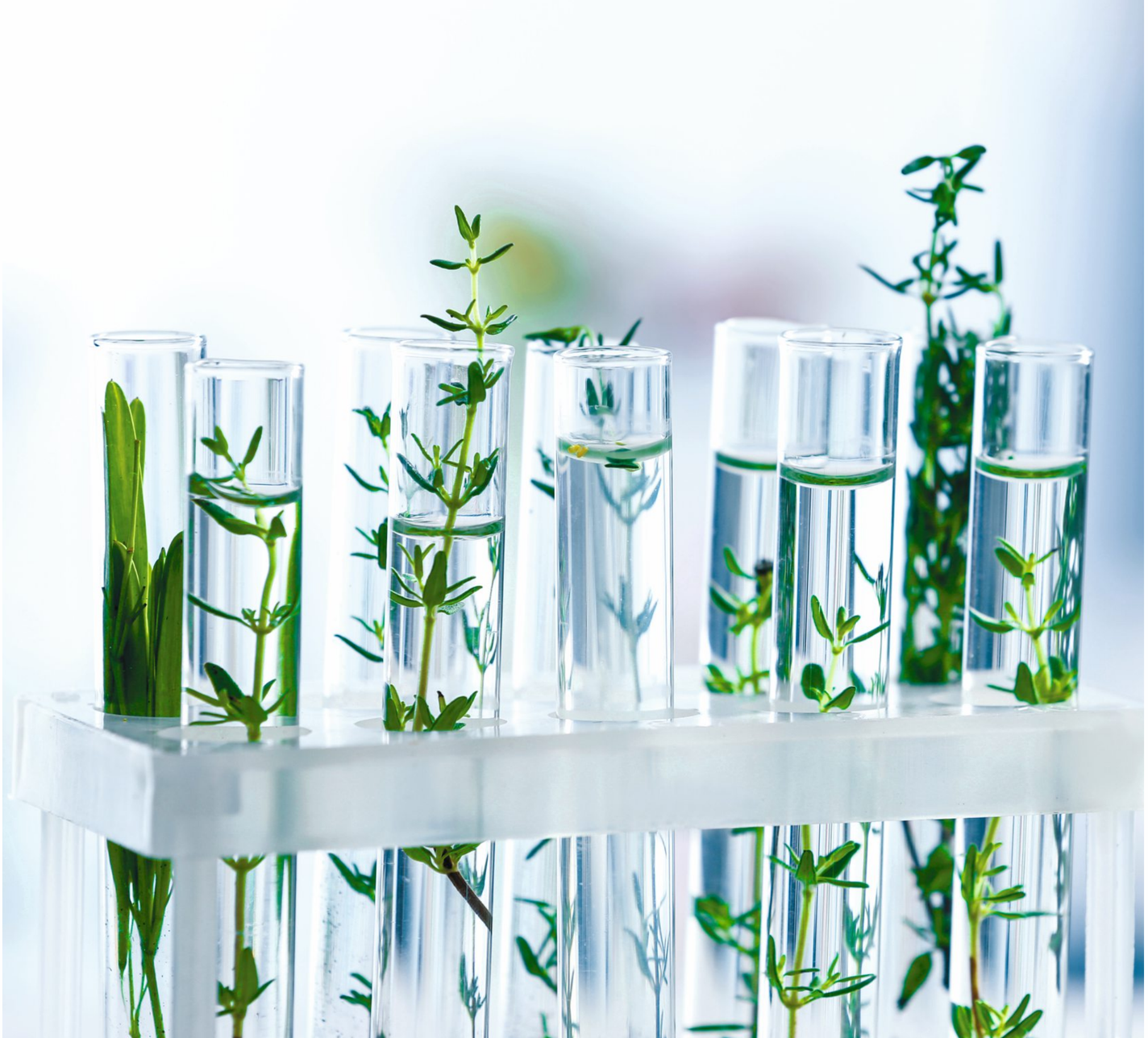
METHOD FOR ERADICATION OF BACTERIAL PHYTOPATHOGENS

The proposed technology relies on activation of inorganic salt solutions by cold atmospheric plasma treatment in order to obtain post-plasma solutions dedicated to the neutralization of bacterial plant pathogens.

The method involves the use of a flow-through reaction-discharge system in which cold atmospheric plasma, i.e. a direct current atmospheric pressure glow discharge (dc-APGD), is operated in contact with a flowing liquid electrode, being an aqueous solution of inorganic salts. The produced post-plasma solutions show bacteriostatic or bactericidal qualities depending on the inactivated phytopathogen. Usage of these solutions enables elimination of phytopathogenic cells in an effective and eco-friendly way.

This innovative method is cost-efficient and gives the possibility of adapting the dc-APGD-based system to the customer's needs. The post-plasma solutions may be widely applied as direct antimicrobial agents for effective and environmentally friendly eradication of bacterial strains and used as formulations recommended for preventive protection of seeds and agricultural or horticultural fields.

Patent application number:
P.427563



THE REAGENT FOR PROTECTION OF MICROORGANISMS IN FREEZE-DRYING PROCESSES

Freeze-drying, as one of the most popular methods of low-temperature drying, is widely used in the food, cosmetics and pharmaceutical industries as well as in the conservation of biological materials. This method is also often used for the preservation of bacteria in order to maintain their longevity. Due to the low temperature used during freezing of the preparations and at the stage of freeze-drying itself, this process leads to a decrease in the activity and viability of bacteria. In order to prevent this from occurring, it is common to add to the preparations some protective substances – cryoprotectants.

The newly developed freeze-drying reagent technology uses a substance of plant origin, which is much cheaper than the often used bovine serum albumin. This modification not only significantly reduces the cost of the preparation but also makes it more humane due to the fact that the reagent has been deprived of zoonotic components. The advantage of this technology is that the effectiveness of the developed reagent remains at the same level as when using a reagent containing BSA, and in some cases even exceeds it.

Patent application number:
P.428215

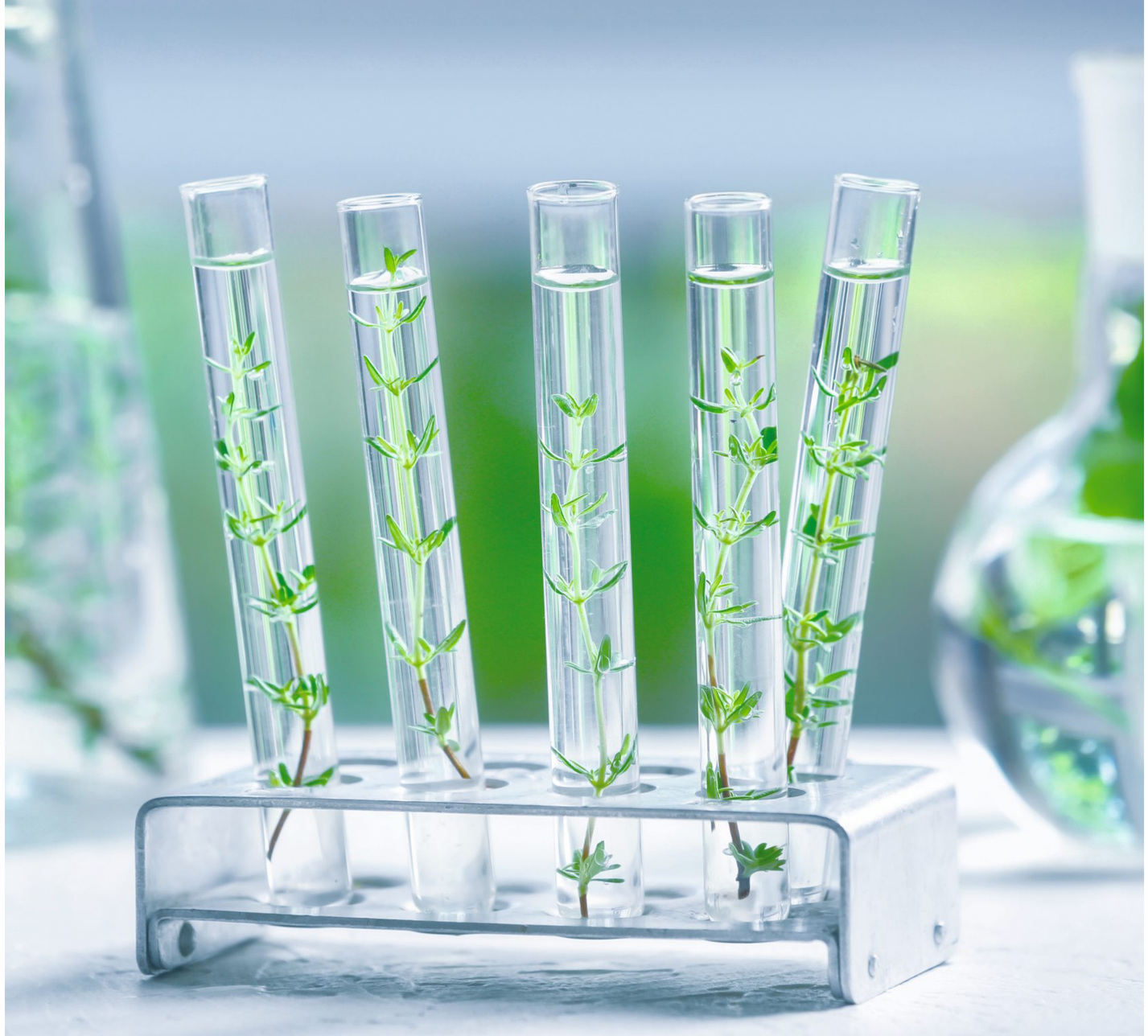
BACULOVIRUS BIOPESTICIDES – A SAFE ALTERNATIVE TO THE CHEMICAL PROTECTION OF PLANTS

The gypsy moth (lymantria dispar) is one of the most dangerous pests spreading in forests, gardens, orchards and parks throughout the world.
Larvae, which feed from April to July, cause widespread damages in tree crowns. During pest gradation, large areas of vegetation are devastated, causing enormous financial losses.
Unfortunately, pest control in forestry and horticulture involves the usage of hazardous and expensive chemicals.

The proposed invention consists of using the Lymantiria dispar Nuclear polyhedrosis virus (LdMNPV-PL) strain as an active ingredient in a plant protection product, which infects pests in natural environmental conditions.
The virus strain was carefully selected for its increased virulence, demonstrating high pest control efficiency and low production and application costs.

The developed technology can be applied in a new, non-hazardous and environmentally friendly plant protection product marked not only by its high efficiency but also by the short time required for eradication of the targeted pest.

Patent application number:
PL 228449



METHOD OF BACULOVIRUS DETECTION

Viral biopreparations are more and more frequently used in agricultural and fruit farming to protect plants from pests. Biological control is used especially in areas where insects attacking crops become resistant to chemical insecticides. The most commonly used group of viruses for biological protection of plants are baculoviruses – very specific and selective in action.

The developed method can be used for the detection and differentiation of baculoviruses in biological preparations and infected insects.
The method is based on the real-time PCR technique using the nucleotide sequence of granuline and lef-9 (late expression factor) fragments of baculovirus genes. It can be used in agriculture to monitor the progress of pest control by testing the level of infection of the insect population with baculovirus as well as to search for new active agents to control plant pests.

The invention can be used in quality control in the process of biopesticide production.
In comparison to current methods of baculovirus detection, the offered technology allows for a much faster and cheaper examination, while maintaining the same accuracy of its results.

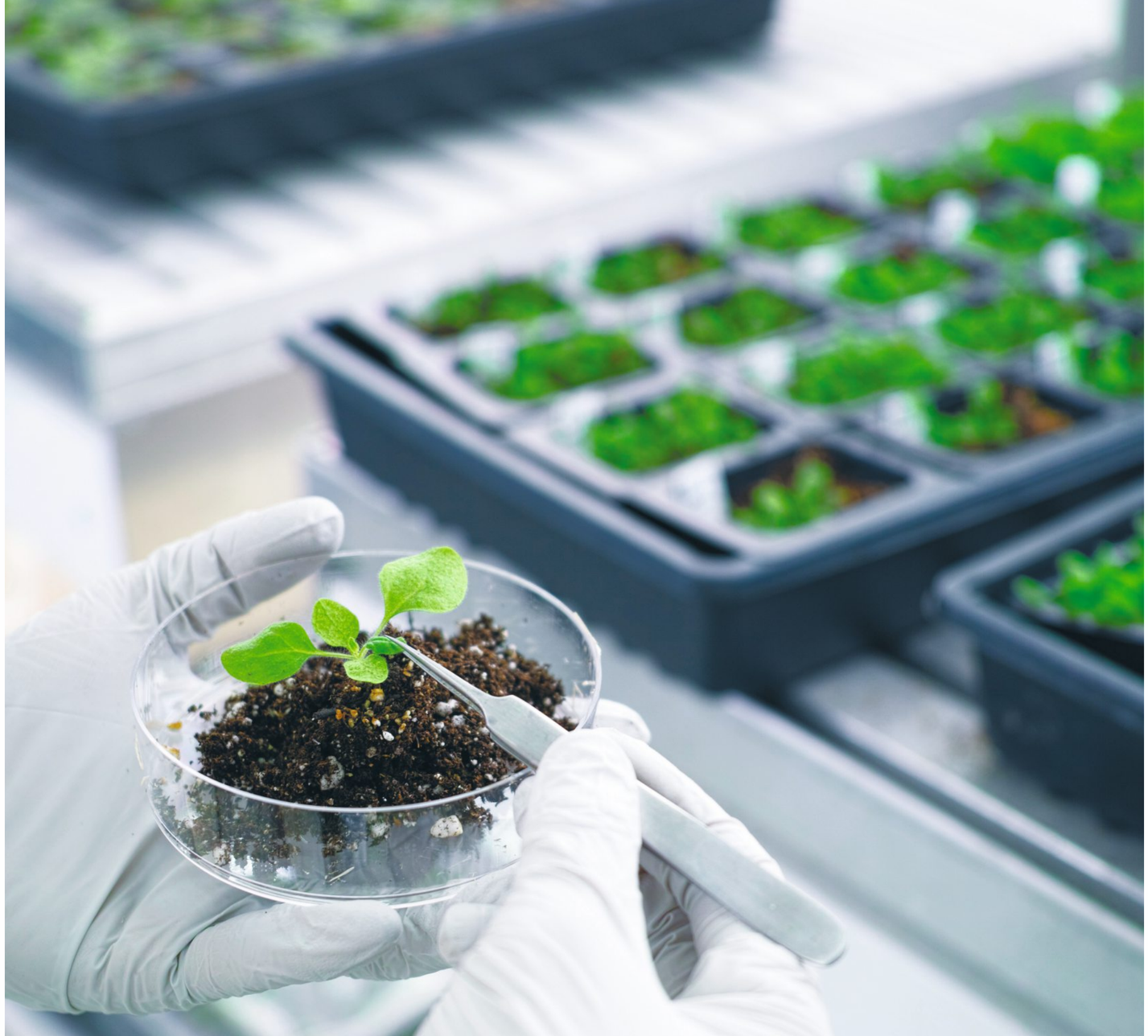
Patent application number:
P.426680

METHOD OF BACTERIOPHAGE PARTICLE CONDENSATION

The invented method allows for bacteriophage concentration without selective multiplication in host bacterial cultures, which results in significant acceleration of bacteriophage particle production and cost reduction. The method is simple, quick, reliable and enables bacteriophages to be successfully isolated from samples with a hundredfold lower concentration of phage particles than conventional propagation in bacterial culture.

The proposed method does not require specialized laboratory equipment and is significantly less expensive than other methods based on centrifugation, filtration or dialysis. The developed technology can be applied in the pharmaceutical industry, in agriculture and in veterinary medicine – wherever it is required to isolate new phage particles from soil, water, sewage, plants or animals samples to conduct appropriate research.

Patent number:
PL 229466



METHOD OF REMOVING CHLOROPHYLL FROM PLANT EXTRACTS

One of the main problems encountered during the search for secondary metabolites in plant extracts is the presence of so-called ballast compounds. One such compound is chlorophyll. Due to its high concentration in plant tissues and the wide spectrum of light absorption, chlorophylls pose a serious problem during the chromatographic analysis of plant extracts – they can make it difficult or even impossible to detect the desired biologically active compounds.

The developed technology provides an effective tool for chlorophyll removal from aqueous and organic extracts obtained from plant tissues containing secondary metabolites. This innovative method, based on organic and inorganic copper salts, is characterized by high efficiency, low cost and minimal environmental impact due to the non-toxicity of the final product – chlorophyllin.

The presented method can be widely applied in cosmetic or pharmaceutical industries in order to simplify the search for and extraction of biologically active compounds.

Patent number:
PL 226117

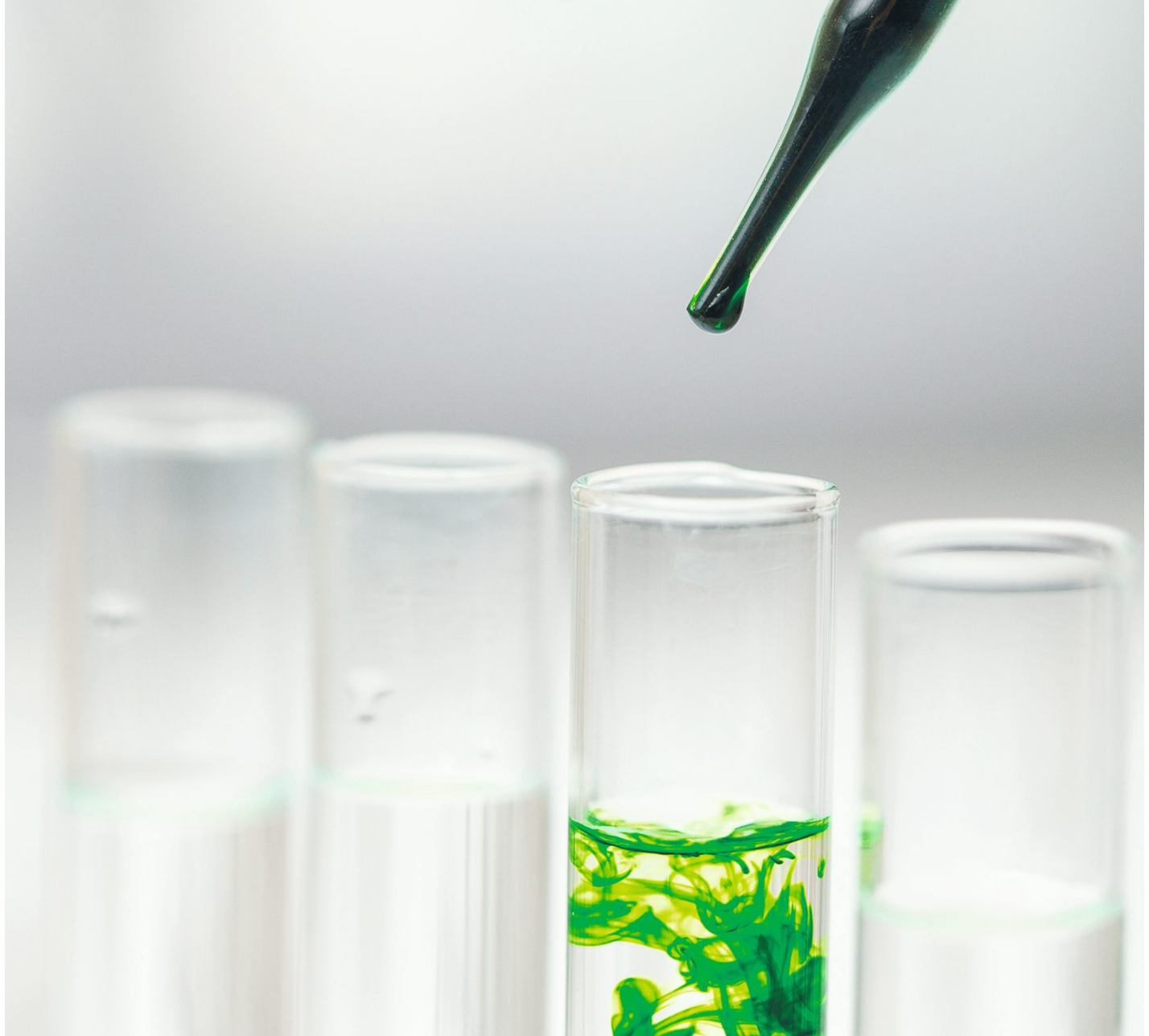
RECOMBINANT VACCINE AGAINST RABBIT HAEMORRHAGIC DISEASE

Rabbit haemorrhagic disease (RHD) is a viral serious disease which, due to its contagiousness and high mortality of infected animals, contributes to a huge loss for both rabbit farmers and rabbit owners. The aforementioned factors necessitate culling of not only the actually infected animals but also animals suspected of contact with infected ones, which results in severe economic losses in the farming industry.

The presented innovative technology relates to the production of vaccine against RHD that consists of recombinant capsid protein having haemagglutinating and antigenic properties, capable of forming pseudo-viral particles (VLP) and thus stimulating the production of antibodies in vaccinated animals. In addition, the marker properties of the developed vaccine provide an effective means of immunological differentiation between already vaccinated animals and those infected with RHD.

The proposed vaccine provides effective protection of animals and allows users to distinguish between infected and vaccinated animals, which may significantly benefit veterinary services, farmers, breeders and rabbit owners.

Patent application number:
P.376122



OLIGONUCLEOTIDES FOR THE DETECTION AND DIFFERENTIATION OF NEWCASTLE DISEASE VIRUS STRAINS

Germany, Poland, France, United Kingdom and Italy are by far the largest producers of poultry in Europe. With the leading position in the sector, however, comes particular susceptibility to poultry diseases, such as avian influenza or Newcastle Disease (ND).

The genetic material of the virus is particularly susceptible to mutations, which promotes the formation of new strains against which existing vaccines may prove ineffective.
Developing an efficient method of detection and identification of specific strains of the virus is therefore particularly important, as it provides farmers and veterinary institutions with an effective method of countering virus outbreaks, and thus avoiding severe financial losses.

The proposed unique technology allows for effective detection and differentiation of ND virus strains. The method relies on degenerate oligonucleotides complementary to sequences encoding fusion F protein for the detection of the virus in swabs from respiratory and/or digestive tracts of birds. The invention may be widely used for screening and prevention of ND epidemics in farmed poultry.

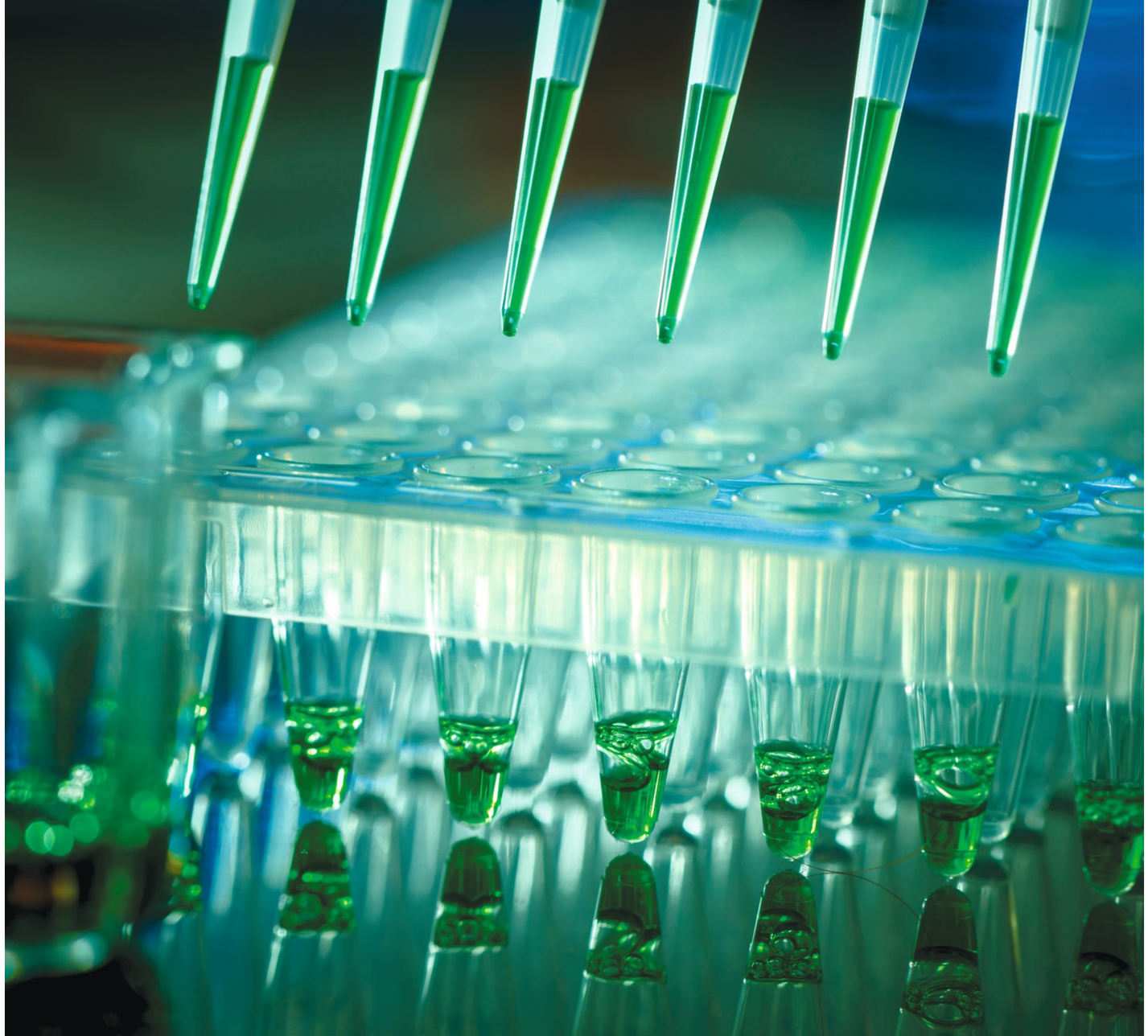
Patent number:
PL 227745

DIAGNOSTIC SET FOR THE DETECTION OF THE RABBIT HAEMORRHAGIC DISEASE VIRUS IN ANIMAL SERUM

Rabbit haemorrhagic disease (RHD) is a viral disease with a very high mortality rate reaching 100% of the affected population. It imposes the necessity of culling even animals suspected of being in contact with infected ones. The aforementioned hazards result in the high demand for diagnostic methods which allow for precise identification of diseased animals and their differentiation from healthy animals.

The developed technology allows for obtaining monospecific immune sera generated by vaccinating laboratory animals with purified recombinant RHD virus antigen (VLP RHDV) to be used in ELISA tests, ensuring high sensitivity, specificity and reproducibility of the obtained results.
The use of a control system consisting of a positive antigen and negative control of the virus as well as samples of control sera allows for quick and accurate classification of the investigated samples as either positive or negative.
Also, it allows distinguishing between healthy and infected animals without the need to cull the entire population.

Patent application number:
P.376121



NUCLEOTIDE SEQUENCE FOR THE DETECTION OF THE NEWCASTLE DISEASE VIRUS (NDV)

The Newcastle Disease (ND) virus exhibits very high transmission rates among birds, and in the case of particularly virulent strains, its mortality rate may reach 100%. The incidence of the disease has been reduced by the preventive vaccination of poultry, but the available vaccines do not counteract the infections of birds, which are a natural reservoir of the virus, and only alleviate or eliminate symptoms.

Consequently, the development of a new, effective method of detecting the ND virus in non-laboratory conditions is becoming increasingly important in order to prevent potential outbreaks in poultry and avoid related financial losses.

The presented invention allows detection of the ND virus in the natural conditions of its existence,in the respiratory tract of domestic and wild birds. The developed technology is used to check the presence of the virus in swabs from the throat or cloaca of farmed birds (ducks, chickens) and wild birds (e.g. pigeons).
The unique invention can be used for screening to prevent epidemics in poultry farming.

Patent application number:
P.391305

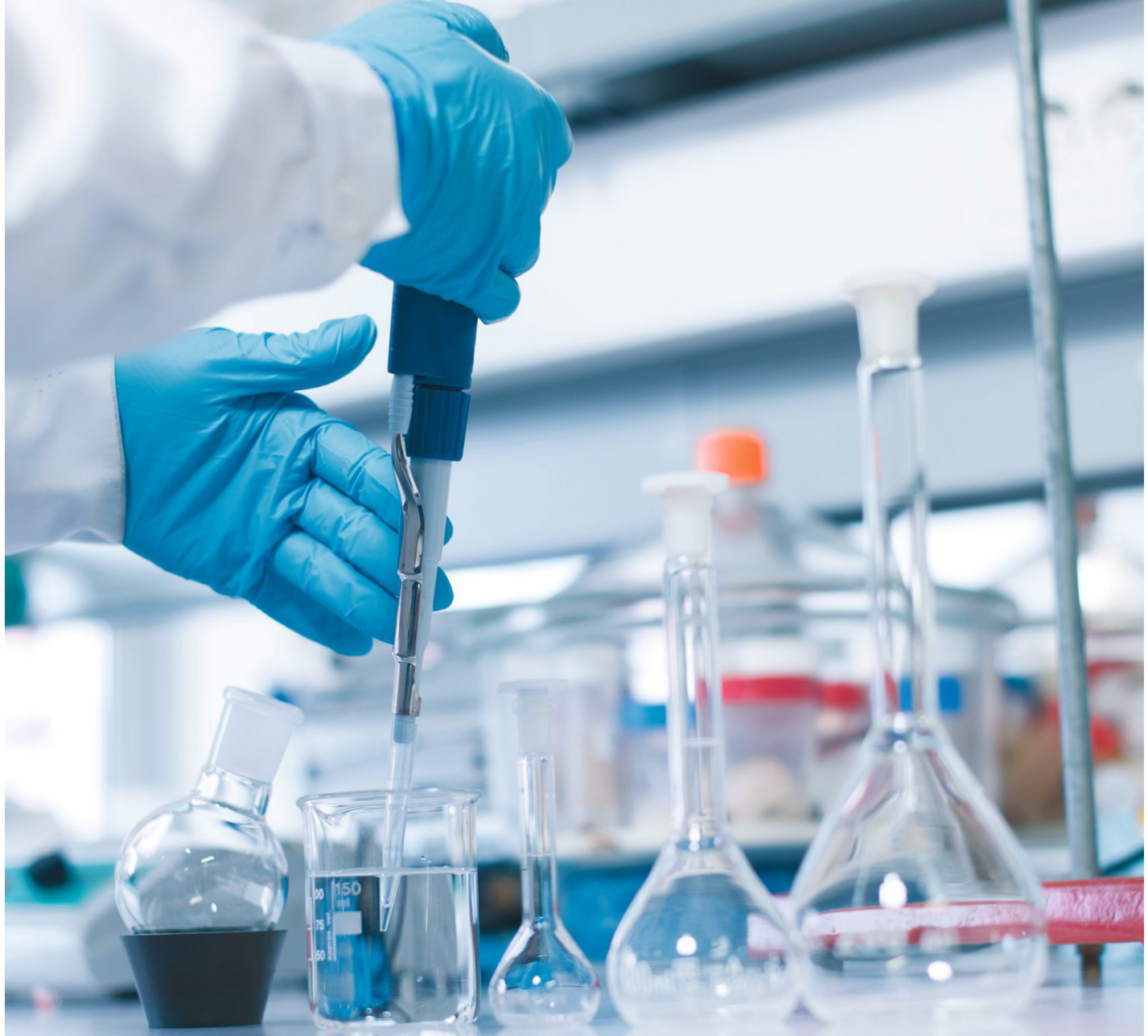
COPPER ION SENSOR

Copper ions (Cu2+ ions) – the third most abundant transition metal in the human body – play an important role in many fundamental physiological processes.

Both the insufficiency of Cu2+ ions, which is, among others, a symptom of anaemia, as well as their excess, are harmful and can lead to many diseases, such as Alzheimer's, Parkinson's, Huntington's diseases or those related to the digestive system, liver or blood vessels. Due to the wide use of copper, which is a heavy metal, e.g. in electrical engineering, electronics, construction and motorization or fertilizers, copper ions are also an important cause of environmental pollution.

The presented innovative sensor for selective and sensitive determination of copper ions in solutions may be used to analyse the quality of chemical reagents used in laboratories. The technology also allows measuring the concentration of copper ions: in waters (including mineral and deionised waters), in food drinks, in cosmetic and pharmaceutical products as well as in biological material.

Patent application number:
P.430245



PLASMA DISCHARGE SYSTEM FOR ERADICATION OF MICROORGANISMS

The presented technology is an innovative plasma discharge device utilising direct current atmospheric pressure glow discharge (dc-APGD) which can be used in sterilization processes involving liquids and gels, of both high and low viscosity (e.g. milk, water, beer, cream).

The device can be used for continuous eradication of such microorganisms as Dickeya, Pectobacterium, Xanthamonas, Clavibacter, Agrobacterium, Pantoea, Erwinia, Pseudomonas, Rathayibacter, Bacillus, Xylella, Burkholderia, Streptomyces, Sphingomonas, Acidovorax, Rhizobacter, Serratia, Rhizomonas, Clostridium and Enterobacter throughout extended periods of time, which, in combination with precise control of operating parameters, allows sterilization to be performed with very high accuracy and efficiency.

The design system is simplified by a lack of reliance on discharge gases for discharge initiation. This new developed method is efficient, environmentally friendly, cheap and competitive, compared to common industrial sterilization methods. The invention may be used in food, cosmetic and pharmaceutical industries as well as health services.

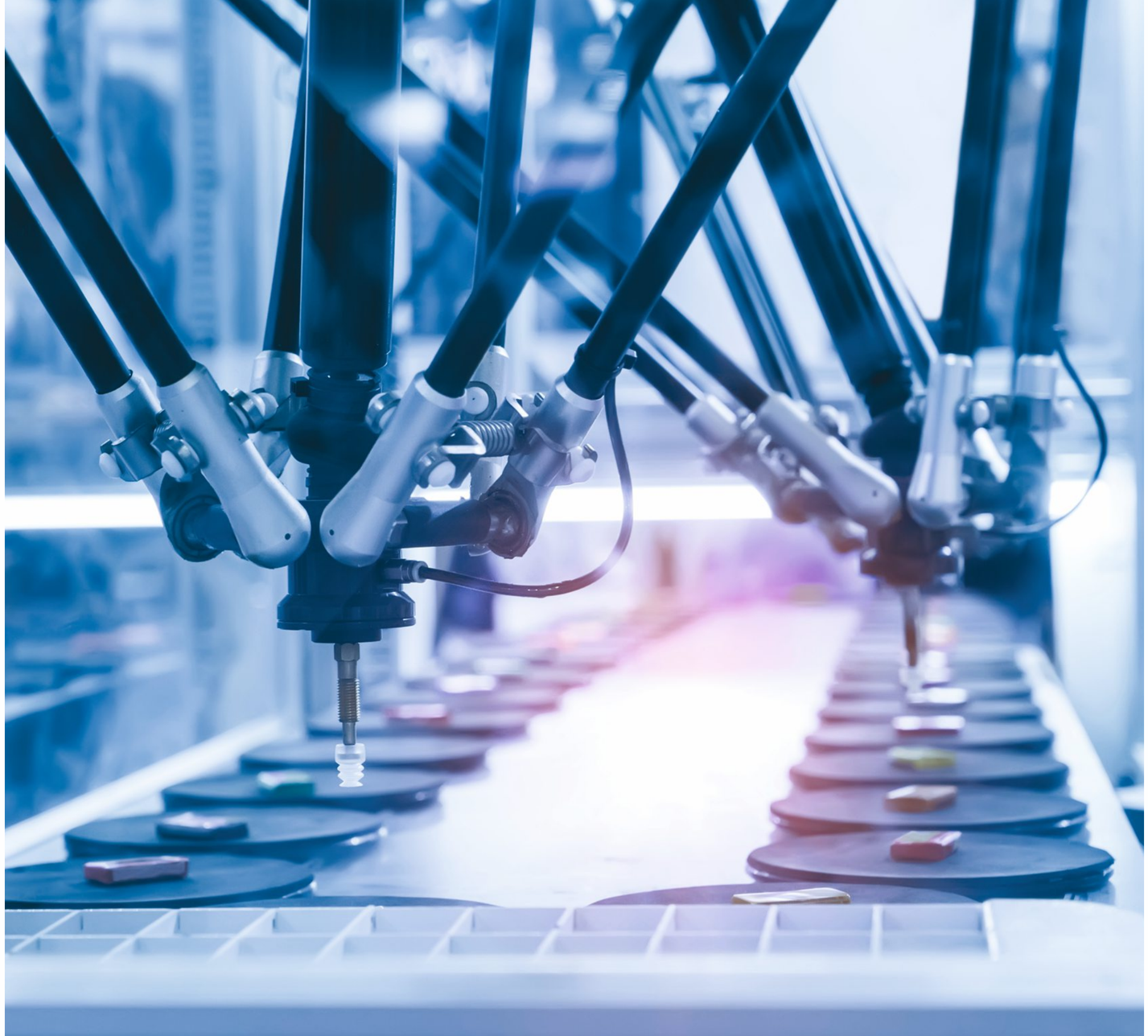
Patent application number:
P.419246

PROTEIN PVII WITH BACTERIOPHAGE M13 AND ITS APPLICATION IN THE BINDING OF NANOMATERIALS

Bacteriophages are used in hybrid materials (bionanomaterials) production and may be applied in biology, medicine, optics and electronics. Carbon nanofibers find a wide range of applications in many industrial sectors, with the largest share in chemical (52%) and electronics industries (40%), including semiconductors.

The presented innovative technology is based on pVII protein with M13 filamentous bacteriophage mutation being a part of filamentous phage with a diameter of about 6.5 nm and a modifiable length of about 880 nm, depending on the length of the single-stranded DNA packed in the capsule. The use of carbon nanofibers in industry is economically efficient due to the low costs and simplicity of production. The improvement of the electrical properties of carbon nanofibers gives the possibility of transfer this technology to various sectors of industry.

Patent application number:
P.415779



IMMUNOGENIC REAGENTS IN DIAGNOSTICS

The new reagents encompass the field of luminescence immunodiagnostics. They are based on acridinium/acridan esters and can be used in chemically bound, free form or as newly created test formats. The reagents enable carrying out ultra-sensitive quantitative analyses of biological molecules such as specific proteins, nucleic acids and others.

Use of reagents allows for carrying out immunodiagnostic tests such as CLIA and ECLIA. They may be used instead of classical IA and ELISA tests and also give the opportunity to quantify also other substrates like hormones, vitamins and medicines or assay their antioxidative properties. Carrying out analyses with the use of the reagents require only a simple luminometer capable of measuring in any way the intensity of emission.

The presented innovative technology based on the new reagents may be wildly applied not only in pharmaceutical and environmental analysis but also in every field where conventional analytical technologies based on spectroscopic measurements (e.g. absorption, fluorescence) are not sufficiently sensitive.

Patent application number:
P.416813

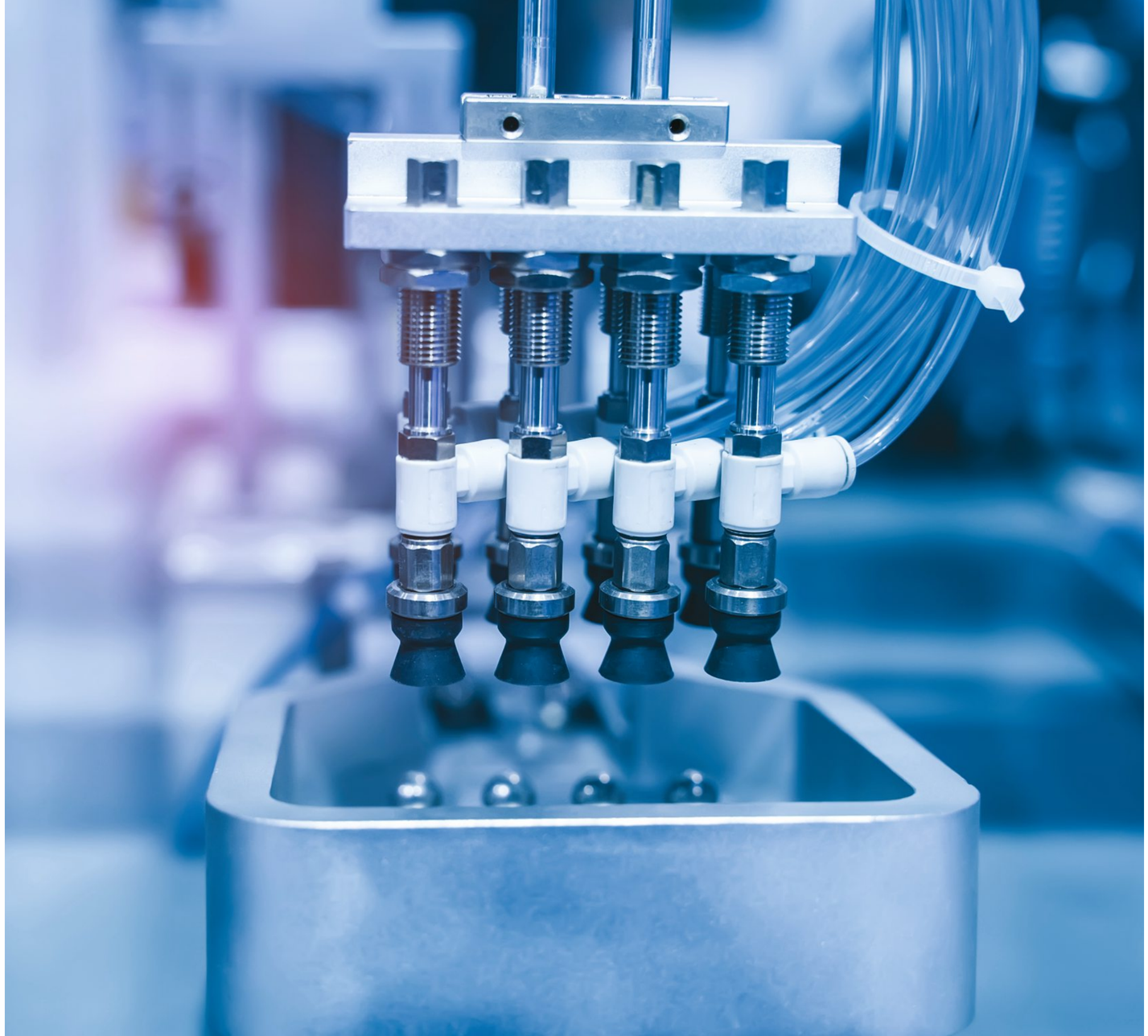
METHOD OF STABILIZING CHARGED STATES OF LANTHANIDES IN THE LUMINOPHORE PRODUCTION PROCESS

Maintaining proper stabilization and controlling the concentration of lanthanides at a given oxidation state [(n+1)+ or n+] is one of the key factors in the design and manufacturing processes of luminophores with defined luminescence properties.

The developed method has a number of advantages over currently used technologies for the production of luminous materials. In a typical synthesis of materials doped with lanthanide ions, the only parameter affecting the concentration of lanthanide at a given degree of oxidation is the heating time of the material in an appropriate atmosphere.

The presented method based on concentration control through co-doping is much more effective and more precise than alternative processing. In addition, by eliminating one stage in the synthesis process, the application of the proposed method translates into a lower cost of phosphors production. The method of synthesis is repeatable, does not require specialized equipment and can be used even in a modestly equipped laboratory. The method may find application in the production of lighting materials, e.g. light bulbs, screens, displays as well as vertical and horizontal road and motorway markings.

Patent application number:
P.411621



AUTOMATED DEVICE FOR SURFACE ENERGY MEASUREMENT OF SOLIDS PERMANENTLY SUBMERGED IN LIQUIDS

Adsorption, wetting and liquid to solids surfaces adhesion play a key role in many industrial sectors. The developed device sets up for the measurement of dynamic contact angles (CA) by the captive bubble method, and is unique in its ability to measure the surface free energy (SFE) of fully-hydrated solids submerged in liquid phase (not only aqueous) in situ, without any physical or chemical treatment of the test sample (such as transfer, removal or drying). The surface of the investigated solid remains fully submerged and emersion is not required for contact angle measurements.

A prototype, computer-driven version of the apparatus effectively measures dynamic contact angles allowing for determining additional wettability parameters, such as CA hysteresis or Π. The invention may have the following possible applications: prosthodontics, biofouling, investigating anti-corrosion coatings, paints and electrochemical sensors, the marine sector, hydro-engineering, agrochemical, limnological laboratories and research institutes.

Patent application number:
P.419913

FERMENTUM MOBILE

Fermentum Mobile is a spin-off company of the University of Gdańsk, which was established by combining experience gained in laboratory work with passion and knowledge about beer. It is the first company on the Polish market that was incorporated for the research and production of high-quality liquid brewing yeast.

The company possesses its own bank of brewing yeast strains which serves as a base to conduct effective propagations. The modern laboratory facility allows Fermentum Mobile to maintain the highest level of manufacturing standards.

The company's products are used not only by fans of home-made beer but also by a growing number of craft breweries. One can already find on the shelves of the best beers stores beverages fermented with Fermentum Mobile yeast - not only in Poland but also abroad. The development plans provide for the introduction of additional analytical services for small and medium-sized breweries that do not have their own laboratory facilities.

QSAR LAB

QSAR Lab is a spin-off company of the University of Gdańsk. This is an R&D company which specializes in computer design of new, safe chemicals and nanomaterials. The company is conducting R&D services in the area of nanotechnology, nanotoxicology, chemical statistics and chemometrics.

Furthermore, the company provides services in the sphere of safety assessment of chemical substances and nanomaterials in accordance with the standards of European law defined by REACH Regulation (1907/2006/EC) (2018/1881/EU), the Regulation on cosmetic products (1223/2009/EC) and the Regulation on plant protection products (1107/2009/EC).

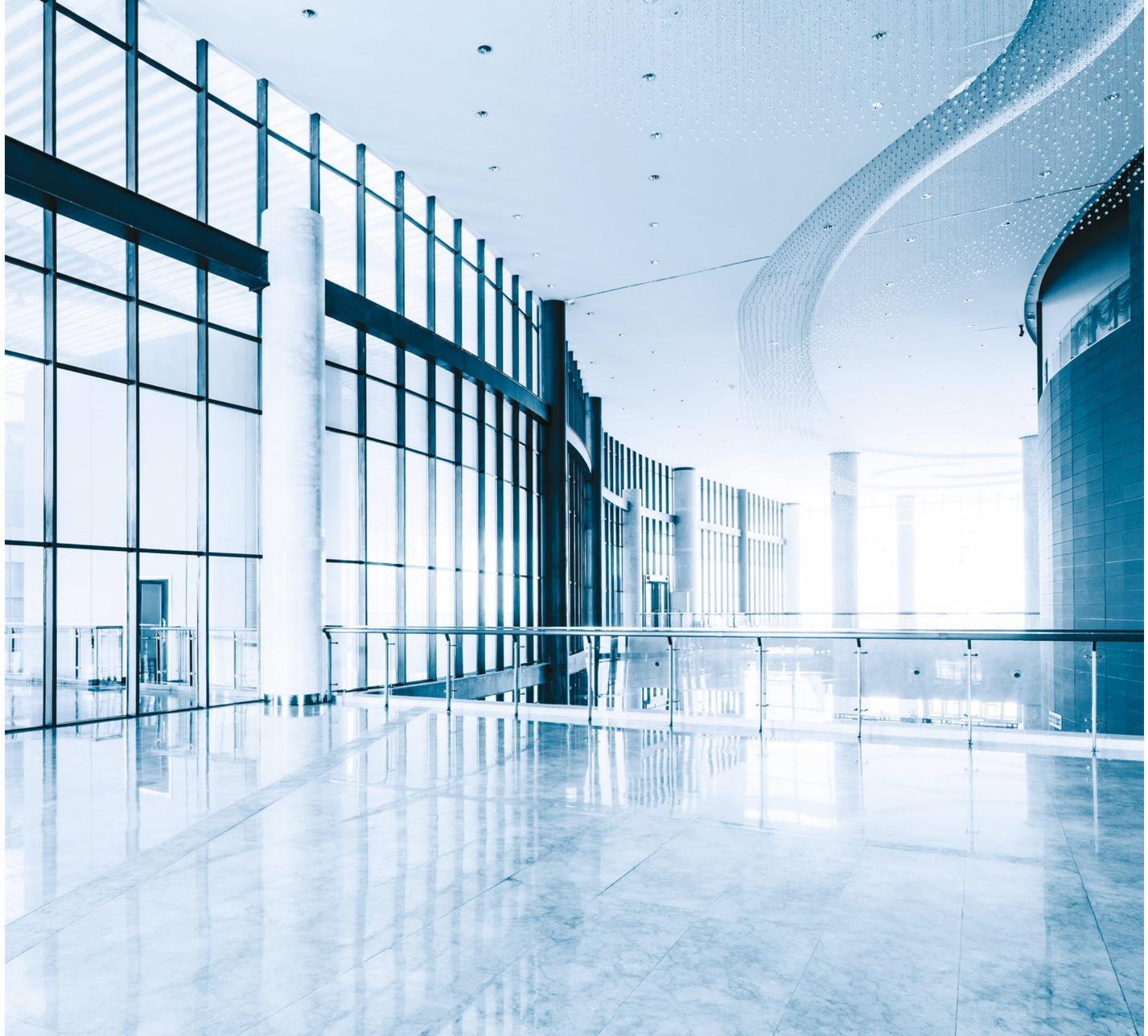
The company's offer commissioned research and the possibility of conducting joint R&D projects. The range of offered services includes support for designing new chemical substances using computational modelling methods, in silico analysis of physicochemical properties and toxicity of substances as well as consulting on the use and safety of nanomaterials. QSAR Lab also offers training course packages related to the application of computational techniques in designing new chemicals, the use of advanced techniques of data analysis and visualization as statistical data analysis.

OFFICINA BALTICA

Officina Baltica – a University of Gdańsk spin-off established in 2018. Its main purpose is the supply of services and products in the blue biotechnology sector.

Since plastic pollution is a global environmental issue, the company seeks to develop algal bloom biomass material intended to be an alternative to plastic. The company tests the chemical composition of algal bloom biomass found in the Baltic Sea, which is aimed at developing technologies intended to be used as a source of raw material for the production of foam in commercial use.

The spin-off focuses also on the development of unique and innovative equipment dedicated mainly to marine research. The company is also testing a prototype of a photobioreactor with internal lighting and is working on a drone technology project which will be used to collect biomass of algal blooms.



VAXICAN

VAXICAN – a University of Gdańsk spin-off established in 2019. The company specializes in research concerning the production of Newcastle chicken/pigeon vaccines. The production of vaccines is based on molecules called Virus-Like-Particles (VLP) from the NDV Paramyxovirus. The company conducts R&D services in the area of development of VLP molecules production technology in insect cells using caterpillar bioreactors.

The company's main goal is to create a modern, safe and inexpensive vaccine against Newcastle disease using a natural bioreactor, which is the gypsy moth caterpillar. The constructed vaccine will belong to a new and safe class of products, which are Virus Like Particles. Another company goal is developing breeding methods of gypsy moth caterpillars for commercial purposes.

The unique vaccine proposed by VAXICAN not only is ahead of the competitors by its level of security but also significantly reduces productions costs through the use of living bioreactors. VLP-NDV is the company's protein product which cannot be regarded as a GMO which further reduces costs of registration and simplifies registration procedures.

INTERNATIONAL CENTRE FOR THEORY OF QUANTUM TECHNOLOGIES

The International Centre for Theory of Quantum Technologies (ICTQT) is a joint research centre of the University of Gdańsk and the Institute for Quantum Optics and Quantum Information of the Austrian Academy of Sciences, which is a strategic partner. It was funded in 2018 within the implementation of the project "International Centre for Theory of Quantum Technologies". Its activity is focused on scientific research in the area of quantum foundations, quantum communication, quantum information, development of quantum technologies with an emphasis on quantum communication and new computing techniques.

The priority of the ICTQT is to find new solutions and protocols for the basic aspects of fundamental quantum physics, from new non-classical phenomena, measures of non-classicality, structural aspects of quantum theory, the theory of quantum measurement, up to the theory of open systems and quantum thermodynamics, and bring them into quantum technologies.

In addition, the ICTQT will create an innovative centre of excellence. Furthermore, ICTQT aims to develop quantum solutions for problems in communication and information security. Its specific goals in this field include the development of: quantum key distribution protocols with low hardware requirements, quantum true random number generators, existing and new quantum cryptographic primitives, methods for secure communication and computation, formal security proofs of quantum cryptographic protocols and also cryptoanalysis tools for industrial outreach.

INTERNATIONAL CENTRE FOR CANCER VACCINES SCIENCE

The International Centre for Cancer Vaccine Science (ICCVS) is a scientific partnership between the University of Gdańsk and the University of Edinburgh. It was launched at the University of Gdańsk in 2017 as a part of the International Research Agendas (IRA) programme. ICCVS aims to form a centre of excellence in inter-disciplinary research to improve human health by establishing discovery science programmes focussed on the immune-cancer synapse.

The scientific objectives of the ICCVS are based on existing international collaborative networks and they aim to define fundamental mechanisms underlying neoantigen production in cancer cells and oncogenic pathways that shape the cancer-immune synapse. Partners are striving to develop novel computational and proteogenomics strategies to fully define the mutated landscape of cancers. The collaboration includes an effort to develop novel comparative cancer models that drive innovation in monoclonal antibody development and the production of multivalent cancer vaccines.

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