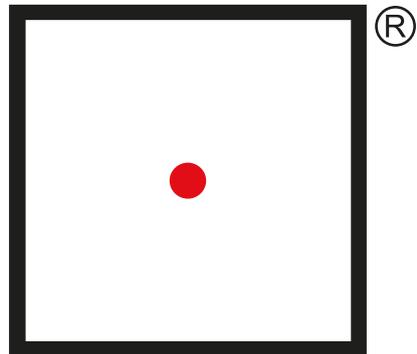


2020



**Polski  
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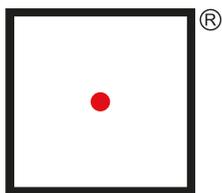
Awards catalogue

22<sup>nd</sup> Annual Competition Polish Product of the Future



The Polish Agency for Enterprise Development (PARP) is a government agency reporting to the minister in charge of the economy. The Agency's aim is to implement economic development programmes that support the innovative and research activities of SMEs, regional development, export growth, and HR development. It also focuses on using new technologies in business. PARP (The Polish Agency for Enterprise Development) actively participates in the creation and effective implementation of state policy related to entrepreneurship, innovation and staff adaptability, and is the key institution responsible for creating a supportive environment for entrepreneurs.

The National Centre for Research and Development (NCBR) is an executive agency of the Minister of Science and Higher Education. By co-financing R&D processes, it supports Polish entrepreneurs, significantly reducing their business risk associated with the implementation of ground-breaking research projects. The NCBR's (The National Centre for Research and Development) mission is to implement tasks serving the social and economic development of Poland, and to solve specific civilisational problems of its inhabitants. With an annual R&D budget of EUR 1 billion, it's currently the largest centre in the country that supports scientific and economic development.



**Polski  
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Przyszłości**

# Awards catalogue

## 22nd Annual Competition

### Polish Product of the Future



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The Catalogue is available free of charge  
ISBN 978-83-7633-427-1



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Creating optimal conditions for the development of modern technologies, products and solutions, as well as their economic applications are among the main goals set by PARP and NCBR in the Strategy for Responsible Development, which assumes that innovation is the main driving force of the economy.

According to the innovation ranking most frequently used in the European Union – European Innovation Scoreboard 2019 – Poland is a moderate innovator, and one of its strongest points is an innovation-friendly environment, in which Poland ranks 8<sup>th</sup>. The international Global Innovation Index 2019 ranking also indicates the business environment as a strength of the Polish economy.

At PARP and NCBR, we believe that the environment and the resulting innovative potential of our science and business sectors are at a high level. The possibilities of Polish enterprises are confirmed by subsequent

editions of the Polish Product of the Future Competition, which we organise jointly.

The Competition has seen over 1,000 projects from companies and scientific institutions that successfully implement and profit from innovations that meet the needs of the 21<sup>st</sup> century in almost every area of life. The Competition winners include a large group of beneficiaries of PARP and NCBR, which is not only a reason to be proud, but a confirmation that support from our institutions allows us to develop innovative projects.

We're also happy about the growing number of applications; almost 100 projects from fields such as medicine, chemistry, artificial intelligence, electronics and biotechnology were submitted in the 22<sup>nd</sup> edition. We're well aware that good examples teach better than the best training, so check out the winning and distinguished solutions and technologies that'll soon change our reality.



**Małgorzata Oleszczuk**  
President of PARP



**Wojciech Kamieniecki, PhD, Eng.**  
NCBR Director

# About the competition

## History

As many as 96 projects were submitted to the 22<sup>nd</sup> edition of the competition. Presentations of the best projects that were awarded and honoured can be found in this catalogue.

The aim of the Polish Product of the Future competition is to select and promote innovative products and technologies developed in Poland that have the potential to make a name for themselves not only on the domestic but also on the global market. The undertaking is organised jointly by the Polish Agency for Enterprise Development (PARP) and the National Centre for Research and Development (NCBR). PARP supports the innovative and

research activity of small and medium-sized enterprises, the NCBR the development of Polish scientific entities and enterprises. The winners are selected by a Jury composed of representatives of the most important institutions in the country: the Chancellery of the President, the Chancellery of the Prime Minister, the Ministry of Economic Development, the Ministry of Science and Higher Education, the Patent Office of the Republic of Poland, the Polish Development Fund, the Chief Technical Organisation, the Warsaw University of Technology, the University of Warsaw and representatives of the media. Awards and distinctions for the most innovative products and technologies are given in three categories: product of the

future by a higher education and science institution, product of the future by an entrepreneur, and joint product of the future by a higher education and science institution and an entrepreneur. The winners receive a financial reward of PLN 100,000, the honoured participants – PLN 25,000. Moreover, all laureates receive the right to use the prestigious sign and slogan „Polish Product of the Future” in their correspondence and promotion. In the 22-year history of the competition, over 1000 innovative projects from various sectors of the economy have been submitted, including the medical, pharmaceutical, electronic and electrotechnical, chemical and industrial automation sectors. So far, 58 projects have

received awards and 123 have been distinguished. Last year’s laureates are very successful in the market. The FlexiOss bone substitute composite by the Lublin-based company Medical Inventi has proven itself in practice. This material was used, for example, to replace a 7-centimeter bone fragment in a patient who was at risk of amputation after a motorcycle accident. The Gdańsk-based company Chitone, which received the award for ChitoVelum® Pro, is planning to launch another revolutionary product onto the market, which will extend the freshness of food products.

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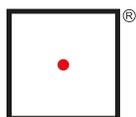
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Polski  
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# StethoMe® – Smart Stethoscope

## Description of the solution

The device is integrated with a mobile app and artificial intelligence algorithms – StethoMe® AI – which identify sounds occurring, among others, in the course of infections, pneumonia, asthma. A precise examination of the lungs by the patient at home is possible thanks to the use of unique technologies ensuring the control over the quality of examination. The system verifying the quality of recordings is based on AI algorithms, which check whether the examination was carried out properly. For example, the system records sounds only when the stethoscope is positioned correctly. It also informs about excessive noise in the room and

pauses the recording until the disturbances cease. It allows to send the test results to an audiovisual panel operated by a physician.

## Introduced innovations

This smart stethoscop connects to an application via wireless technology. A patient records sounds which are saved in the dedicated app. Such a recording is then sent to the StethoMe® AI system, where it is analysed by algorithms. Once the analysis is complete, the patient is quickly informed if abnormal sounds have occurred. The results and recordings are also sent to the physician's panel – a platform used to preview the analysis.

**Use**

StethoMe® is intended for everyday use. The device can be used both by patients at their homes and by medical centers that provide telemedicine services. It helps patients to feel safe and quickly dispel any doubts in case first worrying health-related symptoms appear.

The solution also supports physicians in the diagnostic process removing their doubts related to the assessment of the auscultation. It provides them with the result of pathology detection, the highest quality sound, a spectrogram, as well as an alert on the appearance of abnormal sounds in the lungs. This allows them to diagnose

**The StethoMe® wireless stethoscope is a part of a system based on artificial intelligence (StethoMe® AI) that detects abnormalities in the respiratory system.**

and monitor chronic diseases (e.g. asthma) more precisely and supervise the treatment process without the need for a traditional appointment.

**Implementation status**

StethoMe® is available for sale to business customer as part of the integration. Both the stethoscope and the algorithms detecting abnormal sounds in children's respiratory system have already been awarded a medical certificate (CE 2274) in class IIa –

awarded to medical devices in the EU after a positive assessment by a Notified Body.

Medical certification of AI algorithms for detecting heart murmurs and abnormal sounds in the respiratory system in adults is currently underway.

The manufacturer cooperates in the B2B2C model – mainly with European partners in pilot projects and technology integration. The partners are also telemedicine companies,

clinical units, insurance and technology companies, as well as public organisations and entities. The product is already present on several markets, such as in France, Great Britain, Germany, The Netherlands and Poland.

### **Benefits of using the product**

The solution – using telemedicine – ensures equal access to healthcare services. All this thanks to technology, which allows people to freely contact the physician (regardless of race, gender and place of residence), and thus improve their health and increase their activity in social, professional and public life. The possibility of remote consultation with the support of the AI module also enables quicker consultations, reduces the number of appointments and the risk of misdiagnosis, as well as

ensures continuity of treatment and care.

### **Comparison with the current state of the art**

StethoMe® is a unique combination of a digital stethoscope with AI algorithms. The medical certification of AI algorithms for auscultation of lungs in children is the first such certification in the world. The StethoMe® AI algorithms are 29% more effective than pulmonologists when it comes to detection and classification of abnormal sounds appearing in the respiratory system, among others, in the course of infections, pneumonia, or asthma.



Examination performed using StethoMe® at home.

The StethoMe® electronic stethoscope is compatible with the mobile application and StethoMe® AI (a certified medical sound analysis system supporting the diagnostic process).



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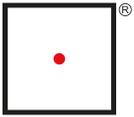
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**Polski  
Produkt  
Przyszłości**

# Photovoltaic glass with quantum dot coating

## Description of the solution

Photovoltaic glass uses nanocrystalline semiconductor structures – quantum dots as electromagnetic wave converters. This gives it excellent parameters of thermal and energy insulation, light transmission and reflection with a simultaneous function of energy generation. Harmful IR and UV radiation is converted into electricity.

It is distinguished by high transparency and can replace standard glass with a low-emission coating.

Quantum dots are semiconductor structures that enable easy control of the range and amount of absorbed electromagnetic

wave. The use of glass with the quantum dot coating reduces the heating of rooms by 80%, which corresponds to the reduction of temperature in the building in summer by 2°C. Without increasing the weight of the glazing structure. Therefore, standard window frames can be equipped with photovoltaic glass instead of coated glass. Cells based on quantum dots work just like standard PV cells – the difference being that quantum dots are more stable and much more resistant to external factors.

## Introduced innovations

On the photovoltaic market, 1<sup>st</sup> and 2<sup>nd</sup> generation cells are popular. The 1<sup>st</sup> generation cells made of crystalline

silicon account for over 80% of all solutions. Due to high labour intensity, they are very expensive. Their disadvantages also include: limited absorption range, decreasing efficiency when temperature rises, angular absorption dependence. Production of thin-film PV cells of 2<sup>nd</sup> generation is cheaper. Advantages: partial transparency,

low weight, which enables installation without interference with structural elements.

The active glass solution combines the best parameters of both generations (temperature stability over time, transparency, low weight and low production costs). Additional benefits are: working at low light levels,

**It generates energy from the sun, significantly improves thermal insulation and energy balance of buildings as well as of means of transport.**

wide absorption range and independence from the angle of light.

### **Use**

It can be expected that in a short time, nano-coatings will replace standard selective coatings. Ensuring increasingly better protection against overheating and at the same time allowing as much light as possible is a desire not only for designers

of buildings, but also of large vehicles (trams, trains, buses) and smaller ones (ambulances, combat vehicles, passenger cars).

### **Implementation status**

- The necessary permits have been obtained and the infrastructure has been designed.
- Construction of the production hall has started.

– The process of purchase of necessary machinery and equipment has begun. Parameterisation of purchased machines and equipment is planned for the end of 2020. Implementation and launch of production – at the turn of 2020/2021).

Product promotion will be carried out parallel to the above stages. Data sheets will be developed and trained sales representatives will offer the product to B2B customers.

### **Benefits of using the product**

The product is characterised by low sensitivity to urban pollution and increased resistance – thin glass has increased mechanical strength and resistance to weather conditions, including hail. It has lower risk of becoming

dull. It weighs about 70% less than the existing solutions. Future customers will receive a product that looks attractive and is also energy-efficient. Even with lower levels of light and diffused light, this glass can potentially operate in conditions of heavy cloudiness and at different angles of light. The product use will also reduce the heat reflection effect in urban infrastructure, which will improve the energy balance of cities.

### **Comparison with the current state of the art**

Quantum dot coated glass is a global revolution in the industry of both glass used in construction and in mobility sector.



Glass with  
quantum coating.

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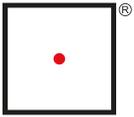
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**Polski  
Produkt  
Przyszłości**

# Recovered Carbon Black from used tires

## Description of the solution

The result of the purification of biochar (contaminated soot) produced in the process of recycling of used tyres is recovered carbon black obtained in an ecologically sustainable manner. After the treatment, the product is sold to manufacturers of rubber goods and in this way it returns to the circuit. Carbon black is an extremely important industrial product – without it the tyre would only be able to cover 100 km. After that distance it would simply get damaged. More than 14 million tonnes of carbon black are currently consumed worldwide. The problem is that it is traditionally obtained as a result

of burning fossil fuels. Syntoil, however, obtain recovered carbon black in an ecological way.

## Introduced innovations

Until now, biochar used to be burned in cement factories because nobody knew how to clean the product. Syntoil collects the biochar from the companies producing it and puts it back into circulation – after previous purification.

## Use

Ecologically produced recovered carbon black can be used in the production of rubber, tyres as well as rubber goods such as car mats

or doormats. Additionally, it can also be used as a pigment.

#### **Implementation status**

Syntoil S.A. is at the stage of expanding the scale of the installation from semi-industrial to industrial. The company has signed agreements on sales and

cooperation with carbon black distributors and producers of rubber goods. The product is being tested on an ongoing basis.

#### **Benefits of using the product**

It does not burn the biochar, but recycles it – as part of the circular economy.

**Syntoil deals with the treatment of biochar (contaminated soot) produced in the process of recycling of used tyres, resulting in recovered carbon black obtained in an environmentally sustainable manner. The company operates within circular economy.**

Reduces the burning of fossil fuels, i.e. crude oil. Helps reduce the carbon footprint. Traditional methods of carbon black production emit a lot of CO<sup>2</sup> (up to 6 tonnes per tonne of carbon black). Here it is less than a tonne of CO<sup>2</sup> per tonne of carbon black, and in the near future there are

plans to use all the carbon dioxide in the process of production of recovered carbon black.

#### **Comparison with the current state of the art**

Both the process and product are innovations on a national

and global scale. Competitive solutions are characterised by much lower purity of material, which limits their use.



Team Syntoil



Carbon black from  
used tyres.

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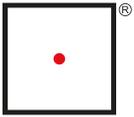
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Team Syntoil





Polski  
Produkt  
Przyszłości

# ICE-ON – Chill-Based Electrical Battery

## Description of the solution

The Chill-Based Electrical Battery – known under the trade name ICE-ON is a device that uses the energy of phase transitions of water into ice at the stage of storage of the energy and the other way round: of ice into water – at the stage of release of the energy. The stored electricity is released as cold, which powers air-conditioning equipment and industrial cooling processes.

The ice is produced at night – due to the lowest cost of electricity and the highest efficiency of compressor equipment – and energy is released during the day, at peak times, when the price of electricity is the highest.

## Introduced innovations

As a result of the R&D works carried out, a heat exchanger was developed, which is the first in the world to enable ongoing removal of ice, and thus its accumulation with unchanging compressor parameters and without any reduction in efficiency. Switching on the ICE-ON at peak times of outside temperatures relieves the chillers operating at maximum capacity with lower efficiency, reducing their load, and thus electricity consumption. This relieves the electricity grids during the hours of peak demand. The device allows for continuous operation – ice can be produced and consumed at the same time.

**Use**

The Chill-Based Electrical Battery may become a breakthrough product, a broadly defined Energy Warehouse for: food processing, chemical, pharmaceutical, plastics, electronics, precision industries and for air-conditioning systems – both in the newly

designed and refurbished installations.

**Implementation status**

Comprehensive industrial tests and research & development works on the battery and its components have been carried out. A prototype of the

The device enables the accumulation of electricity, its storage in the form of ice and the transfer of energy to air conditioning equipment or industrial cooling processes. It reduces the costs of producing cold and in this way also the operating costs.

technology was demonstrated under operational conditions. Research and demonstration of the final form of the technology has been completed. It was established that the target level of the technology has been achieved and it can be applied under the conditions foreseen for it. Thus, the TRL 9 technology readiness level readiness of the new technology to be applied in

practice, under real conditions – was confirmed.

**Benefits of using the product**

Approximately 50% lower costs of energy used to produce cold. Maintaining cooling despite power cuts until the ICE-ON is discharged. Therefore, the device increases the level of security of internal cooling installations in

buildings and industrial plants. High stability and performance with virtually no decrease during exploitation.

Maintaining cooling comfort thanks to the ability to react dynamically to changing needs. Increasing the energy efficiency in RES installations such as: wind power and PV (photovoltaic) installations. Contribution to the reduction of the greenhouse effect (CO<sub>2</sub> reduction). Preventing grid overloads, especially in periods of the strongest sunshine. The service of delivering cold may be a new sales product for electricity producers and distributors.

### **Comparison with the current state of the art**

The Chill-Based Electrical Battery belongs to technical innovations at European and global level, as illustrated by opinions on innovativeness. The Polish Patent Office, in its report on the examination of the state of the art of patent applications concerning the chill-based battery, determined their level as 5xA.

The patent protection shall cover Europe and selected countries in the world.

The innovative technology allows the ice to accumulate evenly over the entire surface of the exchanger, which is placed in the water tank in a horizontal position. Thanks to this positioning, the ice, after reaching the pre-programmed thickness, separates from the surface of the exchanger and is guided by the force of buoyancy – as a uniform sheet – towards the water surface. This function allows to achieve the level of 100% efficiency of the exchanger several times during one cycle of freezing the water in the tank and fill it with many layers of ice created this way. This allows for continuous operation of the equipment – ice can be produced and consumed simultaneously, which is not possible using any other technology.

At present, ICE-ON has no direct competition offering a similar product on the Polish and European market.



ICE-ON – Chill-Based  
Electrical Battery

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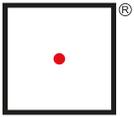
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**Polski  
Produkt  
Przyszłości**

# Advanced Larynx Imager – advanced larynx imaging system

## **Description of the solution**

The Advanced Larynx Imager (ALI) system consists of a high-speed camera (ALI Cam-HS1) and a multifunctional laser illuminator (ALI Lum-MF1). These devices are controlled by the original DiagnoScope Specialist software. Together they enable the most comprehensive diagnosis of laryngeal function possible.

## **Introduced innovations**

ALI Lum-MF1 is the first endoscopic illuminator in the world utilising laser light. It is a light source of outstanding intensity and perfect shape of a light beam, providing less loss (heating) in optical components.

In addition, it has a narrowband character, which allows for the use of the most modern diagnostic techniques (spectral characteristic is adjusted to the sensitivity of the camera and the specificity of laryngeal tissues). It is the only endoscopic illuminator in the world that allows to fully utilise the advantages of a high-speed camera for diagnosing the functioning of vocal folds in regular clinical use, not just for scientific research. This high intensity of light allows the use of a quick shutter speed and provides a sharp image of moving objects. To facilitate the physician's work and improve the quality of medical data, the camera has been given

a unique electronically controlled autofocus lens. Together, the camera and the illuminator allow to achieve new quality in phoniatic diagnostics.

#### **Use**

The system enables the diagnosis of all laryngeal diseases – both

functional and organic – at a level previously impossible to achieve.

#### **Implementation status**

The system was developed as a result of the R&D project POIR.01.01.01-00-0083/15-02 implemented by NCBiR (National Centre for Research

**The system equipped with a camera recording 3200 frames per second and a pioneering laser endoscopic illuminator enables clinical diagnosis of the condition of the patient's larynx with a precision that has not been achieved so far either in Poland or abroad.**

and Development in Poland). The completed one-year long clinical research has confirmed its high parameters and usefulness. The production process has started and the pilot model has been operating for a year in a health resort hospital specialising in voice rehabilitation.

#### **Benefits of using the product**

Speech organ diseases are a significant social problem.

About 6 million people in Poland need their voice for work, and even a slight dysfunction of the speech organ that was left untreated for a long time can lead to permanent damage.

Precise diagnostics is also required for laryngeal cancer. The disease develops very quickly and is often terminal. The quality of speech organ diagnostics can be improved by using methods that are as advanced and detect

changes as early as possible and thus enable effective treatment and rehabilitation. The specialists receive a tool that provides much more reliable results and is easy to use correctly, so that it could also be operated by a medical technician, relieving physicians of some of the tasks that do not require higher qualifications. The physician is only left with the most important task – the diagnosis – for which they have more time.

A stroboscope is effective when this movement is regular but – paradoxically – voice disorders usually result in irregularity of vocal folds. Thanks to the developed system, the postulated leaving the stroboscopy for screening and the widespread use of high-speed cameras in diagnostics becomes possible for a wide range of specialists.

### **Comparison with the current state of the art**

Until now, the only commonly available technique was stroboscopy, which is limited by the need to synchronise the sequence of photos with the motion of vocal folds.



DiagNova –  
Advanced Larynx  
Imager

DiagNova – ALICam-  
HS1 high-speed  
camera head with  
an endoscope –  
sample for clinical  
trials



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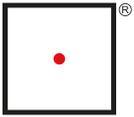
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**Polski  
Produkt  
Przyszłości**

# Musicon – a breakthrough educational tool designed to stimulate the psychophysical development of children

## Description of the solution

Musicon is a tool responding to modern global educational trends, used in the teaching and therapy of children in pre-school and early school age.

The tool fits into the following teaching ideas and principles: STEAM, Montessori, Gordon, Doman, Glottodidactics and Waldorf Education. By engaging multiple senses, simultaneously stimulating both cerebral hemispheres – logical as well as creative – and by activating a reward system and emotion-based work, it enables brain-friendly teaching in line with the

neurobiological conditions of an effective learning process. It is also a tool to develop multiple intelligences.

## Introduced innovations

The main elements of Musicon are the push-buttons. In binary, it is described as 0-1. Like in an analogue computer. Thanks to this form of manual programming, you can also carry out the teaching of sensory mathematics – counting using sight, touch and hearing.

In Musicon, the system of teaching music has been reversed – children starts with play and

composition. They use musical notation before they learn the notes, they create music (conduct an orchestra) without having to master the basics of playing any traditional instrument.

kindergartens, museums, common rooms, speech therapy offices, pedagogical and psychological counselling centres, therapeutic centres, retirement homes.

### **Use**

The target group are children 3-12 years old and seniors. Musicon can be used in schools,

### **Implementation status**

Musicon was put into production in 2018. Thanks to the fact that the tool uses the most universal

**Musicon is a breakthrough educational tool designed to stimulate the psychophysical development of a child. It engages the basic senses (sight, hearing and touch), increases teaching efficiency and enables programming and playing music.**

language in the world – music – it knows no borders and successfully reaches both Polish and foreign institutions.

### **Benefits of using the product**

Durability of the effect, which motivates further work. It gives a sense of success and a reward in the form of one's own composition, which can be

listened to several times. It gives the possibility of observation, possible corrections and allows to record the effects of the experience. It does not require mastering the technique of playing the instrument.

Increased concentration and efficiency of learning. By stimulating the dominant senses – sight, hearing and touch –

according to the mechanisms described in Dale's Cone, users achieve a very high level of knowledge acquisition (e.g. activation of motor memory). Multisensorial stimulation and the possibility of self-regulation (adjusting the pace and the ability to modify the set of instruments) provide stimuli to the user according to his/her individual abilities and needs.

Most traditional instruments used in educational institutions are of low quality (cheap materials and low quality of production), which translates into unfavourable tone colour. The instruments in Musicon are selected in such a way that their sound has a positive influence on, i.a., the proprioceptive system, muscle tension and emotions.



That activities are called Music Therapy.

Musicon affects different senses: hearing, sight, touch, proprioception. It is helpful in the therapy of sensory integration disorders and is used in oligophrenopedagogy. This kind of actions are known as a Multisensory learning.

### **Comparison with the current state of the art**

60% of children of the generation that will enter the labour market in 10-15 years' time will be employed in jobs that do not yet exist. Thanks to promotion of the development of cognitive, social, digital and technological competences, Musicon is the complete answer to this challenge.

The modularity of Musicon allows to freely swap instruments around, experiment with melodies and rhythm.



Intuitiveness is one of Musicon's primary features

## Company information

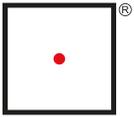
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**MUSICON**



**Polski  
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# ILAGRO – Innovative product that stimulates plant resistance

## Description of the solution

ILAGRO is a different way of providing plant protection against diseases. It stimulates the natural mechanisms of their resistance using an active, environmentally neutral substance. Such protection also leads to improved quantitative and qualitative crop parameters.

## Introduced innovations

Instead of focusing on combating plant pathogens with chemicals, the active substance activates and strengthens the natural mechanisms of plant resistance. This makes it non-toxic both to the plant itself and to the environment.

## Use

ILAGRO is environmentally friendly and cost-effective. To stimulate the mechanisms of plant resistance, it is sufficient to use a minimum amount of active substance – even less than 10 g per hectare. This is 50 to 100 times less than in products currently used in agriculture. The use of the product will contribute to reduction of agricultural production costs and in lower food prices.

ILAGRO can be used to grow virtually any plant species. Moreover, the induced resistance provides the plant with protection against diseases caused by pathogenic bacteria and fungi,

as well as by viruses – where conventional protection measures do not work.

#### **Implementation status**

The group under the leadership of Marcin Śmiglak, DSc, Eng. from Poznań Science and Technology Park has been conducting research on plant resistance inducers since 2013. The

compounds potentially showing biological activity, combined with the induction of plant resistance mechanisms, were synthesised and initially studied under the projects of the Foundation for Polish Science and the National Science Centre. It was possible to narrow down the group of the tested compounds to those showing the highest biological activity, and these have been

**It contains a fully environmentally neutral active substance, which stimulates the plant immune system to defend itself against diseases caused by bacteria, fungi and viruses. It also improves the qualitative and quantitative crop parameters.**

patented in Poland and abroad. In 2017, the spin-off company Innosil sp. z o.o. was established, which acquired the patent rights on a license basis. Since 2019, the scientific consortium of the Poznań Science and Technology Park and the Innosil company has been implementing a project under the Team Tech programme of the Foundation for Polish Science, co-financed by EU funds

(from the European Regional Development Fund under the Smart Growth Operational Programme). The project involves research and development works with the participation of scientific partners from Poland, Germany, Italy and the USA as well as industrial partners. This creates an opportunity to place on the market the first Polish substance inducing plant resistance and

to revolutionise the current approach to the protection of plants. The product still has to go through a number of registration tests, conducted in parallel with research and development works.

### **Benefits of using the product**

European Union legislation imposes the reduction of harmful active substances in plant protection products. Up to 25% of active substances used in agriculture will be withdrawn from the European market. However, the reduction in the number of active substances increases the probability of pathogens building up immunity. This may result in the necessity to use higher doses of active substances and, as a result, introduction of more chemicals to

the environment. There is a great need to introduce new products based on highly efficient, versatile and environmentally neutral substances. ILAGRO responds to that need.

### **Comparison with the current state of the art**

The direct influence of the active substance on the plant's metabolism makes it impossible for pathogens to acquire immunity to the product. Moreover, this type of protection does not cause additional difficulties or increase costs, since the application is carried out using techniques that are already used in agriculture.



Field experiment conducted at the premises of one of the partners. The influence of the concentration of the active substance contained in the ILAGRO product and its application dates on strawberry crops was tested on experimental plots

Experiment involving  
broccoli planting  
conducted at the  
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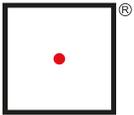
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**Innosil**



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# Otoimplant – middle ear prosthesis with bactericidal effect

## Description of the solution

Otoimplant is a middle ear prosthesis, used both as a total and partial prosthesis. The diverse assortment of sizes allows for the reconstruction of the auditory ossicular chain in a large group of patients suffering from hearing loss. The prosthesis is made of medical polymer, using injection technology by introducing into the polymer matrix a bactericidal modifying additive (silver nanoparticles).

When it is necessary to reconstruct an entire sound-conducting apparatus, full TORP-type (Total Ossicular Replacement Prosthesis) prostheses are used to replace all three auditory

ossicles in the middle ear. In the case that the conductive system has at least one of the ossicles (malleus or stapes), partial PORP-type prostheses (Partial Ossicular Replacement Prosthesis) are used.

## Introduced innovations

The innovativeness of Otoimplant is associated with both the shape of the prosthesis and its antibacterial function. The prosthesis – tested in clinical research – allows improvement of hearing in patients, demonstrates antibacterial properties confirmed by in vitro tests against Gram-positive and Gram-negative bacteria most commonly found in middle ear cavities and is safe for the organism, which was

first proved by in vivo tests on laboratory animals and later by clinical research in patients.

### Use

Developed and tested in clinical research with patients, the laryngological prosthesis provides patients with a shorter period of convalescence and reduces the risk of complications caused

by bacterial infections, as well as enables the reconstruction of the middle ear bone structure and functions by restoring the correct ossicle resonance. This type of implant makes it possible to improve the hearing in patients with a damaged ossicular chain caused by inflammation, injuries, congenital anomalies and otosclerosis.

The product is intended for patients who suffer from hearing loss caused by damage to the auditory ossicular chain as a result of otitis media, past diseases, congenital anomalies and injuries. The purpose of the prosthesis is to restore the patient's hearing.

### Implementation status

The product is at level VIII of technological readiness (TRL). In vitro laboratory tests, in vivo clinical tests on animals and clinical research with patients were carried out. The production technology and the form of the medical device were finally developed. The studies confirmed that the target level of technology

has been reached and the implant can be used in the conditions foreseen for it. The team is in talks with potential investors ready to cooperate on the last phase of product development, i.e. bringing the solution to the last IX TRL level, and thus offering Otoimplant as a finished, fully-fledged product, which can be e.g. subject to co-financing from the National Health Fund.

As part of the protection of intellectual property, the product is protected by a Polish and European patent and the trademark „Otoimplant”.

### **Benefits of using the product**

The product remedies the problem of deafness or hearing loss, which often lead to the exclusion of affected people from society. Patients with Otoimplant can function freely, both in general relationships as well as in the pursuit of their passions or practising sports.

### **Comparison with the current state of the art**

On the medical device market there is a wide selection of middle

ear prostheses. However, there are no prostheses made of plastic, which are also bactericidal. Moreover, Otoimplant allows to perform diagnostic imaging (CT and MRI scans) without artefacts, is highly biocompatible, lightweight and has similar properties to those of the tissue being replaced. None of the competing products combine these features, and all of them are desirable.



Implant



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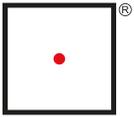
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# Henola – Unique in the world industrial hemp variety commercialised under the Hemp Programme

## Description of the solution

Hemp raw materials are used in the food, textile, cosmetic, medical and construction industries. The Institute of Natural Fibres and Medicinal Plants has bred a variety with unique in the world qualitative and quantitative parameters. Under the IWNIRZ Hemp Programme, which has been established to commercialise the potential of the Institute, seeds of the Polish Henola variety are implemented on several continents.

## Introduced innovations

Henola variety of industrial hemp is the latest variety bred in the Institute of Natural Fibres and Medicinal Plants. Almost 90 years of experience of the Institute allowed to develop an oil-type variety, which is characterised by seed yield at least twice as high as compared to other varieties available on the market (2-3 tonnes per hectare for industrial plantations), low height – up to about 2 m, and a vegetation period shorter by 3 weeks. Henola seeds have a very favourable ratio

of fatty acids and biomass is rich in terpenes.

### Use

The main products with high market potential derived from the plant are: sowing seed, industrial seeds, inflorescence, straw, fibre, and shiv.

Industrial seed are currently the most stable and dynamically developing sector of the industrial hemp market. They are used in the food sector to produce a whole range of products such as roasted seeds, hulled seeds, hemp oil, hemp flour, hemp protein, hemp milk, hemp bars, hemp muesli, hemp bread, etc. Hemp oil

**Henola is an oil-type variety of industrial hemp with a yield at least 2 times higher than other varieties available on the market. This allowed it to be commercialised under the Hemp Programme of the Institute of Natural Fibres and Medicinal Plants (IWNIRZ) in Poland and abroad. Including the USA, where hemp processing is considered to be the fourth most dynamically developing economic sector.**

is also an important ingredient of many cosmetics.

### Implementation status

Work on breeding a new form of hemp which would be characterised by a high seed yield began in 2007. After 7 years of intensive breeding work, an interesting breeding line was obtained, which was submitted

for registration tests at the Research Centre for Cultivar Testing (COBORU) in Poland. In 2017, it was entered in the National Register under the name Henola, under number R 2908, followed by enrollment on the EU common catalogue of cultivated crops. The Institute of Natural Fibres and Medicinal Plants obtained the exclusive breeder's right to the "Henola" variety

numbered R 1372 and this variety was approved by the Colorado Department of Agriculture.

The commercialisation process was handled by the IWNIRZ Hemp Programme team, which allowed for the conclusion of a very beneficial, long-term contract with a key US player in this industry. As a result, Henola seeds are now cultivated in North America, and development work on this variety has also been initiated in South America (Uruguay, Columbia), Japan and Australia. Due to the increased demand for industrial hemp seed material produced by IWNIRZ, the Hemp Programme is dynamically increasing the number of plantations in Poland – by about 100% per year.

### **Benefits of using the product**

Cultivation of this variety gives a high yield, which makes it more attractive to farmers.

Extension of the cultivation areas means greater availability of raw material, used in many sectors, mainly in food sector. After all, hemp seeds are a source of very valuable and easily assimilable protein and vegetable oil, which in about 80% consists of polyunsaturated fatty acids (PFCs) – including omega-3 and omega-6. Lower height of plants makes the harvest much easier.

### **Comparison with the current state of the art**

Henola variety of industrial hemp is the only registered monoecious oil-type variety in the world. There is another oil variety on the market, but of dioecious type, with a lower yield per hectare.



Henola field.

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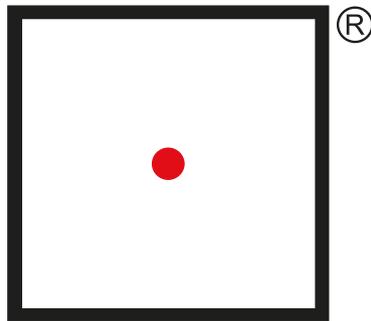
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