НАН УКРАЇНИ

ПЕРСПЕКТИВНІ НАУКОВО-ТЕХНІЧНІ РОЗРОБКИ

2025

ADVANCED R&D AND TECHNOLOGIES

THE NAS OF UKRAINE

ADVANCED R&D AND TECHNOLOGIES

THE NAS OF UKRAINE

2025

INFORMATION TECHNOLOGY

SENSOR SYSTEMS AND DEVICES

MECHANICAL ENGINEERING AND INSTRUMENT-MAKING

TECHNOLOGIES FOR CONSTRUCTION AND FUNCTIONAL MATERIALS

POWER ENGINEERING AND ENERGY EFFICIENCY

FUELS AND LUBRICANTS. MATERIALS AND TECHNOLOGIES

TECHNOLOGIES AND EQUIPMENT FOR EXPLORING, EVALUATING, AND EXTRACTING MINERALS

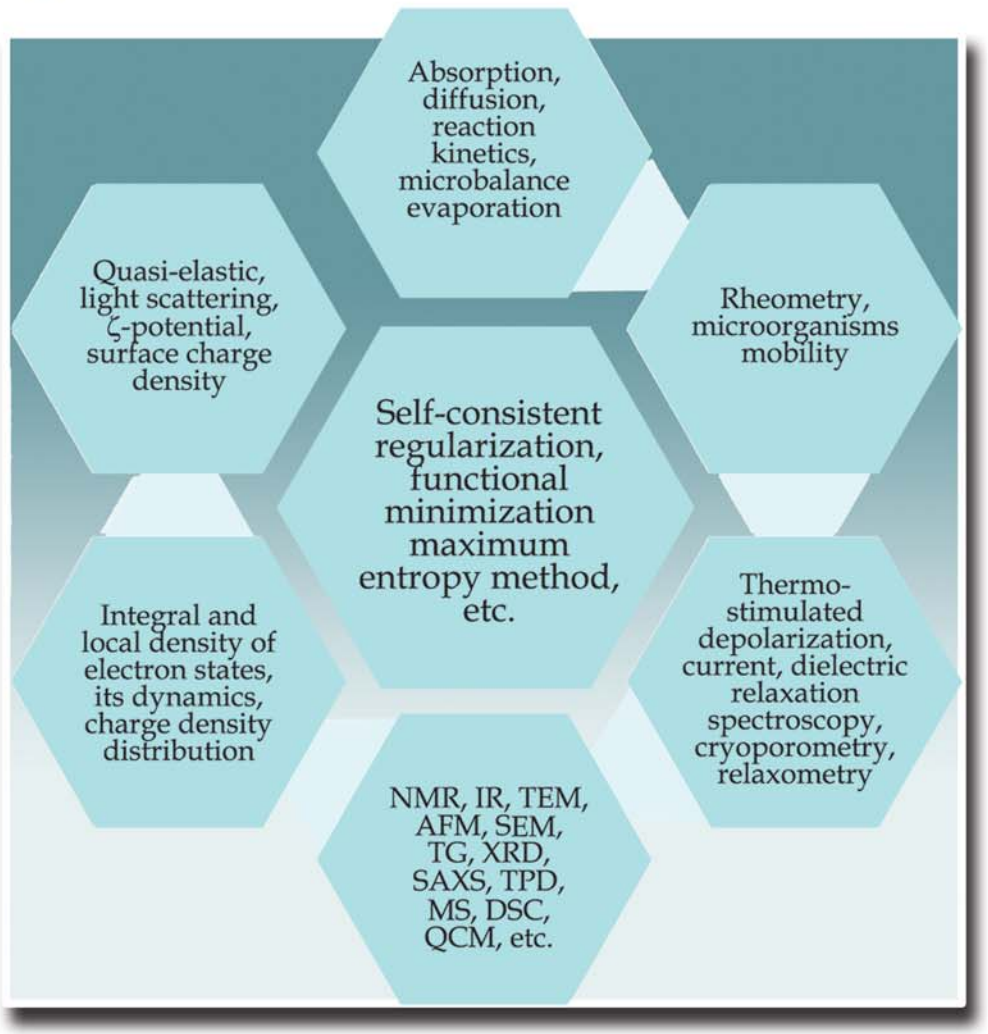
ECOLOGY AND ENVIRONMENT PROTECTION

PHARMACEUTICALS AND MEDICAL DEVICE ENGINEERING

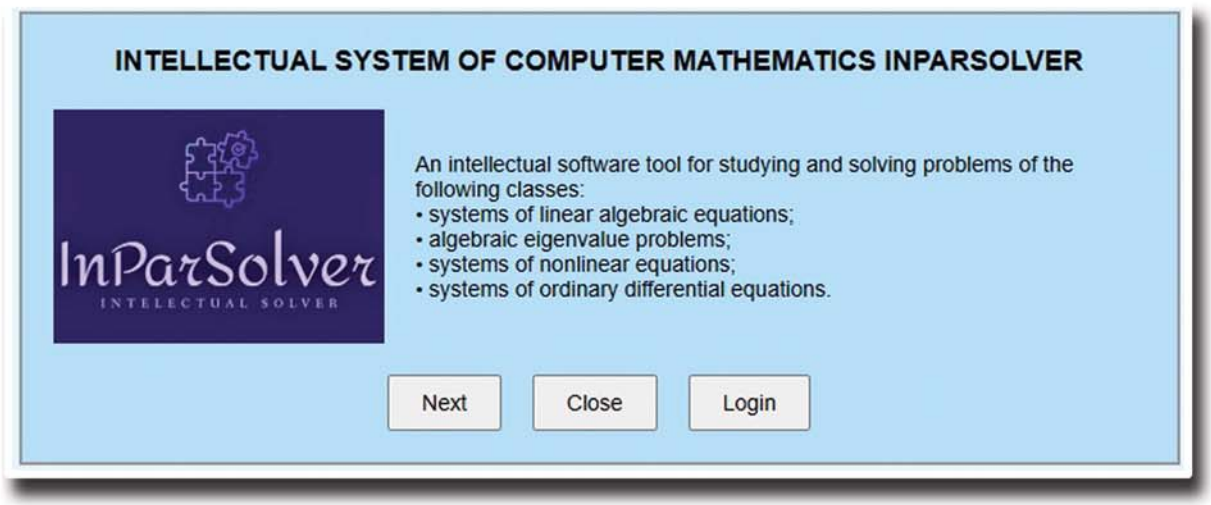
INDUSTRIAL AGRICULTURE AND HORTICULTURE

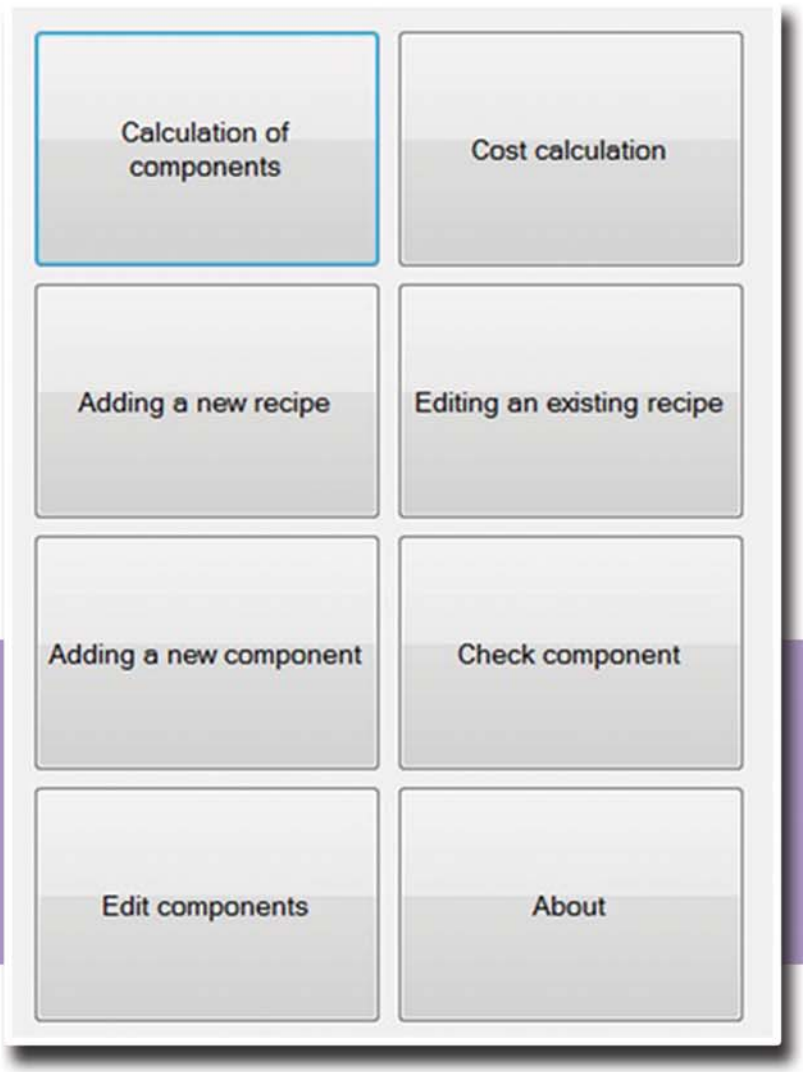
FOOD INDUSTRY

- *INPARSOLVER* INTELLIGENT SYSTEM OF COMPUTER MATHEMATICS FOR MATHEMATICAL MODELING IN SCIENCE AND ENGINEERING
- *RANA* INFORMATION SYSTEM
- COMPLEX OF PROGRAMS FOR ANALYZING EXPERIMENTAL AND QUANTUM CHEMISTRY DATA

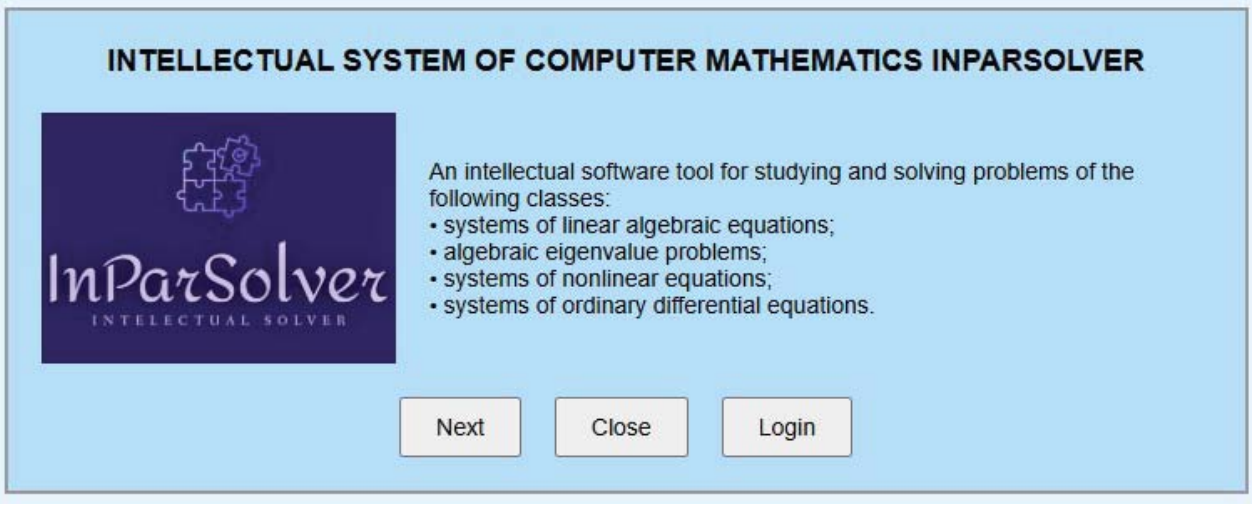


INFORMATION TECHNOLOGY





INPARSOLVER INTELLIGENT SYSTEM OF COMPUTER MATHEMATICS FOR MATHEMATICAL MODELING IN SCIENCE AND ENGINEERING



Application

Automated research and solution of computational problems in mathematical modeling across various scholarly research and engineering domains. Designed for execution on multi-core MIMD-architecture computers equipped with graphics processing units (GPUs)

Specifications

Formulates and investigates computational problems involving approximate data. Automates the research and solution process, including the assessment of computational reliability. Fully automates all parallelization processes for multi-core MIMD systems with GPU acceleration, ensuring efficient resource utilization. Provides user support for operating in parallel computing environments with GPU architecture

Advantages

Inparsolver has no known global analogs. It enables automatic exploration of the mathematical properties of computational problems. Incorporates adaptive self-configuration of the computing environment, algorithms, and software tools based on the specific characteristics of the problem. Delivers solutions with guaranteed accuracy. Achieves up to a 100-fold reduction in computation time for problems translated into mathematical modeling tasks

Development and Commercialization Status

IRL6, TRL6
Ready for deployment on systems with GPU accelerators. Internet-based installation and personnel training available upon request

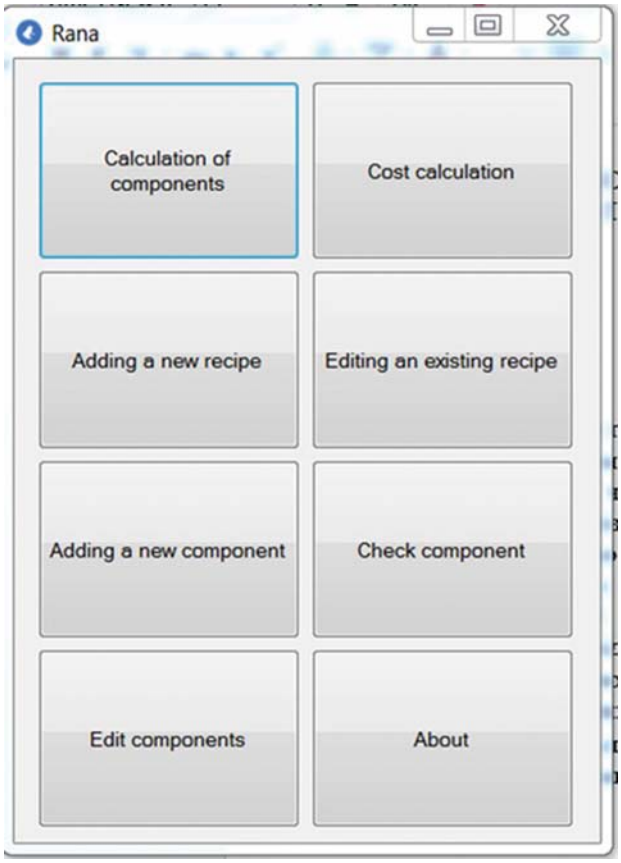
IPR Protection

IPR3

Contact Information

Serhiy V. Yershov, V.M. Glushkov Institute of Cybernetics of the NAS of Ukraine,
+38 044 526 41 78, ErshovSV@nas.gov.ua

RANA INFORMATION SYSTEM



Rana Information System: the interface and the module structure for cosmetic formulation management

Application

For cosmetic industry enterprises of all sizes, who are seeking to automate calculations, streamline formulation management, and enhance quality control

Specifications

The *Rana* software automates and optimizes the manufacture of cosmetic products. It runs on PCs, tablets, and phones (Windows-based) and integrates with production lines to control product output based on specific formulations, taking into account ingredient properties and interactions

Development and Commercialization Status

IRL7, TRL8
Available for sale with implementation and support services provided

Advantages

Unlike many existing solutions, *Rana* ensures complete data isolation, significantly reducing the risk of confidential information leakage — an essential feature for protecting proprietary formulations. Its structured data input/output interface minimizes user errors. The software is intuitive and user-friendly, enabling rapid onboarding. Rana supports the full production cycle, including recipe management, safety assessments, and dosage calculations — delivering an all-in-one solution for cosmetic manufacturing operations

IPR Protection

IPR1, IPR3

Contact Information

Viktoria V. Paientko, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 093 200 37 62, payentkovv@gmail.com

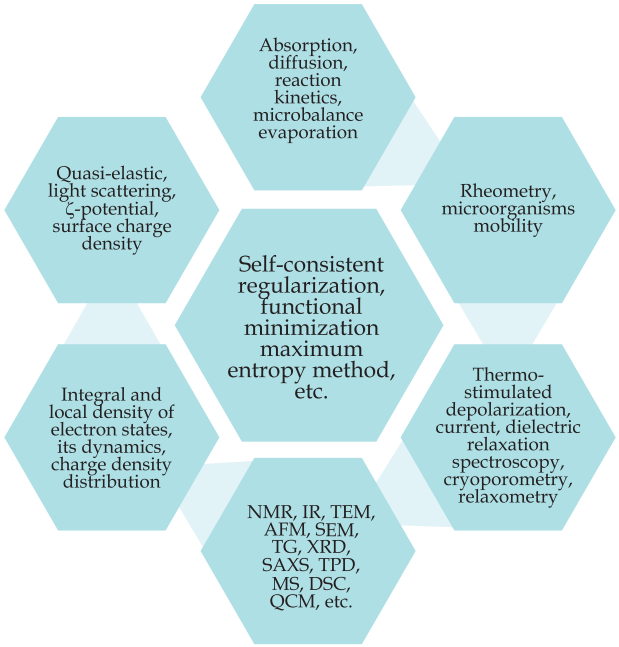
COMPLEX OF PROGRAMS FOR ANALYZING EXPERIMENTAL AND QUANTUM CHEMISTRY DATA

Application

For comprehensive analysis of experimental and quantum chemical data across a wide range of scientific disciplines

Specifications

Compatible with *Windows* and *Linux* operating systems. The programs run on any standard 64-bit PC without additional hardware requirements. Computation time typically spans a few minutes and varies depending on the number of experimental data points, method used, models applied, and integral equations involved



Results of strain measurements in a sandwich panel with a welding defect

Development and Commercialization Status

IRL6, TRL6
Available for installation upon request

IPR Protection

IPR1

Advantages

Unlike conventional software tools, this program suite employs regularization and self-consistent regularization techniques for advanced data interpretation. It enables the analysis of experimental data from gas and liquid phase adsorption, small- and wide-angle X-ray diffraction, thermally stimulated depolarization current, thermogravimetry, temperature-programmed desorption, calorimetry, rheology, infrared and NMR spectroscopy, electron and force microscopy, laser correlation spectroscopy, zeta potential measurements, and quantum chemical calculations. Key capabilities include the determination of pore and crystallite size distributions, adsorption energy and free energy distributions, reaction and relaxation activation energies, diffusion coefficients, atomic charge distributions, and both local and integral electronic density of states

Contact Information

Volodymyr M. Gunko, Chuiko Institute of Surface Chemistry,
+38 044 422 96 27, vlad_gunko@ukr.net

- EQUIPMENT FOR DIAGNOSTIC TESTING OF UNDERGROUND PIPELINES
- WIRELESS SENSOR NETWORKS WITH "INTELLECT AT THE EDGE"
- PRESSING METER FOR TURBOGENERATOR STATOR CORE
- HIGH-INTENSITY BERYLLIUM ION INJECTOR
- CAPACITIVE SENSOR FOR AIR GAP MONITORING IN HIGH-POWER HYDROGENERATORS
- AC PANEL VOLTAGE SMART METER
- *COMPACT-VIBRO* COMPACT VIBRATION-BASED DIAGNOSTIC SYSTEM
- OPTO-ACOUSTIC SYSTEM FOR NON-DESTRUCTIVE TESTING OF LAYERED COMPOSITE STRUCTURAL ELEMENTS
- PORTABLE DOPPLER PASSIVE IONOSONDE

SENSOR SYSTEMS AND DEVICES

EQUIPMENT FOR DIAGNOSTIC TESTING OF UNDERGROUND PIPELINES

Equipment for diagnostic survey of underground pipelines

Specifications

This equipment enables inspections in hard-to-reach areas, identifies the location, direction, and depth of underground pipelines, and detects unauthorized branches using non-contact methods. The system includes a suite of portable, complementary devices:

- Portable tracer — Locates and determines the direction of conductive communications and enables remote monitoring of cathodic protection system performance.
- Depth gauge — Measures the distance to the underground pipeline axis.
- Voltmeter — Measures electrical potential differences for electrochemical protection assessment.
- Non-contact current meters — Analyze current distribution between branches and pipeline sections, detect insulation defects, and assess the efficiency of cathodic protection or generator systems

IPR Protection

IPR2, IPR3

Application

For real-time monitoring of insulation coatings and electrochemical protection systems, and for detecting corrosion zones in underground pipelines without excavation

Advantages

Unlike commercially available alternatives, this integrated set of portable, reconfigurable devices allows for flexible adaptation to different infra-structure types and operating environments. Their complementary functionality ensures comprehensive diagnostics with minimal setup and high mobility

Development and Commercialization Status

IRL7, TRL8
Available for manufacturing upon request. Includes supply, warranty and post-warranty service, operational support, and personnel training

Contact Information

Roman M. Dzhala, Karpenko Physico-Mechanical Institute of the NAS of Ukraine,
+38 066 827 49 23, dzhala.rm@gmail.com, pminasu@ipm.lviv.ua

WIRELESS SENSOR NETWORKS WITH “INTELLECT AT THE EDGE”

Cluster of wireless sensor network

Application

For real-time data acquisition on the condition of biological or physical objects using self-organizing wireless sensor networks (WSNs). Applicable in agriculture, medicine, and environmental monitoring

Specifications

Scalable from a few to several hundred sensor nodes. Node-to-node communication range: up to 150 meters. Modular design allows connection of interchangeable sensor sets for monitoring various parameters. Optional integration of edge processors with embedded AI capabilities based on convolutional neural networks to enable “Intellect at the Edge” technology—facilitating rapid, on-site decision-making based on real-time data. Includes embedded software tools with adaptability for a wide range of application-specific tasks

Advantages

This WSN solution for monitoring crop health using chlorophyll fluorescence induction is a novel technology with no known global equivalents. Key advantages include modular sensor configurations for diverse applications, cost-efficiency, and the ability to deploy AI-driven decision-making at the edge

IPR Protection

IPR3

Development and Commercialization Status

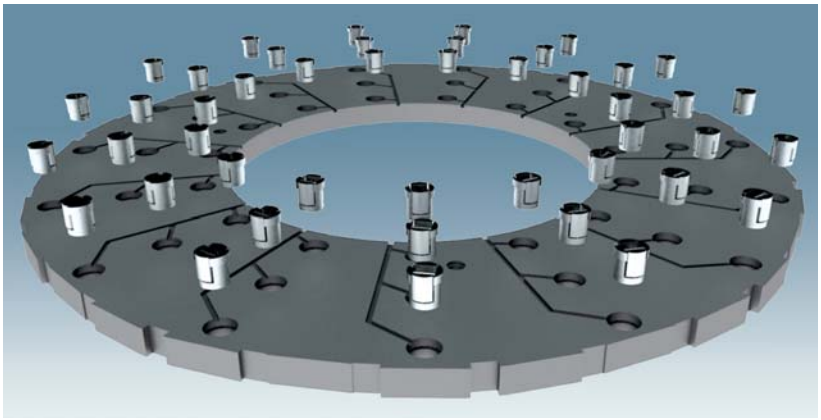
IRL6, TRL6
Available for custom manufacturing. Includes warranty service and personnel training upon request

Contact Information

Serhiy V. Yershov, V.M. Glushkov Institute of Cybernetics of the NAS of Ukraine,
+38 044 526 41 78, ErshovSV@nas.gov.ua

PRESSING METER FOR TURBOGENERATOR STATOR CORE

External view of the meter



Location of meters on the pressure ring

Application

Designed for measuring the specific compression pressure at designated points within the cross-section of a turbogenerator stator core. Used to detect structural defects during factory assembly and quality control of large-scale electric machinery

Specifications

Measurement range: 0–30 kgs/cm²
Sensor type: capacitive primary transducer
Weight: 0.78 kg
Measurement accuracy: within ±1% of the nominal value
Customizable to meet specific pressure or force measurement requirements defined by manufacturers of high-power electric machines

Advantages

Offers high metrological performance at a relatively low cost of production and maintenance

Development and Commercialization Status

IRL4, TRL5
Available for joint development, manufacturing, and validation testing on in-service generator systems

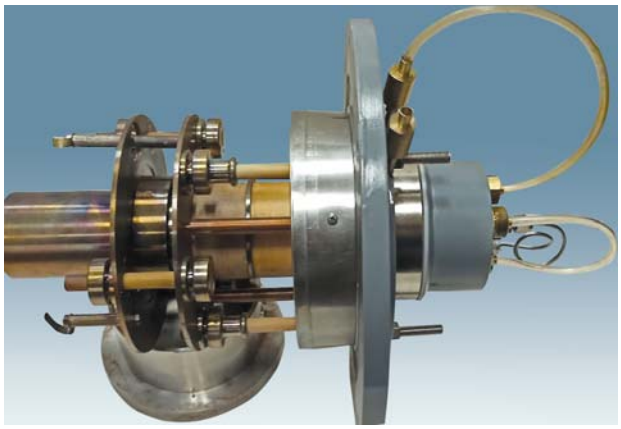
IPR Protection

IPR3

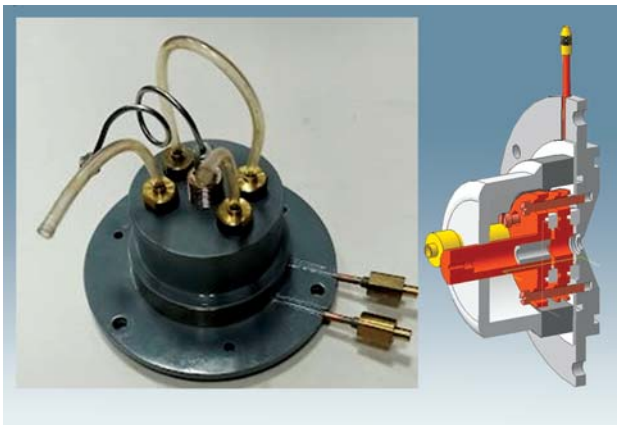
Contact Information

Oleksandr G. Kofto, Institute of Electrodynamics of the NAS of Ukraine,
+38 044 366 25 70, novied@ied.org.ua

HIGH-INTENSITY BERYLLIUM ION INJECTOR



Beryllium ion injector



Beryllium ion source: photo of the ion source (left), cross-sectional view of the source

Application

Designed for ion implantation of indium antimonide (InSb) in the fabrication of infrared (IR) radiation sensors. Developed to meet technological requirements for the production of high-performance IR receivers

Specifications

Cathode-anode voltage, V	100—800
Discharge current, mA	100—400
Beryllium ion current Be^+, μA	~3—5
Magnetic field strength, T	0,16—0,2
Vacuum level, Pa	$1 \cdot 10^{-3}$—$2 \cdot 10^{-3}$
Continuous operation time, h	~35

Advantages

Currently, no equivalent IR sensors based on high-intensity beryllium ion implantation are produced in Ukraine. The development of domestic InSb photodiode technology enables a fully localized production cycle for specialized IR detectors. This advancement enhances Ukraine's capacity to manufacture high-tech products and strengthens its position in the global market for IR technologies

Development and Commercialization Status

IRL7, TRL9
Seeking investment for scaling up to mass production

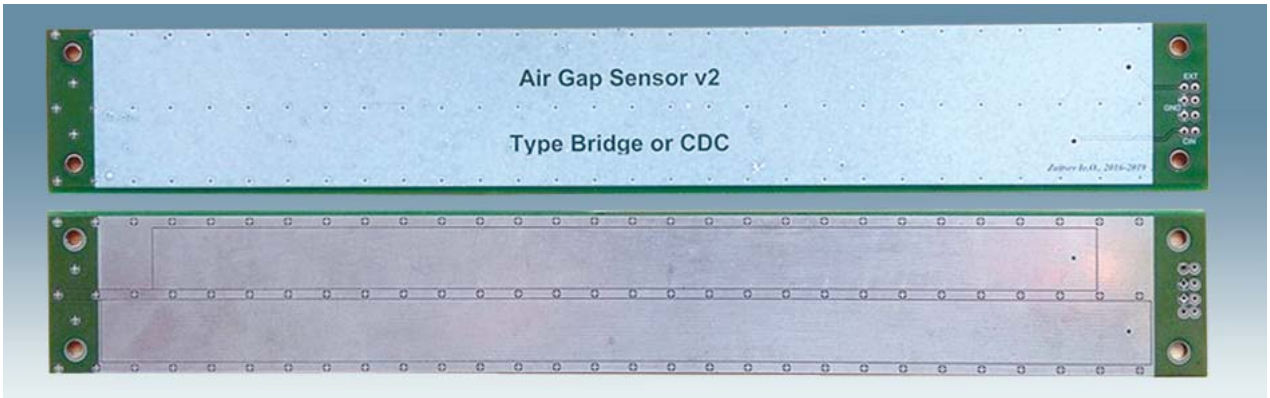
IPR Protection

IPR1, IPR2

Contact Information

Volodymyr A. Baturin, Institute of Applied Physics of the NAS of Ukraine,
+38 067 580 93 27, baturin49@gmail.ua

CAPACITIVE SENSOR FOR AIR GAP MONITORING IN HIGH-POWER HYDROGENERATORS



Capacitive air gap sensor (installation side and working side)

Specifications

Nominal gap: 6 mm
Measurement range: 2 to 10 mm (6 ± 4 mm)
Measurement accuracy: ±1% of nominal value
Distance from sensor to control system: up to 5 m
Power consumption: ≤1 W
Dimensions: 30 mm × 220 mm × 1.5 mm
Magnetic field resistance: up to 2 Tesla

Application

Real-time measurement of the air gap between the stator and rotor in large electric machines — particularly hydrogenerators — to detect mechanical defects such as eccentricity, rotor misalignment, stator bore ellipticity, and both static and dynamic gap variations

Advantages

Offers high metrological precision with low production and operating costs. The sensor design is customizable to meet specific measurement ranges and installation distances according to end-user requirements

Development and Commercialization Status

IRL5, TRL5
Open to collaboration on product manufacture and performance validation on operational hydrogenerators

IPR Protection

IPR3

Contact Information

Oleksandr G. Kofto, Institute of Electrodynamics of the NAS of Ukraine,
+38 044 366 25 70, novied@ied.org.ua

AC PANEL VOLTAGE SMART METER

External view of the meter

Specifications

Measurement range: 0–500 V (with three subranges). Accuracy: ±0.5 %. Voltage input scaling and digital value indication. Programmable linear two-color LED scale: Color changes based on signal level. Light green indicates normal range (between upper and lower thresholds). Red indicates alarm condition (outside the threshold range). Configurable alarm thresholds and display range (via software or keypad)

Application

Designed for monitoring AC voltage parameters at power generation facilities, particularly nuclear power plants (NPPs). Converts analog voltage measurements into digital code, displays real-time values on LED indicators, and transmits data via standardized industrial communication interfaces for integration with NPP control panels

Advantages

Enhances visual monitoring reliability for control room operators at nuclear power plants. The programmable alarm thresholds and display range enable accurate tracking of voltage parameters during critical operations such as pre-startup checks and individual unit testing. The dynamic color-coded display improves situational awareness and response times

Development and Commercialization Status

IRL8, TRL6
Available for joint production, validation, and deployment on operational units at nuclear power facilities

IPR Protection

IPR2

Contact Information

Oleksandr G. Kofto, Institute of Electrodynamics of the NAS of Ukraine,
+38 044 366 25 70, novied@ied.org.ua

COMPACT-VIBRO
COMPACT VIBRATION-BASED DIAGNOSTIC SYSTEM

COMPACT-VIBRO vibration diagnostic system

Specifications

The system is a compact, portable solution comprising a diagnostic unit and a portable computer. It enables: in-situ diagnostics of rotating equipment without halting operations, detection and localization of mechanical defects at early stages, evaluation of the overall technical condition of components, continuous or periodic vibration-based monitoring, assessment of defect severity and progression over time

Application

Intended for real-time assessment of the technical condition and both scheduled and unscheduled vibration diagnostics of rotating machinery during operation at facilities within Ukraine's fuel and energy sector

Advantages

Currently, there are no comparable systems available on the Ukrainian market. COMPACT-VIBRO enables early detection of faults in rotating machinery elements with minimal operational disruption and low implementation cost. It is well-suited for use in critical infrastructure without the need for invasive inspection procedures

Development and Commercialization Status

IRL7, TRL6
Available for manufacturing, delivery, and warranty service upon request. Includes personnel training and technical support for system implementation and operation

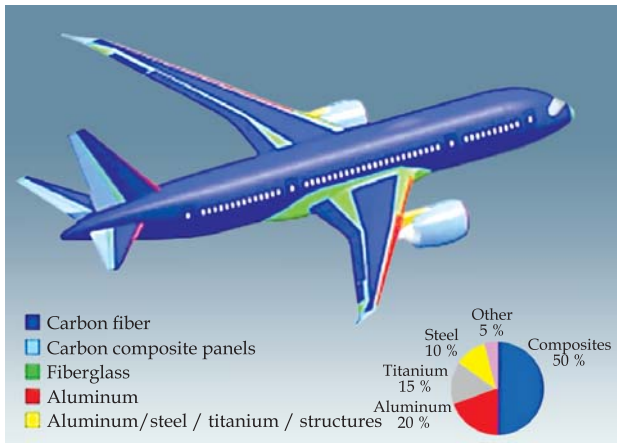
IPR Protection

IPR3

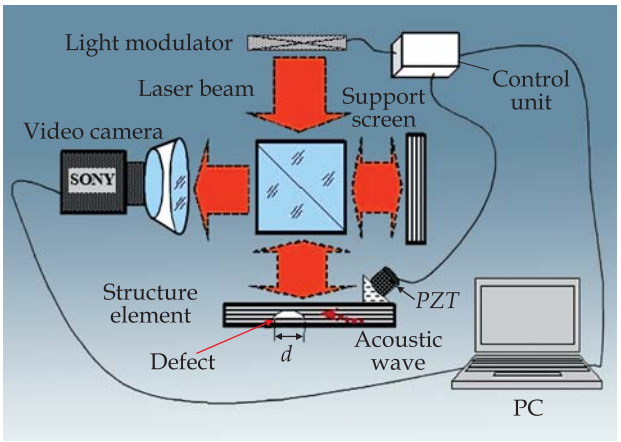
Contact Information

Roman M. Yuzefovych, Karpenko Physico-Mechanical Institute of the NAS of Ukraine,
+38 096 373 37 44, roman.yuzefovych@gmail.com, pminasu@ipm.lviv.ua

OPTO-ACOUSTIC SYSTEM FOR NON-DESTRUCTIVE TESTING OF LAYERED COMPOSITE STRUCTURAL ELEMENTS



Materials used in modern aircraft structures



Composition of the optical-acoustic system

Specifications

The system comprises the following components:
• Laser Module: Based on the OBIS LX660 laser with integrated radiation power modulation and controllable modulation depth; weight: 160 g; optical power: >100 mW
• Digital Oscilloscope: SDS1204X-E, 4-channel, 200 MHz bandwidth, 1 GS/s sampling rate, 500 μV/div sensitivity
• Signal Generator: SGS 6022X, 2-channel, frequency bandwidth up to 200 MHz, resolution of 1 pHz, built-in frequency counter up to 400 MHz
• Video Camera: BFS-U3-28S5M-C, 2.8 MP (1936 × 1464), 130 fps, 12-bit dynamic range, exposure time from 10 μs to 30 s

Development and Commercialization Status

IRL6, TRL5
System adaptation to meet specific customer requirements is available. Applicable for in-service inspection and quality control of damaged or critical layered composite structural elements

Application

Designed for the detection, localization, and identification of hidden defects — such as delaminations, adhesive joint failures, blind holes, and damaged "composite-metal" or "composite-composite" joints — in structural elements used in aerospace, automotive, and civil engineering applications

Advantages

The system supports non-destructive testing of a wide range of layered composite materials, including fiberglass, carbon fiber, and polypropylene-based composites. Detects defects at significantly lower acoustic excitation frequencies (3–10 times lower) compared to conventional methods. Enables more accurate identification and classification of defect types and sizes. Offers high-speed scanning and localization over large inspection areas. Reduces the complexity of testing procedures while enhancing diagnostic reliability

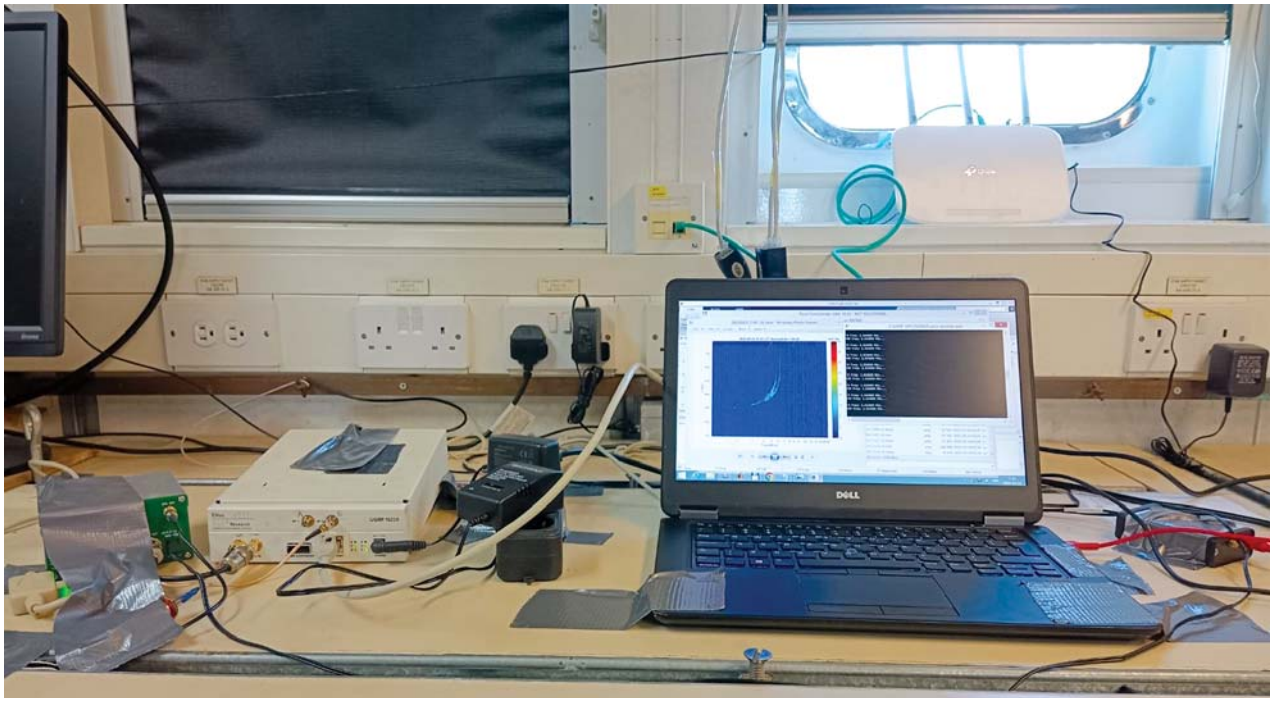
IPR Protection

IPR3

Contact Information

Leonid I. Muravsky, Karpenko Physico-Mechanical Institute of the NAS of Ukraine,
+38 050 845 46 58, muravskyleon@gmail.com, pminasu@ipm.lviv.ua

PORTABLE DOPPLER PASSIVE IONOSONDE



Portable Doppler passive ionosonde installed onboard the *Noosfera* research vessel

Specifications

Operating Frequency Range: 1–30 MHz
Altitude Range: 90–800 km
Distance from Active Ionosonde: 0–5000 km
Device Dimensions: 30 × 30 × 40 cm

Advantages

The system offers several key benefits over conventional ionosondes:

- Passive Operation: No electromagnetic emission, ensuring compatibility with sensitive environments
- Low Cost: Economical alternative to traditional active ionosondes
- Software-Defined Control: Flexible configuration and signal processing through software
- Extended Coverage: Enables selection and adjustment of the ionospheric sounding region
- Doppler Shift Analysis: Allows for determination of vertical velocity profiles of ionospheric layers

Application

Designed for the investigation and monitoring of ionospheric conditions at various altitudes and distances from an active ionosonde. Enables geophysical and space weather research, HF communication optimization, and ionospheric modeling

Development and Commercialization Status

IRL4, TRL5
Manufactured to order based on the specific tasks and operational requirements of the customer. Includes personnel training on hardware operation and software usage. Ideal for research institutes, universities, and governmental monitoring stations

IPR Protection

IPR1

Contact Information

Oleksandr V. Koloskov, Institute of Radio Astronomy of the NAS of Ukraine,
+38 057 341 77 38, koloskov@rian.kharkov.ua

- WATER BULLET TRAP FOR HIGH-ENERGY PROJECTILES
- HYBRID CERAMIC-METAL ROLLERS FOR GAS TURBINE ENGINES DESIGNED FOR EXTREME TEMPERATURE AND LOAD CONDITIONS
- IMPELLER-TYPE DYNAMIC POROUS SEAL
- ENVIRONMENTALLY SAFE CORROSION INHIBITORS FOR TECHNICAL CLEANING FLUIDS
- COMBINED SYSTEM FOR IMPROVING THE QUALITY OF JET GRINDING PRODUCTS
- AUTOMATIC FRONT-END CURVATURE CONTROL SYSTEM BY ASYMMETRIC PLATE ROLLING
- TECHNOLOGY FOR ENHANCING WEAR AND CORROSION RESISTANCE OF STRUCTURAL ALLOYS VIA COMBINED OXIDE COATINGS
- INSTALLATION FOR PRECISION ANALYSIS OF HYDROGEN IN METALS AND ALLOYS

MECHANICAL ENGINEERING AND INSTRUMENT-MAKING

WATER BULLET TRAP FOR HIGH-ENERGY PROJECTILES

Vertical bullet trap

9 mm and 12.7 mm cartridges

Application

Designed for forensic ballistic analysis, this system allows for the recovery of high-caliber bullets—specifically 12.7 mm—without compromising surface markings, enabling accurate weapon identification and trace examination

Specifications

The bullet trap consists of a cylindrical metal chamber of calibrated dimensions, filled with water. Upon firing, the water medium decelerates the bullet, allowing for intact retrieval without deformation or damage to forensic trace evidence

Advantages

Currently, there are no domestically produced water bullet traps capable of safely capturing 12.7 mm high-energy rounds. This solution fills that gap by enabling non-destructive testing of large-caliber projectiles

Development and Commercialization Status

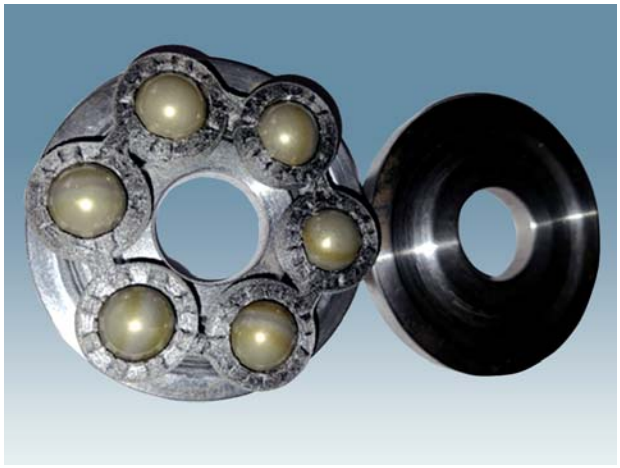
IRL3, TRL4
We are actively seeking manufacturing and testing partners to advance the development and deployment of this water bullet trap for high-energy projectiles

IPR Protection

IPR1, IPR2, IPR3

Contact Information
Volodymyr A. Maksymyuk, S.P. Tymoshenko Institute of Mechanics of the NAS of Ukraine,
+38 098 214 35 59, volmak@ukr.net

HYBRID CERAMIC-METAL ROLLERS FOR GAS TURBINE ENGINES DESIGNED FOR EXTREME TEMPERATURE AND LOAD CONDITIONS



Components of six-ball (left) and twelve-ball (right) hybrid roller

Specifications

Balls
Phase composition: Si_3N_4 — 20 vol.% ZrN
Hardness: 19 GPa
Relative density: 0.98—0.99
Diameter: up to 20 mm

Bearing Cage
Phase composition: P6M5K5 — 10 wt.% TiC
Bending strength: 2,470 MPa
Hardness: 67.5 HRC
Outer diameter: up to 65 mm
Inner diameter: up to 21 mm

Larger diameters for balls and bearing cages can be manufactured upon customer request. Operates without lubrication at a temperature under 600 °C. Resistant to cyclic loads and aggressive environments

Application

Aviation gas turbine engines. Steam turbine engines for thermal power plants

Advantages

Currently, neither hybrid rollers for demanding operating conditions nor their key components—balls made of composite ceramics—are produced in Ukraine. The developed full-cycle manufacturing technology relies on locally sourced raw materials, enables the reduction of production costs and the substitution of import critical components in gas turbine engines

IPR Protection

IPR1, IPR3

Development and Commercialization Status

IRL5, TRL4
Available for the technology of powder synthesis and consolidation of ceramic balls and bearing cages for hybrid rollers

Contact Information

Serhii M. Fomenko, Institute for Problems of Material Science of the NAS of Ukraine,
+38 095 244 36 38, tech.transfer@ipms.kyiv.ua

IMPELLER-TYPE DYNAMIC POROUS SEAL

Porous impeller rotor

Application

Sealing of high-speed shaft cavities in turbopump units of liquid rocket engines used in fuel component supply systems

Specifications

The impeller-type dynamic porous seal consists of a carrier impeller disk and a porous body mounted on it. To prevent fluid leakage from sealed cavities and to maintain shaft sealing integrity, the porous impeller seal is typically used in combination with other types of seals. Its effectiveness has been verified through laboratory testing with model fluids. Various structures and geometries of porous bodies can be used depending on design requirements

Advantages

In comparison to traditional bladed or slotted impeller seals—currently the most common solutions in turbopump units for liquid rocket engines—this impeller-type dynamic porous seal provides improved sealing performance for high-speed shafts. It achieves a cost-efficiency index of 0.99 while ensuring reliable cavity tightness at design operating speeds

Development and Commercialization Status

IRL5, TRL5
Custom design, draft documentation, and technical support (including author supervision) are available upon request

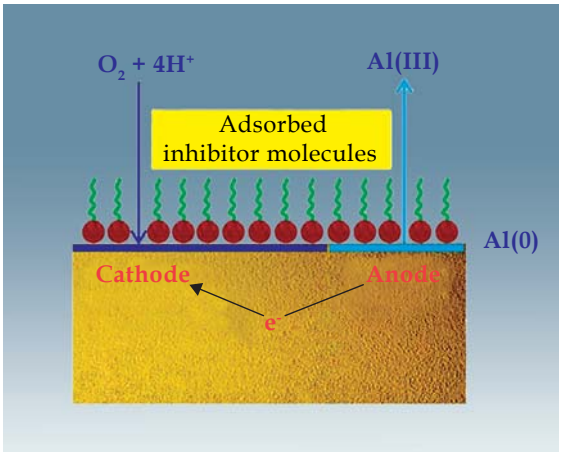
IPR Protection

IPR2

Contact Information

Mykhailo O. Katrenko, Institute of Technical Mechanics of the NAS of Ukraine and the SSA of Ukraine, +38 056 373 29 95, katrenko.m.o@nas.gov.ua

ENVIRONMENTALLY SAFE CORROSION INHIBITORS FOR TECHNICAL CLEANING FLUIDS



Application

Designed for use in technical cleaning fluids and anti-icing agents for both military and civilian aircraft. Also suitable for corrosion protection of aluminum, light alloys, and steels

Specifications

The inhibitor is formulated using environmentally safe biopolymers (polysaccharides) and carboxylates derived from renewable plant-based raw materials

Advantages

Provides a sustainable alternative to conventional triazole-based corrosion inhibitors, which are known to contaminate soil and water near airports and military air bases. This formulation significantly reduces environmental impact while maintaining high corrosion protection performance

Development and Commercialization Status

IRL6, TRL5
Small-batch production available upon request.
Seeking partners for full-scale manufacture

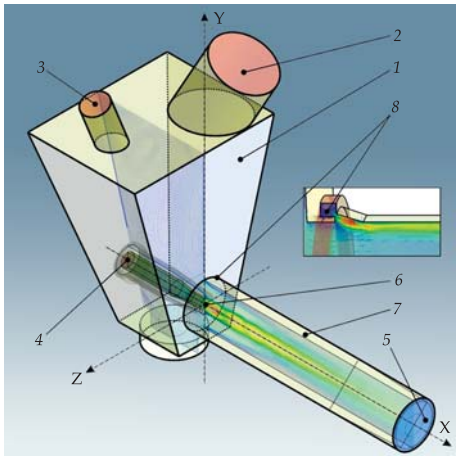
IPR Protection

IPR3

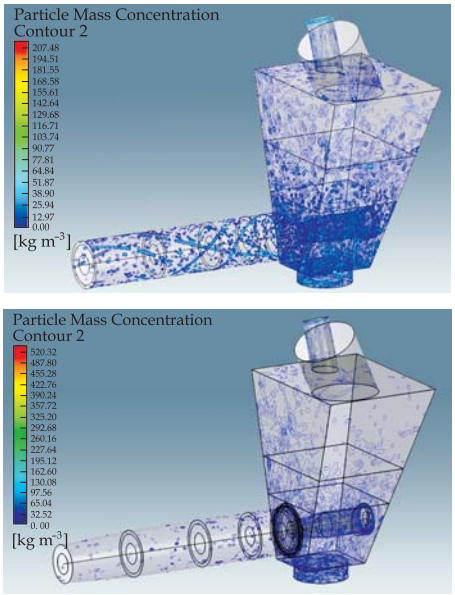
Contact Information

Sergiy A. Korniy, Karpenko Physico-Mechanical Institute of the NAS of Ukraine,
+38 097 380 44 67, korniy_sergiy@ukr.net, pminasu@ipm.lviv.ua

COMBINED SYSTEM FOR IMPROVING THE QUALITY OF JET GRINDING PRODUCTS



Jet mill ejector diagram with additional air supply: *1* — bulk material feed hopper; *2*, *3* — pipelines; *4* — central nozzle; *5* — conical nozzle; *6* — active air feed nozzle; *7* — booster tube; *8* — additional energy carrier flow supply channel



Concentration of solid particles on the wall of the accelerated mill tube before (above) and after (below) upgrade

Application

Improving the material flow efficiency within jet mill channels

Specifications

The upgraded ejector design ensures a uniformly accelerated flow at the outlet and maintains a stable air layer to protect structural walls from wear. An additional energy carrier (air) is introduced through a peripheral channel along the ejector tube, entering the jet mill via strategically placed slotted holes and a conical nozzle (confuser). This configuration provides a uniform flow and minimizes erosion. The placement of the slotted holes shields the mill walls from the abrasive two-phase flow, thereby enhancing product quality and extending equipment life

Advantages

This system has no direct analogs in existing jet mill technology. The supplementary air flow protects acceleration tubes from wear, reducing contamination from material erosion. The conical nozzle optimizes internal flow dynamics, promoting uniform particle distribution at the outlet and improving the grinding process. Overall, the system enhances product consistency and operational reliability

IPR Protection

IPR3

Development and Commercialization Status

IRL6, TRL5
Custom system design, technical documentation, and engineering support available upon request

Contact Information

Nataliya S. Pryadko, Institute of Technical Mechanics of the NAS of Ukraine and the SSA of Ukraine, +38 056 373 29 95, +38 095 351 89 93, np-2006@ukr.net

AUTOMATIC FRONT-END CURVATURE CONTROL SYSTEM BY ASYMMETRIC PLATE ROLLING

Application

Minimizes bending at the front ends of rolled plates produced by asymmetric rolling processes

Specifications

Systematically quantifies the front-end curvature induced by differences in friction between upper and lower rolls—drawing on numerical analyses grounded in asymmetric rolling theory. A predictive alignment model compensates for curvature by adjusting bending based on initial plate thickness and deformation across passes. The system factors in frictional asymmetry, roll diameter, and deformation degree to generate corrective control signals. Operates on *ibaNet750* digital signal modules with the *ibaLogic* control environment, enabling high-speed dynamic response (<1 ms cycle time) with minimal modifications to existing rolling mill control systems. Supports rolled plates with thicknesses ranging from 6 mm to 110 mm

Advantages

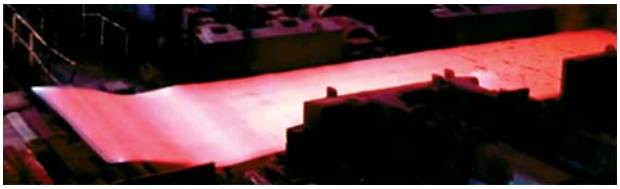
Operates without requiring dedicated front-end bend gauges. In pilot testing, reduced the proportion of plates needing additional hot leveling by 25%. Enhances product flatness and yield by proactively managing asymmetric deformation within the rolling pass

Development and Commercialization Status

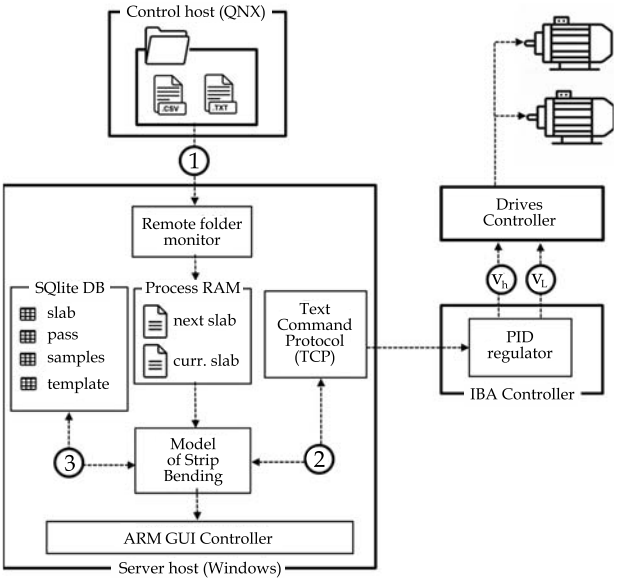
IRL6, TRL5
Offers design, customization, cold/hot commissioning, and full-scale implementation support

IPR Protection

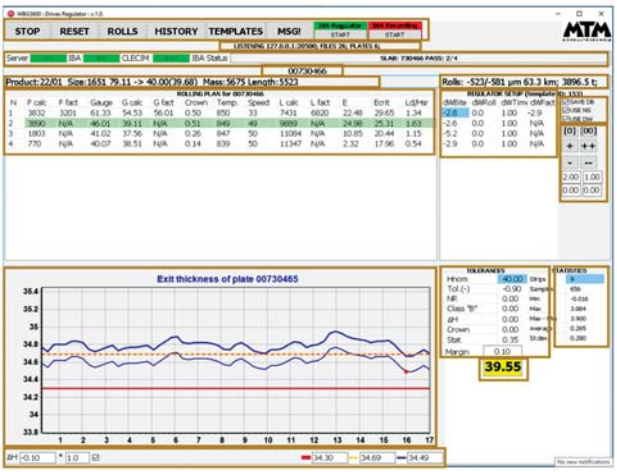
IPR1, IPR2



Front-end bending of the sheet



Data exchange flowchart

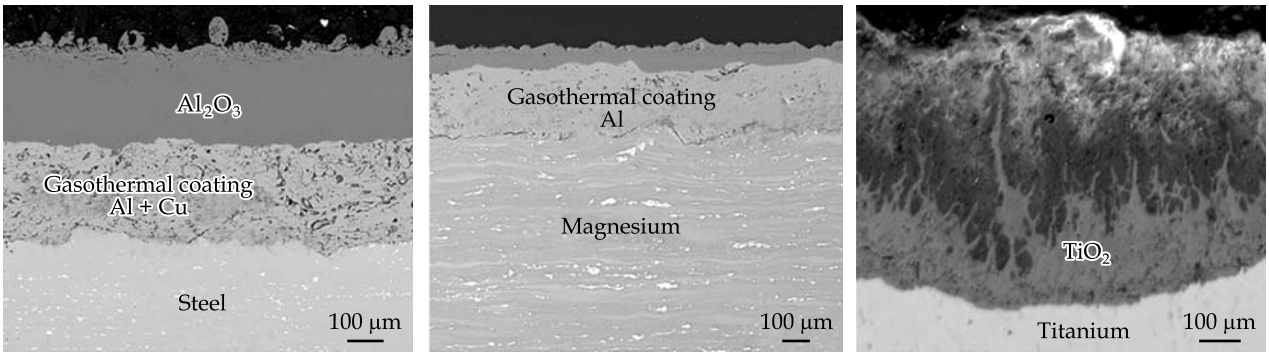


System interface

Contact Information

Eduard V. Parusov, Iron and Steel Institute of Z. I. Nekrasov of the NAS of Ukraine,
+38 056 790 05 14, +38 050 453 46 93; office.isi@nas.gov.ua

TECHNOLOGY FOR ENHANCING WEAR AND CORROSION RESISTANCE OF STRUCTURAL ALLOYS VIA COMBINED OXIDE COATINGS



Structure of combined metal oxide coatings on steel, aluminum, and titanium alloys

Specifications

This technology involves synthesizing oxide layers with high corrosion resistance based on ceramic coatings and zirconium dioxide (ZrO_2). The process incorporates micro- and nano-particles of metal within the oxide matrix, resulting in coatings up to 300 microns thick. These coatings exhibit hardness up to 20,000 MPa. Additionally, thermal barrier coatings are created by spraying a zirconium coating onto the surface of heat-resistant structural alloys, which is then transformed into zirconium dioxide through plasma-electrolytic synthesis

Advantages

Unlike conventional methods, this technology forms a zirconium dioxide (ZrO_2) layer that imparts high strength and resistance to crack propagation. The resulting coatings also possess ultra-low thermal conductivity (ranging from 2.5 to 3 W/(m·K)), which is approximately an order of magnitude lower than that of zirconium dioxide ceramics. This enhancement improves the wear resistance of light alloys and offers better protection for turbine blades, rocket nozzles, and other components subjected to high temperatures

Application

Enhancing the wear and corrosion resistance of structural alloys by forming composite metal-oxide coatings on their surfaces

Development and Commercialization Status

IRL6, TRL7
Available for licensing, with small batches of products manufactured upon request. Seeking partners for establishing joint production ventures

IPR Protection

IPR3

Contact Information

Iryna M. Pohrelyuk, Karpenko Physico-Mechanical Institute of the NAS of Ukraine,
+38 096 073 00 23, irynapohreluk@gmail.com, pminasu@ipm.lviv.ua

INSTALLATION FOR PRECISION ANALYSIS OF HYDROGEN IN METALS AND ALLOYS

Application

Designed for quantitative determination of hydrogen content in metals and alloys using gas chromatography combined with a quartz furnace—ideal for applications in materials science, semiconductor manufacture, and nuclear power engineering

Specifications

Hydrogen sensitivity: 2–5 ppm
Detector type: Thermal conductivity detector (katharometer)
Sample mass: 4–5 g
Sample heating time to 1200 °C: 5–20 min
Heat source: Two 500 W halogen lamps in quartz furnace
Sorbent: NaX molecular sieve, particle size 0.25–0.50 mm

Installation for precision analysis of hydrogen in metals and alloys

Advantages

This system uniquely combines a high-sensitivity thermal conductivity detector with a molecular-sieve separation column to measure hydrogen in metal and alloy samples down to 2–5 ppm using 4–5 g sample masses. While performance is comparable to top-tier international analyzers, existing commercial equipment is significantly more expensive

Development and Commercialization Status

IRL5, TRL6
Small-batch manufacturing available; seeking investment for production ramp up

IPR Protection

IPR1, IPR2

Contact Information

Aleksei M. Kalinkevich, Institute of Applied Physics of the NAS of Ukraine,
+38 0542 33 30 89, kalinkevich@ipflab.sumy.ua

- ALUMINUM MASTER-ALLOYS WITH ULTRAFINE MODIFYING PHASES
- MULTIPURPOSE EPOXY-BASED ADHESIVES AND BINDERS
- LARGE-SCALE OPTICAL CERAMICS BASED ON YTTRIUM-ALUMINUM GARNET (YAG)
- LARGE-SIZE SAPPHIRE SINGLE-CRYSTAL PRODUCTS
- CONDUCTIVE GLUE
- FATTY ACID ESTERS FOR TECHNICAL FLUIDS
- TITANIUM-SAPPHIRE LASER SINGLE CRYSTALS
- BASALT CARDBOARD PRODUCTION LINE
- MHD EQUIPMENT AND TECHNOLOGY FOR PRODUCING MASTER ALLOYS AND HIGH-QUALITY ALUMINUM ALLOYS
- ASPHALT CONCRETE MODIFIER FROM RECYCLED POLYMER WASTE
- $A^{II}B^{VI}:TM^{2+}$ SINGLE CRYSTALS FOR ACTIVE ELEMENTS FOR MID-IR SOLID-STATE LASERS
- HIGH-STRENGTH MULTILAYER COMPOSITE MATERIALS
- NANOCOMPOSITES BASED ON BIMETALLIC MAGNETIC NANOPARTICLES (NiCo, FeCo) AND CARBON NANOSTRUCTURES
- SEMICONDUCTIVE MATERIALS IN THE FORM OF TRANSPARENT COATINGS
- EQUIPMENT FOR THE PRODUCTION OF METAL POWDERS BY PLASMA SPRAYING OF WIRE MATERIALS
- OPTICALLY TRANSPARENT PHOTOCURED POLYMER MATERIAL
- POLYFUNCTIONAL POLYURETHANE ADHESIVES AND PROTECTIVE COATINGS
- PORTABLE SYSTEM FOR THERMAL DERIVATIVE ANALYSIS OF CAST IRON
- RESOURCE-SAVING SYNTHESIS OF NANOSCALE SILICON DIOXIDE FROM METALLURGICAL WASTE
- FIBERGLASS WITH ENHANCED MECHANICAL PROPERTIES
- HIGH-VOLTAGE BREAKDOWN-RESISTANT COPPER SAMPLES MODIFIED BY ION IRRADIATION AND METAL COATINGS
- HEAT-RESISTANT MICROSPHERE TEXTOLITES (MST)
- CENTRIFUGAL CASTING TECHNOLOGY FOR ALUMINUM ALLOYS
- TECHNOLOGY FOR PRODUCING GRANULAR NICKEL POWDERS
- TECHNOLOGY FOR PRODUCING GLOBULATED GRAPHENE
- ULTRA HEAT-RESISTANT POLYMER BINDERS BASED ON DOMESTIC RAW MATERIALS AND CARBON/GLASS FIBER COMPOSITES WITH OPERATING TEMPERATURES UP TO 350 °C
- INSTALLATION FOR PRODUCING HIGH-PURITY POWDERED GRAPHITE
- SEALS MADE OF HIGH-PURITY EXPANDED GRAPHITE REINFORCED WITH CARBON NANOTUBES
- CHEMICAL-RESISTANT EPOXY-BASED COATINGS

TECHNOLOGIES FOR CONSTRUCTION AND FUNCTIONAL MATERIALS

ALUMINUM MASTER-ALLOYS WITH ULTRAFINE MODIFYING PHASES

Application

Enhances the quality of aluminum alloy castings and ingots for foundries, metallurgical plants, and the machinery industry

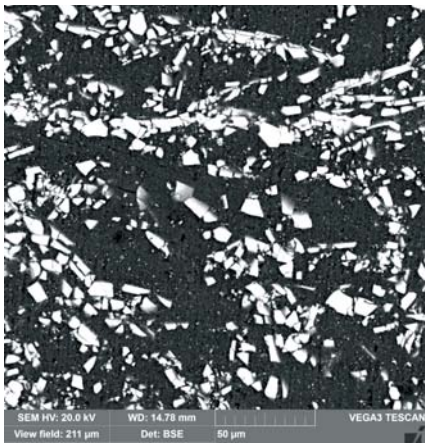
Specifications

Master-alloys are produced by remelting aluminum together with scrap and waste from refractory and highly reactive metals. They feature extremely fine dispersion of modifying particles and uniform distribution throughout the alloy

Master-alloy ingot

Advantages

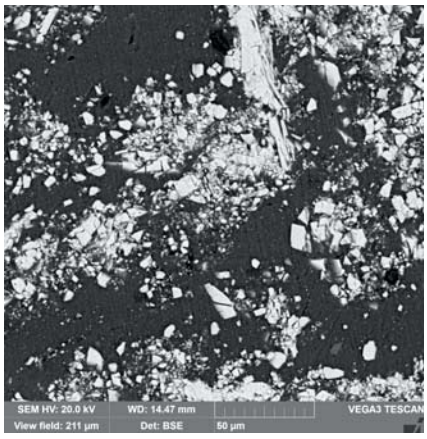
Eliminates the need for costly potassium-fluoride salts—environmentally friendly. Supports the use of nearly any type of secondary raw materials. Guaranteed refractory and reactive metal content of 5–15 wt%, including molybdenum, hafnium, and tungsten—key refractory metals with high melting points and excellent high-temperature performance. Shortens master-alloy absorption time by 20–50%. Greatly extends the effectiveness and duration of modification through ultrafine phase dispersion



Microstructure of Al-10Zr master-alloy

Development and Commercialization Status

IRL6, TRL6
Custom-batch production available upon request. Technology transfer for alloy preparation, including master-alloy application, can be provided



Microstructure of Al-10Mo master-alloy

IPR Protection

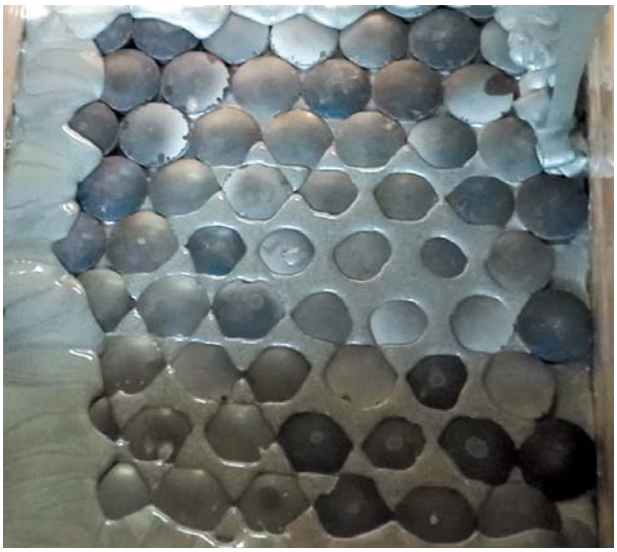
IPR2

Contact Information

Svyatoslav V. Gnyloskurenko, Physico-Technological Institute of Metals and Alloys of the NAS of Ukraine, +38 044 424 12 50, expo@ptima.kiev.ua

MULTIPURPOSE EPOXY-BASED ADHESIVES AND BINDERS

Epoxy adhesive paste



Composite materials based on epoxy binders

Application

Epoxy-based adhesives and binders designed for general and specialized bonding applications in machine building and the aerospace industry

Specifications

Appearance: Viscous liquids and pastes.
Compatible with reinforcing agents and modifiers.
Enhanced adhesion to a wide range of materials: ferrous and non-ferrous metals, alloys, glass, ceramics, wood, plastics.

Tensile strength	~40 MPa
Adhesion shear strength	~23 MPa
Adhesion tensile strength	~30 MPa
Pot life at 20 °C	30 min to 1 week

Advantages

Lower cost.
Superior adhesion to dissimilar substrates.
Adjustable technological properties through formulation flexibility

IPR Protection

IPR1

Development and Commercialization Status

IRL6, TRL6
Custom production batches available upon request. Licensing and technology transfer for binder formulations supported

Contact Information

Oleksandr L. Tolstov, Institute of Macromolecular Chemistry of the NAS of Ukraine;
+38 044 291 02 08; tolstov@nas.gov.ua

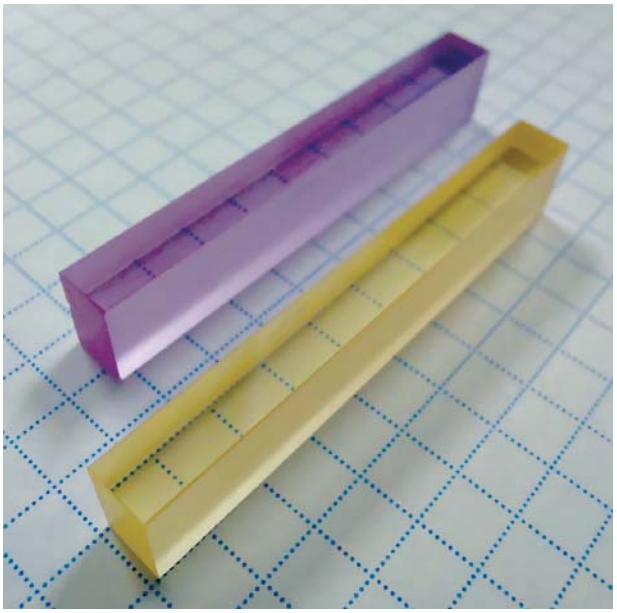
LARGE-SCALE OPTICAL CERAMICS BASED ON YTTRIUM-ALUMINUM GARNET (YAG)

Application

Used as active laser media in near-infrared (IR) ceramic lasers, ideal for high-energy solid-state laser systems

Specifications

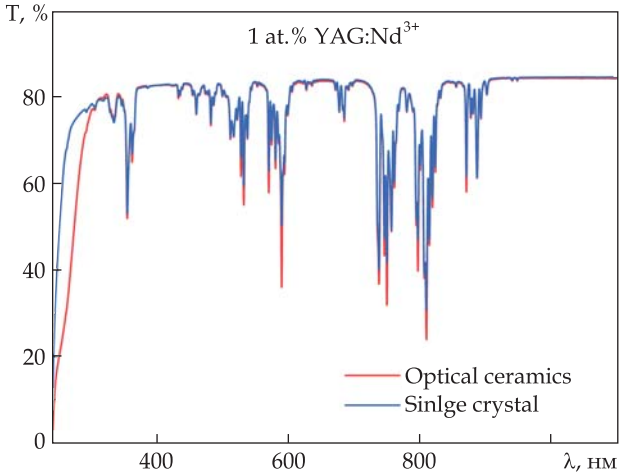
Made of 100% crystalized yttrium aluminum garnet doped with rare-earth ions (RE = Nd^{3+}, Sm^{3+}, Yb^{3+}); maintains excellent optical homogeneity even at elevated activator concentrations. Optical losses on the order of 10^{-2} cm^{-1}. Dopant concentrations supported up to: Nd^{3+}: 2 at. %, Sm^{3+}: 9 at. %, Yb^{3+}: 15 at. %. High flexibility in component shape and size



Samples of YAG optical ceramics: 1 at.% Nd^{3+}-doped and 5 at.% Sm^{3+}-doped, dimensions 50 × 7 × 5 mm

Advantages

Supports significantly higher activator concentrations than single-crystal YAG. Exceptional dopant homogeneity throughout the material volume. Lower sintering temperature (~0.7 T_m) than single crystals. High production yield and reduced raw material usage. Substantially lower production costs while maintaining optical performance



Optical transmittance spectra of 1 at.% Nd^{3+}-doped YAG ceramics (2.2 mm thick) compared with 1 at.% Nd:YAG single-crystal of identical composition

Development and Commercialization Status

IRL7, TRL7
Fabrication of custom YAG ceramic samples available upon request

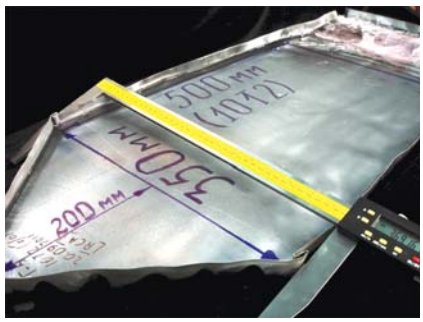
IPR Protection

IPR1, IPR3

Contact Information

Roman P. Yavetskiy, Institute for Single Crystals of the NAS of Ukraine,
+38 057 341 02 77, yavetskiy@isc.kharkov.ua

LARGE-SIZE SAPPHIRE SINGLE-CRYSTAL PRODUCTS



Large-size sapphire single crystal


Sapphire optical windows


Products made of profiled sapphire

Application

Ideal for demanding optical, optoelectronic, scientific, and industrial applications, including: materials for harsh environments: high temperature, pressure, aggressive chemicals, and radiation; optical and IR protective windows; substrates for epitaxial semiconductor growth; precision-formed sapphire products and complex profiles

Specifications

Material: Single-crystal sapphire (optical and structural grade). Transmission range: 0.2–5.5 μm. Typical blank sizes up to 350 × 500 × 30 mm; rods Ø 0.5–40 mm; tubes Ø up to 50 mm with wall thickness 0.6–6 mm. Other sapphire profiles and structures

Development and Commercialization Status

IRL8, TRL9
Custom manufacture of sapphire substrate blanks, windows, rods, tubes, capillaries, and precision profiles available to spec

Advantages

Crystal-grown near-net shape products significantly reduce secondary machining operations and associated costs while improving overall production efficiency

IPR Protection

IPR1, IPR2, IPR3

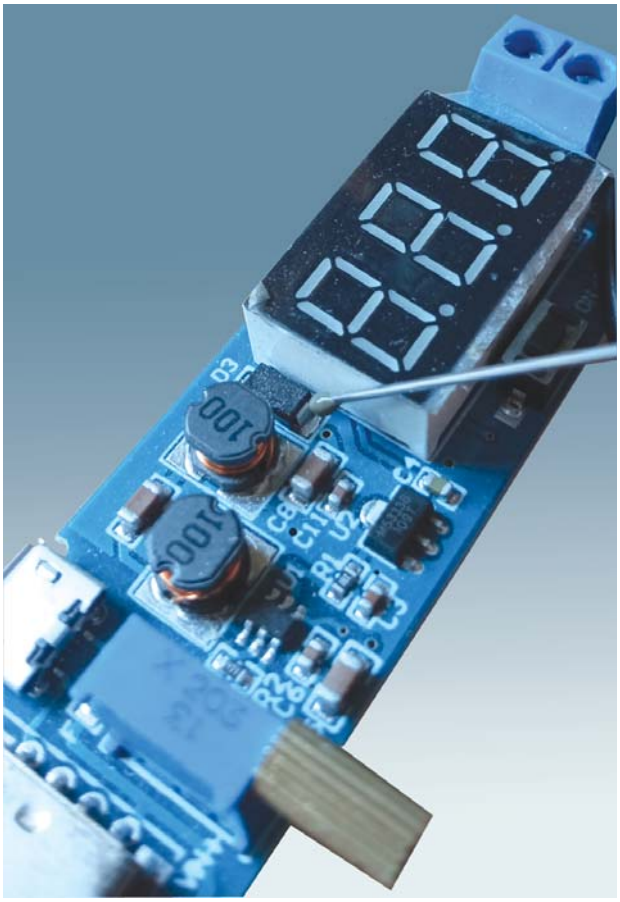
Contact Information

Serhii V. Nizhankovskyi, Institute for Single Crystals of the NAS of Ukraine,
+38 (057) 341 01 69, nizhankovsky@isc.kharkov.ua

CONDUCTIVE GLUE

Application

Conductive adhesive for general and specialized purposes, for conductive joints where soldering or welding is not available



Use of conductive adhesive for repairing electric joints

Specifications

Two-component system. Dark grey paste.
Curing under various temperature conditions.
Curing time: 24 hours after application.

Tensile strength	~40 MPa
Adhesion tensile strength	~33 MPa
Bulk electrical resistivity	≤ 6 mΩ·cm
Pot life at 20 °C	1.5 h

Development and Commercialization Status

IRL6, TRL6
Product and manufacture technology are ready for pilot-scale production

Advantages

As compared with analogs, this adhesive has lower cost, high electrical and thermal conductivity, and the ability to bond dissimilar conductors

IPR Protection

IRP1

Contact Information

Oleksandr L. Tolstov, Institute of Macromolecular Chemistry of the NAS of Ukraine,
+38 044 291 02 08, tolstov@nas.gov.ua

FATTY ACID ESTERS FOR TECHNICAL FLUIDS

Application

Used as multifunctional technical fluids in various industries, including: base bio-oils, flow accelerators, processing oils for synthetic fibers, metalworking fluids, and other industrial applications

Specifications

Transparent, light-colored liquid. Non-corrosive and fully biodegradable.

Density	0.8700–0.8720 g/cm^3
Kinematic viscosity	3.0–6.8 mm^2/s
Viscosity index	230–320
Acid number	< 0.50 mg KOH/g
Pour point	< –20 °C

Advantages

As compared with methyl esters, these fatty acid esters offer significantly lower pour points (< –20 °C) and higher boiling points (360–420 °C). They also demonstrate excellent oxidative stability and lubricating performance

IPR Protection

IPR3

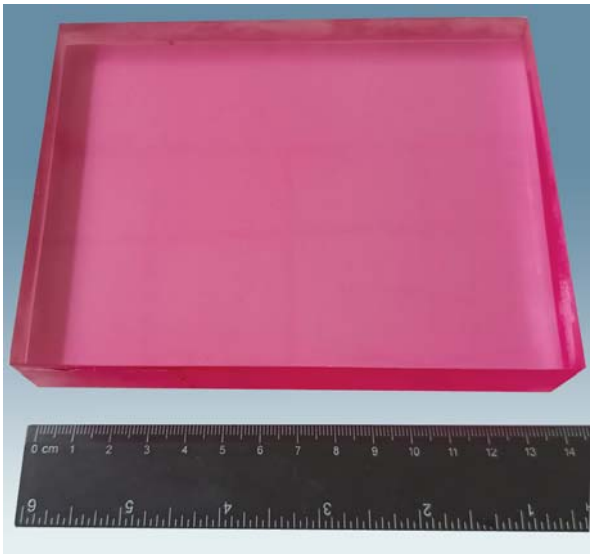
Development and Commercialization Status

IRL4, TRL4
Small-scale batches are produced on demand. Seeking partners to establish mass production

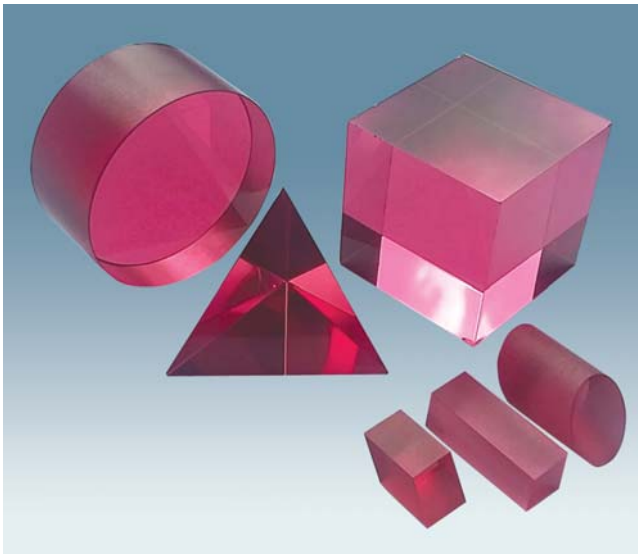
Contact Information

Stepan O. Zubenko, V.P. Kukhar Institute of Bioorganic Chemistry and Petrochemistry of the NAS of Ukraine, +38 044 292 30 84, +38 050 182 58 86, s.o.zubenko@ukr.net

TITANIUM-SAPPHIRE LASER SINGLE CRYSTALS



Titanium-sapphire single crystal



Optical elements made of titanium-sapphire

Application

Used in femtosecond pulsed and tunable lasers operating in the near-infrared range (650–1100 nm), for applications in biochemical research, medical devices, and the development of advanced precision tools for material processing

Specifications

Titanium (Ti^{3+}) doping level: 0.03–0.3 wt.%
Absorption coefficient (532 nm, E//c): 0.2–7.5 cm^{-1}
Figure of Merit (FOM): ≥300 (low-doped) to 100 (high-doped)
Wavefront distortion (WFD): < λ/4 at 632.8 nm
Maximum crystal size: up to 110 × 150 × 30 mm

Advantages

Enables the production of large-size titanium-sapphire single crystals with high homogeneity of titanium ion distribution and excellent FOM values

IPR Protection

IPR1, IPR2, IPR3

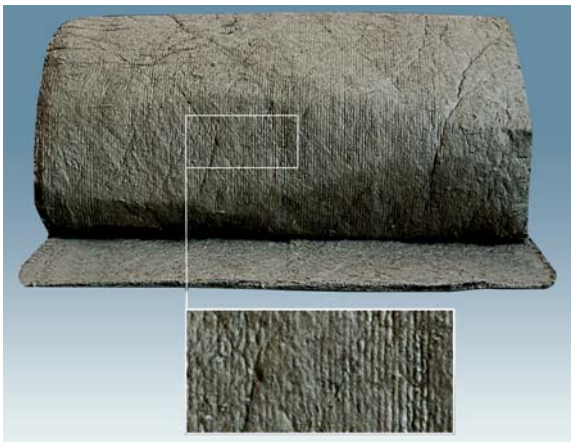
Development and Commercialization Status

IRL8, TRL9
Custom manufacture of optical elements from titanium-sapphire is available per customer specifications

Contact Information

Serhii V. Nizhankovskyi, Institute for Single Crystals of the NAS of the Ukraine,
+38 057 341 01 69, nizhankovsky@isc.kharkov.ua

BASALT CARDBOARD PRODUCTION LINE



Thermal insulation basalt cardboard TC4

Continuous line for basalt insulation cardboard production

Application

Designed for the production of thermal insulation cardboard using superfine basalt fiber (BSTF) and a polyvinyl acetate binder. The resulting product is used for thermal insulation of energy systems, industrial and household equipment, and building structures

Specifications

Continuous, convective conveyor-based operation. Output capacity: up to 16 m^3/day. Drying agent: secondary energy resource (SER) from the BSTF production process—a mixture of natural gas combustion products and air, up to 130 °C. Product format: sheets, 1500 × 600 mm, thickness 6–20 mm, density: 90 kg/m^3.
Features: high thermal resistance, fireproof, resistant to aggressive environments, extreme temperatures, and vibrations

Advantages

The drying process features low energy consumption. Compared to conventional systems, the use of secondary energy resources significantly reduces the demand for primary energy carriers

Development and Commercialization Status

IRL7, TRL7
Equipment manufacture and warranty service are available upon request

IPR Protection

IPR1

Contact Information

Andrii V. Tymoshchenko, Institute of Engineering Thermophysics of the NAS of Ukraine,
+38 044 424 15 86, a_timoshchenko@ukr.net

MHD EQUIPMENT AND TECHNOLOGY FOR PRODUCING MASTER ALLOYS AND HIGH-QUALITY ALUMINUM ALLOYS

Laboratory furnace with electromagnetic stirrer for preparing master alloys

Magnetodynamic casting unit for smelting aluminum alloys

Application

Used for the preparation of master alloys for modification and microalloying of Al-Si and Al-Cu alloys, as well as for the production of high-performance aluminum alloys and cast products in the machine-building industry

Specifications

Master alloys are produced in an electric resistance furnace (2 kW power, 2 kg melt capacity), equipped with an electromagnetic stirrer. Smelting of aluminum alloys, along with microalloying and/or modification using the prepared master alloys, is performed in a magnetohydrodynamic (MHD) casting unit with a 630 kg melt capacity and total electric power of up to 70 kW

Advantages

This process and equipment have no known analogs worldwide.
The technology enables: Production of master alloys with a fine-dispersed structure. Transformation of alloy structure from dendritic to globular. Strength improvement by 10–20%. Up to 2–3 times increase in plasticity. Significant energy and material savings

Development and Commercialization Status

IRL5, TRL5
Equipment manufacture, technology transfer for industrial implementation, and production of limited batches of master alloys are available upon request

IPR Protection

IPR1, IPR2, IPR3

Contact Information

Svyatoslav V. Gnyloskurenko, Physico-Technological Institute of Metals and Alloys of the NAS of Ukraine, +38 044 424 12 50, expo@ptima.kiev.ua

ASPHALT CONCRETE MODIFIER FROM RECYCLED POLYMER WASTE

TDV modifier

Specifications

Modification of bitumen

Composition, per 100 m.p. of bitumen	PP^R	SBS
Bitumen BND 50/70	PG 64-Y	PG 64-Y
Bitumen + 5 m.p. of modifier	PG 82-Y	PG 76-Y
Bitumen BND 160/220	PG 52-Y	PG 52-Y
Bitumen + 4 m.p. of modifier	PG 64-Y	PG 58-Y
Bitumen + 6 m.p. of modifier	PG 70-Y	PG 64-Y

Modification of SMA-20 asphalt concrete (5 % TDV)

SMA-20 asphalt concrete
Formulation:
BASE: aggregate 0-25 mm + mineral powder (100.00 %)
Bitumen BND 70/100 (5.60 %)
Stabilizing additive iFiberC (0.35 %)
Modifier (5.00 %)

Sample code	Actual density	R50* average	Increase
Without modifier	2.43	0.763	0
SUPERFLEX	2.42	0.935	23
TDV 1	2.42	0.946	24
TDV 2	2.41	0.962	26
TDV 3	2.42	0.975	28

* R50 — compressive strength at T = 50 °C

Application

Employed in the modification of bitumen and asphalt concrete for enhancing the mechanical durability and rutting resistance of road pavements

Advantages

Delivers performance grading /rutting resistance on par with or exceeding SBS-modified binders, with significantly reduced material cost and environmental impact. Leverages recycled polymer waste effectively – improves sustainability, while maintaining binder performance

Development and Commercialization Status

IRL4, TRL5
Custom manufacture and supply of polymer modifier batches, upon request

IPR Protection

IPR3

Contact Information

Alexander M. Fainleib, Institute of Macromolecular Chemistry of the NAS of Ukraine,
+38 044 291 0271, +38 044 291 03 22, fainleib@i.ua

$A^{II}B^{VI}$: TM^{2+} SINGLE CRYSTALS FOR ACTIVE ELEMENTS FOR MID-IR SOLID-STATE LASERS

Application

Active laser media for radiation sources operating in the atmospheric transparency windows (2–5 μm). Designed for compact mid-infrared lasers used in remote atmospheric sensing; environmental monitoring; photodynamic therapy; high-precision non-invasive medical diagnostics; tomography; attosecond pulse optics

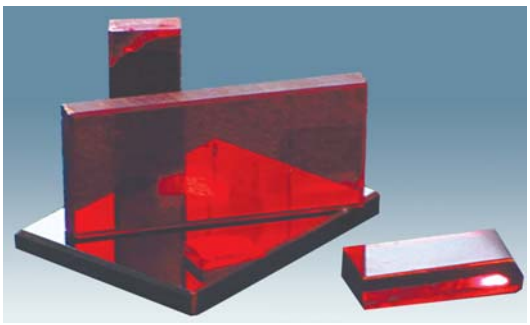
Specifications

Cr^{2+}- and Fe^{2+}-doped binary (ZnS, ZnSe, CdS) and ternary ($Zn_{1-x}Mg_xSe$, $Cd_{1-x}Mn_xTe$) single crystals based on $A^{II}B^{VI}$ group compounds.
Active ion concentration: 5×10^{17} to 3×10^{19} cm^{-3}.
Absorption coefficient (λ = 1.78 μm): 0.5–30 cm^{-1}.
Wavefront distortion: ≤ λ/5
Maximum element size: 40 × 20 × 20 mm^3

Equipment for growing $A^{II}B^{VI}$ chalcogenide crystals using the vertical Bridgman method, under excessive inert gas pressure

Advantages

As compared with other solid-state mid-IR laser media, these crystals offer broad and smooth tunability of the laser emission wavelength; operation in both pulsed and continuous-wave modes; low lasing threshold and high efficiency; broad absorption bands, allowing flexibility in pump source selection



Optical elements made of ZnSe:Cr(Fe) single crystals

Development and Commercialization Status

IRL8, TRL9
Custom manufacture of blanks and optical elements according to customer specifications is available upon request

IPR Protection

IPR1, IPR2

Contact Information

Oleksii K. Kapustnyk, Institute for Single Crystals of the NAS of Ukraine,
+38 057 341 03 49, oleksii.kapustnyk@isc.kharkov.ua

HIGH-STRENGTH MULTILAYER COMPOSITE MATERIALS

Application

Used as structural and thermal protection materials in aerospace and missile systems, automotive and shipbuilding industries, oil and gas sectors, electrical engineering, construction, and public utilities

Specifications

These polymer composites are based on fiberglass fabric and phenol-formaldehyde resins (novolac and resol types). They combine high mechanical strength (flexural modulus: 33–36 GPa) with low specific weight (1.5 g/cm^3). The materials feature are as follows: Excellent dielectric properties. Low thermal conductivity. Non-flammability. Resistance to temperature fluctuations. Chemical resistance to aggressive environments

Development and Commercialization Status

IRL5, TRL5
Small-batch production available upon request. Partner search is ongoing for establishing mass production

Advantages

The flexural modulus of the resulting fiberglass-reinforced plastics exceeds that of conventional epoxy-based composites, which are significantly more expensive. The use of domestic raw materials enables scalable production of a wide range of structural fiberglass laminates for various applications

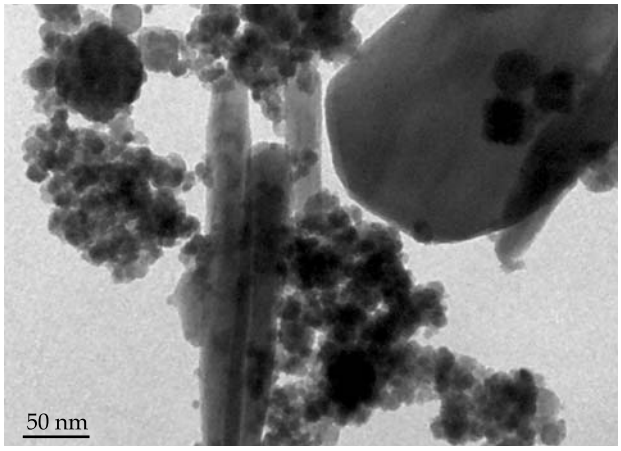
IPR Protection

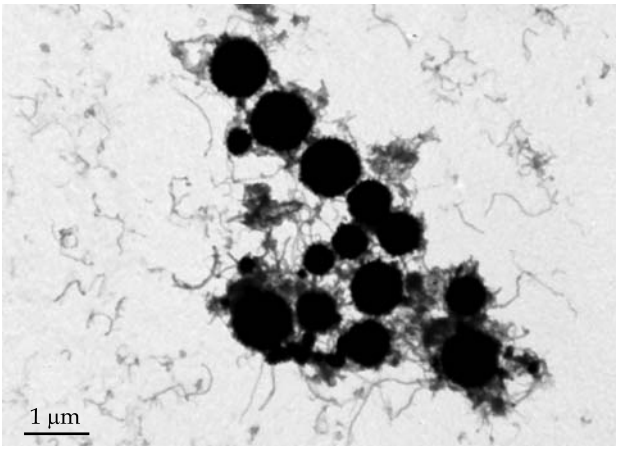
IPR3

Contact Information

Serhiy P. Rogalsky, V.P. Kukhar Institute of Bioorganic Chemistry and Petrochemistry of the NAS of Ukraine, +38 098 451 75 69, sergey.rogalsky@gmail.com

NANOCOMPOSITES BASED ON BIMETALLIC MAGNETIC NANOPARTICLES (NiCo, FeCo) AND CARBON NANOSTRUCTURES





TEM images of nanocomposites: carbon fiber/FeCo (left) and nanotubes/NiCo (right)

Specifications

Composite	Frequency 9 GHz				Low frequency		Adsorption, dB/cm, 9 GHz
	ε′	ε″	μ′	μ″	ε′ (10 kHz)	σ (1 kHz)	
NiCo	4.9	3.0	3.6	5.1	$0.4 \cdot 10^4$	8.0	6.8
GNP/NiCo	4.0	2.4	1.7	0.7	–	1.0	9.7
SiO_2/NiCo	5.9	4.1	1.2	0.6	$1.3 \cdot 10^5$	$1 \cdot 10^{-6}$	7.7
MWCNT/NiCo	7.3	6.4	2.6	2.2	$1.6 \cdot 10^7$	2.9	9.2
FeCo	5.6	4.2	1.26	0.29	$6.4 \cdot 10^6$	0.26	6.3
CF/FeCo	12.6	25.8	1.06	0.02	$1.7 \cdot 10^5$	0.15	3.9
GNP/FeCo	3.4	1.4	1.1	0.04	–	0.01	7.3
MWCNT/FeCo	3.2	2.9	1.26	0.06	99	$1.6 \cdot 10^{-2}$	17.3

Application

Used in environmental protection, healthcare, advanced materials production, and functional device components. Target consumers include specialized scientific, R&D, and design organizations engaged in the development and application of nanotechnologies

Advantages

As compared with existing analogs, these nanocomposites combine and preserve the best properties of their individual components. Key advantages include: Broad electromagnetic absorption in the ultra-high frequency (UHF) range, up to 16 dB. High electrical and thermal conductivity. Excellent thermal stability, up to 400 °C. Thermal stability exceeds that of analogs by up to 150 °C

Development and Commercialization Status

IRL4, TRL5
Small-scale batches are available upon request

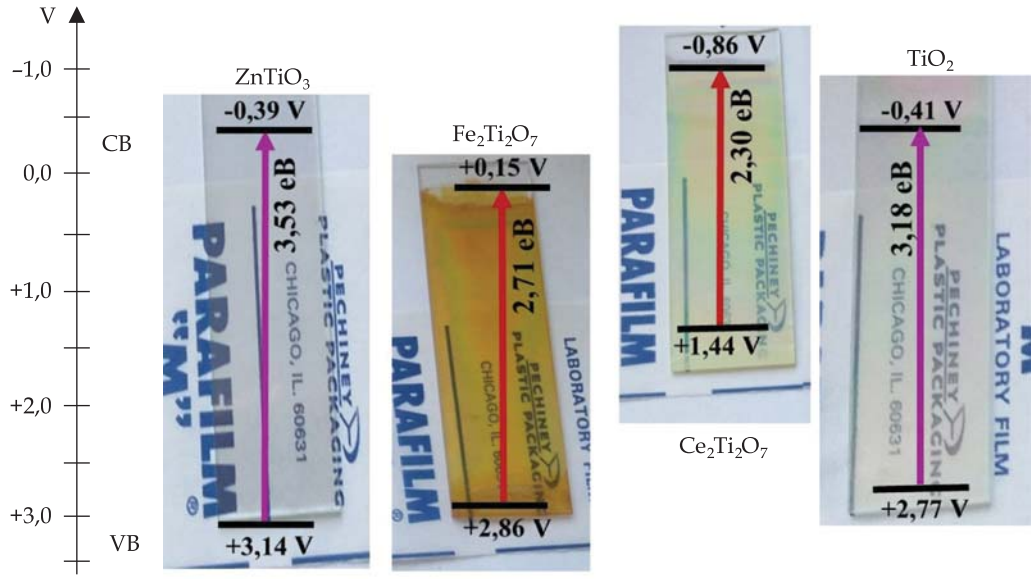
IPR Protection

IPR1

Contact Information

Oksana M. Lisova, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 067 707 66 65, oksana.garkusha@gmail.com

SEMICONDUCTIVE MATERIALS IN THE FORM OF TRANSPARENT COATINGS



Application

It is used as photocatalysts, self-cleaning surface coatings, and optical filters for specific solar spectrum ranges

Specifications

Transparent solid composite films based on mixed metal oxides with semiconductive properties. The materials exhibit bandgap energies of 2.30 eV for $Ce_2Ti_2O_7$; 2.71 eV for $Fe_2Ti_2O_7$; and 3.53 eV for $ZnTiO_3$

Advantages

As optical filters, the films efficiently absorb light in both the UV and visible ranges. For photocatalytic applications, the coatings provide enhanced adsorption of organic and inorganic pollutants; high resistance to corrosion and photocorrosion; reusability without requiring filtration or centrifugation, unlike conventional materials—enabling a cost-effective and simplified process

IPR Protection

IPR3

Development and Commercialization Status

IRL4, TRL3
Small-batch production is available upon request

Contact Information

Oksana P. Linnik, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,;
+38 067 585 64 02, okslinnik@yahoo.co.uk

EQUIPMENT FOR THE PRODUCTION OF METAL POWDERS BY PLASMA SPRAYING OF WIRE MATERIALS

Application

Designed for the production of metal powders suitable for use in *3D* printing technologies

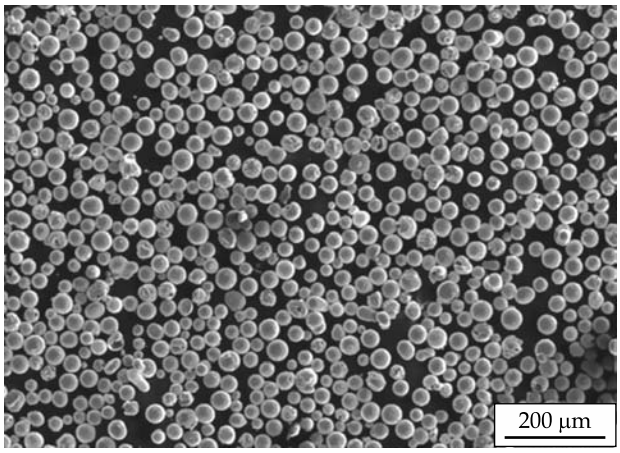
Specifications

Power supply voltage (AC, 50 Hz), V	380 (–10%…+5%)
Arc operating voltage, V	35–40
Arc operating current, A	100–400
Working gas mixture pressure, MPa	0.4–0.6
Air pressure, MPa	1.0–1.2
Air consumption, normal m^3/h	30–50
Propane-butane gas pressure, MPa	0.8–1.0
Propane-butane gas consumption, normal m^3/h	1.0–2.0
Cooling water pressure, MPa	0.3
Particle size of metal powders:	
Average < 70 μm;	
Fraction 25–63 μm – up to 85%	

Apparatus for implementing the technology

Advantages

Enables the production of fine metal powders with average particle sizes below 70 μm — significantly finer than powders produced by mechanical or physicochemical methods



Morphology of plasma-sprayed titanium wire fraction 25—50 μm

Development and Commercialization Status

IRL8, TRL7
Design, equipment manufacture, and personnel training are available upon request

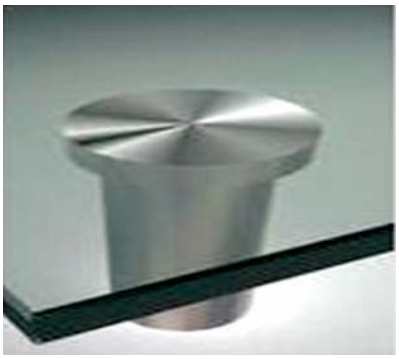
IPR Protection

IPR1, IPR2

Contact Information

Stanislav V. Petrov, Institute of Gas of the NAS of Ukraine,
+38 066 103 78 36, vizana.sp@gmail.com

OPTICALLY TRANSPARENT PHOTOCURED POLYMER MATERIAL


Use of optically transparent photocured polymer material

Application

Used for bonding a wide range of optical components in laser optics, as well as for coating and on-site repair of solar cell elements

Advantages

Superior adhesion to surfaces with varying surface energy.
Wider range of operating temperatures.
Enhanced UV and radiation resistance with preserved optical properties.Higher mechanical strength.
These features contribute to improved energy efficiency and reduced cost of photovoltaic systems, while extending service life by more than twofold

Specifications

For Coating Applications	
Optical transparency	≥ 92–95%
Adhesion to inorganic and organic surfaces	≥ 45 MPa
Operating temperature range	–190 to +200 °C
Shear failure stress	27.5 MPa
Thermal cycling resistance (–100 to +80 °C)	≥ 1000 cycles
For Photovoltaic Converters (PVC) with Coating	
Short-circuit current	1.09 A
Open-circuit voltage	12.0 V
Efficiency factor (EF)	16.4%

IPR Protection

IPR3

Development and Commercialization Status

IRL4, TRL5
Production and supply of polymer material batches are available upon request

Contact Information

Oleksandr Brovko, Institute of Macromolecular Chemistry of the NAS of Ukraine,
+38 044 559 42 95, brovko@ nas.gov.ua

POLYFUNCTIONAL POLYURETHANE ADHESIVES AND PROTECTIVE COATINGS

Application

Designed to extend the service life of industrial, construction, and infrastructure facilities by protecting them from the destructive impact of natural and man-made environmental factors

Specifications

Adhesives (for metal, concrete, brick, wood): Adhesive strength (PPM//concrete): 22 MPa. Adhesive strength (PPM//metal): 40 MPa. Cohesive strength: 41.5–46.0 MPa. Protective Anti-Corrosion and Waterproofing Coatings: Adhesion rating: < 1 point. Resistance to: technical and marine water, oil, gasoline, UV, biological agents, abrasion, and chemicals Concrete water impermeability: Protected (PPM): w = 12–15. Unprotected: w = 4. Abrasion resistance: Protected concrete: 0.002 g/cm^2. Unprotected concrete: 1.29 g/cm^2

Advantages

These multifunctional materials outperform existing analogs by: Being developed from a unified synthetic model. Functioning as adhesives, protective coatings, impregnating agents, and binding compounds. Offering long-term protection, with reliable service life of up to 12 years

Development and Commercialization Status

IRL4, TRL5
Prototypes are manufactured upon request and their performance is validated under real-world operating conditions

IPR Protection

IPR1, IPR3

Concrete aircraft sludge parking, protected by polyfunctional polyurethane material (PPM)

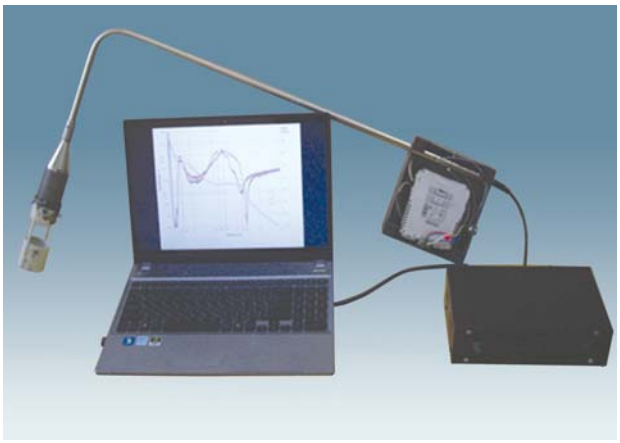
Military box (wood), protected by PPM to ensure biosecurity and water resistance

Reinforced concrete floating dock, outer side mooring beam, protected by PPM from the action of salt fog and seawater

Contact Information

Yuri V. Savelyev, Institute of Macromolecular Chemistry of the NAS of Ukraine,
+38 044 296 70 62, yuri2savelyev@gmail.com

PORTABLE SYSTEM FOR THERMAL DERIVATIVE ANALYSIS OF CAST IRON



System for thermal derivative analysis of cast irons (STDA-C)

Application

Rapid, in-process analysis of the chemical composition and performance characteristics of cast iron during the melting stage

Specifications

The system includes: Computer with pre-installed software. Immersion probe. Sampler with integrated thermocouple package. RS-485 communication module. WAD-AIK BUS analog-to-digital converter. Shielded cable. Customizable database based on the specific cast iron grade. Determines content of primary elements (C, Si, Mn) and additional alloying elements. Predicts casting properties including hardness, strength, and service performance

Advantages

Compared to existing solutions, this system enables: Fast and accurate determination of chemical composition during melting.
Real-time prediction of structure and properties of castings without additional sampling or lab testing.
High accuracy (absolute error: ±0.1%).
Complete analysis in under 5 minutes.
Compact, portable design suitable for use with multiple furnaces and pouring ladles.

Development and Commercialization Status

IRL6, TRL6
Available for order, including full software package and a customized database for specific applications

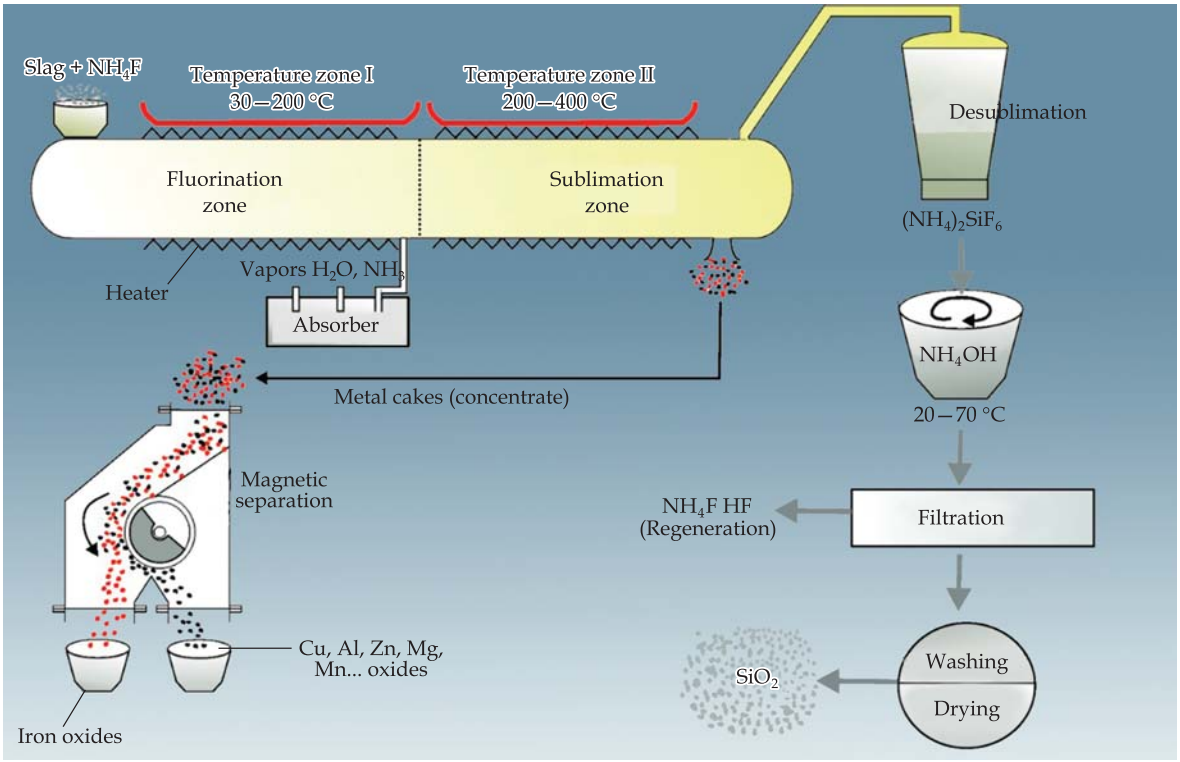
IPR Protection

IPR1, IPR2

Contact Information

Svyatoslav V. Gnyloskurenko, Physico-Technological Institute of Metals and Alloys of the NAS of Ukraine, +38 044 424 12 50, e-mail: expo@ptima.kiev.ua

RESOURCE-SAVING SYNTHESIS OF NANOSCALE SILICON DIOXIDE FROM METALLURGICAL WASTE



Application

For the synthesis of nanosized silica from solid silicon-containing metallurgical waste, as well as for developing recommendations and conducting a techno-economic feasibility study for scaling up silica production

Specifications

The technology involves sublimation of silicon-containing industrial waste at temperatures up to 400 °C, followed by continuous desublimation of ammonium hexafluorosilicate and its hydrolysis in the liquid phase. The resulting silicon dioxide is amorphous, nanoscale, highly pure (99.97%), and exhibits strong sorption properties

Advantages

Unlike conventional methods, this technology: Requires no specialized chemical feedstock or costly reagents. Uses only one reagent—ammonium fluoride (NH_4F). Operates at relatively low temperatures. Utilizes industrial waste as raw material. Enables simultaneous recovery of a collective concentrate of valuable metals in addition to silica production

IPR Protection

IPR2, IPR5

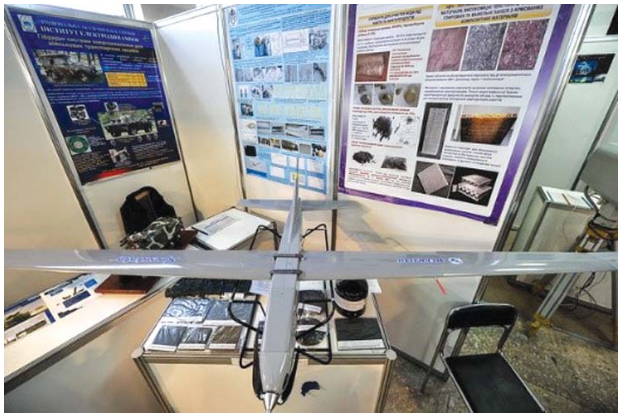
Development and Commercialization Status

IRL6, TRL4
Seeking partners for industrial implementation and scale-up

Contact Information

Liudmyla S. Andriyko, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 066 240 08 39, andriykolyuda@gmail.com

FIBERGLASS WITH ENHANCED MECHANICAL PROPERTIES



Application

Intended for use in aerospace, automotive, shipbuilding, and sports equipment industries

Specifications

The tensile strength (σ_b) of fiberglass with an epoxy binder from leading global manufacturers ranges from 200 to 400 MPa, corresponding to a specific strength (σ_b/ρ) of 105–210 kJ/kg. Reinforcing the epoxy binder with an optimal amount of carbon nanotubes (CNTs)—including CNT-modified epoxy resin and a polymerization catalyst using native CNTs—results in an 80–100% increase in specific strength compared to unreinforced material

Advantages

Structural components made from CNT-modified fiberglass are lighter and offer greater corrosion resistance. The enhanced strength of these materials significantly improves the durability and safety of vehicles, watercraft, and aircraft, particularly during landings in challenging terrain

Development and Commercialization Status

IRL5, TRL5
Seeking investors for industrial-scale production

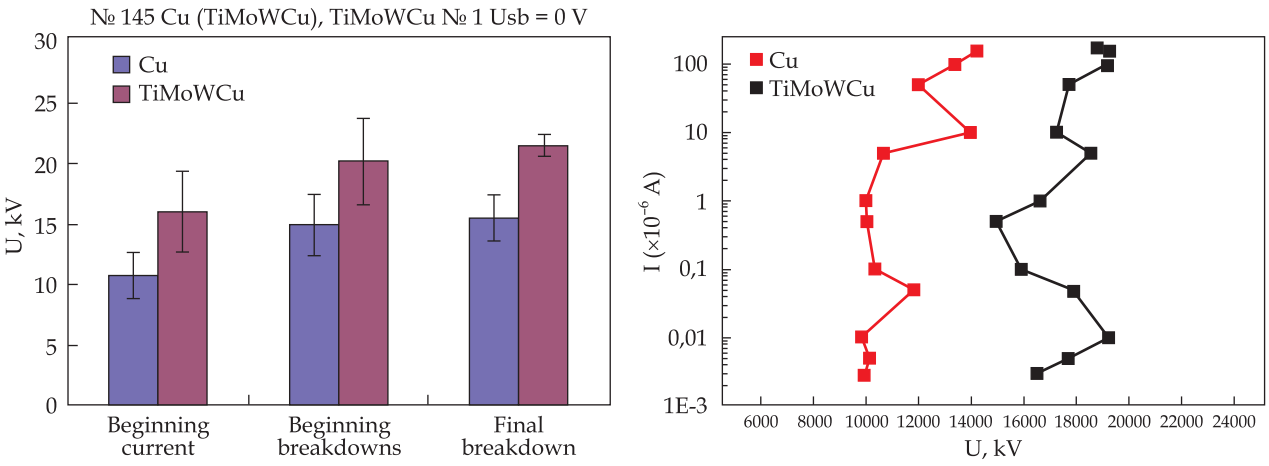
IPR Protection

IPR3

Contact Information

Yurii I. Sementsov, Chuiko Institute of Surface Chemistry of the NAS of Ukraine;
+38 095 833 28 26; ysementsov@ukr.net

HIGH-VOLTAGE BREAKDOWN-RESISTANT COPPER SAMPLES MODIFIED BY ION IRRADIATION AND METAL COATINGS



Breakdown characteristics for copper samples coated with four-component films

Specifications

Process		Breakdown voltage increase, %
Surface Cleaning	Polishing Annealing Discharge cleaning	
Ion Plasma Coating	Ti film coating TiN film coating Mo film coating	~15 ~20 ~25
Ion Implantation of Surface (ion energy 200 KeV)	Ar^{2+}; dose 1.6×10^{17} cm^{-2} Zr^{2+}; dose 1.2×10^{17} cm^{-2} N^{2+}; dose 4×10^{17} cm^{-2}	~25—30 ~25—30 ~20

Application

Used in the manufacture of components for the CLIC collider accelerating structures, providing enhanced resistance to vacuum breakdowns and supporting the achievement of accelerating gradients up to 100 MV/m

IPR Protection

IPR1, IPR2

Advantages

Modified copper samples demonstrate 20–25% higher surface resistance to high-voltage vacuum breakdowns compared to untreated counterparts

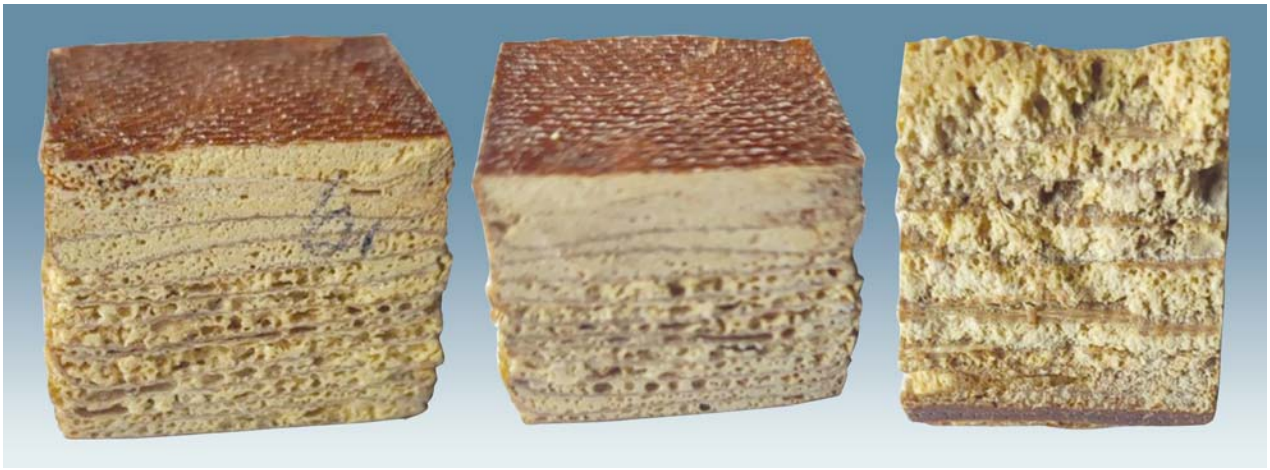
Development and Commercialization Status

IRL7, TRL9
Seeking partners to organize mass production

Contact Information

Volodymyr A. Baturin, Institute of Applied Physics of the NAS of Ukraine,
+38 067 580 93 27, baturin49@gmail.ua

HEAT-RESISTANT MICROSPHERE TEXTOLITES (MST)



Application

Designed for use in aircraft structures as reinforcing elements in load-bearing components such as floor panels, emergency escape shafts, wing panels, and mechanization units

Specifications

Binder content (polycyanurate): 40 wt%
Density: 0.6 kg/cm²
Compressive strength at 20 °C: 59 MPa
Compressive strength at 200 °C: 29 MPa

Advantages

Comparable to the best international analogs. As compared with conventional microsphere textolites based on standard EDT-69N epoxy binders, the proposed MSTs offer significantly higher compressive strength at both 20 °C and 200 °C

Development and Commercialization Status

IRL4, TRL5
Custom manufacture of polymer material is available upon request

IPR Protection

IRP3

Contact Information

Alexander M. Fainleib, Institute of Macromolecular Chemistry of the NAS of Ukraine,
+38 044 291 0271, +38 044 291 03 22, fainleib@i.ua

CENTRIFUGAL CASTING TECHNOLOGY FOR ALUMINUM ALLOYS

Aluminum alloy castings with diameters of 400 mm (left) and 150 mm (right), produced by centrifugal casting

Application

Production of hollow aluminum alloy castings—such as pipes, rings, bushings, and bands—for subsequent deformation processing or direct use in cast form after heat treatment

Specifications

The technology is implemented using an integrated equipment system that includes a vacuum magnetohydrodynamic (MHD) mixer and a centrifugal casting machine with adjustable mold rotation speeds ranging from 300 to 2200 rpm. It enables the production of castings with diameters from 150 to 400 mm and lengths of up to 800 mm

IPR Protection

IPR2

Advantages

As compared with chill casting, the technology significantly enhances both strength and ductility: Yield strength ($\sigma_{0.2}$): increase up to 20%. Ultimate tensile strength (σ_v): increase up to 30%. Elongation (δ): increase up to 4 times. The mechanical properties of centrifugally cast billets closely approach those of wrought products. The process also reduces production costs relative to traditional methods of manufacturing pipe and ring blanks, such as sheet welding or ingot piercing

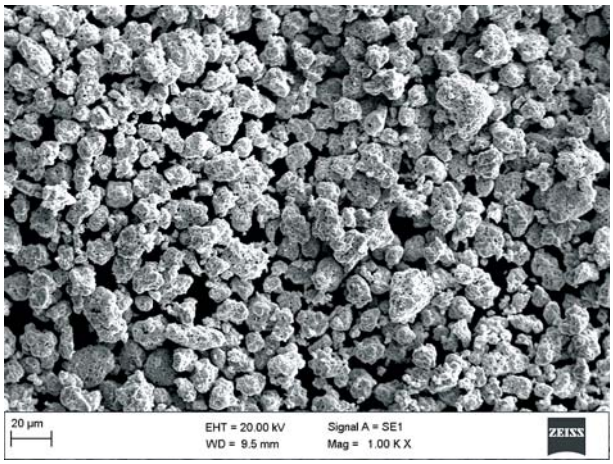
Development and Commercialization Status

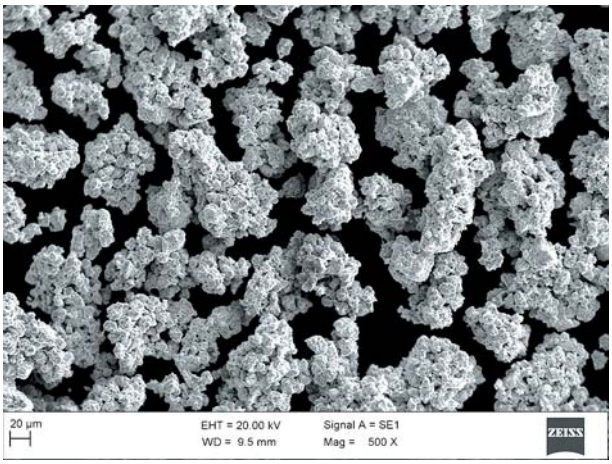
IRL6, TRL6
Licensing agreements are available for technology deployment. Small-scale casting production is offered on demand. Seeking partners for modernization and industrial-scale implementation

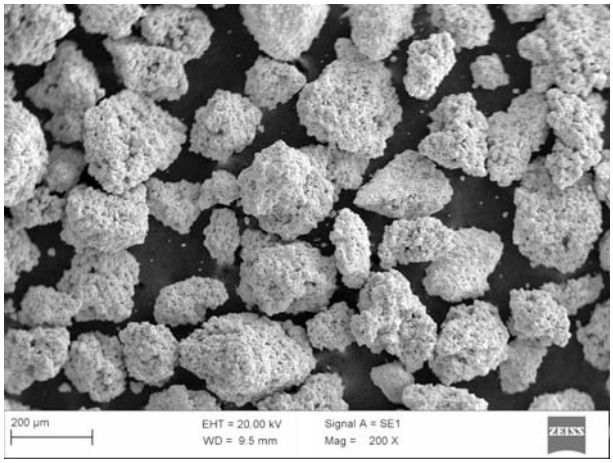
Contact Information

Svyatoslav V. Gnyloskurenko, Physico-Technological Institute of Metals and Alloys of the NAS of Ukraine, +38 044 424 12 50, expo@ptima.kiev.ua

TECHNOLOGY FOR PRODUCING GRANULAR NICKEL POWDERS







Dispersity and morphology of granular Ni powders: <45 µm (top), 45–71 µm (middle), and >71 µm (bottom)

Application

Used in oxide cathodes for klystrons and magnetrons, as well as in adsorbents, filters, and other applications

Specifications

The technology enables the production of granular nickel powders via hydrogen reduction of nickel oxide powders with grain sizes of <45 µm, 45–71 µm, and >71 µm. The chemical composition of the resulting powder includes nickel (Ni): ≥ 99.78%; silicon (Si), manganese (Mn): ≤ 0.001%; iron (Fe): ≤ 0.01%; sulfur (S), lead (Pb), zinc (Zn): ≤ 0.005%; oxygen (O): 0.063%; and carbon (C): 0.05%. Technical specifications: TU U 25.4-05416930-018-019(I):2023. *A reduced granular nickel powder* has been developed for this product

Advantages

The process is simple, environmentally friendly, and energy efficient compared to conventional methods

Development and Commercialization Status

IRL7, TRL7
Customized grain sizes of nickel powder are available upon request

IPR Protection

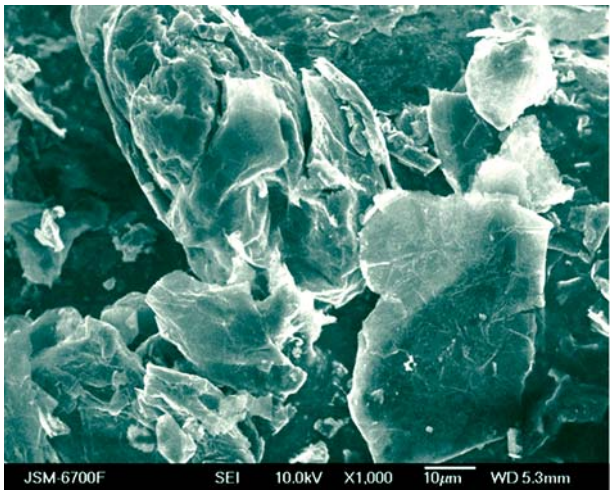
IPR1, IPR3

Contact Information

Serhii M. Fomenko, Institute for Problems of Materials Science of the NAS of Ukraine,
+38 095 244 36 38, tech.transfer@ipms.kyiv.ua

TECHNOLOGY FOR PRODUCING GLOBULATED GRAPHENE

Processing of thermally expanded graphite in an ultrasonic disperser



Microstructure of globulated graphene

Specifications

The process involves multiple stages of mechanical treatment of thermally expanded graphite. Initial processing is carried out in a cavitator to impart hydrophilic properties, followed by ultrasonic dispersion and drying. The resulting globulated graphene features uniform globule size (approximately 50 μm), spherical shape, and the consistent presence of individual graphene petals within each globule. The concentration of graphene petals is confirmed by corresponding values in Raman spectroscopy plots

Application

Production of globulated graphene for use in anodes of energy storage systems (batteries and supercapacitors), as well as in medicine, energy, and electronics

Advantages

The technology enables large-scale, environmentally friendly production of globulated graphene

Development and Commercialization Status

IRL8, TRL6
Refining, finalizing, and implementing the technology, upon request

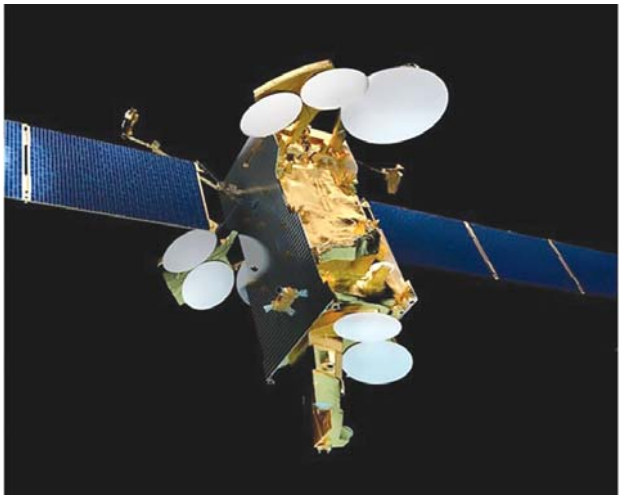
IPR Protection

IPR2

Contact Information

Yevgeny V. Strativnov, Institute of Gas of the NAS of Ukraine,
+38 095 182 73 43, estrativnov@gmail.com

ULTRA HEAT-RESISTANT POLYMER BINDERS BASED ON DOMESTIC RAW MATERIALS AND CARBON/GLASS FIBER COMPOSITES WITH OPERATING TEMPERATURES UP TO 350 °C



Application

For the production of microsphere textolites used in reinforcing elements of load-bearing structures such as floor panels, emergency escape shafts, wing panels, and mechanization units

Specifications

Cured Matrix
Glass transition temperature: 318–337 °C
Thermal stability in air and nitrogen: $T_{d10\%}$ > 400 °C
Char residue in nitrogen at 700 °C: 60–75%
Carbon Composite
Tensile strength at 25 °C / 250 °C: 922 / 711 MPa
Bending strength at 25 °C / 300 °C: 907 / 330 MPa
Compression strength at 25 °C / 300 °C: 556 / 164 MPa

IPR Protection

IPR3

Advantages

Mechanical performance is on par with leading international analogs. The binder's curing process has been optimized by reducing both the final temperature and polymerization time. A ~13-fold increase in bending strength at 300 °C has been achieved compared to the standard EDT-69N epoxy binder. The binder is promising for practical application in aerospace and other high-tech industries

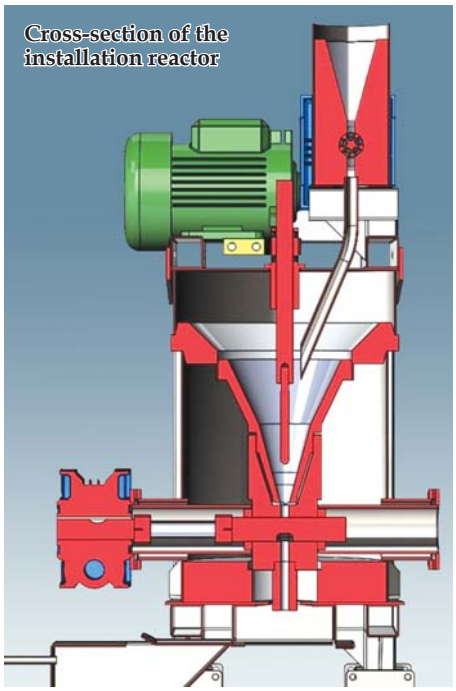
Development and Commercialization Status

IRL4, TRL5
Custom manufacture and supply of polymer binder batches are available upon request

Contact Information

Alexander M. Fainleib, Institute of Macromolecular Chemistry of the NAS of Ukraine,
+38 044 291 02 71, +38 044 291 03 22, fainleib@i.ua

INSTALLATION FOR PRODUCING HIGH-PURITY POWDERED GRAPHITE



Application

Production of high-purity graphite for use in metallurgy, the chemical industry, nuclear power, and in the development of anodes for a wide range of lithium-ion batteries

Specifications

The installation enables purification of graphite to a purity level of 99.99%.

The main characteristics:
Supply voltage: 220 V
Electrode current: 50–250 A
Power supply: 7.5 kW
Raw material batch volume: 0.1–0.3 L
Total nitrogen consumption: 50–300 L/h
Productivity: 500–720 kg/h

Advantages

High technological efficiency is ensured through continuous loading and unloading of material into an electrothermal fluidized bed. The process is environmentally friendly due to the use of nitrogen instead of hazardous acids

IPR Protection

IPR1

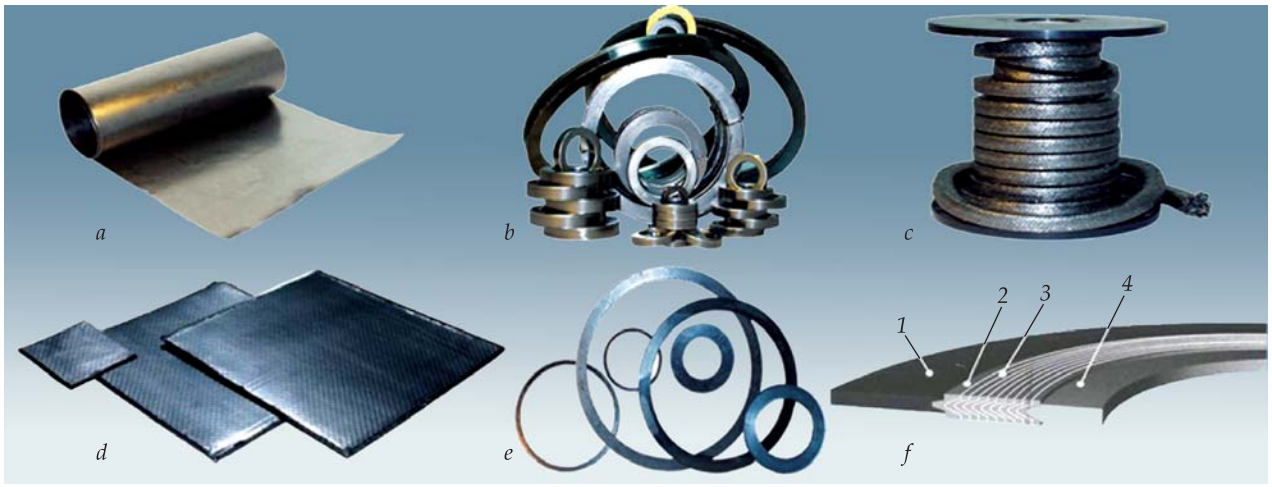
Development and Commercialization Status

IRL8, TRL6
Design and manufacture of the installation, as well as personnel training, are available upon request

Contact Information

Yevgeny V. Strativnov, Institute of Gas of the NAS of Ukraine,
+38 095 182 73 43, estrativnov@gmail.com

SEALS MADE OF HIGH-PURITY EXPANDED GRAPHITE REINFORCED WITH CARBON NANOTUBES



Mechanical seals: *a* — graphite foil; *b* — high-pressure valve sealing rings; *c* — braided packing; *d* — sheet materials; *e* — flange graphite gaskets; *f* — spiral seals

Application

Sealing components in nuclear and thermal power equipment, as well as in chemical and oil refining industries

Specifications

Heat resistance in air: up to 450 °C
Heat resistance in joints (compressed): up to 650 °C
Tensile strength: 4.2–8.5 MPa
Compression at 35 MPa: 26–30%
Recovery after pressure release at 35 MPa: 11.8–23.6%

Development and Commercialization Status

IRL5, TRL5
Seeking investors for industrial-scale production

IPR Protection

IPR3

Advantages

As compared with existing global analogs, the developed mechanical seals are significantly more cost-effective and environmentally friendly. They offer:
22% higher tensile strength
18% greater recoverability
25% lower compressibility
Reduced wear in friction assemblies extends equipment service life by approximately twofold

Contact Information

Yulia V. Hrebelna, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 067 503 72 41, liza50@ukr.net

CHEMICAL-RESISTANT EPOXY-BASED COATINGS

Chemical and biotech reactors with chemical resistance coating

Specifications

Appearance (before curing): translucent or opaque viscous liquids
Curing process: up to 3 stages
Curing temperature: 90–190 °C
Appearance (after curing): translucent or opaque rigid films
Chemical resistance: stable in aggressive chemical and biological environments (DSTU 5981-88) at temperatures up to 180 °C

Advantages

As compared with known analogs, these coatings have enhanced technological and decorative properties, high impact strength, excellent adhesion to iron, aluminum, and their alloys, improved corrosion resistance, and customizable appearance of the final product

Application

Protection of reactors and service equipment in the chemical, biotechnological, and food industries

Development and Commercialization Status

IRL5, TRL5
Small-scale production available upon request

IPR Protection

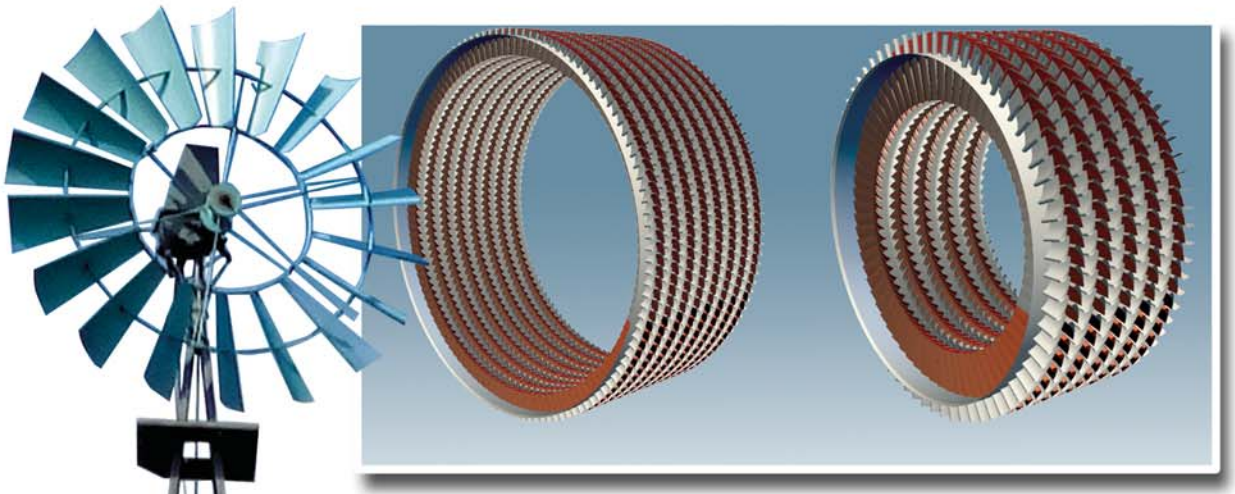
IPR1

Contact Information

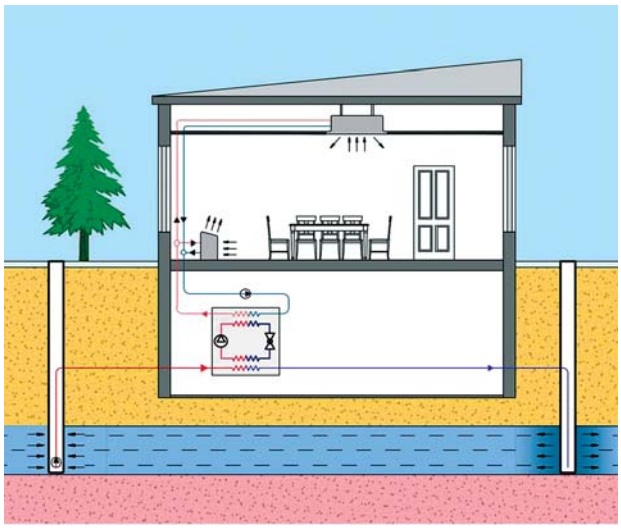
Oleksandr L. Tolstov, Institute of Macromolecular Chemistry of the NAS of Ukraine,
+38 044 291 02 08, tolstov@nas.gov.ua

- AUTONOMOUS GEOTHERMAL HEAT PUMP SYSTEM
- AUTONOMOUS SYSTEM FOR MONITORING GROUNDWATER TEMPERATURE AND LEVEL
- HIGH-EFFICIENCY STEAM TURBINE WITH ULTRA-SUPERCRITICAL STEAM PARAMETERS
- 4 KW WIND POWER TURBINE
- WIND PUMP SYSTEM
- GAS-FUELED POWER STATIONS
- HYBRID THREE-PHASE BATTERY UNINTERRUPTIBLE POWER SUPPLY SYSTEM
- ELECTRIC GENERATOR FOR REPOWERING SOLAR STATION DURING LOW SOLAR RADIATION
- ELECTRIC GENERATOR WITH MAGNETIC GEARBOX FOR LOW-POWER WIND TURBINES
- COMMUTATION CELL FOR DYNAMIC CONNECTION OF PVSOURCES
- MOBILE AUTONOMOUS POWER SUPPLY SYSTEM BASED ON A CAR TRAILER
- SPARK PORTABLE PRODUCER GAS STOVE FOR HOUSEHOLD USE
- SOFTWARE FOR DETERMINING OPTIMAL UNDER-FREQUENCY LOAD SHEDDING (UFLS) SETTING IN POWER SYSTEMS
- RUNNER RK5252M77 OF THE DNIESTER PSPP PUMP-TURBINE
- ACTIVATED BIOCHAR PRODUCTION TECHNOLOGY
- FORMATION OF A LOCAL POWER SYSTEM WITH RENEWABLE ENERGY

POWER ENGINEERING AND ENERGY EFFICIENCY



AUTONOMOUS GEOTHERMAL HEAT PUMP SYSTEM



Application

Efficient and environmentally friendly heat supply using thermal energy from groundwater

Specifications

Air heating device: fan coil
Heat pump type: water-to-water
Heat output: 10–25 kW
Electricity consumption: 2–5 kW
Heated area: 200–500 m²
Number of wells: from 2
Well flow rate: 2–5 m³/h
Groundwater temperature: 8–12 °C

Advantages

Complies with international standards. Offers up to fivefold energy savings compared to conventional electric heating systems. Zero atmospheric emissions

IPR Protection

IPR3

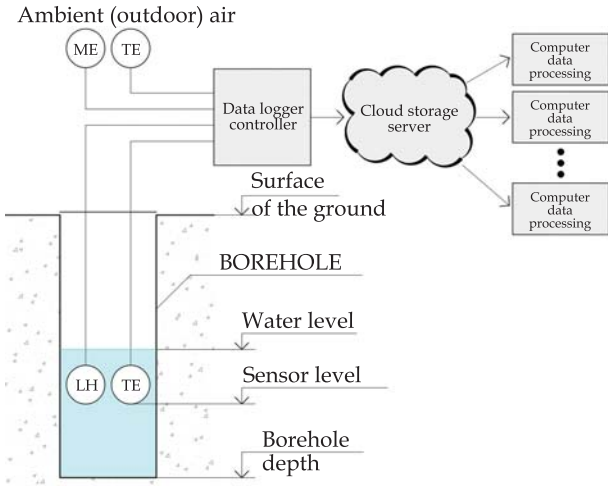
Development and Commercialization Status

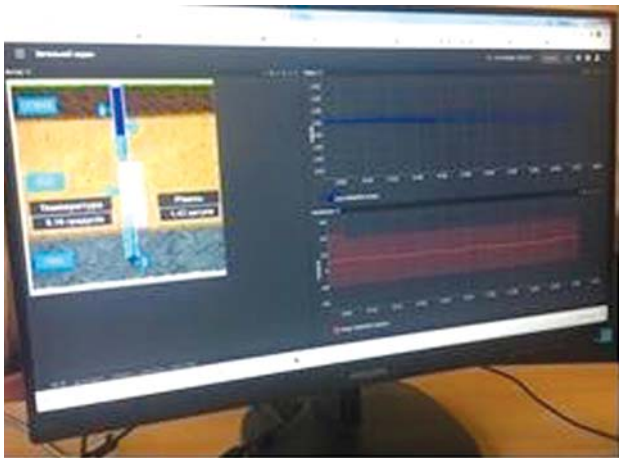
IRL6, TRL5
A functional prototype has been developed; design documentation is currently being prepared for production

Contact Information

Yuriy P. Morozov, Institute of Renewable Energy of the NAS of Ukraine,
+38 044 206 28 09, renewable@ukr.net, geotherm@ukr.net

AUTONOMOUS SYSTEM FOR MONITORING GROUNDWATER TEMPERATURE AND LEVEL





Visualization of monitoring results

Application

Monitoring, processing, and visualization of natural coolant parameters in geothermal heating systems—both during feasibility study phases and for efficient ongoing operation

Specifications

Groundwater temperature: up to 90 °C
Well depth: up to 4000 m
Level sensor: Hydrostatic Dinel HLM-25S
Temperature sensor: Resistance thermal transducer TSP-102
Integration controller: WebHMI based on Raspberry Pi
Measurement frequency: every 5 s

Advantages

Automated real-time monitoring of well parameters; supports data collection under natural conditions as well as during water extraction or injection. Enables remote access and control

Development and Commercialization Status

IRL6, TRL5
A functional prototype has been developed; design documentation is currently being prepared for production

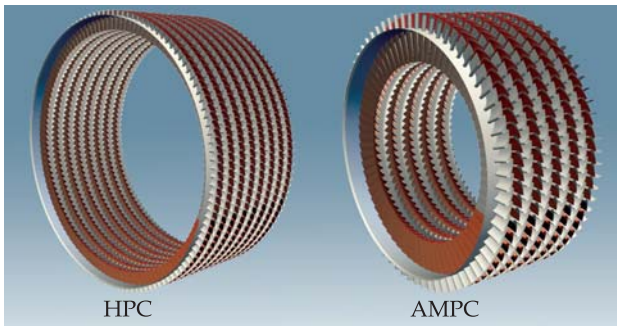
IPR Protection

IPR3

Contact Information

Oleksii V. Zurian, Institute of Renewable Energy of the NAS of Ukraine,
+38 044 206 28 09, renewable@ukr.net, geotherm@ukr.net

HIGH-EFFICIENCY STEAM TURBINE WITH ULTRA-SUPERCRITICAL STEAM PARAMETERS



Flow parts of high- and additional medium-pressure cylinders

Application

Designed for the modernization of existing K-300 series steam turbines and the development of new turbines—including those operating on biofuels—to enhance the efficiency of power plants

Specifications

Nominal steam parameters at turbine inlet:
Pressure: 35 MPa
Temperature: 700 °C
Design steam mass flow rate: 1000 t/h
High-pressure cylinder (HPC) efficiency: 94.2%
Additional medium-pressure cylinder (AMPC) efficiency: 94.5%

Advantages

Transitioning turbines to ultra-supercritical parameters reduces specific fuel consumption, strengthens energy security, supports economic growth, and lowers greenhouse gas emissions.
A loop-flow scheme has been proposed for the first time in steam turbine engineering, offering multiple advantages and enabling the development of a new generation of highly efficient turbines.
Increase in the overall power unit efficiency up to 49.2%—a gain of 5.2% as compared with the K-330 series and over 7% as compared with the K-325 series
Increase in the power output by 80.64 MW
An innovative internal blade cooling method enables the use of less heat-resistant materials, reducing costs and expanding material options

Development and Commercialization Status

TRL4, IRL6
Planned for implementation at JSC *Ukrainian Power Machines* in the modernization of K-300 turbine and in the development of advanced turbine systems

IPR Protection

IPR3

Contact Information

Roman A. Rusanov, Anatolii Pidhornyi Institute of Power Machines and Systems of the NAS of Ukraine, +380 572 93 01 44, roman_rusanov@ipmach.kharkov.ua, admi@ipmach.kharkov.ua

4 KW WIND POWER TURBINE

Application

Designed for powering household electrical appliances, electric heaters (for space and water heating), electric motors, and battery charging systems

Specifications

Rated Power Output (at 8 m/s wind speed): 4 kW
Rotor Diameter: 6.5 m
Number of Blades: 3
Blade Airfoil Profile: RAF-6
Rotor Speed: 19.7 s^{-1}
Hub Height: 17.5 m
System Weight (excluding foundation): 1200 kg

Development and Commercialization Status

IRL3, TRL5
Technical documentation available for purchase. Engineering support and customization provided upon request

IPR Protection

IPR3, IPR4

Advantages

Optimized for regions with moderate average wind speeds (e.g., Ukraine and similar climates). Equipped with a centrifugal rotor speed governor for blade pitch adjustment and overspeed protection. Permanent magnet generator utilizing a repurposed asynchronous motor. Integrated with a pulse battery charging unit for enhanced energy storage efficiency

Contact Information

Mykola O. Shykhailov, Institute of Renewable Energy of the NAS of Ukraine,
+38 044 206 28 09, renewable@ukr.net

WIND PUMP SYSTEM

Prototype of a wind pump (Polubotky Village, Chernihiv region)

Application

Serves as an autonomous or backup water supply solution, ideal for agricultural irrigation and off-grid applications

Specifications

Rated output (at 5 m/s wind speed, 28 m lift height): 1.2 m^3/h
Rotor diameter: 2.4 m
Number of blades: 18
Blade profile: Bracket-type
Rotor speed: 10.5 s^{-1}
Hub height: 10.6 m
System weight (excluding foundation and piping): 600 kg

Development and Commercialization Status

IRL5, TRL6
Technical documentation available for purchase. Engineering support and customization provided upon request

Advantages

Capable of lifting water from depths up to 40 m. Integrated automatic overspeed protection during high wind gusts. Optimized for average wind conditions typical in regions such as Ukraine. Reliable performance in remote or off-grid environments

IPR Protection

IPR3

Contact Information

Mykola O. Shykhailov, Institute of Renewable Energy of the NAS of Ukraine,
+38 044 206 28 09, renewable@ukr.net

GAS-FUELED POWER STATIONS

Gas generator set with generator gas purification system

Open-frame gas engine power plant.
Fuel: producer gas

Specifications

Fuel type: dried wood chips or wood pellets

Fuel/Indicators	Wood chips			Wood pellets		
Diameter / Height, m	1.0 / 2.0	1.5 / 3.0	3.0 / 5.0	1.0 / 2.0	1.5 / 3.0	3.0 / 5.0
Power, kW	511	1150	4599	693	1559	6237
Fuel consumption, kg/h	193	434	1737	203	457	1827
Electric power of the piston station, kW	164	414	1840	222	561	2495
Operating time at one load, h	1.0—1.5	1.5—2.5	4.5—5.5	5—6	7.5—9	12.5—15

Application

Designed for autonomous generation of electricity and heat at industrial facilities using processed biofuel as the primary energy source

Development and Commercialization Status

IRL8, TRL8
Full-cycle services available upon request, including design, manufacture, delivery, warranty support, and personnel training

Advantages

High economic efficiency with a projected payback period of under 3 years

IPR Protection

IPR2, IPR3

Contact Information

Kostyantyn Ye. Pyanykh, Institute of Gas of the NAS of Ukraine,
+38 095 245 55 07, pyanykh67@gmail.com

HYBRID THREE-PHASE BATTERY UNINTERRUPTIBLE POWER SUPPLY SYSTEM

Application

Autonomous uninterruptible power supply for military, industrial, medical, and residential facilities

Specifications

The system stores electricity from various sources, including the central power grid, fuel generators, solar panels, and wind turbines.

Nominal AC voltage: 380 V
Rated power: 50 kW
Maximum system capacity: 235 kWh
Battery backup time:
- 10 kW load: 23 h
- 25 kW load: 10 h
- 50 kW load: 4 h

Dimensions:
Length – 6 m
- Width – 2.35 m
- Height – 2.63 m

Designed for outdoor installation

Development and Commercialization Status

IRL8, TRL9
Seeking partners for serial production and product sales

IPR Protection

IPR3

Advantages

Equipped with intelligent features such as virtual power plant, micro-grid integration, smart planning, and scenario-based operation. Enables the creation of hybrid power networks by integrating wind turbines, solar panels, fuel generators, and the central grid. Supports three operating modes for charging and discharging, depending on the connection priority to the central grid, renewable sources, and the battery system. Available in stationary or mobile configurations

Contact Information

Serhii V. Tarasov, Institute of Transport Systems and Technologies of the NAS of Ukraine,
+38 098 506 92 04, tsv.transmag@gmail.com, itst@westa-inter.com

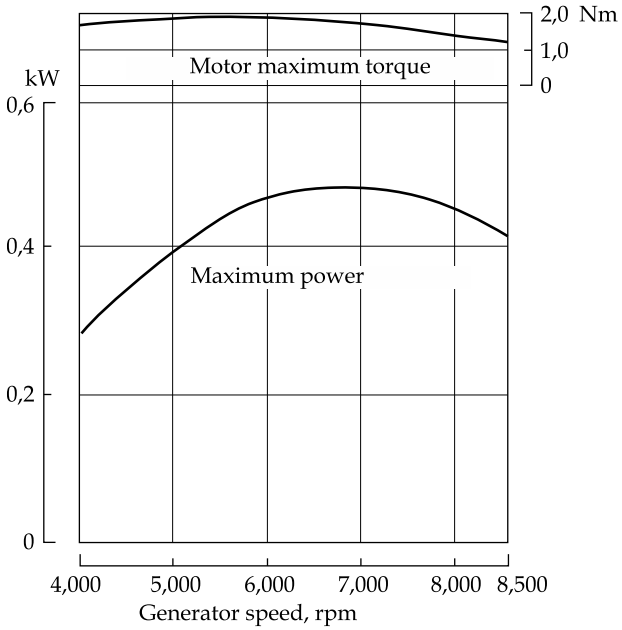
ELECTRIC GENERATOR FOR REPOWERING SOLAR STATIONS DURING LOW SOLAR RADIATION

Application

Designed to ensure stable power supply for consumers as part of the energy-generation system in solar power stations

Specifications

Rated power: 0.4 kW at 34 V
Rated current: 12 A
DC voltage range: 28–43 V
Operating temperature: –5°C to +40°C
Protection class: IP20
Weight: 4.8 kg
LED digital display for output current and voltage
Powered by an air-cooled, low-noise engine



Advantages

In systems with hybrid inverters and storage batteries, the generator operates at the point of maximum power extraction with minimal fuel consumption. Its electrical parameters are close to the NMOT (Nominal Module Operating Temperature) of a solar panel. At rated power, fuel consumption does not exceed 0.5 l/h of gasoline. It can serve as a substitute for solar panels when powering EcoFlow charging stations, providing stable energy supply with high fuel efficiency. An optional automatic start function is available: the generator can switch to engine mode using an ESC algorithm, enabling automated integration within the solar station system

Development and Commercialization Status

IRL6, TRL6
Manufactured and supplied on request.
Currently tested at operational solar power stations

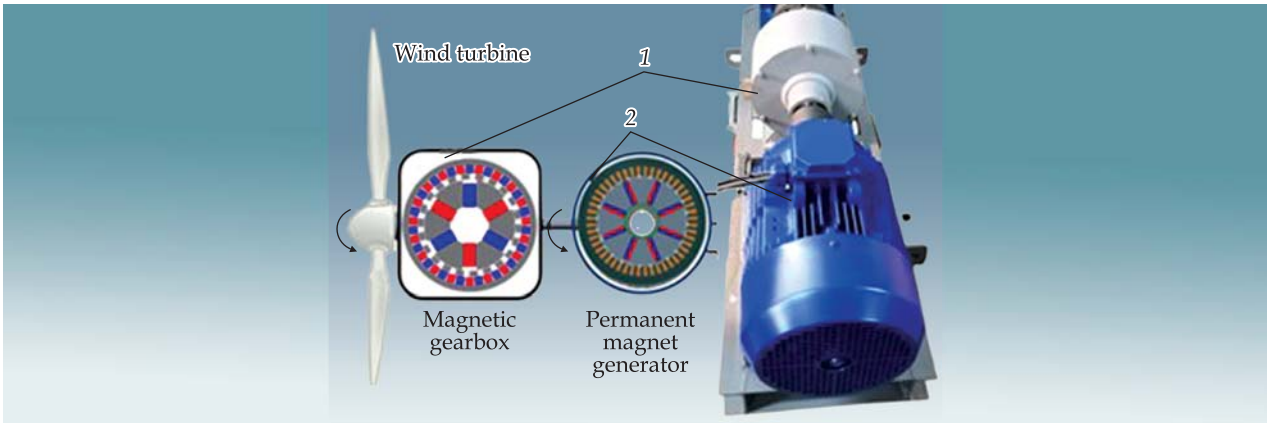
IPR Protection

IPR1, IPR2

Contact Information

Oleksander G. Kofto, Institute of Electrodynamics of the NAS of Ukraine,
+38 044 366 25 70, novied@ied.org.ua

ELECTRIC GENERATOR WITH MAGNETIC GEARBOX FOR LOW-POWER WIND TURBINES



Connection diagram of the electric generator with magnetic gearbox in a wind turbine

Application

Designed for use in wind turbines with capacities of up to 10 kW to supply power to low-consumption household and industrial equipment in private homes, farms, remote settlements, and mobile autonomous facilities

Specifications

Magnetic Gearbox
- Reduction ratio: 6.67
- Rated torque (high-speed rotor): 120 Nm
- Outer diameter: 330 mm
- Length: 360 mm

Electric Generator
- Rated rotor speed: 1200 rpm
- Rated power: 10 kW
- Rated torque: 90 Nm
- Outer diameter: 320 mm

Advantages

The use of a magnetic gearbox ensures high reliability, quiet operation, and no need for lubrication. It enables torque slip at hurricane-level wind speeds, reduces mechanical losses, and extends system service life due to non-contact torque transmission. This design minimizes wear on wind turbine components and lowers maintenance requirements

Development and Commercialization Status

IRL7, TRL6
Manufactured and delivered on request. Currently, tested at the wind farm installation site

IPR Protection

IPR1, IPR2

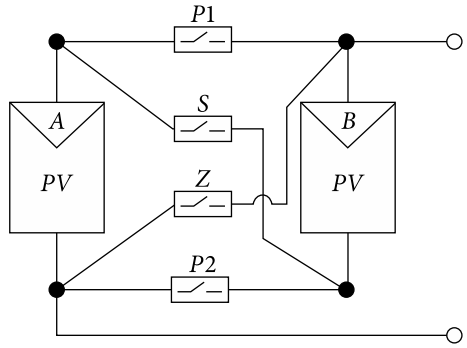
Contact Information

Oleksandr G. Kofto, Institute of Electrodynamics of the NAS of Ukraine,
+38 044 366 25 70, novied@ied.org.ua

COMMUTATION CELL FOR DYNAMIC CONNECTION OF PV SOURCES

Application

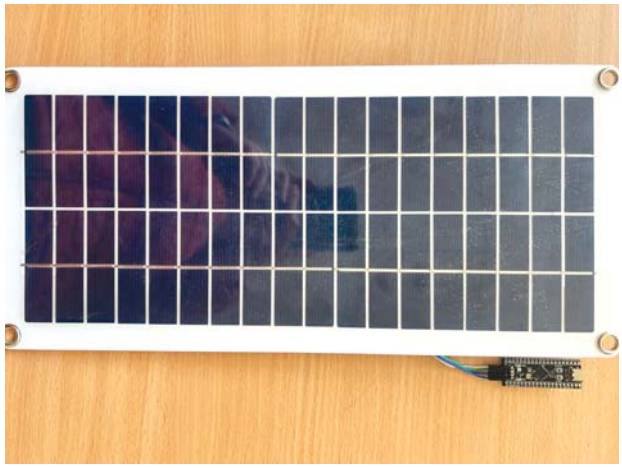
For connecting photovoltaic energy sources in series or parallel, or for shunting them to modify output parameters. The use of dynamic connections enables the generation of electrical energy with a wide range of nominal voltages and currents. It also represents a step toward generating alternating current with various waveforms



Commutation cell of two sources (*PV* — *PV*-element, *P*1 and *P*2 — parallel connection, *S* — series connection, *Z* — bypass connection)

Specifications

The required configuration is created using a programmable logic controller and field-effect transistors, allowing for a wide range of output voltages and currents (typically 400 V, 100 A)



Photopanel with switching unit

Advantages

Instead of fixed connections in the electrical circuits of photovoltaic cells, dynamically switched connections are proposed. These connections can create arbitrary or predictably variable topologies of power generation circuits by changing between series and parallel configurations. Dynamic switching offers advantages not only during the installation of specific systems but also for device and system control during operation, both in automatic and remote modes

Development and Commercialization Status

IRL3, TRL3
A research model and preliminary market efficiency assessment are under development

IPR Protection

IPR2

Contact Information

Dmytro V. Bondarenko, Institute of Renewable Energy of the NAS of Ukraine,
+38 044 206 28 09, renewable@ukr.net

MOBILE AUTONOMOUS POWER SUPPLY SYSTEM BASED ON A CAR TRAILER

Mobile autonomous power supply system based on a car trailer: in transport mode (left), deployed mode (center), and deployed mode – side view of the trailer (right)

Specifications

The car trailer is equipped with an autonomous 220 V / 50 Hz power supply system, including:
Longi LR5-72HTH-580M solar panels with a total nominal capacity of 3.5 kW;
Deye SUN-06K-SG05LP1 inverter for energy conversion and system control (6 kW);
Pytes V5 / $LiFePO_4$ 100A battery for energy storage (5 kWh);
Gasoline inverter generator for backup power supply in the absence of solar energy (3.5 kW);
Optional battery charging from the centralized power grid.
The system operates with automatic source switching: Sun → Battery → Generator.
Maximum load capacity: 5 kW
Total weight: 540 kg

Application

Designed to provide autonomous power supply in both urban and field conditions, with high mobility and rapid deployment capability

Advantages

The system enables autonomous power supply using photovoltaic energy in diverse environments with rapid deployment. Manual azimuth adjustment enhances efficiency by optimizing the solar panel orientation relative to the sun's path

Development and Commercialization Status

IRL6, TRL6
A prototype for field testing and serial production planning is under development

IPR Protection

IPR2

Contact Information

Valerii O. Pundev, Institute of Renewable Energy of the NAS of Ukraine,
+38 044 206 28 09, renewable@ukr.net

SPARK PORTABLE PRODUCER GAS STOVE FOR HOUSEHOLD USE

Application

Outdoor cooking, heating water, and preparing livestock feed

Specifications

Reactor volume: 9.0 dm^3
Fuel load: ≤ 5.8 kg
Fuel types: wood chips, firewood, pellets, briquettes
Fuel moisture: ≤ 30%
Combustion duration: 2–3 hours (depending on fuel type)
Efficiency: 23.4–30.8%
Air supply: 12 V fan, 0.15 A
Weight (without fuel): 8 kg
Power source: battery or mains

Advantages

Uses 2–3 times less fuel than similar products; efficiency only 20–30% lower than a gas stove; smokeless, soot-free combustion; mobile and portable

Development and Commercialization Status

IRL6, TRL7
Production license available for sale

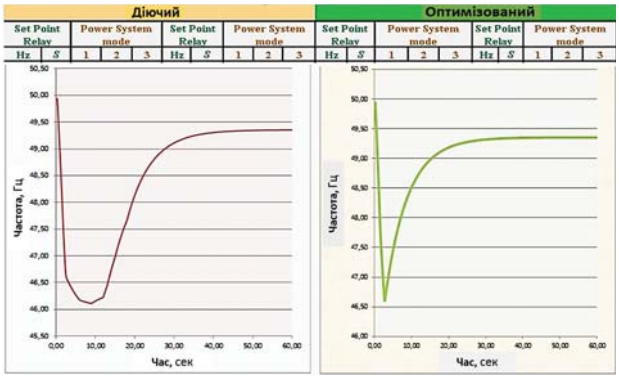
IPR Protection

IPR3

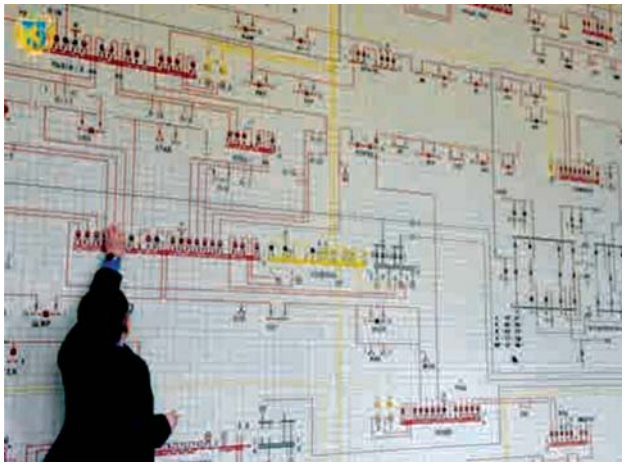
Contact Information

Volodymyr P. Klius, Institute of Renewable Energy of the NAS of Ukraine,
+38 044 206 28 09, +38 095 067 07 64, biomassa@ukr.net

SOFTWARE FOR DETERMINING OPTIMAL UNDER-FREQUENCY LOAD SHEDDING (UFLS) SETTINGS IN POWER SYSTEMS



Frequency recovery before (left) and after (right) the optimization of settings



Application

Enhancing the efficiency of under-frequency load shedding in local distribution networks

Specifications

The software calculates relay settings for UFLS systems in compliance with regulatory requirements established by transmission system operators, national regulators, or associations of transmission system operators. It can also generate settings based on specific network requests, accounting for limits on frequency deviation duration. Compatible with Windows 7 or higher

Advantages

As compared with existing tools, the software enables dynamic relay adjustments by considering seasonal load variations and the intermittent nature of renewable energy generation. It ensures compliance with regulations and saves operator time

IPR Protection

IPR3

Development and Commercialization Status

IRL7, TPL8
UFLS integration at the distribution network level, including relay setting calculations, has been developed

Contact Information

Volodymyr A. Lytvynchuk, Institute of Renewable Energy of the NAS of Ukraine,
+38 044 206 28 09, volytvynchuk@gmail.com

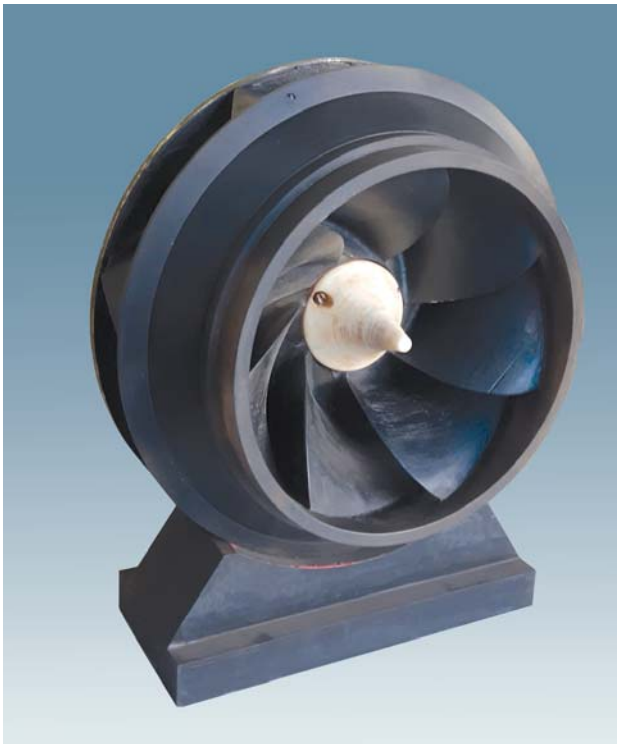
RUNNER RK5252M77 OF THE DNIESTER PSPP PUMP-TURBINE

Application

Hydraulic energy storage and generation, used to balance electricity supply and demand, and to level daily fluctuations in power consumption

Specifications

The key parameters of the full-scale unit are as follows:
Maximum head in turbine mode: H_{max} = 165 m
Nominal flow rate in turbine mode: Q = 273.2 m^3/s
Runner diameter: D_1 = 7.3 m
Maximum unit power:
in turbine mode: N_t = 390 MW
in pumping mode: N_p = 420 MW



Model RK5252M77 for research on the hydrodynamic stand EKS-30 of IPMS of the NAS of Ukraine, which has the status of national heritage of the NAS of Ukraine

Advantages

Numerical and experimental studies show that across the entire operating range in turbine mode, the pump-turbine equipped with the RK5252M77 runner demonstrates higher efficiency than units 1–4 of the Dniester PSPP. At nominal head, the efficiency advantage reaches 2%. The flow passage with the RK5252M77 runner features an extended operating range and ensures stable performance at partial loads—from 40% to 100% of nominal capacity. It also exhibits improved pulsation characteristics in the draft tube, reducing unit vibrations

Development and Commercialization Status

IRL8, TRL6
Geometric data for the RK5252M77 runner has been transferred to JSC *Ukrainian Power Machines* for large-scale model production. Joint acceptance and testing will be conducted on a hydraulic test stand, followed by implementation on units 5–7 of the Dniester PSPP

IPR Protection

IPR2

Contact Information

Oleg M. Khorev, Anatolii Pidhornyi Institute of Power Machines and Systems of the NAS of Ukraine, +380 572 93 01 44, oleg_xo@ukr.net, admi@ipmach.kharkov.ua

ACTIVATED BIOCHAR PRODUCTION TECHNOLOGY

Biochar samples

Specifications

Biochar is produced and activated in a single stage at a temperature of 800–1000 °C.
The yield is 10–15% of the raw material mass.
Biomass types: birch, maple, willow chips, walnut shells

Biomass size: 5–40 mm
Moisture content: 20–45%
Sorptive properties of activated biochar:
From willow chips: S = 402 m^2/g; Id = 32.2%
From birch chips: S = 352 m^2/g; Id = 42.2%

Application

Production of activated biochar from biomass for technical applications

Advantages

Energy consumption is half that of conventional technologies. Utilizes renewable raw materials

Development and Commercialization Status

IRL6, TRL7
Production license available for sale

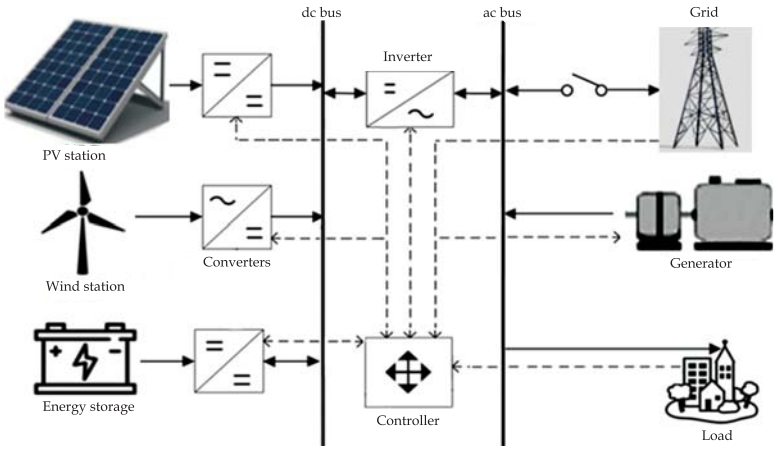
IPR Protection

IPR3

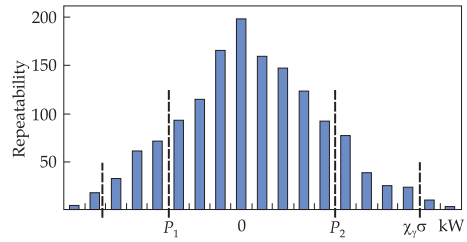
Contact Information

Volodymyr P. Klius, Institute of Renewable Energy of the NAS of Ukraine,
+38 044 206 28 09, +38 095 067 07 64, biomassa@ukr.net

FORMATION OF A LOCAL POWER SYSTEM WITH RENEWABLE ENERGY



Generalized flowchart of a local hybrid power system with renewable energy sources and power balancing components



Result of statistical evaluation — histogram of power imbalances: P_i — permissible deviations from the balanced regime; χ_γ — quantile of the probability distribution of imbalances

Application

Assessment of optimal parameters for a local power system (microgrid) with renewable energy sources and balancing technologies to ensure reliable energy supply in both grid-connected and islanded modes

Specifications

Design of a local hybrid power system considering seasonal wind and solar energy patterns at a specific location, load profiles, and energy exchange in grid-connected or isolated modes. Assessment of balancing components: type, quantity, battery and backup generator control algorithms. Capability to calculate financial outcomes under different tariff scenarios

Development and Commercialization Status

IRL6, TRL5
A techno-economic feasibility study can be provided on request, along with training in system modeling and operational methods

Advantages

In contrast to conventional methods, this approach treats electricity generation and consumption as random processes of defined types over time. It enables the calculation of probable energy flows at specific moments and the identification of optimal energy conservation parameters, while estimating the likelihood of adverse events and ensuring reliable supply within specified confidence intervals

IPR Protection

IPR1

Contact Information

Mykola P. Kuznietsov, Institute of Renewable Energy of the NAS of Ukraine,
+38 044 206 28 09, renewable@ukr.net, nik_ku@ukr.net

- BIOPREPARATION FOR ECOLOGICAL BIOFUEL PRODUCTION
- PLASTIC SILICA GREASES
- BIODIESEL PRODUCTION TECHNOLOGY
- BLENDED ETHANOL BIODIESEL PRODUCTION TECHNOLOGY
- INSTALLATION FOR FUEL BIOETHANOL PRODUCTION FROM LIGNOCELLULOSIC BIOMASS

FUELS AND LUBRICANTS. MATERIALS AND TECHNOLOGIES

BIOPREPARATION FOR ECOLOGICAL BIOFUEL PRODUCTION

Application

Recycling of organic waste from industry, livestock farming, and agriculture into biofuel, as well as preparing and preserving raw materials at various production facilities

Specifications

The biopreparation is a concentrate of acetone-butanol bacteria (ABBC) that activates acetone-butanol fermentation, promoting biofuel production.
It decomposes a wide range of organic substrates (grains, production residues, sugars, sewage, etc.).
Controls the processes of substrate preparation and fermentation.
Enables one- or two-stage processing:
- Stage I: substrate preparation and preservation (conversion into organic acids)
- Stage II: fermentation and biofuel production (yielding acetone, hydrogen, or butanol depending on process settings)

Advantages

Requires no pre-activation or special preparation; effective and universal for both individual stages and the entire process.
Increases the end-product yield by 24% as compared with conventional methods.
Reduces raw material processing costs by a factor of 1.7

Development and Commercialization Status

IRL7, TRL8
Bacterial strains and technical documentation are available under license agreements.
Seeking partners for launching mass production

IPR Protection

IPR3

Contact Information

Olena G. Vasylenko, D.K. Zabolotny Institute of Microbiology and Virology of the NAS of Ukraine, +38 067 239 57 85, elenavasylenk@ukr.net

PLASTIC SILICA GREASES

Laboratory samples of plastic silica greases

Application

For high-temperature operation in aggressive environments, vacuum, or under radiation exposure

Specifications

Thickener: MO_2/SiO_2 (M = Zr, Ti, Ce)
Dispersion medium: polydiethylsiloxane
Penetration at 25 °C: 26–30 mm
Heat resistance: up to 200 °C
High mechanical strength

Advantages

Outperforms the domestic *Silard* grease in mechanical stability by a factor of 10. Operates reliably at 200 °C, resists leakage under heavy loads, and maintains viscosity across temperatures for all-season use

Development and Commercialization Status

IRL3, TRL4
Experimental batches available upon request for testing in real-world friction units

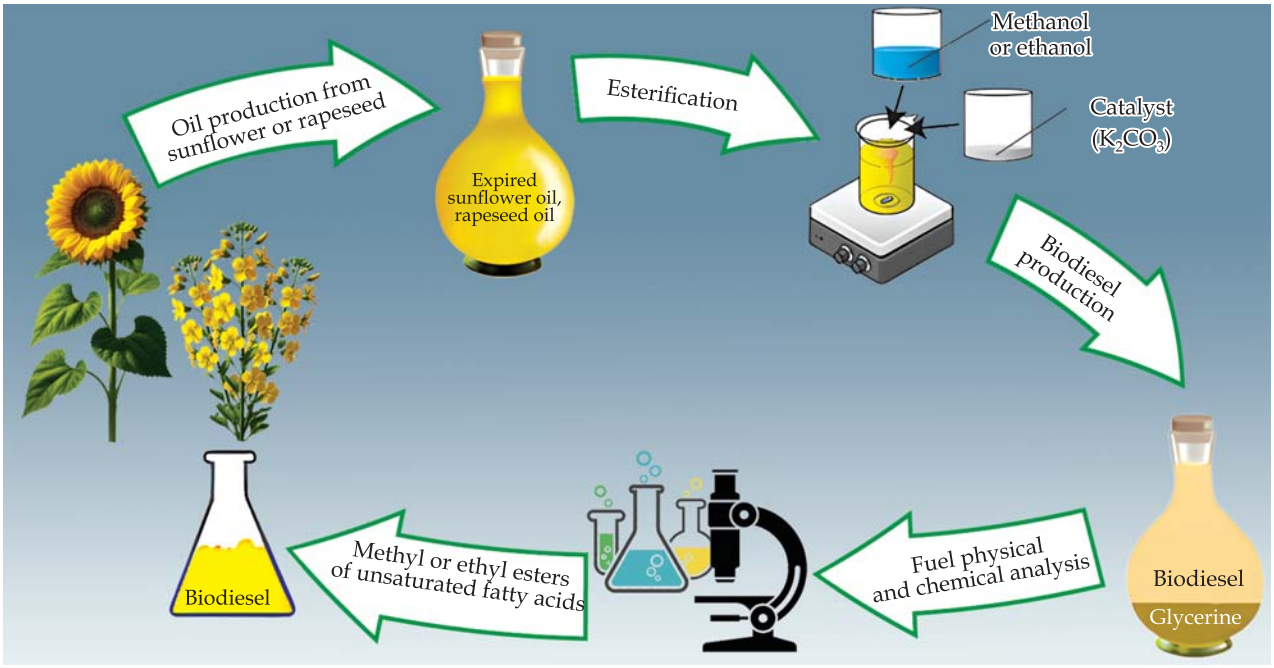
IPR Protection

IPR3

Contact Information

Mykola V. Borysenko, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 099 160 25 91, borysenko@nas.gov.ua

BIODIESEL PRODUCTION TECHNOLOGY



Schematic flowchart of biodiesel fuel production using new technology

Application

Production of biodiesel fuel for internal combustion engines used in rail, water, and road transport

Specifications

The process involves reacting vegetable oil with alcohol (methanol 99.8% or ethanol 96%) in the presence of a catalyst for 4–6 h at 15–25 °C. The aqueous layer is separated, and the organic layer is washed twice with water, dried over sodium sulfate, and the solvent is removed under vacuum

Development and Commercialization Status

IRL5, TRL5
Seeking investors and partners for scaling to industrial production. Licensing opportunities available

Advantages

Compared to existing methods, the technology ensures a high yield (94–100%) without saponification or heating. Phase separation occurs quickly (5–7 min). Biodiesel can be produced not only from refined oil but also from expired sunflower oil and cold-pressed rapeseed oil. Impurities in the final product are below 2%

IPR Protection

IPR3

Contact Information

Mykola I. Korotkikh, L.M. Litvinenko Institute of Physical-Organic & Coal Chemistry of the NAS of Ukraine, +38 095 530 30 61, nkorotkikh@ua.fm

BLENDED ETHANOL BIODIESEL PRODUCTION TECHNOLOGY

Application

Alternative fuel production for diesel engines

Advantages

Enables replacement of up to 30% of petroleum diesel, significantly enhancing Ukraine's energy independence. Offers superior environmental performance compared to petroleum-based diesel

Specifications

A process flow diagram and temporary technological regulations have been developed for designing an industrial plant with a capacity of 1 t/day. The fuel is made of fully renewable domestic raw materials (sunflower or rapeseed oil and ethanol) and contains up to 30% fatty acid ethyl esters. It meets DSTU 8695:2016 requirements for cetane number, density, viscosity, cold filter plugging point, ash content, corrosion activity, and oxidative stability.
A laboratory setup has been built

Development and Commercialization Status

IRL7, TRL7
Small batches available on request.
Seeking partners for scaling to mass production.
Licenses available

IPR Protection

IPR3

Contact Information

Stepan O. Zubenko, V.P. Kukhar Institute of Bioorganic Chemistry and Petrochemistry of the NAS of Ukraine, +38 044 292 30 84, +38 050 182 58 86, s.o.zubenko@ukr.net

INSTALLATION FOR FUEL BIOETHANOL PRODUCTION FROM LIGNOCELLULOSIC BIOMASS

Application

Integrated processing of agricultural and forestry plant waste into fuel bioethanol, used as a motor fuel additive

Specifications

Output from 100 kg of biomass: 35–40 l
Specific energy consumption: 3–5 kWh
Weight: 200 kg
Dimensions: 2000 × 1500 × 1000 mm

Installation for the production of bioethanol from lignocellulosic raw materials

Advantages

Performs dispersion, dissolution, heating, and hydrolysis in a single unit, reducing energy and resource inputs by 25–30%

Development and Commercialization Status

IRL7, TRL8
Design documentation available for sale with author support

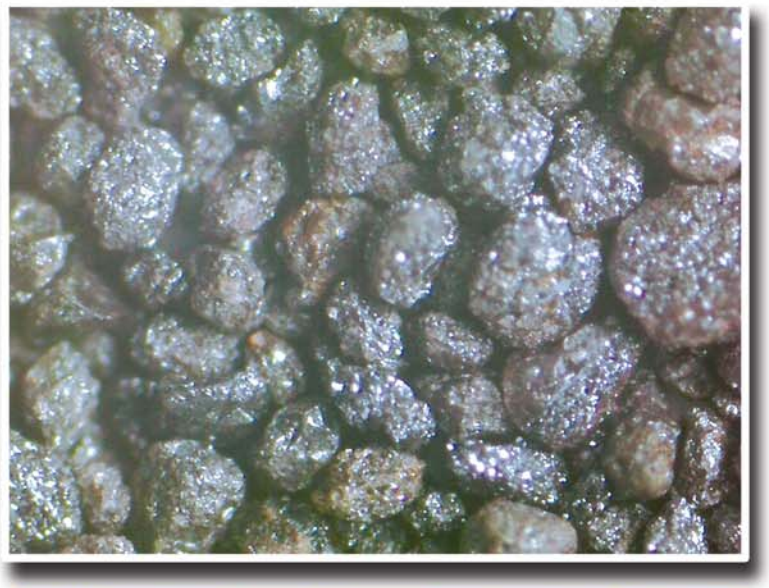
IPR Protection

IPR1, IPR3

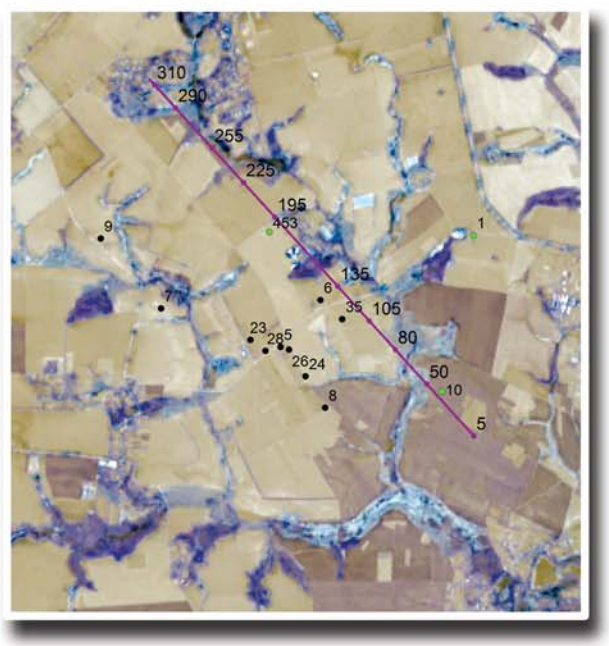
Contact Information

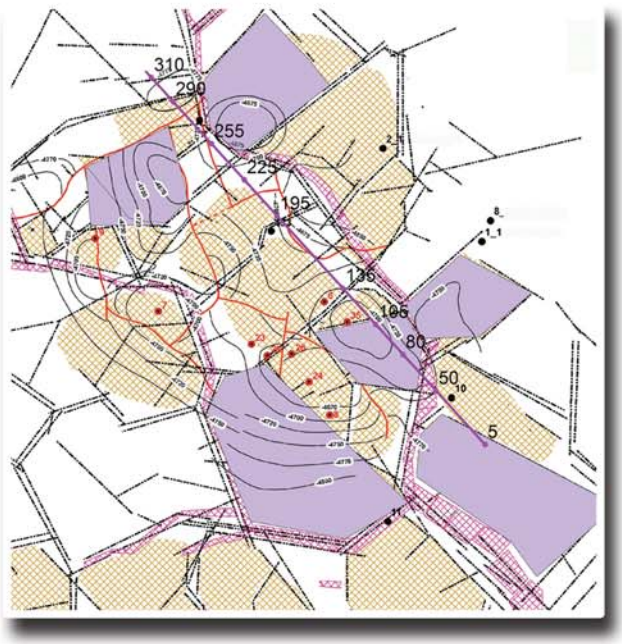
Oleksandr M. Obodovych, Institute of Engineering Thermophysics of the NAS of Ukraine,
+38 044 424 31 85, tdsittf@ukr.net

- METHODOLOGY FOR FORECASTING OIL AND GAS PROSPECTS USING REMOTE SENSING DATA
- V-AIR.TECH FOR COMPREHENSIVE PROCESSING OF HEMATITE QUARTZITES IN A VORTEX AIR-MINERAL FLOW

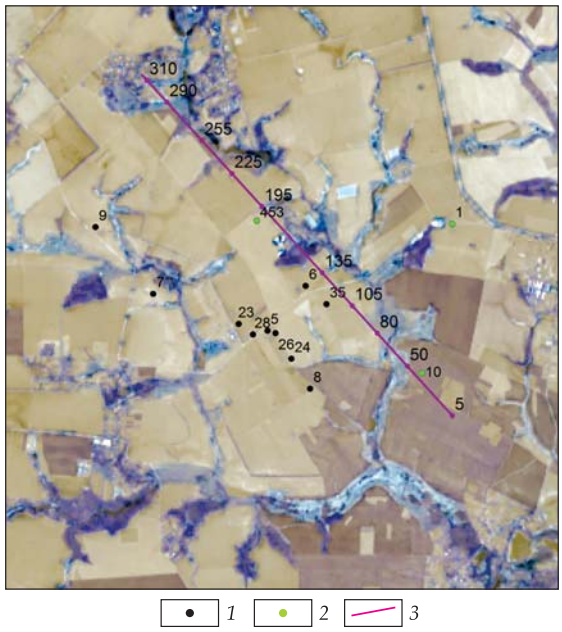


TECHNOLOGIES AND EQUIPMENT FOR EXPLORING, EVALUATING, AND EXTRACTING MINERALS

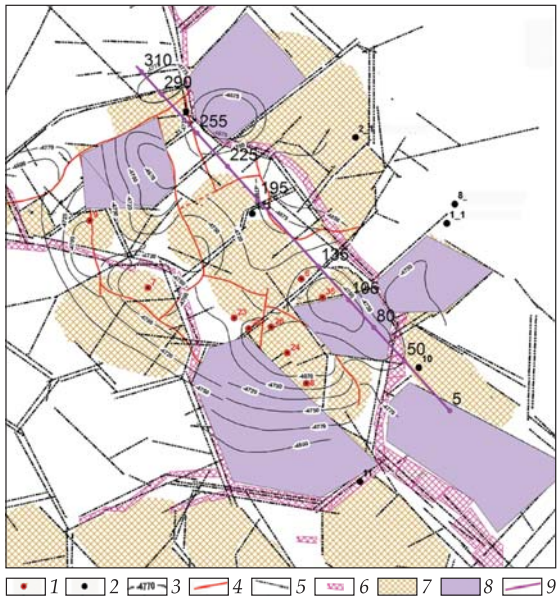




METHODOLOGY FOR FORECASTING OIL AND GAS PROSPECTS USING REMOTE SENSING DATA



Lipovodolinsk oil and gas condensate field on the Landsat 8 KZ (20210510). Legends: *1* — productive wells; *2* — unproductive wells; *3* — seismic profile No 104



Lipovodolinsk oil and gas condensate field. Fault-block model. Legends: *1* — productive wells; *2* — unproductive wells; *3* — isogypsums of the reflective horizon VB3; *4* — faults; *5* — lineaments; *6* — lineament zones; *7* — neotectonic uplifts; *8* — prospective neotectonic uplifts; *9* — seismic profile No. 104

Application

Used to guide exploration of hydrocarbon deposits

Specifications

Based on models linking landscape features to commercial hydrocarbon deposits using geological, geophysical, morphostructural, and remote sensing data. Outputs include maps identifying promising exploration zones

Advantages

High clarity, efficiency, and cost-effectiveness. Expands spatial (surface and subsurface) use of remote sensing for onshore oil and gas exploration

Development and Commercialization Status

IRL7, TRL8
Forecasting of prospective areas and well siting recommendations available upon request

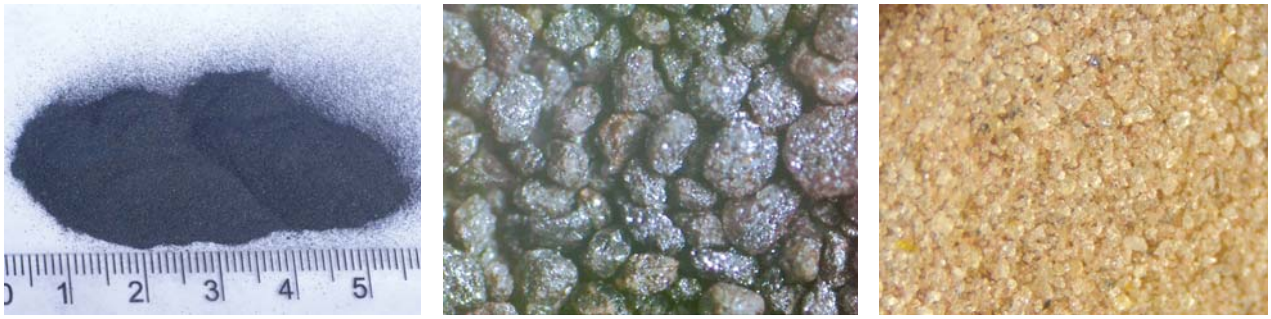
IPR Protection

IPR2

Contact Information

Olga V. Tytarenko, Scientific Center for Aerospace Research of the Earth, Institute of Geophysics of the NAS of Ukraine, +38 067 996 72 99, olgatitarenko @casre.kiev.ua

V-AIR.TECH FOR COMPREHENSIVE PROCESSING OF HEMATITE QUARTZITES IN A VORTEX AIR-MINERAL FLOW



a *b* *c*

Commercial products obtained from the hematite quartzites, using the V-AIR.TECH: *a* — iron ore concentrate (Fe total 67–69%), *b* — sintering ore (Fe total 60–62%), *c* — quartz sand

Application

Processing of iron ore mining waste to produce multiple marketable products

Specifications

Hematite concentrate (Fe total 67–69%)
Sintering ore (Fe total 60–62%)
Clinker raw materials and dry pigments (Fe total ~40%)
Quartz sand

Development and Commercialization Status

IRL8, TRL7
Custom manufacture, equipment maintenance and personnel training are available upon request

Advantages

Outperforms existing technologies by delivering high-purity products without using water, flotation, chemical reagents, or heating—preserving the natural environment. Generates no processing waste. The equipment is compact, modular, and mobile

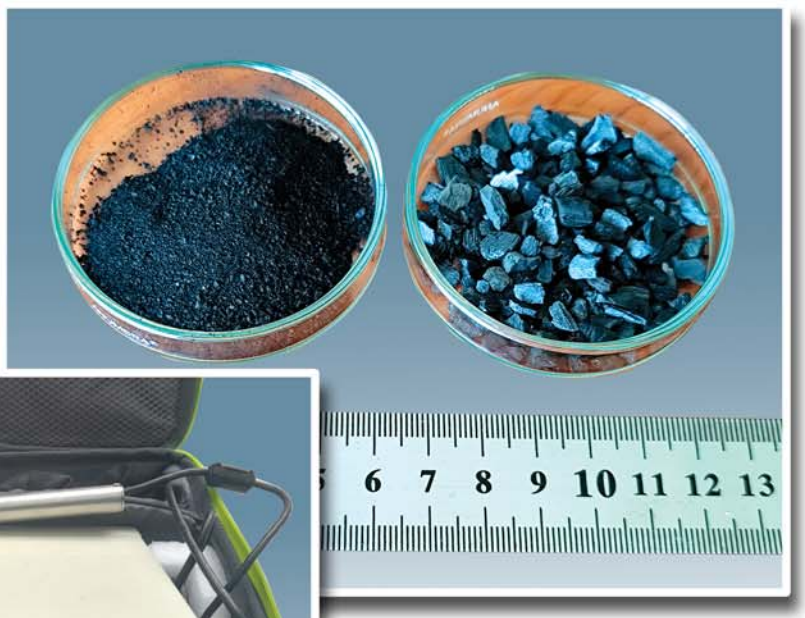
IPR Protection

IPR3

Contact Information

Vladyslav V. Ivanchenko, the Center for Problems of Marine Geology, Geoecology, and Sedimentary Ore Formation of the NAS of Ukraine, +38 067 608 52 80, ivanchenkovv@nas.gov.ua , vvivanchenko@ukr.net

- BIFUNCTIONAL NANOCOMPOSITES OF CONJUGATED POLYMERS FOR DETECTION OF VOLATILE TOXIC COMPOUNDS AND EMI SHIELDING
- X-RAY AND GAMMA RADIATION DETECTION UNIT
- COMPOSITE SYSTEMS FOR HYDROCARBON REMOVAL FROM WATER BODIES
- LANDSLIDE PROCESSES REMOTE GEOECOLOGICAL MONITORING TECHNIQUE
- RADIOMETER FOR MEASURING THE GEOMETRIC DIMENSIONS OF RADIONUCLIDE CONTAMINATION AREAS
- SORBENTS BASED ON INSECT CHITIN FOR WASTEWATER TREATMENT
- TECHNOLOGY FOR PRODUCING NANOPOROUS CARBON ADSORBENT FROM BROWN COAL



ECOLOGY AND ENVIRONMENT PROTECTION

BIFUNCTIONAL NANOCOMPOSITES OF CONJUGATED POLYMERS FOR DETECTION OF VOLATILE TOXIC COMPOUNDS AND EMI SHIELDING

Application

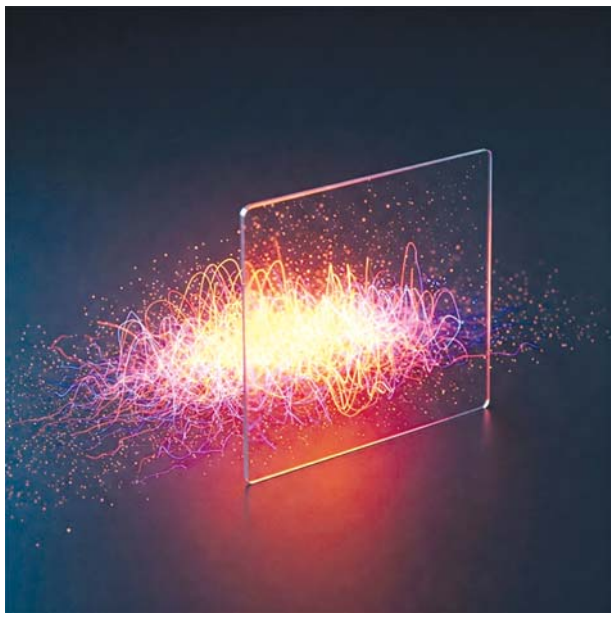
Sensitive layers in gas sensors for detecting volatile toxic compounds. Absorbing components in composite materials for electromagnetic interference (EMI) shielding

Specifications

Fine powders (black, dark green, or blue).
Detect toxic volatile compounds in the range of 100 ppb to 10,000 ppm.
Provide electromagnetic shielding efficiency up to 68.4 dB at 67 GHz in 1 mm thick products.

Advantages

Sensor response is 5–10 times higher than that of pure conductive polymers.
EMI shielding performance at 67 GHz is 6.3 times higher as compared with composites with pure conjugated polymers



Development and Commercialization Status

IRL4, TRL4
Support available for production setup

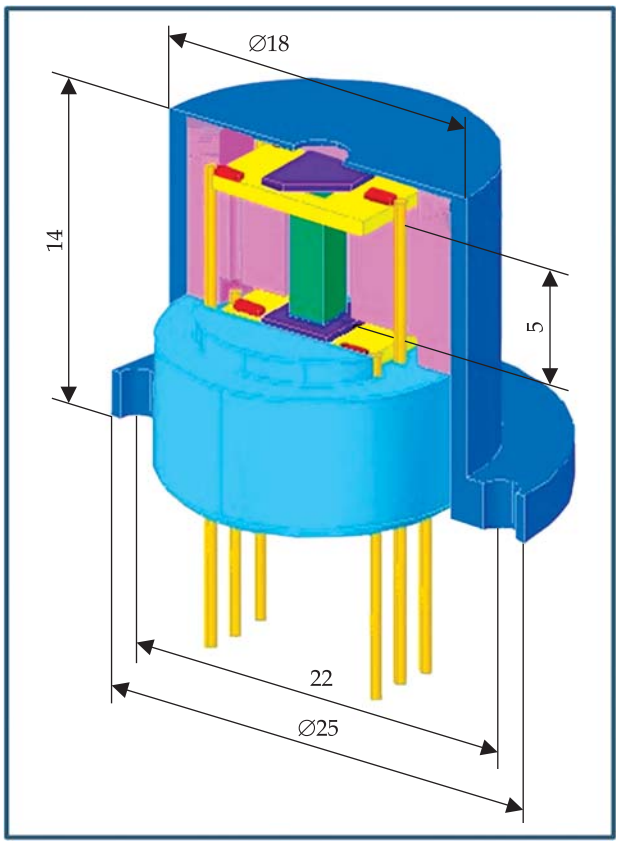
IPR Protection

IPR1, IPR3

Contact Information

Oleksandr A. Pud, V.P. Kukhar Institute of Bioorganic Chemistry and Petrochemistry of the NAS of Ukraine, +38 044 292 30 86, pud@bpci.kiev.ua

X-RAY AND GAMMA RADIATION DETECTION UNIT



Design of the detection unit

Appearance of the detection unit

Application

Detection and identification of radioactive materials in nuclear energy, geology, environmental monitoring, and scholarly research

Specifications

Radionuclide monitoring and detection unit for X-ray and gamma spectrometry in the energy range of 10 keV to 1.5 MeV.
Energy resolution:
7% for Cs^{137}
1.9% for Am^{241}
Allows qualitative assessment of individual radionuclide contributions

Advantages

Compact design, wide energy detection range, and operation without the need for cooling

Development and Commercialization Status

IRL6, TRL6
Custom production and sales available upon request

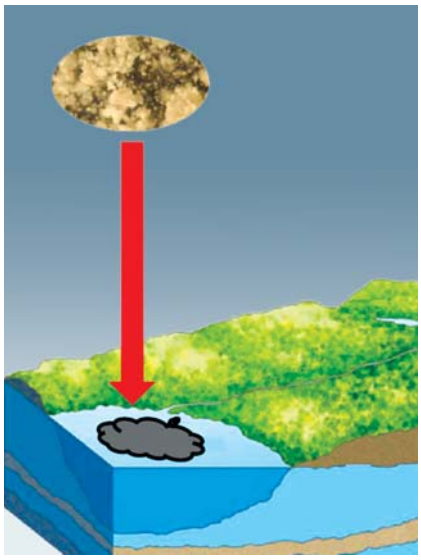
IPR Protection

IPR1

Contact Information

Serhii G. Pugach, Kharkiv Institute of Physics and Technology of the NAS of Ukraine, National Science Center, +38 057 335 68 43, +38 057 349 10 49, pugach@kipt.kharkov.ua

COMPOSITE SYSTEMS FOR HYDROCARBON REMOVAL FROM WATER BODIES



Application

Remediation of water bodies and soils contaminated with oil and grease

Specifications

Powdered bionanocomposite systems based on hydrophobic/hydrophilic silica blends and bacterial cultures. Evenly disperse throughout the water column, absorbing hydrocarbons from surface to bottom layers. Biodegradation of hydrocarbons occurs within 15–45 days without forming harmful by-products. One kilogram treats up to 20 m^3 of water

Advantages

More cost-effective and environmentally friendly than existing analogs

Development and Commercialization Status

IRL5, TRL5
Pilot batches produced. Seeking partners for scale-up and commercial distribution

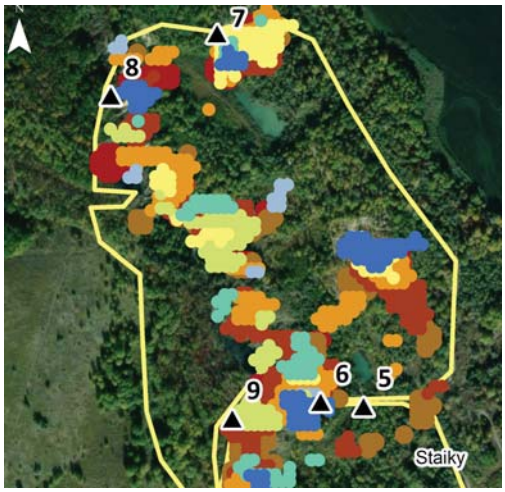
IPR Protection

IPR2

Contact Information

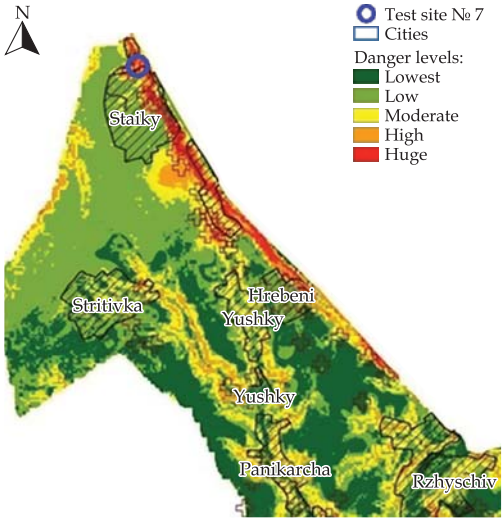
Tetiana V. Krupska, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 067 976 03 44, krupska@ukr.net

LANDSLIDE PROCESSES REMOTE GEOLOGICAL MONITORING TECHNIQUE



Part of the landslide active point map with numbers

Active landslide, test site No. 7, Staiky



Landslide susceptibility map, Rzhyshchiv urban territorial community

Application

Assessment of landslide susceptibility in a territory to forecast its development, and to minimize risks for farmers, builders, and emergency responders

Specifications

Through the remote monitoring of landslides, based on open-access data, a landslide susceptibility map is obtained, classifying the territory into five hazard categories: lowest, low, moderate, high, and huge, using a color scale from green to red

Advantages

Offers more accurate hazard assessment than conventional methods, enabling clear classification and rapid detection of new landslide-prone areas

Development and Commercialization Status

IRL5, TRL6
Landslide susceptibility maps highlighting high-risk areas and recommending preventive measures can be created on request for public and private entities

IPR Protection

IPR2

Contact Information

Tetiana A. Orlenko, State Institution "Scientific Centre for Aerospace Research of the Earth of the Institute of Geological Sciences of the NAS of Ukraine," +38 044 486 11 48, tetianaorlenko@ukr.net

RADIOMETER FOR MEASURING THE GEOMETRIC DIMENSIONS OF RADIONUCLIDE CONTAMINATION AREAS

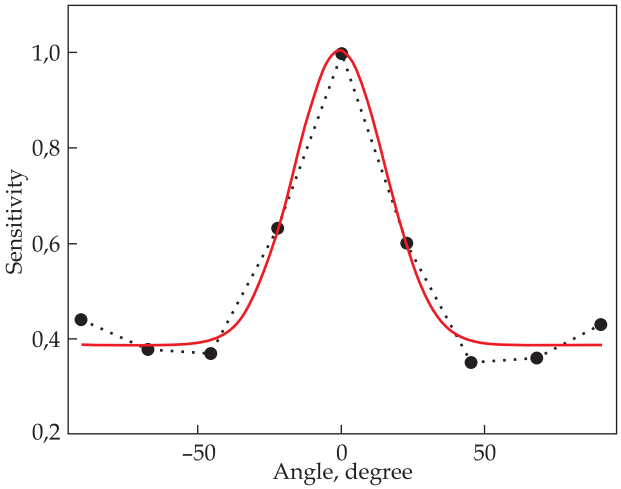
Application

Detection and localization of radioactive contamination

Specifications

Energy range: 50 keV to 3.0 MeV
Maximum input load: 30,000 pulses/s
Measurement time: 1–10 s
Sensitivity reduction angle to 0.5 level: 25°
Weight: ≤ 1 kg
Battery life: ≥ 8 h

Radiometer in working condition. Radiometer with carrying bag



Sensitivity vs. angle

Advantages

Effective solution for import substitution

Development and Commercialization Status

IRL6, TRL6
Manufactured and supplied upon request

IPR Protection

IPR1

Contact Information

Sergii G. Pugach, Kharkiv Institute of Physics and Technology of the NAS of Ukraine, National Science Center, +38 057 335 68 43, +38 057 349 10 49, pugach@kipt.kharkov.ua

SORBENTS BASED ON INSECT CHITIN FOR WASTEWATER TREATMENT

Sorbents based on the shells of *Hermetia illucens* larvae in a Petri dish

Application

Treatment of wastewater contaminated with industrial pollutants

Specifications

Produced from modified shells of black soldier fly larvae (*Hermetia illucens*), a food industry by-product. These thin, mechanically stable sorbents consist of nearly pure chitin and exhibit high adsorption capacity for heavy metals (cations), metalloids (oxyanions), dyes, complexing agents, and other persistent organic pollutants

Alanod effluents containing red dye, before and after sorbent treatment

Advantages

Abundant, low-cost, and biocompatible raw materials. The sorbents offer high chemical and biological stability, enabling regeneration and reuse

Development and Commercialization Status

IRL5, TRL6
Seeking investors for production

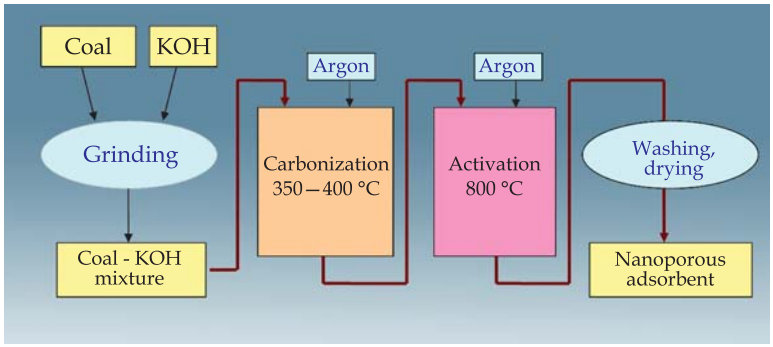
IPR Protection

IPR1, IPR2

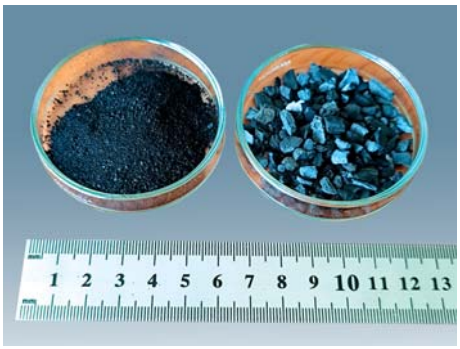
Contact Information

Aleksei M. Kalinkevich, Institute of Applied Physics of the NAS of Ukraine,
+38 0542 33 30 89, kalinkevich@ipflab.sumy.ua

TECHNOLOGY FOR PRODUCING NANOPOROUS CARBON ADSORBENT FROM BROWN COAL



Process flowchart for the production of nanoporous adsorbent from brown coal



Carbon adsorbent of various dispersions

Application

Production of nanoporous carbon adsorbent for purifying liquid media and water, concentrating dispersed elements (including noble metals), and removing organic ecotoxicants, heavy metal cations, and radionuclides

Specifications

Brown coal is ground to 1–2 mm, mixed with solid potassium hydroxide (1.0:0.6–1.0:1.0 g/g), and carbonized at 350–400 °C for 45–75 min in an argon atmosphere. The mixture is then activated by heat shock at 800 °C for 60 min, cooled, and washed with distilled water

Development and Commercialization Status

IRL5, TRL5
Seeking investors and partners for industrial-scale production

IPR Protection

IPR3

Advantages

Produces low-ash carbon adsorbents with enhanced properties, as compared with existing analogs:
1.4× greater specific surface area
1.4× higher total pore volume
1.9× larger subnanopore volume
1.5× increased micropore volume
1.3× higher adsorption capacity for methylene blue
1.2× higher iodine number

Contact Information

Volodymyr O. Kucherenko, L.M. Litvinenko Institute of Physical-Organic & Coal Chemistry of the NAS of Ukraine, +38 095 058 29 28, V.A.Kucherenko@ukr.net

- NANOSILVER-BASED BACTERICIDAL MATERIAL FOR FIRST AID
- *COLMATEK:* ADVANCED HEMOSTATIC AND WOUND HEALING AGENT
- *STOP-BLOOD* HEMOSTATIC BANDAGE
- *METROXAN* HYDROPHILIC-HYDROPHOBIC SORPTION COMPOSITION
- TONIC AND ADAPTOGENIC DIETARY SUPPLEMENT BASED ON SILICA AND GINSENG
- *STRESONIC* DIETARY SUPPLEMENT
- NOURISHING BODY CREAM
- A REMEDY WITH A COMPLEX ACTION FOR THE TREATMENT OF CORONAVIRUS DISEASE
- MEDICAL ADHESIVE WITH ANTISEPTIC PROPERTIES
- COMPOSITE FOR LOCAL OSTEOTHERAPY BASED ON BIOACTIVE GLASS 60S/VANCOMYCIN
- MAGNETICALLY SENSITIVE NANOADSORBENTS WITH TAILORED SURFACE PROPERTIES
- MINIATURE ELECTROCARDIOGRAPHIC DEVICE
- NANOSTRUCTURED TOOTHPASTE
- NEW ANTI-ANXIETY COMPOUND WITH LOW TOXICITY
- POLYMER IMPLANTS WITH ANTIMICROBIAL AND PRO-REGENERATIVE PROPERTIES
- *HEMODYN* DEVICE
- *BACILIFE* PROBIOTIC DIETARY SUPPLEMENT BASED ON *BACILLUS* GENUS BACTERIA
- SENSOR DEVICE FOR EXPRESS NON-INVASIVE DIAGNOSIS OF LACTASE DEFICIENCY, BRONCHIAL ASTHMA, AND HELICOBACTERIOSIS
- SYNTHETIC HYDROGEL IMPLANTS BASED ON BIOCOMPATIBLE HYBRID MATERIALS
- SQUID-SENSOR MAGNETOMETRIC SYSTEM FOR EARLY DETECTION, DIAGNOSIS, AND MONITORING OF HEART DISEASES
- *LEPTO-RT-PCR* TEST SYSTEM
- PRODUCTION TECHNOLOGY FOR HIGH-EFFICIENCY BIOLOGICALLY ACTIVE AGENTS
- BIOCOMPATIBLE PHOTOPOLYMER MATERIAL

PHARMACEUTICALS AND MEDICAL DEVICE ENGINEERING

NANOSILVER-BASED BACTERICIDAL MATERIAL FOR FIRST AID

Cotton fabrics with different surface concentrations of silver nanoparticles. From top to bottom: gauze, madapolam, and calico

General view of the bactericidal material based on madapolam

Specifications

Serves as bactericidal wipes placed between the wound and dressing materials (e.g., bandages). The size can be adjusted based on application needs, limited only by the textile substrate

Application

Used in upgraded first aid dressings for treating wounds and burns. Target users include military personnel, hospital patients, and professionals at risk of contaminated injuries

Advantages

Low-cost and easy to produce. Can be applied to any natural fabric (gauze, calico, linen, etc.), making it versatile and accessible compared to existing alternatives

Development and Commercialization Status

IRL4, TRL4
Technology and product are ready for manufacture. Small batches available upon request. Investment needed for clinical trials, state certification, and pilot production setup

IPR Protection

IPR3

Contact Information

Iryna S. Petryk, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 097 348 77 95, irinapetrik@ukr.net

COLMATEK: ADVANCED HEMOSTATIC AND WOUND HEALING AGENT

Application

Designed for rapid and effective bleeding control, *COLMATEK* also promotes accelerated wound healing and tissue regeneration—even in patients with clotting disorders

Specifications

COLMATEK is a hemostatic agent formulated from a proprietary collagen matrix modified with a targeted blood-clotting activator. This localized action ensures rapid hemorrhage control without triggering systemic coagulation. Its biocompatible collagen base minimizes adverse immune reactions, making it suitable for both routine first aid and clinical or surgical use. The material is fully biodegradable in the wound environment, supporting natural healing and eliminating the need for removal

Advantages

No removal required, reducing trauma and follow-up care. Fast, localized bleeding control via targeted clotting activation. Low immunogenicity and full biodegradability. Promotes tissue regeneration and minimizes complications. Effective in patients with hemophilia A and B

IPR Protection

IPR3

Development and Commercialization Status

IRL6, TRL6
Seeking strategic partners and investors for launching full-scale production

Contact Information

Volodymyr I. Gryshchuk, Palladin Institute of Biochemistry of the NAS of Ukraine,
+38 050 152 37 39, gryshchukv@gmail.com

STOP-BLOOD HEMOSTATIC BANDAGE

Industrial sample of hemostatic material in the form of a cloth

Specifications

The *Stop-Blood* bandage is made of spunlace fabric impregnated with highly dispersed silica and sodium alginate. Additional agents—such as softeners, antiseptics, or radiopaque markers—can be incorporated as needed. Preclinical studies have been completed

Application

Designed to control "nodal" and other types of bleeding in situations where a tourniquet cannot be applied

Advantages

Compared to leading alternatives such as *QuickClot® Combat Gauze* (USA) and *SENTA PHARM* (Ukraine), the *Stop-Blood* bandage demonstrates enhanced coagulation efficiency due to the inclusion of highly dispersed silica. It initiates clotting more effectively, detoxifies the wound during hemostasis, and helps prevent rebleeding after removal

Development and Commercialization Status

IRL5, TRL6
Seeking partners to scale up production and distribute the finished product

IPR Protection

IPR1, IPR3

Contact Information

Igor I. Gerashchenko, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 050 382 47 51, igorgera57@ukr.net

METROXAN HYDROPHILIC-HYDROPHOBIC SORPTION COMPOSITION

Metroxan hydrophilic-hydrophobic composition manufactured by pharmacy compounding

Initiation of purulent wound treatment with *Metroxan*

Result of the treatment after 8 days

Application

Designed for the treatment of infected wounds, including abscesses, phlegmons, trophic ulcers, second- to third-degree burns (IIA–IIB–III), diabetic foot ulcers, and similar conditions

Specifications

Metroxan consists of highly dispersed silica, methoxan (or methylaerosil), decamethoxin, and metronidazole. It demonstrates a protein adsorption capacity of at least 200 mg/g. In addition to its sorption properties, it exhibits pronounced antimicrobial activity against anaerobic microorganisms. Both preclinical and clinical studies have been completed

Advantages

Unlike powdered analogs such as *Gentaxan*® (Ukraine) and *Tyrosur*® (Germany), *Metroxan* does not contain antibiotics, thereby minimizing the risk of adverse effects, including allergic reactions. The key benefits include:

- A combination of hydrophilic and hydrophobic sorbents for broad-spectrum absorption of pathogenic exudates and microflora.
- Adjustable hydrophilicity through modification of component ratios, enabling effective application throughout all wound healing phases—from exudation to granulation

Development and Commercialization Status

IRL8, TRL8
Seeking partners for large-scale production and commercial distribution

IPR Protection

IPR2, IPR3

Contact Information

Igor I. Gerashchenko, Chuiko Institute of Surface Chemistry, NAS of Ukraine,
+38 050 382 4751, igorgera57@ukr.net

TONIC AND ADAPTOGENIC DIETARY SUPPLEMENT BASED ON SILICA AND GINSENG

Application

Designed to boost physical and mental performance, relieve chronic fatigue, and support detoxification in cases of toxicosis of various origins. Recommended for healthy adults as a tonic, adaptogen, radioprotective, and general strengthening agent to enhance productivity and increase the body's resistance to stress and adverse environmental factors

Specifications

This powdered dietary supplement is formulated using highly dispersed silica as a carrier, combined with micronized ginseng root. The composition provides tonic, adaptogenic, detoxifying, and general restorative effects

Advantages

An environmentally friendly formulation. Unlike many commercial adsorbents, this product contains minimal amounts of free silicon nanoparticles, reducing the potential for cellular penetration. Compared to conventional herbal blends, it offers prolonged release of bioactive compounds, contributing to sustained well-being and vitality

IPR Protection

IPR2

Development and Commercialization Status

IRL7, TRL8
Currently produced in small, custom-manufactured batches with packaging available in powder and capsule form. Seeking partners for scale-up to full-scale production and market distribution

Contact Information

Tetiana V. Krupska, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 067 976 03 44, krupska@ukr.net

STRESONIC DIETARY SUPPLEMENT

Application

Intended for use in cases of neurosis, insomnia, increased nervous excitability, and post-traumatic stress. *Stresonic* provides a calming effect on the central nervous system and supports the elimination of toxic substances

Specifications

A powdered dietary supplement formulated with highly dispersed silica and finely milled medicinal plants known for their sedative and detoxifying properties. The product is free from tranquilizers and non-habit-forming

Advantages

As compared with conventional herbal remedies, *Stresonic* offers prolonged release of bioactive compounds, enhancing its therapeutic efficacy. It supports general well-being while promoting gentle detoxification

Development and Commercialization Status

IRL7, TRL7
Produced in small batches on a custom basis. Seeking partners to scale up manufacture and distribute the finished product

IPR Protection

IPR2

Contact Information

Tetiana V. Krupska, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 067 976 03 44, krupska@ukr.net

NOURISHING BODY CREAM

Application

Designed for skin care, cleansing, nourishment, and protection against environmental stressors. Target consumers include cosmetic clinics, beauty salons, and individuals seeking high-quality natural skincare products

Specifications

This body cream is formulated using a composite base enriched with active nanoparticles derived from minerals and botanical sources. It delivers deep cleansing, hydration, and nourishment; supports collagen synthesis and skin regeneration; and provides natural protection against dehydration and external irritants

Advantages

As compared with conventional products such as *Nivea Creme* or *Olay Regenerist*, this cream offers several key benefits:

- Enhanced absorption due to the presence of active nanoparticles
- Natural formulation free from synthetic additives
- Optimized balance of nourishment and hydration through the use of both solid and liquid oils
- Protective wax barrier for sustained delivery of active ingredients

Development and Commercialization Status

IRL7, TRL8
Produced in small batches upon request. Open to partnership opportunities for mass production and distribution

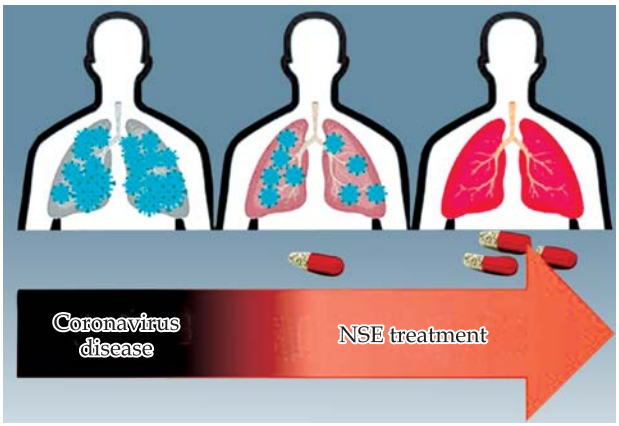
IPR Protection

IPR3

Contact Information

Viktoria V. Paientko, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 093 200 37 62, payentkovv@gmail.com

A REMEDY WITH A COMPLEX ACTION FOR THE TREATMENT OF CORONAVIRUS DISEASE



The therapeutic agent effectively suppresses coronavirus replication in the body

The therapeutic agent effectively prevents blood clot formation caused by coronavirus infection

Application

The therapeutic agent effectively prevents blood clot formation caused by coronavirus infection

Specifications

This compound reduces coronavirus replication and prevents thrombosis, offering a multifaceted therapeutic approach. Its active ingredient, *N-stearoylethanolamine* (NSE), sets it apart from other antiviral agents. NSE is administered orally in liquid dosage forms at a dosage range of 0.08–8.1 mg/kg of body weight. The remedy is currently undergoing preclinical evaluation

Advantages

Triple-action mechanism: antiviral, anticoagulant, and anti-inflammatory. Alleviates both viral load and systemic disease symptoms. Superior safety profile as compared with Remdesivir, with no observed toxicity or side effects. Stable under both environmental and physiological conditions

Development and Commercialization Status

IRL6, TLR6
Seeking partners for rollout and commercialization

IPR Protection

IPR3

Contact Information

Halyna V. Kosiakova, O.V. Palladin Institute of Biochemistry of the NAS of Ukraine,
+38 063 694 87 95, Kosiakova@hotmail.com

MEDICAL ADHESIVE WITH ANTISEPTIC PROPERTIES

Application

Designed for use in surgical practice to provide atraumatic closure of soft tissues, seal surgical and traumatic wounds, and reduce the risk of microbial contamination

Specifications

Biocompatible and resorbable.
Promotes accelerated tissue regeneration.
Provides long-lasting antimicrobial protection.
Preclinical testing and limited clinical trials completed

Advantages

As compared with existing analogs, this adhesive demonstrates superior adhesion to biological tissues and high hydrophilicity. It polymerizes rapidly—within 5 min—directly in the wound environment without causing tissue deformation or impairing functional activity. Additionally, the material offers a more cost-effective solution than existing alternatives

IPR Protection

IPR3

Development and Commercialization Status

IRL5, TRL6
Technology transfer available for further commercialization. Small-batch manufacturing and delivery can be arranged upon request

Contact Information

Rita A. Rozhnova, Institute of Macromolecular Chemistry of the NAS of Ukraine,
+38 044 296 70 31, rozhnovarita@gmail.com

COMPOSITE FOR LOCAL OSTEOTHERAPY BASED ON BIOACTIVE GLASS 60S/VANCOMYCIN

Bioactive glass granules 60S

Application

Used for filling bone defect cavities and treating infections in orthopedic surgery

Specifications

The Bioglass 60S/Vancomycin composite is a biocompatible, bioresorbable bone substitute with antibacterial, osteoconductive, osteostimulating, and angiogenic properties. It provides sustained release of the antibiotic Vancomycin over a period of up to 14 days in concentrations sufficient for a prolonged antibacterial effect. Demonstrates antibacterial activity against Gram-positive microorganisms (e.g., *Enterococcus faecalis*, S*taphylococcus aureus*) with inhibition zones of 29–30 mm (in vitro). Supplied in granule form (1–3 mm)

Development and Commercialization Status

IRL3, TRL4
Seeking partners for preclinical trials and investors to support compliance evaluation with international and national standards and further implementation

Advantages

Comparable in medical and biological properties to international analogs. Exhibits high biocompatibility and resorbability, efficient drug immobilization, and sustained drug release. Supports bone regeneration through osteoconductive, osteostimulating, and angiogenic effects

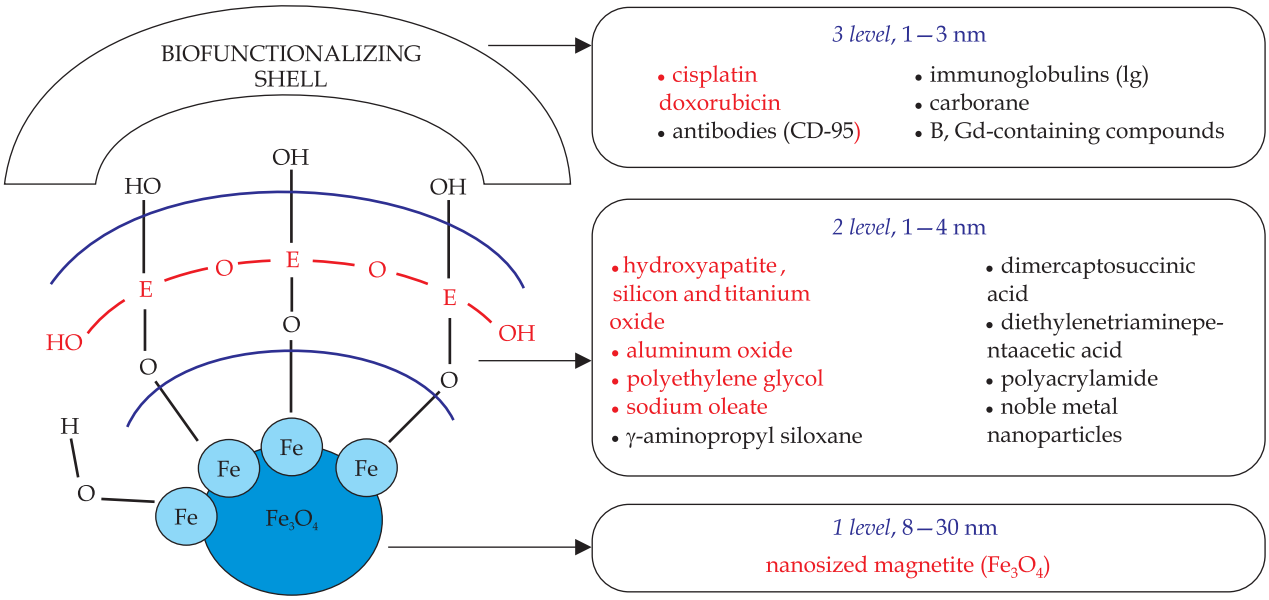
IPR Protection

IPR1, IPR2

Contact Information

Andrii P. Kusiak, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 067 276 21 51, a_kusyak@ukr.net

MAGNETICALLY SENSITIVE NANOADSORBENTS WITH TAILORED SURFACE PROPERTIES



Application

Designed for drug deposition and targeted delivery to specific organs or cells; magnetic-field-assisted adsorption and removal of heavy metal ions, cellular debris, viruses, and toxins from the body; recognition of microbiological objects in biological media; and combined local chemo-, immuno-, and hyperthermia therapies

Specifications

A universal magnetically sensitive platform enables the creation of a broad range of functional materials with:

High biocompatibility

Capability to immobilize therapeutic agents and ensure their sustained release

Enhanced selectivity and adsorption capacity without compromising magnetic responsiveness or biocompatibility

Advantages

Comparable in performance to well-known domestic and international counterparts. A key advantage is precise control via magnetic fields, allowing for effective magnetic separation and targeted action

Development and Commercialization Status

IRL5, TRL5

Test samples can be manufactured upon request for preclinical and clinical studies. Seeking investors to support regulatory compliance (international and domestic) and further development and commercialization

IPR Protection

IPR3

Contact Information

Andrii P. Kusiak, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 067 276 21 51, a_kusyak@ukr.net

MINIATURE ELECTROCARDIOGRAPHIC DEVICE

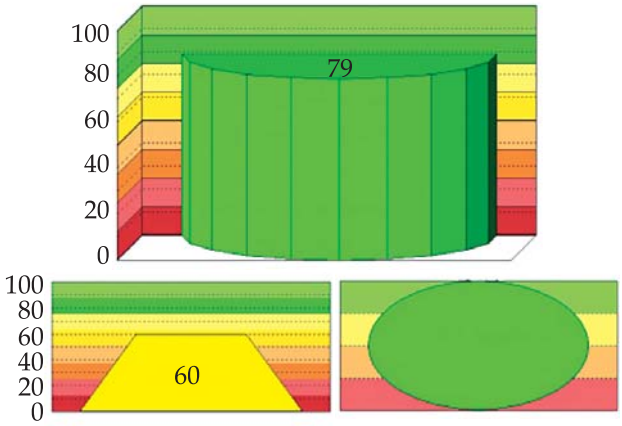
Miniature ECG device with innovative software

Application

Intended for comprehensive diagnostics of myocardial condition and autonomic nervous system function. Applicable in civil and military medical institutions, emergency care, rehabilitation, pediatrics, occupational and sports medicine, as well as home healthcare

Specifications

Available in one- or six-channel (tap) configurations. Miniature digital electrocardiograph. Includes laptop and proprietary software suite. Service life: 10 years. Diagnostic capacity: up to 15 patients per hour. Conformity assessed by UKRMETRTESTSTANDARD



Innovative scale for assessing a person's functional state

Advantages

Unique in the market—enables diagnostic use by non-medical personnel. Incorporates advanced ECG analysis methods based on artificial intelligence, including a proprietary scaling system for detecting subtle ECG changes and assessing psycho-emotional states

IPR Protection

IPR3, IPR4

Development and Commercialization Status

IRL7, TRL7
Small-batch production is underway. Warranty service and personnel training are available. Seeking partners for scaling to serial production

Contact Information

Illya A. Chaikovsky, V.M. Glushkov Institute of Cybernetics of the NAS of Ukraine,
+38 044 526 30 79, d220@meta.ua

NANOSTRUCTURED TOOTHPASTE

Application

Designed for daily oral care with both preventive and therapeutic benefits

Specifications

Formulated in line with ecological and efficacy standards, the toothpaste is packaged in a reusable glass jar, offering an environmentally friendly alternative to traditional tubes.
Its base combines nanostructured clay with diatomite components, delivering optimal abrasiveness (pH 7.8–8.0) for effective cleaning without damaging enamel. Essential oils of coriander, hyssop, and immortelle provide antibacterial, anti-inflammatory, and soothing effects, supporting overall oral and gum health

Advantages

As compared with mainstream products like *Colgate Total*, this toothpaste leverages nanostructures to enhance the bioavailability of active ingredients. The synergistic use of clay minerals and nanosilica ensures gentle whitening and effective cleaning. High safety and environmental sustainability further distinguish the product

Development and Commercialization Status

IRL7, TRL8
Available for small-batch production upon request by dental clinics and healthcare companies

IPR Protection

IPR1, IPR3

Contact Information

Viktoria V. Payentko, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 093 200 37 62, payentkovv@gmail.com

NEW ANTI-ANXIETY COMPOUND WITH LOW TOXICITY

Specifications

The compound effectively alleviates anxiety, enhances mood, and reduces pain—without causing addiction or impairing muscle function or motor coordination. Its low toxicity profile makes it suitable for long-term use. All required preclinical studies have been completed, and the compound is ready to enter Phase I clinical trials

Application

A novel active compound intended for the development of anti-anxiety medications for use in clinical practice across a wide range of medical fields, including oncology, surgery, traumatology, gynecology, family medicine, psychiatry, cardiology, pulmonology, and clinical psychology

IPR Protection

IPR3, IPR3

Advantages

As compared with benchmark drugs such as *Gidazepam* and *Imipramine*, the compound exhibits a stronger anxiolytic effect, significantly lower toxicity, and no addictive potential

Development and Commercialization Status

IRL5, TRL5
Seeking partners for clinical trials and commercialization

Contact Information

Valentyn A. Chebanov, Institute of Functional Materials Chemistry of SSI "Institute for Single Crystals" NAS of Ukraine, +38 067 576 62 27, chebanov@isc.kh.ua

POLYMER IMPLANTS WITH ANTIMICROBIAL AND PRO-REGENERATIVE PROPERTIES

Application

Designed for restorative and reconstructive surgeries, these implants are used to restore soft and bone tissues in maxillofacial, orthopedic, and plastic surgery

Specifications

High biocompatibility. Sustained antimicrobial activity. Tissue-regenerative properties. Flexibility and elasticity. Preclinical testing and limited clinical trials completed

Polymer implants with antimicrobial and pro-regenerative effects

IPR Protection

IPR2

Development and Commercialization Status

IRL5, TRL6
Technological documentation is available for transfer. Small batches of the material can be manufactured upon request

Advantages

As compared with existing analogs, the implants offer enhanced effectiveness, safety and reliability. They ensure secure fixation, excellent integration with surrounding tissues and are more cost-efficient

Contact Information

Rita A. Rozhnova, Institute of Macromolecular Chemistry of the NAS of Ukraine,
+38 044 296 70 31, rozhnovarita@gmail.com

HEMODYN DEVICE

General view of the *HEMODYN* device

Measuring sensor

Application

Designed for the study of hemodynamics in the microcirculatory segment of the circulatory system, the device is suitable for use in civil and military medicine, occupational and sports medicine, and home healthcare

Specifications

Research method: Spectrophotometric, two-wavelength, reflective
Study duration: 1–2 min
Power supply: Universal (mains ~220V) and built-in battery (12V)
Interface: USB 2.0 port
Display: TFT touch screen
Data output: Paper printout
Weight (electronic unit): 1,000 g
Dimensions: 255 × 205 × 105 mm

Advantages

Currently, there is no direct analog in the market. The device's affordability, ease of use, and portability make it ideal not only for medical institutions of various levels but also for use in field conditions and at home. It enables a non-invasive, atraumatic, real-time assessment of microcirculatory hemodynamics

Development and Commercialization Status

IRL7, TRL7
Small-scale production is ongoing.
Warranty service and user training are available.
Seeking partners for large-scale production

IPR Protection

IPR3

Contact Information

Serhiy V. Yershov, V.M. Glushkov Institute of Cybernetics of the NAS of Ukraine,
+38 044 526 41 78, ErshovSV@nas.gov.ua

BACILIFE PROBIOTIC DIETARY SUPPLEMENT BASED ON *BACILLUS* GENUS BACTERIA

Application

For restoring intestinal microbiota, correcting immune status, and improving digestion. Used in the prevention and treatment of intestinal dysbiosis, diarrhea, and functional gastrointestinal disorders, as well as for reducing endogenous intoxication

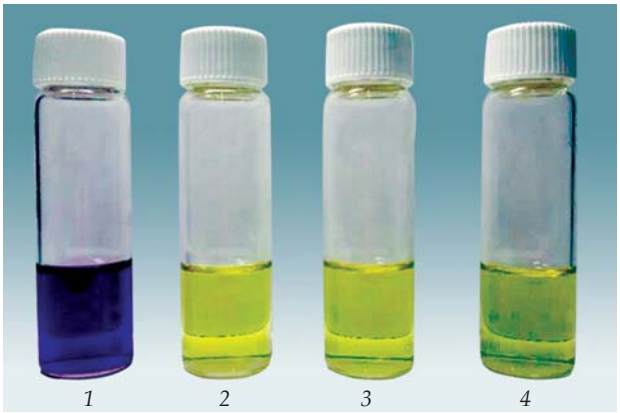
Specifications

Contains probiotic bacteria of the *Bacillus* genus that produce antibiotic substances, enzymes, antioxidants, amino acids, and polysaccharides. Exhibits hepatoprotective and detoxifying effects. Enhances nutrient absorption. Spore-forming bacteria ensure high resistance to adverse gastrointestinal conditions. Preclinical efficacy has been demonstrated

Antimicrobial activity of BACILIFE against opportunistic microorganisms (growth inhibition zone, mm): *1* — *Escherichia coli* 028; *2* — *Proteus vulgaris* 72; *3* — *Staphylococcus aureus* 209; *4* — *Candida albicans* 690; *5* — *Pseudomonas aeruginosa* ATCC 27959

Advantages

Multifunctional action including antimicrobial, antiviral, antioxidant, immunomodulatory, and anticancer properties. Ensures the survival and activity of probiotic cells throughout the gastrointestinal tract



Antiradical activity of probiotic strains to stable 2.2-diphenyl-1-picrylhydrazyl free radical (DPPH·): *1* — stable 2.2-diphenyl-1-picrylhydrazyl radical as reference; *2, 3* — antiradical activity of *Bacillus amyloliquefaciens* ssp. plantarum IMV B-7142; *4* — antiradical activity of *Bacillus subtilis* 5007

Development and Commercialization Status

IRL6, TRL7
Production strains and specifications are available under a license agreement

IPR Protection

IPR2

Contact Information

Larisa A. Safronova, the D.K. Zabolotny Institute of Microbiology and Virology of the NAS of Ukraine, +38 067 401 18 16, safronova_larisa@ukr.net

SENSOR DEVICE FOR EXPRESS NON-INVASIVE DIAGNOSIS OF LACTASE DEFICIENCY, BRONCHIAL ASTHMA, AND HELICOBACTERIOSIS

Application

A compact diagnostic device for the express, non-invasive detection of lactase deficiency, bronchial asthma, and gastric *Helicobacter pylori* infection. Suitable for use in both clinical settings and at home

Specifications

The device operates on an empty stomach by sampling exhaled air through a mask connected to the sensor system. It measures the presence and concentration of specific target analytes:

- Hydrogen (1–1000 ppm) — marker for lactase deficiency
- Nitric oxide (0.1–2.0 ppm) — marker for bronchial asthma
- Ammonia (1–500 ppm) — marker for Helicobacter pylori infection

Device dimensions: 96 × 56 × 26 mm
Weight: less than 0.5 kg
Equipped with an integrated sensor system and features for enhanced usability and safety, including:

- Dual power supply: internal rechargeable battery and external power source
- Common-mode filter to suppress electromagnetic interference and electrostatic discharge
- Built-in battery protection against incorrect polarity installation
- Short-circuit fuse

Overheating protection during charging

- Color display
- Mobile application with interactive text and voice-guided instructions

State registration completed:
TU U 26.5-05417288-012: 201

Advantages

Unlike existing analogs, the device can simultaneously diagnose two of the three indicated conditions. It combines advanced sensor technology with user-friendly operation, making it accessible to non-specialists and medical professionals alike

IPR Protection

IPR2

Development and Commercialization Status

IRL5, TRL5
Currently seeking partners for production and broad market implementation

Contact Information

Iryna P. Krysiuk, O.V. Palladin Institute of Biochemistry of the NAS of Ukraine,
+38 044 235 3137, +38 067 965 7071, iryna.kr@biochem.kiev.ua, 4iryna.kr@gmail.com

SYNTHETIC HYDROGEL IMPLANTS BASED ON BIOCOMPATIBLE HYBRID MATERIALS

Application

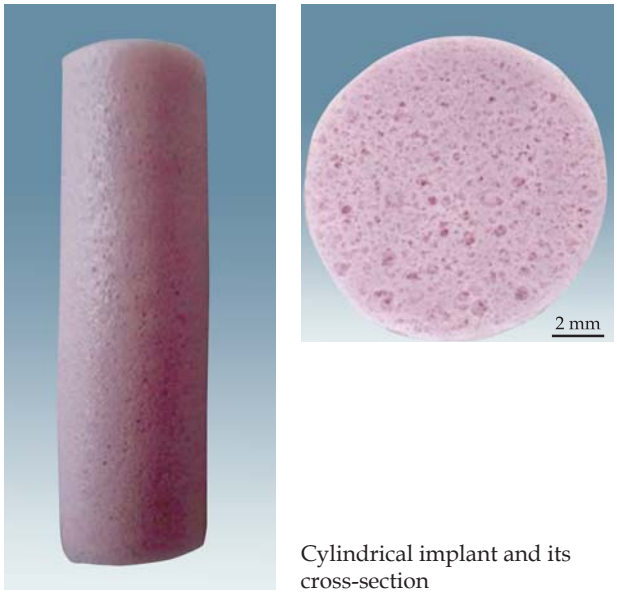
Designed for post-traumatic and post-surgical recovery of anatomical and functional structures, particularly in reconstructive surgery of the oculo-orbital region and other areas of the facial skeleton. Also used for filling postoperative cavities

Specifications

Available in various shapes and sizes:
- Spheres: 16–20 mm diameter
- Plates: 10×60 mm, 70×70 mm, 20×70 mm (thickness: 5–15 mm)
- Cylinders: 15×80 mm

Key characteristics:
- Absorption capacity: ~40 g/g
- Sorption efficiency: 86%
- Thermal stability: ≥ 380 °C

Sanitary-chemical testing and preclinical studies have been conducted



Cylindrical implant and its cross-section

Advantages

As compared with existing domestic and international analogs, these implants exhibit superior technical and biomedical performance. Key benefits include:
- High biocompatibility and mechanical stability
- No resorption or degradation over time
- Low antigenicity
- Controlled, prolonged release (up to 24 hours) of incorporated agents:
  - Chemotherapeutic drugs (e.g., doxorubicin, cisplatin, fluorouracil)
  - Antimicrobial agents (e.g., albucid)
- Complex regenerative, antimicrobial, and antitumor effects
- Long-lasting analgesic and anti-inflammatory properties

Development and Commercialization Status

IRL5, TRL5
Currently seeking investors for further evaluation against international and national standards and for subsequent commercialization

IPR Protection

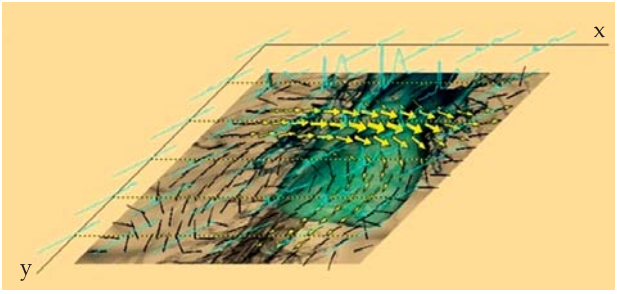
IPR2

Contact Information

Yurii M. Samchenko, F.D. Ovcharenko Institute of Biocolloidal Chemistry of the NAS of Ukraine, +38 063 393 72 88, yu1sam@yahoo.com

SQUID-SENSOR MAGNETOMETRIC SYSTEM FOR EARLY DETECTION, DIAGNOSIS, AND MONITORING OF HEART DISEASES

SQUID sensor magnetometric system (one of the options)



Magnetocardiosignal display and analysis option

Application

Designed for screening and non-invasive clinical diagnostics, this system enables risk stratification of arrhythmias and long QT syndrome, diagnosis of coronary artery disease, early ischemia detection, treatment effectiveness evaluation, and assessment of the proarrhythmogenic effects of pharmaceutical agents

Specifications

Stationary configuration
Dimensions: 800 × 800 × 2000 mm
9 measuring channels
Integrated reference electrocardiograph for MCG–ECG signal synchronization
Service life: 10 years
Patient throughput: up to 4 patients per hour
Scanning area: 20 × 20 cm
Spatial resolution: 4 mm
Operating time per 20 l liquid helium refill: 5 working days
Operates without the need for electromagnetic shielding
Clinical trials completed; certified and accompanied by methodological recommendations from the Ministry of Healthcare of Ukraine

Advantages

The 9-channel configuration offers an optimal cost-to-performance ratio, enabling reconstruction of multiple spatially distributed cardiac electrical sources. Advanced noise-reduction and signal-processing algorithms allow for high-precision diagnostics without the need for magnetic shielding. The system is more cost-effective compared to international analogs

Development and Commercialization Status

IRL7, TRL7
Currently available in small-scale production. Includes delivery, warranty service, and training for medical personnel

IPR Protection

IPR3, IPR4

Contact Information

Mykhailo A. Primin, V.M. Glushkov Institute of Cybernetics of the NAS of Ukraine,
+380 44 526 30 79, +38 067 934 88 99, priminma@meta.ua

LEPTO-RT-PCR TEST SYSTEM

Application

Real-time detection of *Leptospira* spp. — the causative agent of leptospirosis, a widespread acute infectious disease in humans. The system is intended for use in scientific and diagnostic laboratories for analyzing biological samples (blood, urine, tissue homogenates) and/or environmental samples (water, surface swabs, etc.)

Specifications

The test system reliably detects as few as 100 genome-equivalent copies of pathogenic *Leptospira* spp. per reaction (equivalent to 20 copies per 1 µL). This meets established diagnostic PCR system requirements. Its sensitivity is comparable to the gold-standard PCR methods utilizing hydrolysis probes or SYBR Green dye

Advantages

In contrast to many international counterparts that are cost-prohibitive or limited by supply chain issues, this test system provides high sensitivity at a significantly reduced cost—while maintaining full compliance with international PCR diagnostic standards

Development and Commercialization Status

IRL5, TRL5
Seeking partners for manufacture

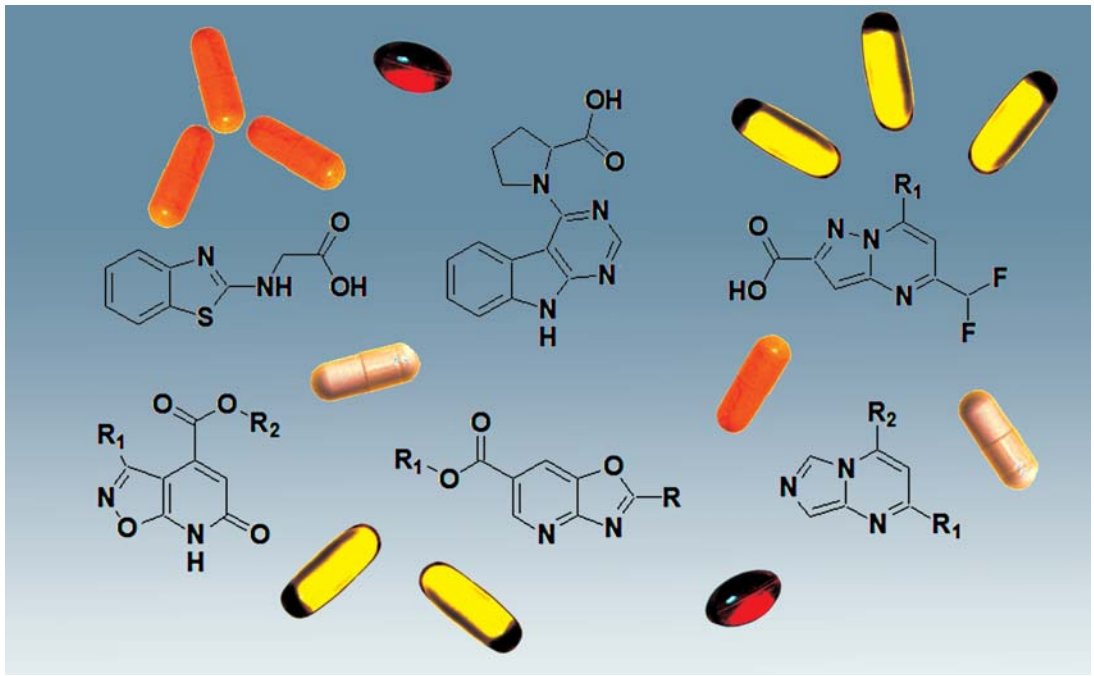
IPR Protection

IPR1, IPR2

Contact Information

Valentyn A.Chebanov, Institute of Functional Materials Chemistry of SSI "Institute for Single Crystals" NAS of Ukraine, +38 067 576 62 27, chebanov@isc.kh.ua

PRODUCTION TECHNOLOGY FOR HIGH-EFFICIENCY BIOLOGICALLY ACTIVE AGENTS



Application

This technology enables the production of a broad spectrum of biologically active compounds for use in the development of pharmaceutical agents with anti-inflammatory, antitumor, and antibacterial properties, as well as histamine receptor antagonists. Compounds produced through this method may also demonstrate antioxidant and antiglycation effects, and can be used in formulations with anti-inflammatory, antiviral, antiparasitic, and antihypertensive action

Specifications

The synthesis process is conducted at room temperature in 2–3 technological stages, using low-cost catalysts and conventional purification methods for isolating target products. The technology relies on standard, widely available equipment and does not require specialized infrastructure

Development and Commercialization Status

IRL5, TRL5
Seeking investors and strategic partners to support technology advancement from laboratory to industrial scale, and to launch full-scale manufacture. Open to licensing agreements

Advantages

This is a novel, proprietary technology with no direct global analogs. It provides high yields of biologically active compounds (73–85%), conserves energy resources, and enables the efficient production of diverse bioactive substances as raw materials for pharmaceuticals

IPR Protection

IPR2, IPR3

Contact Information

Serhii V. Tolkunov, L.M. Litvinenko Institute of Physical-Organic & Coal Chemistry of the NAS of Ukraine, 38 050 953 65 90, s_tolkunov@yahoo.com

BIOCOMPATIBLE PHOTOPOLYMER MATERIAL

Application

Innovative material designed for the production of contact lenses

Specifications

High transparency in the visible light spectrum.
UV protection.
Biocompatibility.
Antimicrobial properties

Advantages

As compared with foreign analogs, this material has a lower production cost, enhanced UV protection, improved mechanical strength, and customizable surface layer properties

Development and Commercialization Status

IRL5, TRL5
Small-scale production is available upon request

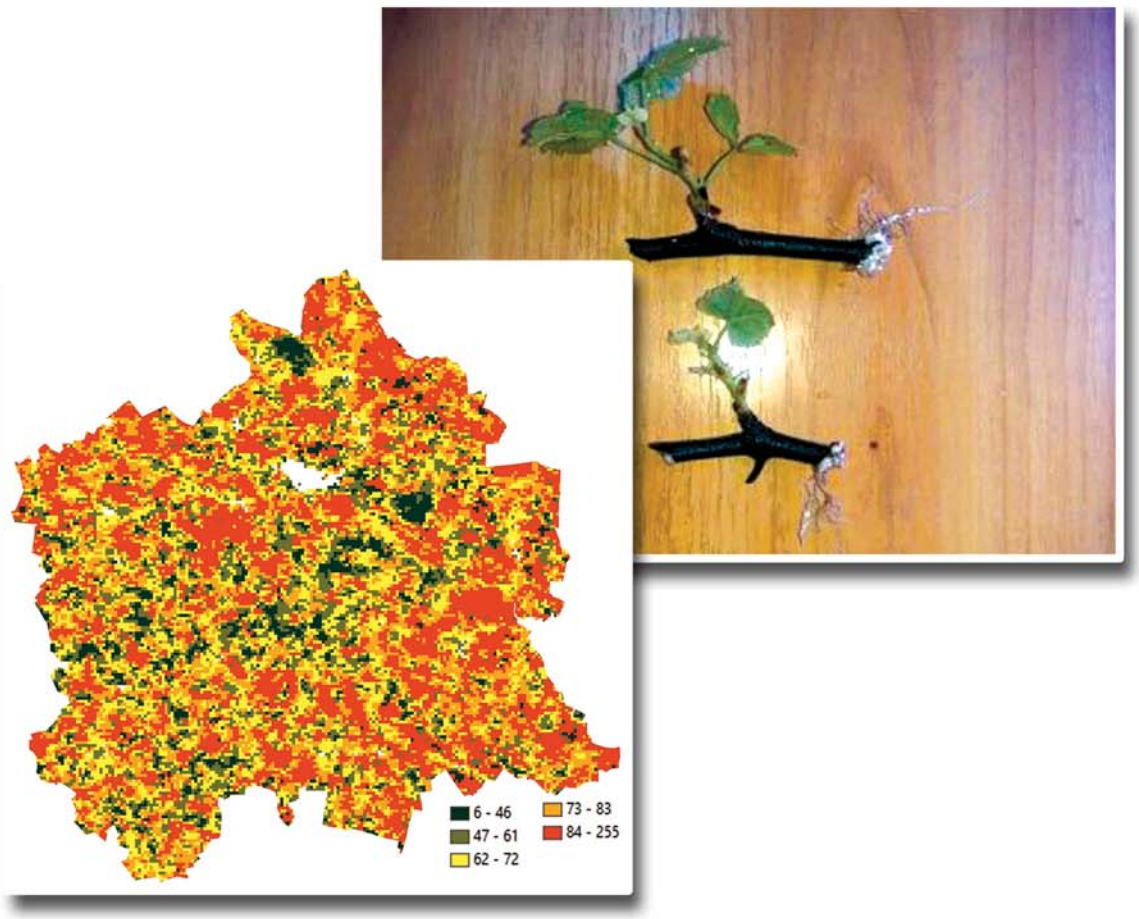
IPR Protection

IPR1

Contact Information

Oleksandr L. Tolstov, Institute of Macromolecular Chemistry of the NAS of Ukraine,
+38 044 291 02 08, tolstov@nas.gov.ua

- *ECOSTIM* MULTICOMPONENT NANOCOMPOSITE SYSTEMS
- BIOPREPARATIONS FOR BIOREMEDIATION OF SOILS CONTAMINATED BY MILITARY ACTIVITY AND PESTICIDE USE
- METHODOLOGY FOR CORN YIELD PREDICTION
- NANOCOMPOSITE PREPARATIONS FOR SEED PRIMING AND FOLIAR FERTILIZATION OF AGRICULTURAL CROPS
- PORTABLE DEVICE FROM THE *FLORATEST* FAMILY
- TOOL FOR SATURATION OF FRUIT AND BERRY CROP CUTTINGS WITH NUTRIENT AND CRYOPROTECTIVE MEDIA



INDUSTRIAL AGRICULTURE AND HORTICULTURE

ECOSTIM MULTICOMPONENT NANOCOMPOSITE SYSTEMS

Application

Used for pre-sowing treatment of seeds of vegetable, cereal, and green crops, as well as for boosting the yield of agricultural plants in both horticulture and field farming

Specifications

Depending on vegetation conditions, *ECOSTIM* can increase crop yields by 10–20%, and in some cases, up to 50%. The application rate is 10–20 kg per ton of seeds, with a cost not exceeding €10/kg. For finished agricultural products, the consumption of the composite does not exceed 0.5–1 kg per ton (costing €5–10). At a grain price of €200/t, the expected profit gain is €30, while the treatment cost remains €5–10/t

Advantages

Environmentally safe. Does not require special equipment for application. Retains activity in the germination zone for extended periods. More cost-effective than foreign and domestic counterparts

IPR Protection

IPR2

Development and Commercialization Status

IRL7, TRL8
Small batches of finished product are available on request. Seeking partners for scaling up to mass production

Contact Information

Tetiana V. Krupska, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 067 976 03 44, krupska@ukr.net

BIOPREPARATIONS FOR BIOREMEDIATION OF SOILS CONTAMINATED BY MILITARY ACTIVITY AND PESTICIDE USE

Application

Designed for the purification and remediation of soils used in agriculture—including organic farming—and in areas designated for green tourism. The biopreparations restore the phytosanitary condition of soil and improve fertility

Liudmyla Biliavska, Doctor of Biological Science, Head of the Department for General and Soil Microbiology of the D.K. Zabolotny Institute of Microbiology and Virology of the NAS of Ukraine, is surveying the soils damaged by explosion of munitions in Hostomel (Kyiv Oblast), in 2022

Specifications

Complex-action biopreparations that are safe and officially registered in Ukraine. Capable of degrading a broad range of pollutants. Enhance the effectiveness of phytoremediation plants. Payback period of up to 5 years, accounting for temporary loss of agricultural productivity due to land removal from economic circulation during the bioremediation process

Advantages

As compared with existing solutions, this biotechnology offers:
No need for precise identification of individual pollutants. Scalability to large areas.
Stable and effective long-term results

Development and Commercialization Status

IRL7, TRL9
License agreements signed with biotechnology manufacturers. Test batches available upon request. Includes research support and bioremediation process monitoring using a custom-developed indicator system

IPR Protection

IPR2

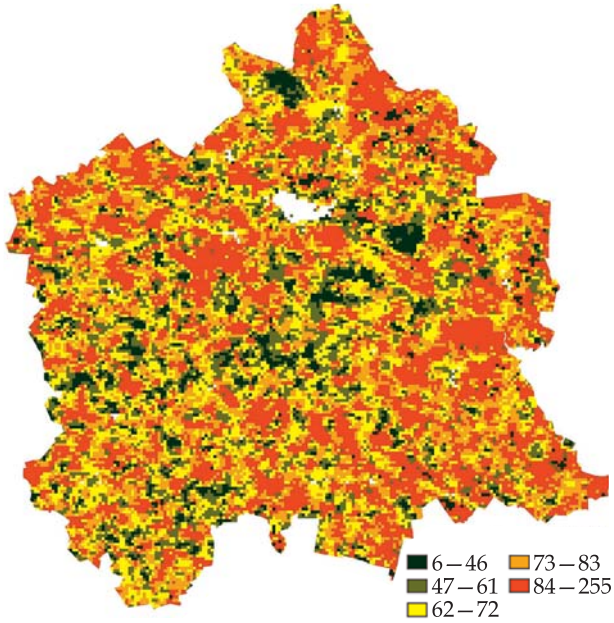
Contact Information

Olena G. Vasylenko, D.K. Zabolotny Institute of Microbiology and Virology of the NAS of Ukraine, +38 067 239 57 85, elenavasylenk@ukr.net

METHODOLOGY FOR CORN YIELD PREDICTION

Corn sprouts

Corn leaves at stages 5–6



Fraction of photosynthetic active radiation

Application

Designed for accurate yield forecasting for various agricultural producers and across different territorial levels

Specifications

The developed methodology integrates expert assessments to evaluate the influence of diverse indicators, including:

- Land surface temperature.
- Fraction of photosynthetically active radiation (fPAR).
- Soil surface moisture.
- Vegetation condition indicators such as gross primary productivity (GPP), leaf area index (LAI), and vegetation indices.

Expert input is used to quantify the strength of relationships between indicators, assess the impact of individual factors, and evaluate the combined influence of multiple variables on yield outcomes

Advantages

Unlike conventional methods, this approach leverages fuzzy logic and neural networks, achieving a prediction accuracy of 90–95%. It supports the integration of a wide range of yield determinants—biological, climatic, and soil-related

Development and Commercialization Status

IRL4, TRL4
Customized yield predictions are available for field, crop rotation, and community levels upon request

IPR Protection

IPR2

Contact Information

Mykhailo O. Popov, Scientific Center for Aerospace Research of the Earth of the Institute of Geological Sciences of the NAS of Ukraine, +380 44 482 01 66, mpopov@casre.kiev.ua

NANOCOMPOSITE PREPARATIONS FOR SEED PRIMING AND FOLIAR FERTILIZATION OF AGRICULTURAL CROPS

Application

Nanocomposite preparations of organic origin with growth-promoting and anti-stress effects, designed for seed priming and foliar application to enhance plant growth, development, and grain productivity

Specifications

Water-soluble formulations derived from organic waste, based on multi-metal complexes of polygalacturonates of biogenic elements, silica, and a lignosulfonate component

Component	Priming Rate	Foliar Rate
Metal complexes of polygalacturonates	5 g/t of seeds	150 g/ha
Lignosulfonate fugate, lignohumate	2.5 g/t of seeds	75 g/ha
Silica nanosols	2 g/t of seeds	55 g/ha

Advantages

Environmentally safe, growth-stimulating, and anti-stress solutions suitable for organic farming. The components enhance soil biological activity and improve plant drought tolerance

IPR Protection

IPR2

Development and Commercialization Status

IRL4, TRL5
Seeking partners for scaling up to mass production

Contact Information

Vitali O. Yevdokymenko, V.P. Kukhar Institute of Bioorganic Chemistry and Petrochemistry of the NAS of Ukraine, + 38 044 292 01 39, +38 067 989 40 50, vay.77@ukr.net

PORTABLE DEVICE FROM THE *FLORATEST* FAMILY

Portable device *Floratest*

Application

Intended for smart agriculture, precision farming, industrial horticulture, and ecological monitoring, this portable device enables rapid, non-destructive diagnostics of the impact of stress factors—both natural and anthropogenic—on plant health. Its use supports timely decision-making for crop preservation, efficient water and energy use, optimal fertilizer application, and protection against various stressors

Specifications

Leaf excitation wavelength	450–470 nm
Maximum luminous intensity	5000 mcd
Leaf emission wavelength	670–770 nm
Measurement error	≤ 5%
Device weight	0.5 kg
Optical sensor weight	40 g

Advantages

No direct competitors in Ukraine. 2–3 times more affordable than foreign alternatives. User-programmable. Easily upgradable via replaceable optical sensors

Development and Commercialization Status

IRL7, TRL8
Manufacture, supply, warranty service, and personnel training are provided under a license agreement

IPR Protection

IPR3

Contact Information

Serhiy V. Yershov, V.M. Glushkov Institute of Cybernetics of the NAS of Ukraine,
+38 044 526 41 78, ErshovSV@nas.gov.ua

TOOL FOR SATURATION OF FRUIT AND BERRY CROP CUTTINGS WITH NUTRIENT AND CRYOPROTECTIVE MEDIA

Cultivation of cuttings after 12 months of hypothermic storage after the vacuum infiltration by nutrient medium

Cultivation of cuttings after the vacuum infiltration (upper row) or soaking (bottom row)

Application

Designed to extend the viability of cuttings for grafting, propagation, or cryopreservation, supporting the creation of low-temperature genetic resource banks

Specifications

The tool enables saturation of fruit and berry cuttings by first degassing biological samples, followed by infusion with a nutrient or cryoprotective medium under vacuum at 20–40 kPa. Up to 15 cuttings can be processed per cycle, with the option to increase capacity upon request. The device is portable, weighing 10 kg, with overall dimensions of 570×380×380 mm

Advantages

As compared with existing analogs, the device is more affordable and portable. It eliminates the soaking stage, restores initial moisture content, and extends the hypothermic storage period of cuttings up to 12 months. It also improves the viability of cryopreserved samples. Saturation occurs up to 10 times faster than traditional methods

Development and Commercialization Status

IRL6, TRL5
Manufacture and personnel training are available upon request

IPR Protection

IPR3

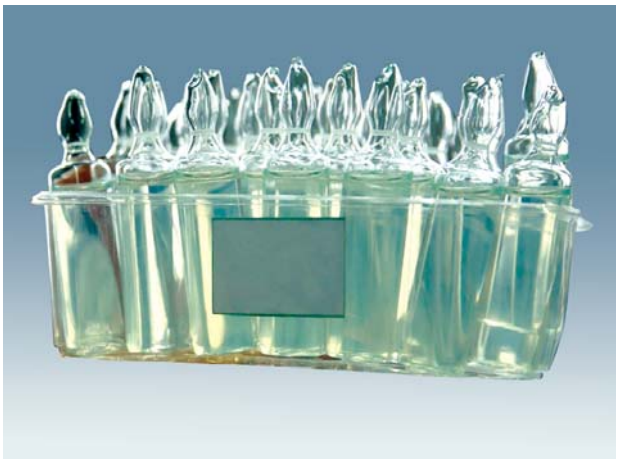
Contact Information

Lyudmila P. Fomenko, Institute for Problems of Cryobiology and Cryomedicine of the NAS of Ukraine, +38 095 863 94 08, ipcc@cryonas.org.ua

- *VAGAREVITA* DIETARY SUPPLEMENT
- BEET DRINK
- RAW MATERIALS FOR THE PRODUCTION OF WHOLE GRAIN HEALTHY FOOD PRODUCTS
- CHOCOLATE COMPOSITION

FOOD INDUSTRY

VAGAREVITA DIETARY SUPPLEMENT



Experimental samples of the *Vagarevita* dietary supplement

Application

A multifunctional dietary supplement intended for men and women over 50 to support vital body functions and overall wellness. It is also recommended for men involved in sports.
Vagarevita serves as:

- An auxiliary agent to help stabilize blood sugar levels in individuals with insulin resistance or those unable to undergo insulin therapy;
- A supportive supplement during treatment of atherosclerosis (to lower triglyceride and cholesterol levels);
- A complementary agent in the treatment of male infertility, erectile dysfunction, and testosterone deficiency, particularly after physical or emotional stress, circadian rhythm disruption, injury, or concussion

Specifications

Aqueous solution of highly dispersed gadolinium-europium orthovanadate with the following properties:

- Neutralizes free radicals and reactive oxygen species involved in aging and various diseases;
- Balances the antioxidant/prooxidant system in the body;
- Reduces inflammation;
- Helps maintain stable blood glucose levels;
- Improves spermatogenesis and restores male reproductive function;
- Enhances physical endurance and energy levels;
- Reverses negative age-related changes;
- Contributes to improved quality of life and longevity

Classified as a Class V compound (practically non-toxic) with no toxic effects on vital systems (cardiovascular, respiratory, central nervous, excretory, reproductive), based on preclinical studies

IPR Protection

IPR2, IPR3

Advantages

A unique, domestically developed product with no known analogs

Development and Commercialization Status

IRL7, TRL6
Custom small-batch production available.
Seeking partners for large-scale manufacture

Contact Information

Svitlana L. Yefimova, Institute for Scintillation Materials of the NAS of Ukraine,
+38 057 341 01 49, ephimova@isma.kharkiv.ua

BEET DRINK

Application

A functional food product for daily consumption, suitable for prevention, recovery after injury, and as a dietary aid in cases of:

- Dysbiosis
- Chronic gastritis
- Colitis
- Cholecystitis
- Hypertension
- Vegetative-vascular dystonia
- Myocardial dystrophy

Specifications

Contains a broad spectrum of carbohydrates, organic acids, enzymes, pectins, and tannins;
Enriched with lactic acid bacteria, which supply essential amino acids, vitamins, and microelements, enhancing the drink's antioxidant and detoxifying effects;
Normalizes blood cell formation and hemoglobin synthesis;
Improves capillary permeability and blood flow; strengthens vascular walls and reduces capillary deformation and venous stasis;
Exhibits hepatoprotective and radioprotective properties;
Reduces the number of pathogenic microorganisms in the intestine;
Functional properties confirmed by preclinical studies

Advantages

Unlike similar products on the market, its effectiveness for cardiovascular health, gastrointestinal function, liver support, and lipid metabolism has been scientifically proven.
Simple and well-controlled production process based on regulated time and quality parameters

IPR Protection

IPR1

Development and Commercialization Status

IRL7, TRL9
Seeking partners for mass production through license agreements and/or provision of bacterial starters

Contact Information

Olena G. Vasylenko, D.K. Zabolotny Institute of Microbiology and Virology of the NASU,
+38 067 239 57 85, elenavasylenk@ukr.net

RAW MATERIALS FOR THE PRODUCTION OF WHOLE GRAIN HEALTHY FOOD PRODUCTS

Biligrain's whole-grain products with a 100% natural dark brown color (no added colorants), made of black-grain spelt varieties

Application

Used in the production of whole grain health-focused food products with a wide range of benefits for the human body. These include protection against metabolic syndromes (obesity, diabetes, hypertension, and dyslipidemia), cardiovascular diseases, and certain cancers, as well as support for healthy aging

Specifications

Winter spelt wheat variety *BILBERRY* features dark purple grains due to a high content of anthocyanin pigments—similar to those found in colored berries and flowers. The grain is rich in antioxidants, anthocyanins, essential vitamins, and trace elements, particularly iron and zinc

Advantages

As compared with conventional wheat, the *BILBERRY* black spelt grain offers:

- High antioxidant activity
- Increased levels of essential minerals and vitamins
- High total fiber and soluble (digestible) protein
- Resistant starch content
- Reduced phytate levels
- Low gluten immunoreactivity

Development and Commercialization Status

IRL9, TRL9
Flour, bread, bakery products, and cereals are available from grain cultivated exclusively in the Biligrain fields

IPR Protection

IPR3

Contact Information

Oleksandr I. Rybalka, Institute of Plant Physiology and Genetics of the NAS of Ukraine,
+38 067 489 1961, rybalkaalexander@gmail.com

CHOCOLATE COMPOSITION

Application

Designed for use in military food systems, as well as for tourism and active outdoor activities

Specifications

Ingredients: cocoa butter, cocoa, carob, and bioadditives based on a kaolin clay composite, silica, bee pollen, or plant-based mixtures. High in energy. Shelf life: 2 years

Advantages

This chocolate composition offers multiple benefits as compared with similar products, such as the *Emergency Ration Bar* or *U.S. Military MRE Chocolate Discs*. These include:

- Enhanced nutritional value due to a complex formulation with an optimal balance of macro- and micronutrients
- Extended shelf life thanks to the inclusion of silica and kaolin clay
- Natural ingredients that offer additional health benefits, such as immune system support and antioxidant activity

Development and Commercialization Status

IRL7, TRL8
Seeking investors for scaling up manufacture

IPR Protection

IPR3

Contact Information

Viktoria V. Payentko, Chuiko Institute of Surface Chemistry of the NAS of Ukraine,
+38 093 200 37 62, payentkovv@gmail.com

CLASSIFICATION OF THE TECHNOLOGY READINESS LEVEL (TRL)

Stage	TRL	Interpretation	Description
Development	TRL1	Fundamental Principles Identified	Fundamental research has been conducted. Fundamental principles have been observed and documented, serving as a foundation for potential new technological applications
	TRL2	Concept Formulated	Potential applications of foundational principles have been identified, including possible technological solutions. Initial feasibility studies and market assessment have been initiated. A small research team has been established to evaluate technical feasibility
Proof of Concept	TRL3	First Evaluation of the Idea and Technology Effectiveness	Laboratory-based analytical and experimental investigations have validated core technical concepts. Initial engagement with potential users has begun. The research team is expanding, and preliminary market viability assessments have been carried out
	TRL4	Laboratory Validation of a Functional Prototype	Core components have been integrated into a laboratory prototype for initial performance testing. Production feasibility and fundamental manufacturing principles are being explored. Target markets have been identified, and market analysis is underway
Prototype Design and Demonstration of Operability in a Relevant Environment	TRL5	Prototype Testing in Relevant Environment	The system has been undergoing validation using broader technological infrastructure in environments that simulate real-world operations. Preparation for production launch continues, including testing of pilot products for primary markets and initiating pilot deployment strategies
Pilot production and demonstration	TRL6	Release of a Pilot Product Prototype, Including Testing in a Relevant Operational Environment	The product and manufacturing process are fully prepared for release in pilot production settings or small-scale industrial facilities. Production refinements and additional R&D efforts are being implemented. Market readiness and logistical support are being established
	TRL7	Demonstration of Pilot Production	A fully operational low-volume production line is demonstrating the commercial product. The product has been tested in target markets, and go-to-market strategies have been finalized. Commercial trial launches are underway
Initial Market Introduction	TRL8	System Complete and Qualified	At this stage, the product's design, manufacturing processes, and supporting procedures have all been fully established and validated. A production-ready version of the system has been tested under operational conditions and has been "qualified" for deployment through successful demonstration and evaluation. The system is deemed ready for full-scale implementation
Full Commercial Deployment	TRL9	Fully Proven and Commercially Operational	The product is in full-rate production, competitively manufactured, and fully tailored to target markets. Minor improvements have led to new product versions. The manufacturing process and overall system performance are continuously optimized through ongoing innovation. The system has demonstrated its value and maturity through operational success on the market

CLASSIFICATION OF THE LEVEL OF PROTECTION OF RESULTS (IPR PROTECTION)

IPR Code	Level of Protection
IPR1	Technical solutions constitute know-how.
IPR2	Applications for the registration of inventions, utility models, industrial designs, and other industrial property rights have been filed or are anticipated.
IPR3	Protective documents of Ukraine for industrial property objects have been obtained and are maintained in force.
IPR4	International application(s) for a patent for an invention have been filed (under the PCT system, European Patent Convention, etc.); application(s) for a patent for an invention have been filed in foreign country(ies) under national procedures.
IPR5	Patent(s) for an invention have been obtained and are maintained in force in foreign country(ies).

[1] Measures for implementing intellectual property rights protection are carried out by scientific institutions in accordance with the legislation of Ukraine, considering the requirements of paragraphs 5, 8, and 9 of the Regulation on the Use of Intellectual Property Rights in the National Academy of Sciences of Ukraine, approved by the Presidium of the National Academy of Sciences of Ukraine on January 16, 2008, No. 15 on Units for Technology Transfer, Innovation Activities, and Intellectual Property (as amended).

[2] Know-how refers to technical, organizational, or commercial information obtained through experience and testing of technology and its components, which: has not been generally known or easily accessible at the time of the technology transfer agreement; is essential, i.e., important and useful for production processes, technological processes, and/or service provision; has been defined, i.e., described sufficiently comprehensively to verify its compliance with the criteria of non-general knowledge and essentiality (Article 1 of the Law of Ukraine on State Regulation of Technology Transfer Activities).

INNOVATION READINESS LEVEL (IRL) CLASSIFICATION

IRL	Development Readiness Level	Definition and Description
IRL1	Inventor or Dreaming Team	The lowest level of readiness, when an intention is transformed into an idea of using space systems, or space technologies are converted into a commercial initiative.
IRL2	Conceptual Research	Once the core ideas are formulated, they are documented for study and analysis of commercial potential.
IRL3	Experimental Validation of Commercial Potential	Active R&D begins, including theoretical and laboratory investigations to validate design properties, market potential, competitiveness, and technological solutions.
IRL4	Feasibility for Specialized Program with Development Team	Core technologies and business components are developed and tested for compatibility. An initial business plan is prepared.
IRL5	Feasibility for Design Support (No Product, No Revenue)	Core technologies and business components are integrated with practical support schemes. The business plan is realistic but requires validation against the characteristics of the final product.
IRL6	Feasibility for Development and Design Support Using Market Mechanisms (Product Exists, No Revenue)	Prototype system is tested in an appropriate environment. The business team is not yet fully formed, and the idea is not ready for commercialization. A comprehensive business plan is prepared, covering marketing, management, technological, and financial aspects.
IRL7	Feasibility for Limited Production; Fully Staffed Business Team (Product Exists, Limited Revenue)	Business operations can be launched in a limited format. The team is fully staffed.
IRL8	Feasibility for Full-Scale Production and Distribution (Product and Revenue Exist)	Technology functionality is confirmed, and the new production capability supports market expansion.
IRL9	Fully Established Business with Appropriate Infrastructure and Personnel (Growing Market)	Production processes incorporate innovative solutions, and the business continues expanding into new markets.

Науково-виробниче електронне видання

НАЦІОНАЛЬНА АКАДЕМІЯ НАУК УКРАЇНИ

ПЕРСПЕКТИВНІ НАУКОВО-ТЕХНІЧНІ РОЗРОБКИ НАН УКРАЇНИ 2025

Англійською мовою

Упорядкування
І.А. Мальчевського, С.А. Беспалова

Редагування, корегування
О.А. Загородньої

Художнє оформлення
Є.О. Ільницького

Технічне редагування і комп'ютерна верстка
В.М. Каніщевої

Підготовка ілюстративного матеріалу
Є.О. Ільницького, О.А. Бурдік, О.Ю. Кисельова

Підписано до друку 10.09.2025.
Гарн. Book Antiqua.
Один електронний USB флеш-накопичувач.
Об'єм данних 55 Мб.
Тираж 100 прим. Зам. № 7775е.

Видавець і виготовлювач
Видавничий дім «Академперіодика» НАН України
01024, Київ, вул. Терещенківська, 4
Свідоцтво про внесення до Державного реєстру суб'єктів
видавничої справи серії ДК № 544 від 27.07.2001