SCIENCE & TECHNOLOGY
CENTER IN UKRAINE

CATALOGUE OF TECHNOLOGIES

OF ACADEMY OF TECHNOLOGICAL SCIENCES OF UKRAINE

for interested
high technology customers

WELCOME TO THE CATALOGUE

"*80 Technologies of Academy of Technological Sciences of Ukraine*" is the example of fruitful cooperation between The Science and Technology Center in Ukraine (STCU) and Academy of Technological Sciences of Ukraine (ATSU). This catalogue is aimed for interested high technology customers and was created according to Statement of Intent to Cooperate between STCU and ATSU, signed on June 25th, 2005.

Cutting-edge specific and technical achievements underpin technological advances, which in turn significantly support economic development and growth. Ukraine has a huge technical strength in a wide range of scientific and engineering disciplines such as material sciences, informational and communications technologies, medium- and heavy –machine equipment design and construction, geo-technology, technology management, environmental protection technologies, etc. However, the transition to market economics and conversion of industrial-technical potential from military to peaceful endeavors has not been easy. Despite years of development elsewhere in the economy, Ukraine still has lack capacity (or resources) to harness fully the potential of its technological strengths in order to convert its expertise into innovative products and services for the global market.

A close cooperative partnership between the STCU and the ATSU will benefit both sides. To help foster such a partnership, the STCU and the ATSU agree to explore possibilities for supporting or jointly sponsoring activities that will enhance opportunities for Ukrainian technologists in the military-industrial complex to enter into cooperative pursuits with western scientists and engineers.

A. Hood, STCU Executive director **A. Morozov, President of ATSU**

STATEMENT OF INTENT TO COOPERATE

Between the Science and Technology Center in Ukraine and the Academy of Technological Sciences of Ukraine

Thursday 23 June 2005

Cutting-edge scientific and technical achievements underpin technological advances, which in turn significantly support economic development and growth. Countries of the former Soviet Union have recognized strengths in a wide range of scientific and engineering disciplines such as material sciences, information and communications technologies, medium- and heavy-machine equipment design and construction, geotechnology, technology management, environmental protection technologies, etc. However, the transition to market economies and the conversion of industrial-technical potential from military to peaceful endeavors has not been easy. Despite ten years of development elsewhere in the economy, these countries still lack the capacity (or resources) to harness fully the potential of their technological strengths in order to convert their expertise into innovative products and services for the global market.

An important objective of **the Science and Technology Center in Ukraine** (STCU) is to promote an environment of innovation, spurring scientific and technical growth into innovative products for global markets. In particular, the STCU is committed to supporting participating former weapons scientists and engineers in developing long-term sustainable civilian career opportunities that will strengthen the scientific research and development capacity of Ukraine.

These objectives closely match those of **the Academy of Technological Sciences of Ukraine** (ATSU), which was founded in 1991with a vision to unite under one organization scientists and technical experts working in the military-industrial complex. The mission of the ATSU is to consolidate the intellectual, technological and industrial potential of Ukraine with the goal of supporting the continued development of Ukrainian social and economics strengths, fostering technological innovation, and contributing to the revival of Ukraine's industrial capabilities.

A close cooperative partnership between the STCU and the ATSU (hereafter the "Parties") will benefit both sides. To help foster such a partnership, **the STCU and the ATSU agree to explore possibilities for supporting or jointly sponsoring activities that will enhance opportunities for Ukrainian technologists in the military-industrial complex to enter into cooperative pursuits with western scientists and engineers.** These activities may include, but are not limited to, the following:

1. Marketing and economic sustainability training
2. Promotion of scholarly and expert/specialist exchanges
3. Seminar, conference, exhibition and trade fair participation
4. Regular meetings between the Parties to explore future opportunities for cooperation
5. Training workshops for grant-writing, project implementation, patent applications, etc.

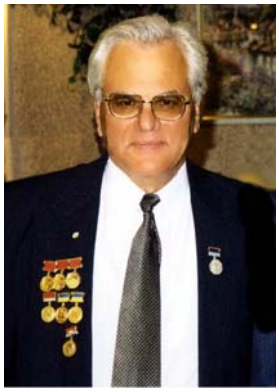
The STCU and ATSU will continue to work together to support these activities as well as others that contribute to Ukraine's long-term scientific and technological growth. Both sides will remain flexible in order to incorporate new opportunities for cooperation as they arise.

The Parties do not intend this *Statement of Intent to Cooperate* to create obligations binding under international law.

Andrew Hood
Executive Director
Science & Technology Center in Ukraine

Academician Anatoliy Oleksiovych Morozov
President
Academy of Technological Sciences of Ukraine

ACADEMY OF TECHNOLOGICAL SCIENCES OF UKRAINE



A. Morozov, ATSU President

The Academy of technological sciences of Ukraine (ATS of Ukraine) is Pan-Ukrainian NGO. It joins efforts of the persons and the companies, which work in the different sectors of science and industry and also in the different regions of Ukraine.

ATS of Ukraine was created in 1991 by the group of leading scientists and technologists, that represented scientific, industrial and defense Ukrainian institutions. ATS of Ukraine is the member of the International Academy of technological sciences, it has the close contacts with UNIDO, Russian Academy of technological sciences, with other international organizations; foreign companies and universities.

ATS of Ukraine strategy, which determines its objectives and structure, is consolidation of intellectual and technological potential of Ukraine for accelerated development of the economy of the country.

Academy membership: 110 actual members (academicians), 106 corresponding members and 4 candidates in the members of Academy; 27 foreign members from the USA, Russia, Canada, Germany, Israel, Azerbaijan, Sweden, Italy, Netherlands, Poland, Uzbekistan. 107 doctors of sciences, 72 candidates of sciences and 22 world-known technologists are among the Academy members. There are 33 Ukrainian State Prize winners; 22 Honorable scientific workers of Ukraine; 88 Professors and 20 members of the National Academy of Science of Ukraine.

The structure of ATS of Ukraine: the Board; 4 Regional Departments (Kharkov, Donetsk, Crimea, Lvov); 11Regional cells in other cities of Ukraine; 9 technical sections according to the directions of Academy activities (IT; Engineering; instrument-making; food production; construction technologies etc.).

Companies created by ATS of Ukraine:

- Institute of biomedical technique and technologies;
- Institute of radar technologies;
- Ukrainian center of environmental and waters projects;
- Research institute of radiation defense.

Main tasks of ATS of Ukraine:

- Management of the inter-branch scientific research, support and accompaniment of high-tech, which determines the technological level of the country;
- Participation in the solving of the scientific and the technical problems of reconstruction and upgrading of existing production facilities by the use of innovative technologies;
- Assistance in the training of the new generation of scientists and technologists and providing inter-industrial; inter-regional and international links.

SCIENCE AND TECHNOLOGY CENTRE IN UKRAINE

A. Hood STCU Executive director

The Science and Technology Center in Ukraine (STCU) is an intergovernmental, nonprofit organization supported by governments of Canada, the European Union, the United States, and Ukraine with the goal of aiding underemployed scientists previously working on the development of weapons of mass destruction for the Soviet Union.

The STCU was established under an intergovernmental agreement in 1993, and began operations in 1995. Since then, governmental programs and private sector agencies from Canada, the European Union and the United State have used the STCU to manage nearly 993 R&D projects, worth over US $142, 6 million.

For over 10 years, the Science and Technology Center in Ukraine (STCU) has worked to assist former weapon scientists and institutes in Ukraine and in other Beneficiary countries (Azerbaijan, Georgia, Moldova, Uzbekistan). STCU project activity has taken place in the following disciplines: nuclear Energy & Safety, Environmental & Energy Conservation Biotechnology, Agriculture, and Medicine, Chemistry, Physics, Sensors, Aerospace & Aeronautics, Industrial and Communications Technologies, Material Science.

The STCU mission is to assist these former military scientists, technicians, and their institutes in redirecting their S&T talents toward peaceful, successful, self-sustaining civilian research employment. The STCU provides tax-free grants for cooperative science research and technology development projects, as well as provides supplemental support activities. Because the STCU is a multilateral organization, it operates with diplomatic status, using international financial and procurement standards, and providing professional management and oversight of its activities. Thus, STCU attempts to promote national, regional and global security.

Content

INTRODUCTION

THIS CATALOGUE INCLUDES 80 TECHNOLOGIES CREATED BY THE MEMBERS OF ACADEMY OF TECHNOLOGICAL SCIENCES OF UKRAINE. THE TECHNOLOGIES ARE SEPARATED INTO 10 SECTIONS:

- BIOTECHNOLOGIES, AGRICULTURE AND MEDICINE
- MATERIAL SCIENCE
- CHEMISTRY
- ENVIRONMENTAL SCIENCES
- SENSORS
- INDUSTRIAL TECHNOLOGIES
- NUCLEAR ENERGY AND SAFETY
- INFORMATION TECHNOLOGIES
- ECONOMICS
- SECURITY

EACH TECHNOLOGY OCCUPIES THE SEPERATE PAGE. THE DESCRIPTION INCLUDES GENERAL INFORMATION, ADVANTAGES AND (IN MOST CASES) PICTURES. THE TECHNOLOGIES ARE ON DIFFERENT STAGES OF READINESS. THIS LEVEL WAS REFLECTED IN APPROPRIATE PART OF THE DESCRIPTION.
FOR USER FRIENDLINESS EACH TECHNOLOGICAL AREA IS MARKED BY A SPECIFIC COLOR. THE SAME COLOR IS THE STRIP ON THE RIGHT SIDE OF THE EACH PAGE.
ON THE LAST PAGE ONE CAN FIND THE CONTACT DETAILS.

BIOTECHNOLOGIES, AGRICULTURE AND MEDICINE
BINOCULAR MAGNIFIER LBX-21

Description

The magnifier is intended for fastening on the head for stereoscopic observation during research and practical activity of physicians of different fields (in ophthalmology, stomatology, neurosurgery and vascular surgery), and also for application in industry (when manufacturing printed circuit boards, manufacturing small components and complicated assemblies from these components), jewelry, restoration operations etc.

Linear FOV, mm	41-109
Magnification, fold	4,2-5,8
Working focal length, mm	300-500
Eye basis changing range, mm	58-73
Overalldimensions, mm	310x200x180
Weight, kg	0,32

Innovative Aspect and Main Advantages

Small overall dimensions and weight provide for convenience in use.
It is possible to use it with a light, designated to supply the light source and concentrate the luminous flux on the input pupil of the fiber optics bundle. Thereby the high intensity working zone illumination by the “cold light” is provided.

Areas of Application

It is used in clinics, industry, jewelry, restoration operations.

Stage of Development

Already on the market.

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NANODIMENSIONAL ENTEROSORBENT SILICS WITH EXTENDED SURFACE

Description

Silics is distinguished for its substantial adsorptive capacity with reference to proteins (up to 800 mg g^{-1}) and microbes (10^8–10^{10} microbes per gram), broad adsorption spectrum, and high adsorption rate.

Innovative Aspect and Main Advantages

The physiologic activity of Silics is due to its high sorptive capacity with reference to protein toxins, pathogenic microorganisms, and viruses. The detoxicating effect amounting to about 90% is attained very rapidly (within 5–10 min). Application of the enterosorbent does not require any preliminary diagnostics of infection and makes it possible to substantially decrease or completely exclude use of antibiotics and other potent medicaments which are, as a rule, toxic.

Areas of Application

One more intrinsic value of pharmpreparations on the basis of Silics resides in that their application is indispensable when eliminating consequences of those mass affections of people which may be caused by natural and technogenic catastrophes. Of special importance here is, first of all, the possibility to provide emergency care for patients with wounds and traumas, to effect elimination and prophylaxis of gastrointestinal infections and viral hepatites, to perform decontamination and purification of potable water. Also, application of Silics may have much promise and potentiality in implementation of complex programs aimed at elimination of long-term consequences of the Chernobyl catastrophe over the territories of Ukraine, Russia, Belarus.

Fig.1. Nanodimensional enterosorbent SILICS with extended surface

Stage of Development

Already on the market.

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PROTECTIVE-AND-STIMULATING COMPOSITIONS

Description

Synthesis of a biologically active cell cryoprotectant media focused on post-thaw gametes to increase viability and longevity for artificial insemination in livestock breeding and medicine.

Innovative Aspect and Main Advantages

Project idea is to adsorb biomolecules on ultra fine silica surfaces to reduce cellular cryo-damage from external and internal factors thereby giving positive biological advantage.

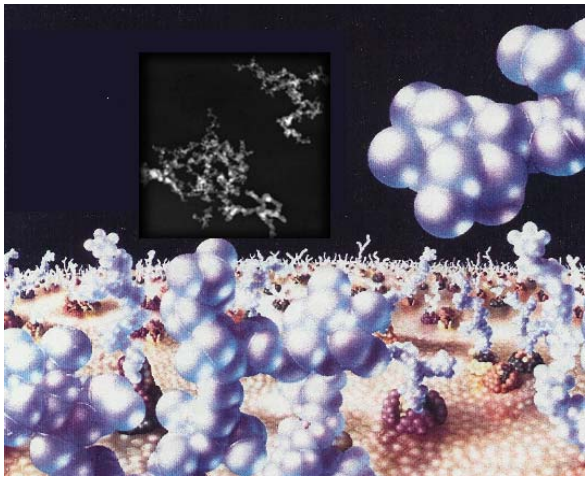

Fig. 1. Schematic picture of cell surface and real image of silica nano-particles.

Size of the particle is about 20 nm

Fig. 2. Size of the aggregate is 1000 nm

Presence of nano-material in cryo-media provides safety of reproductive cells

Areas of Application

Our experiments in the framework of the project has shown that admixture of high-dispersed compositions to known cryo-media for artificial insemination increased the longevity and fertilization rate of human and bovine gametes.

Stage of Development

Tested, available for demonstration – field tested.

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BINOCULAR MAGNIFIERS LBX-10, LBX-20

Description

Magnifiers are used as eyepieces to magnify stereoscopic image during research and practical activity of physicians of different fields (in ophthalmology, stomatology, neurosurgery and vascular surgery), and also for application in industry (when manufacturing and control the printed circuit boards, manufacturing the small components and complicated assemblies from these components), jewelry, restoration operations etc.

Linear FOV, mm	38-140
Magnification, fold	2,7-3,1
Working focal length, mm	350-900
Eye basis change range mm	58-73
Overall dimensions, mm	278x185x173
Weight, kg	0,23

Innovative Aspect and Main Advantages

Small overall dimensions and weight provides for convenience in use.

It is possible to use it with a light, designated to supply the light source and concentrate the luminous flux on the input pupil of the fiber optics bundle. Thereby the high intensity working zone illumination by the “cold light” is provided.

LBX-10

LBX-20

Areas of Application

They are used in clinics, industry, jewelry, restoration operations.

Stage Development

Already on the market.

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MATERIAL SCIENCE

NOVEL ION-PLASMA AND PLASMA-CHEMICAL COATING TECHNOLOGIES

Description

Technologies are developed and the equipment is modernized for deposition of the different types of coatings on the metal and ceramic substrates. The deposition methods are based on novel vacuum ion-plasma and plasma- chemical processes.
General view of the equipment is shown on the fig. 1. It is possible to deposit:
Pure metals (Ni; Ti; Cu; W; Mo; Cr etc.);
Their nitrides;
Carbides and carbide-nitrides;
Oxides etc.

The wear resistance of the articles after deposition of the coatings increases in up to 10 times.
The layers from refractory metals have extra high corrosion resistance, close to enamel. As the example, the tungsten coated chemical reactor shown on fig. 2. was tested in the pharmaceutical industry and demonstrated high performance. Additionally to high corrosion resistance it has high Shock and Thermo-shock resistance.
Proposed products are: equipment and coated articles according to client requirements.

Innovative Aspects and Main Advantages

There are the following main advantages of proposed products:

Equipment is much less expensive then European analogues with the same quality. Estimated cost of the coated samples is three times lower then European analogues. The delivering time is inside two-three days.

Four Ukrainian patent applications were filed to protect the novelties in the technologies.

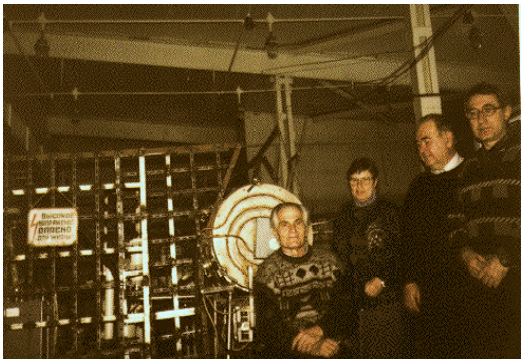

Fig. 1 General view of the equipment for DLC deposition

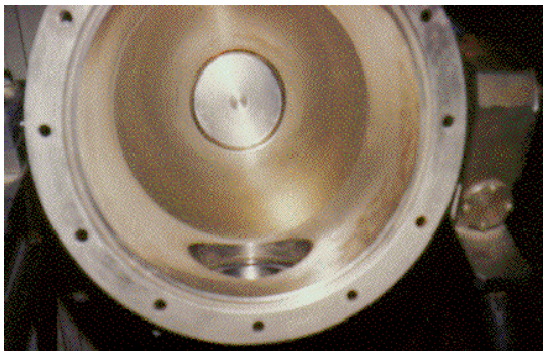

Fig. 2 Extra high corrosion resistant tungsten coated chemical reactor

Areas of Application

The technologies are applicable in airspace industry; atomic industry; engineering and other sectors.

Stage of Development

The equipment and technologies are ready for small-scale production.
It is possible to modify the technology up to client requirements.
We are looking for the partners for product promotion to the European market.

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INDICATOR STRUCTURES FOR MAGNETO-OPTIC IMAGING OF MAGNETIC IRREGULIARITIES

Description

Imaging method is based on magneto-optic (MO) Faraday effect that allows a transformation of spatially non-uniform distribution of the inspected specimen leakage field into an optical contrast image. Indicator structure consists of soft magnetic epitaxial film of Bi-substituted rare earth iron garnet grown by liquid phase epitaxy (LPE) method with deposited mirror and protective layer. The general view of the samples is shown on the fig. 1. A principle of magneto-optic visualization using the Bi-substituted iron garnet LPE film is shown on fig. 2.

Innovative Aspect and Main Advantages

The developed LPE technological process ensures obtaining the following indicator structures:
- structure diameter – till 3" (76.2 mm);
- structure thickness – 0.5…30 μm;
- specific Faraday rotation $2\varkappa_F$
@500 nm – till $5 \cdot 10^4$ deg/cm;
@633 nm – till $2 \cdot 10^4$ deg/cm;
@1300 nm – till $2 \cdot 10^3$ deg/cm.

Fig. 1. Substrates and MO indicator structures

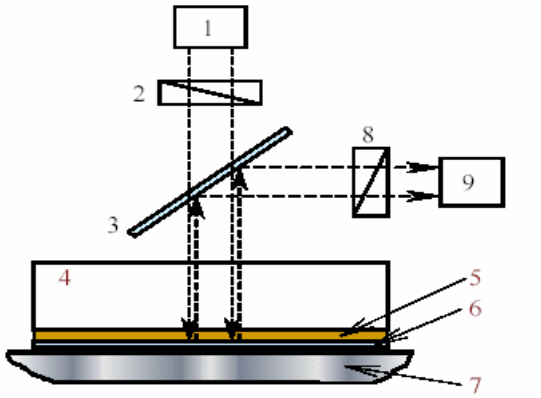

Fig. 2. Principle of magneto-optic visualizing 1 – light source, 2 – polarizer, 3 – beam split mirror, 4 – transparent substrate, 5 – indicator layer, 6 – mirror layer, 7 – inspected specimen, 8 – analyser, 9 – CCD camera

Areas of Application

Indicator structures are used for non-destructive testing and evaluation of hidden flaw, non-uniformities and micro-defects in ferromagnetic, conductive and super conductive materials, recognizing and authentication of magnetic protection marks on banknotes and securities, visualization of magnetic records, topo-graphing of electrical currents in planar conductor structure, etc.

Stage of Development

We are seeking for the partners for joint development and further fabrication of MO visualizers on the base of developed indicator structures for different applications.

The fabrication technology for Bi-substituted rare earth iron garnet films is well worked out in laboratory version. The SRC "Carat" is provided with needed technological and analytical equipment only on 80 %.

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THICK-FILM NTC THERMISTOR MATERIALS

Description

Mixed transition metal manganite ceramics of the $NiMn_2O_4$-$CuMn_2O_4$-$MnCo_2O_4$ system are used as functional materials in thick-film pastes. The problem is – to retain the high level of temperature sensitivity proper to bulk thermistor ceramics during the fabrication course of thick-film thermistors. This problem is resolved, mainly, by proper pastes formulation and correctly maintained sintering route.
At present, thick-film NTC thermistors possessing the characteristics:
• nominal sheet resistivity 1,000 k./sq.
• temperature sensitivity 3500 K
can be fabricated via screen printing route of the designed thick-film pastes. Further research aimed on the development of thick-film materials with lower values of nominal sheet resistance is foreseen in future.

Innovative Aspect and Main Advantages

The compositions of spinel-type thermistor ceramics - the functional material of thick-film pastes, are patented in Ukraine.
According to the environmental policy of the European Union, lead-free thick-film materials are proposed.
Thick-film thermistors are distinguished by:
• design flexibility
• miniaturization
• cost effectiveness etc.,
in comparison to discrete analogues (Fig. 1).

Fig. 1. View of planar-type thick-film thermistors of different topology and disk-type bulk analogue, for comparison

Areas of Application

• Temperature Compensation
• Temperature measurement &Control

Stage of Development

We look for the Application possibilities of the proposed thick-film materials; cooperation for further research is appropriate, also.

Trial quantities of thermistor pastes is available for testing.

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RADIOABSORBING COMPOSITION «TSEPOR»

Description

'Tsepor' is a highly effective material for radio absorbers and sound- and heat-insulators capable to afford protection of various civilian and special objects.

'Tsepor' is a porous nontoxic material stable to acids, alkalis, solvents, and sea water. The temperature interval of operation is from –40 to +100 °C at relative humidity of air from 0 to 98%.

Innovative Aspect and Main Advantages

Physico-mechanical properties

Actual density, g cm^{-3}	0.6–1.1
Layer thickness, mm	8–25
Compressive strength, MPa	7–8
Normal moisture content, %	2–5
Heat conductance, W/(m·K)	0.06–0.10
Acoustic absorptivity at a frequency of 4000 Hz, %	40–50
Coefficient of absorption of radiation in the SHF range, dB	15–20

Fig.1 Radioabsorbing composition «TSEPOR»

Areas of Application

The material is designed to afford protection of various objects and maintenance personnel from action of electromagnetic radiation in the SHF range and heat and sound radiation. It is also able to provide waterproofing of buildings and constructions.

Stage of Development

Tested, available for demonstration – field tested.

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DEFORMED DUCTILE CAST-IRON

Description

On the base of investigation of thermoplastic deformation of high-strength cast-iron the technology of production of wares with high working and physical-mechanical properties has been developed. The essence of the technology is thermoplastical deformation of blanks from ductile cast-iron; it permits to change structural conditions of metal and obtain qualitative new properties. It is known, that cast-iron is a difficult deformed alloy. To solve this question a complex technological action has been developed. It provides optimization of cast-iron chemical composition, including economy alloying, whittling regulation of loading regimes, determination of preliminary heating temperature interval, etc. It is determined, that maximal level of properties (in 2 time higher than initial cast-iron) is observed provided degree of deformation comprises 80%.

Innovative Aspect and Main Advantages

Plastic deformation of ductile cast-iron permits to increase its strength in two times. Also other mechanical properties improve corresponding to image. During deformation liquidation of internal microdefects and microstructural rifts is realized. It reveals itself in increasing of deformed cast-iron density on 0.2-0.3 g/sm^2 comparatively with initial cast-iron.

Areas of Application

The ability of high-strength cast-iron to improve its properties during thermoplastic treatment dose this material perspective for making of power transmission, jobs of piston's group, shafts, collars, gears and so on. Application of deformed cast-iron for producing of wares, which work under high loading and intensive wear-out, is the most reasonable.

Stage of Development

The technology of manufacturing of wares from deformed ductile cast-iron has been tested in industrial conditions. High mechanical and working properties of
wares has been confirmed with laboratory an industrial tests.

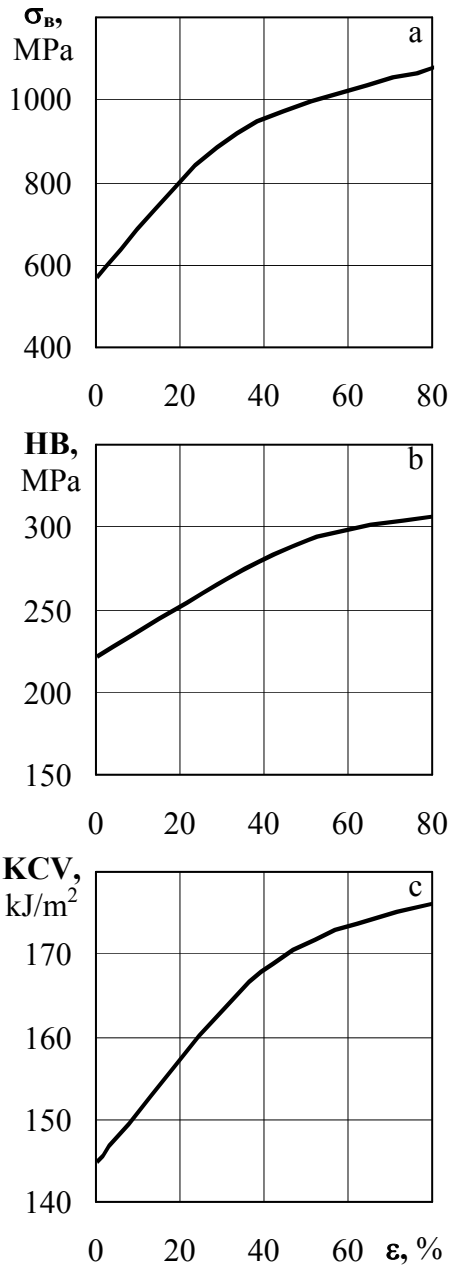

Fig. 1. Influence of deformation degree to strength (a), hardness (b), and toughness (c) of ferritic-pearlitic ductile cast-iron

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MATERIALS OF SERIES P-MT AND P-NT FOR RADIO ABSORBERS AND SOUND- AND HEAT-INSULATORS

Description

The materials are produced in the form of rolled fibrous cloths of the felt type with a width of up to 1.7 m and length of up to 30 m. They are nontoxic and light and are noted for a high processibility in their usage. The temperature interval of operation is from −50 to +70 °C (up to +100 °C for the P-NT materials) at relative humidity of air from 0 to 98%.

Innovative Aspect and Main Advantages

Physico-mechanical properties

	P-NT-U	P-NT-01	P-NT-02
Surface density, g cm^{-3}	960	250	335
Layer thickness, mm	12	4.5	5.2
Tensile strength of a strip 50 × 100 mm, kgf	294	78	88
Normal moisture content, %	12	3	3
Heat conductance, W/(m·K)	0.047	0.045	0.045
Acoustic absorptivity at a frequency of 4000 Hz, %	50	50	52
Coefficient of absorption of radiation in the SHF range, dB	up to 25	up to 25	up to 25

Fig. 1 Materials of series P-MT and P-NT for radio absorbers and sound- and heat-insulators

Areas of Application

The materials of these series are designed to afford protection of various objects and maintenance personnel from action of electromagnetic radiation in the SHF range and heat and sound radiation. They can also be used when constructing environmentally benign official buildings and living quarters.

Stage of Development

Tested, available for demonstration – field tested.

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OBTAINING OF DUCTICLE CAST-IRON WITH APPLICATION OF CORED WIRE

Description

Cored wires are powder filler put in steel envelope. Cored wires are uncoiled from the reel and supplied to the liquid metal by supply device (tribe-apparatus) with intended speed. Dissolution of envelope and interaction of wire's extender with liquid metal arise at the required depth, which is appointed by calculated speed of inlet. The technology can be applied for modifying, desulphuration, deoxidisation, alloying and carbonization of the metal in ladles, casting plants and melting furnaces. There is wide application of the technology for billet casting at automatic and carrousel lines for continuous casting of billet from high-strength cast-iron and also for little-serial and individual casting.

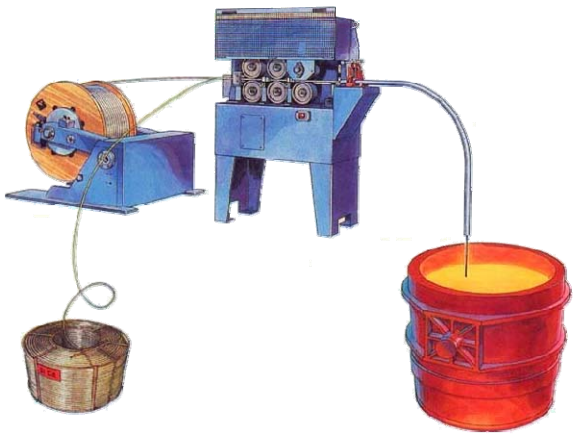

Fig. 1. Scheme of the process

Innovative Aspects and Main Advantages

Investment for organization of technology is not big. Required area for equipment is about 15 m^2. Equipment contains tribe-apparatus, operating stand and stand of reeling off. Consumed power is not more than 10 kWh.
Technology ensures:
Fulfillment of treatment process of liquid metal at automatic regime;
High level of useful employment of cored wire components (not less then 60% of magnesium);
Accurate dosage of introduced components.

Fig. 2. Cored wire in reels

Areas of Application

The treatment of liquid metal with cored wire is made with the purposes:
Refinement, desulphuration and deoxidisation;
Modifying for obtaining of spheroidal graphite cast-iron;
Modifying and alloying of everything steel and cast-iron marks;
Carbonization of metal.

Stage of Development

Efficiency of technology application for ductile cast-iron obtaining has been confirmed with industrial tests. The technology has been introduced on enterprise of transport machine building.

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MATERIALS FOR ELECTRICAL CONTACTS AND ELECTRODES, WHICH UNCONTENTS OF NOBLE METALS

Description

Scientific-Production Enterprise "GEKONT" was developed of industrial electron beam technology of producing of materials for electrical contacts, which have no analogues in world practice. The materials on a basis Cu and Mo, not containing extremely scarce Ag and W, receive by high-speed electron beam evaporation and subsequent condensation of the mixed steam flow in vacuum on the substrate, heated up to determined temperature. Previously put dividing layer provides easy branch condensing of a material from a substrate.
The composite materials for electrical contacts also are let out according to TU U20113410.001-98.
Today "GEKONT" successfully is delivering electrical contacts for many enterprises of Ukraine, Russia, Southern Korea, China, Czech, Romania, Poland.

Innovative Aspects and Main Advantages

The new contacts surpass in durability known on Ag base (W-Ag, Ag-CdO, Ag-Sn) in 1.5…3 times and at the same time they in 2.2…2.5 times is cheaper.

- increasing terms of durability of contacts;
- decreasing of contact's cost;
- decreasing of contact's service's term;
- possible to repair old contacts.

Areas of Application

Electrical contacts of devices (relay, contactors, actuators, shuters etc.), electrodes of machines contact welding, spring electrocontacts and membranes.

Stage of Development

Materials was patented (Patents of Ukraine № 34875, # 17204A) and certificated (TU U20113410001-98,TU U31.2-20113410-003-2002)
Already on the market, commercialized.
(made more then 1.5 mln. electrocontacts).

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COMPOSITION FOR PROTECTION OF BUILDING AND CONSTRUCTION MATERIALS SURFACE

Description

The composition includes organic and inorganic compounds as well as a water soluble waterproofing admixture. When the composition is used to damp construction materials and various buildings and structures, it provides a thorough impregnation of their surfaces, which renders them hydrophobic, i.e. resistant to water and moisture.

Innovative Aspect and Main Advantages

This water resistance is very strong so that the surface of a treated material is not only waterproof but is also able to withstand a water column at a pressure of 4–5 atm. The composition can function at a temperature from –60 to +250 °C without losing its properties. It is harmless to health because after application the composition does not evolve any hazardous substances. In addition, it is stable against various aggressive media (resists attacks by 2% nitric acid and 2% alkali solution). Moreover, it consists of easily accessible ingredients.

Areas of Application

Hydrophobic-and-insulating composition is intended to protect construction materials (brick, concrete, slate, unglazed ceramic tile, coatings on the basis of lime and cement paints, cement strainer, wood, marble, granite, etc.) and various buildings and structures by dint of hydrophobization of their surfaces.
When being treated, the surface is coated with the composition by means of an inking roller, brush, pulverizer or compressor at a temperature not lower than 10 °C. The coating solution is applied in one or two layers without gaps and runs up to formation of an apparent lustre, i.e. up to complete cessation of saturation of the surface with the solution.

Fig.1. Composition for protection of building and construction materials surface

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PIROGENIC NON-MODIFIED SILICA OF THE GRADES "ASIL"

Description

Silica of the grades 'ASIL' porous blue-white powder or free-flowing white light grey powder are characterized by high chemical resistance to action of the most chemical reagents. Their mixing with water and the most organic liquids is very good. With addition of ASIL to the liquid it's possible to reach its densifying, jelly state. ASIL is hygroscopic and during its storage, it absorbs moisture very well.

Innovative Aspect and Main Advantages

Technical characteristics of hydrophilic pyrogenic silica ASIL

Index denomination	Index parameters for the grades
Silica dioxide mass part (SiO_2) in recalculation of burnt substantion, %, not less	99,9
pH of suspension, not less	3,8
Moisture mass part %, not more	1
Mass loses at burning, %, not more	1
Bulk density, gr/dm^3: Noncompacted compacted	40-60 120-140
Specific surface, m^2/gr by BET method	60-380±40

Areas of Application

Non-modified ASILs can be used as high-quality fillers for rubber, plastic and leatherette, as thickeners of liquids (paints, lubricating greases, glues, proofing compounds and others), as carriers of acting substances (in medicine, perfumery), as anti-caking agents of loose materials as well as in radio electronics textile and other industry branches.
Is used consisting of the batch for production of acid-proof enamel surfaces and in production of polymer materials.

Fig.1. Pirogenic non-modified silica of the grades "ASIL"

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SUBSTRATE FOR RAISING OF PLANTS IN GREENHOUSES

Description

The Institute of Surface Chemistry of the NAS of Ukraine has developed an environmentally benign substrate on the basis of native mineral fibers and inorganic binding agent designed to raise hydroponically vegetables (tomatoes, cucumbers, and peppers), vitamin cultures (lettuces, onions), flowering and ornamental plants. The substrate can also be used for sprouting of seeds and growing of seedlings.

The presence of a mixture of mineral fibers and inorganic binding agent makes it possible to provide for a desired moisture-holding capacity and chemical inertness with respect to pathogenic microflora. The substrate is noted for its appropriate adsorption properties with reference to mineral soil additives.

Production of the substrate does not require any special equipment and can be performed using process lines that are intended to manufacture heat-insulating plates and are not subjected to any essential changes or sophistication of manufacturing methods.

Innovative Aspect and Main Advantages

Technical characteristics of the substrate

Plate sizes, mm	
length	1000 ± 10
width	500 ± 10
thickness	80 ± 10
Density, kg m^{-3}	115 ± 15
Total porosity, %	≥95
Voluminal water absorption, %	
in the case of complete immersion	80 ± 10
in the case of incomplete immersion	≥30
Shrinkage in the case of complete watering, %	≤10

Areas of Application

The tray agriculture method for raising vegetables (tomatoes, cucumbers, peppers, lettuces, onions), flowering and ornamental plants allows one to gather in the harvest several times per year. Besides, it provides for an enhanced economic efficiency of plant growing and high quality of crop products under conditions of repeated usage of a substrate (for 2–3 years).

The substrate as well as plant products raised on the substrate meets the most stringent toxic and hygienic indices and requirements.

Stage of Development

Commercialized.

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CHEMISTRY

PHOTOACTIVE POROUS FILMS AND STABLE NANOSIZED PRECIOUS METALS IN POWDER AND FILM FORMS FOR ENVIRONMENTAL CLEANING

Description

The investigations are directed to the synthesis of porous silica, titania (nanosized anatase), zirconia, as well as their binaries and ternary compositions in form of films and powders using sol-gel route with template-based approaches. The synthesis has been based on the introduction of the template agents on the stage of hydrolysis of appropriate alcoxides of Si, Ti or Zr. Transparent chemically and thermally films are modified with nanosized noble metal particles and iron ions and are sensibilized to the visible irradiation.

Innovative Aspect and Main Advantages

- Elimination of toxic organic (chlorinated phenoles, cancerogenic polyacenes, textile dyes, inorganic (toxic Cr(VI) and Hg(II), Cu(II) compounds from air and water.
- Simple and convenient fabrication of stable silver, gold, platinum, palladium particles for catalytic and bactericide application
- Iron-titania films with high photocatalytic activity in the process of dinitrogen photofixation.

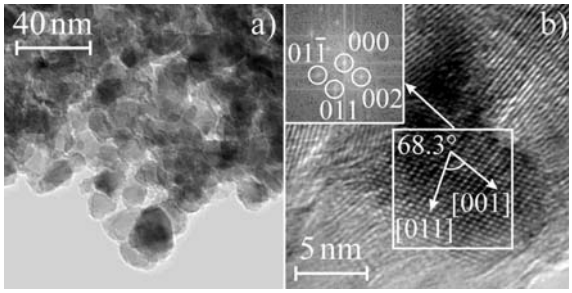

Fig. 1. HRTEM-image of TiO_2 with the nanosized anatase reflections

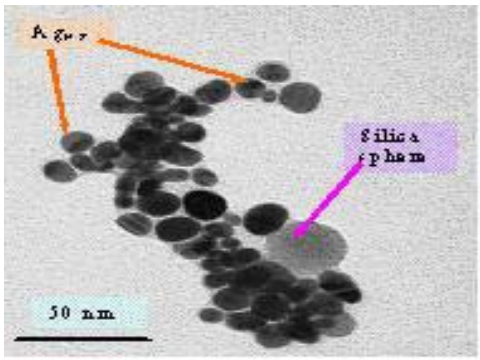

Fig. 2. TEM of silver nanoparticles with silica spherical particle

Areas of Application

Effective redox photocatalysts based on silica- and titania-composed nanosized transparent stable films are easily prepared via low-temperature sol-gel route with high decontamination activity of toxic organic and inorganic pollutants under UV-visible and solar irradiation

Photochemically produced nanosized noble metal particles stable either in solution or on the film surface with high bactericide and photocatalytic activity.

Stage of Development

Prototype available for testing.

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COMPLETE PROCESSING OF DONBASS COAL MINE WASTE PILES

Description

In view of unfavorable environmental and economical situation in this country, it is urgent to develop and introduce innovative technologies aimed at complete processing of coal mining wastes.

Coal mine waste piles include various minerals and can be used as raw materials for construction. However, chemical analysis of the wastes shows that they are of special interest as raw stuff for producing non-ferrous metals and rare earths. For instance, there are high quantities of beryllium, tin, yttrium, zinc, copper, niobium and other metals in the waste piles of Lugansk mines; and there is germanium, bauxites, gallium, scandium in the waste piles of Donetsk region mines. The quantities of the above elements are sufficient for commercial production.

With the above in mind, the following trends have been identified for developing a flowsheet for processing the pile wastes of Donetsk region mines:

Extracting iron-containing feedstock;
Extracting germanium-containing feedstock;
Extracting accompanying rare earths;
Extracting aluminium-containing feedstock for further processing or producing silumin alloys at the site;
Extracting silicates for producing construction materials.

At present the basic parameters of the waste processing flowsheet have been developed, and preliminary tests and experiments carried out to prove the feasibility of the complete processing flowsheet. An electrohydraulic crusher has been developed for extracting germanium. A number of technologies have been patented. Cost-effectiveness and feasibility calculations prove that this waste processing technology is highly profitable and eco-favorable.

Innovative Aspects and Main Advantages

Unconventional waste raw materials are used for production of highly marketable produce. Unique technology so far not rivaled in Ukraine and the world.

Areas of Application

Coal mining industries, environment management.

Stage of Development

R&D, patents available, the developer searching partners for completion and introduction.

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COMBINED UTILIZATION OF CHLORINE-ORGANIC AND METAL-SULPHIDE WASTES

Description

The formation of harmful wastes is the objectionable result of chlorine-organic compound production. At the mass production level the quantity of the wastes could be evaluated as thousands of metric tones/year for single production facility.
For example, annual amount of high-toxic chlorine-organic wastes for Ukrainian company Lucor (vinyl-chloride and dichloride – ethane production) is equal to 6,000 tones. Near 2 M cubic meters of natural gas are needed to burn these wastes. Additionally 4,000 tones of alkalis are used for neutralization of chlorine hydrocarbon.
World experience shows that:

- The amount of wastes is equal to 5-10%% of the total production value;
- The level of the direct expenses for neutralization of such wastes lies between 5 and 30%% from the total production costs.

Additionally to the direct expenses, the sizeable amounts of extra high toxic compounds (phosgene, chlorine and even dioxin) are appeared.

It is proposed the novel method for combined utilization chlorine-organic and metal-sulphide wastes. The final products of this technology are the materials, which can be used in road-building and construction industries.

The proposed project stages are listed on the right top.

Innovative Aspect and Main Advantages

- There are few obvious advantages of proposed method compare to existing ones:
- It utilizes both chlorine-organic and metal-sulphide wastes;
- The product of neutralization can be used in the road building;
- There are no pollutant emissions in this technology.

Project stages

Stage 1.
The detailed investigation of the utilization of chlorine-organic wastes on Lucor and Carpatnaftohim companies.
Stage 2.
The method creation for utilization of chlorine-organic and sulfur-contained wastes by their transformation into commodity products.
Stage 3.
The technology creation for polymer production, which is acceptable as the components for concrete and asphalted compositions.
Stage 4.
The technology test on Lucor and Carpatnaftohim companies.

Each stage duration is approximately 1 year.
Total project duration is 4 years.

Areas of Application

The technology can be used at the chemical companies, which produce chlorine-organic and relative products.

Stage of Development

Proposed idea is on laboratory test level.

Inexpensive facilities in Ukraine for field tests are available.

Published results of laboratory tests are available for the additional request.
We are looking for the investor to transform our idea up to the industrial level.

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INDUSTRIAL RECYCLING OF WASTE OIL LUBRICANTS

Description

We offer an efficient technique of remediating soils and ground waters polluted with oil products. It includes the vacuum recovery of polluted waters from the network of cleanup wells.
The available vacuum systems are efficient at minor depths of the water table (up to 10 m).
Based upon domestically produced equipment and proprietory design of pneumatic pump, GALSANA limited liability company developed a novel pneumatic-vacuum technology of cleanup of soils and ground waters which secures the most exhaustive purification of ground waters from oil products with water table depths up to 50 m.
These technologies and equipment deserve wide spreading and introduction in practice during the realization of various programs of protecting subsoil from the negative impact of economic activity connected with recovery, transportation, processing and storage of crude oil and oil products.

Innovative Aspect and Main Advantages

Utilization of proprietory pneumatic-vacuum systems with greater effective depth for the purpose of cleanup of ground waters from oil products.

Areas of Application

Environment protection.

Stage of Development

Employed on commercial basis.

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ENVIRONMENTAL SCIENCES

RECYCLING OF SLOP OILS AND ACID TARS

Description

Slop oils or acid tars (hereinafter referred to as organic wastes) are recovered from the sludge pit by applying a pontoon complex and are further transported to mixers.
In the mixers they are treated with chemical reagents and sultaneously heated and mixed. In case of necessity deoxidation is applied.
After that organic wastes are injected into a separating unit where they are separated into organic matter, water and solid impurities. The recovered organic matter is used as stove fuel or is mixed with crude oil and transported for further processing.

Innovative Aspects and Main Advantages

Possibility of recycling organic wastes into raw materials for processing in refineries instead of crude oil or together with crude oil.
Possibility to use solid and aqueous phases as raw materials for the industry.

Areas of Application

Environment protection, oil refining industry.

Stage of Development

Employed on commercial basis.

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SENSORS

TECHNOLOGIES FOR GROWTH OF COMPLEX OXIDE SINGLE CRYSTALS FOR QUANTUM-, OPTO- AND ACOUSTOELECTRONICS

Description

A basic technology is grounded on pulling single crystals of high-melting point complex oxides from their melt contained in platinum or iridium crucible on specially oriented seed at predetermined atmosphere (air, rare gases, gas mixtures).

Technological peculiarities are consisted of the following steps:

- preparation of growth charge and its control;
- designing thermal blocks of growth machine to attain an optimal temperature gradients;
- melt preparation and its homogenization;
- choice of optimal growth parameters (temperature, crucible sizes, crystal rotation and pulling rates).

The growth technological process is carried out on specialized equipment with RF heating of crucible and automatic mass control of growing crystal. The SRC "Carat" possesses 10 specially designed unique machines produced by Physitherm, France, which enables to grow crystals with mass till 30 kg. The crystal growth production section belongs to scientific objects, which are a national property of Ukraine.

To increase a competitive ability on the world single crystal market of science intensive production that the SRC "Carat" can produce it is needed investments for:

- finish gathering existing installed base of company with series of machines for finishing and chemical-mechanical processing working surfaces of single crystal active elements for different purposes;
- finish gathering existing analytical base with facility of precise control of chemical composition;
- solving problem of providing with technological rigging made of noble metals (platinum, iridium);
- renovation of existing systems of power supply for growth equipment.

Innovative Aspect and Main Advantages

The developed technological processes ensures at the moment obtaining of:

- pure and Nd-doped single crystals of gadolinium gallium garnet (GGG) with diameter till 100 mm and length of cylindrical part till 300 mm used as substrate material for liquid phase epitaxy of rare earth iron garnets and active media for high power solid state lasers;
- yttrium aluminium perovskite single crystals doped with neodymium and thulium ions with diameter till 60 mm and length of cylindrical part till 200 mm used as active media for solid state lasers;
- pure and doped with magnesium oxide (more than 5% mol.) congruent single crystals of lithium niobate with diameter till 85 mm and length of cylindrical part till 100 mm used as the most promising material for opto- and acoustoelectronics;
- single crystals of lead, cadmium and calcium tungstates with diameter till 80 mm and length of cylindrical part till 120 mm used as scintillation materials for registration of ionising radiation.

Areas of Application

High quality active media for electronics, quantum electronics, opto- and acoustic-electronics, photonics optics, etc.

Stage of Development

Prototype available for testing.

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MONOLITHIC PASSIVELY Q-SWITCHED SOLID-STATE LASERS

Description

A basic technology is grounded on pulling single microchip laser in a solid-state micro-laser with longitudinal pumping by power semiconductor laser on appropriate wavelength and passive Q-switch realized on the base of using saturable absorber. An active element (fig. 1) of this laser represents a monolithic structure that consists of lasing medium (YAG:Nd – yttrium aluminium garnet doped with neodymium) and passive Qswith (saturable absorber, YAG:Cr^{+4} – yttrium aluminum garnet doped with chromium atoms in +4 valent state) as well as input and output mirrors.

The active element is fabricated by group technology method with following cutting a large area structure onto small individual elements – chips.

We are seeking for the partner for industrial production of these type devices.

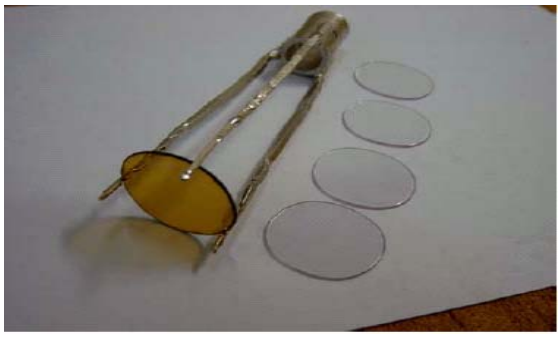

Fig 1. Substrates YAG:Nd and grown epitaxial film YAG:Cr4+

Fig. 2. Microchip laser prototype

Innovative Aspect and Main Advantages

The laser manufacturing technology consists of active element fabrication and assembling the laser and involves the following steps:

– fabrication of YAG:Nd single crystal substrate of generation medium (thickness ~ 1mm, diameter 20…30 mm) with surfaces of epitaxial grade;

– growing up an epitaxial layer of passive Q-switch by liquid phase epitaxy (LPE) method with thickness of 40…200 mkm and concentration of 4- valent chromium ions till 10^{18} cm^{-3} (the technology for fabrication of microchip laser active media is protected by Ukrainian declarative patent (Filed at 11.12.2002);

– removal of un-working layer of saturable absorber from one side of the grown structure and reducing a thickness of working layer to needed thickness (with precision ± 1 mkm) with further processing of both sides till optical grade and flatness to be better than 10ЃЊЃЊ.

– deposition of multi-layered input and output laser mirrors on appropriate sides of the structure with given value of transmission and reflection coefficients at the pumping (0.808 mkm) and generation (1.064 мкм) wavelength;

– dicing the plate on separate individual elements – chips;

– laser assembling;

– parameter check..

Areas of Application

Time-of-flight ranging, collision-avoidance systems, laser-induced breakdown spectroscopy, monitoring of effluents, close-loop process control, ultraviolet laserinduced fluorescence spectroscopy, micromachining, microsurgery, dermatology, non-destructive testing, photolithography, laser projection displays, visible laser pointers, etc.

Stage of Development

The readiness of engineering developments to apply in industry is near 60%.

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SENSORS

PURE YIG AND YIG-BASED EPITAXIAL FILM

Description

The YIG films used presents a versatile choice of various constructional solutions for passive planar micro-strip devices of a wide microwave range, and they are an indispensable material for designing miniature and sub-miniature microwave components.

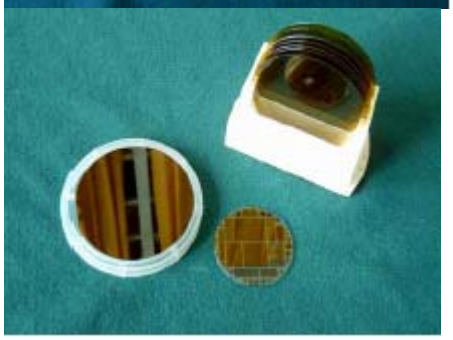
Standard specification:
Diameter, 76.2 ± 0.2 mm
GGG substrate thickness, 0.46 mm

Proposed R&D Services
• Development of the LPE growth technology for any kinds of rare earth ferrous and non-ferrous garnets under customer's requirements for magnetic-electronics, sensor, laser and scintillator application, etc.
• Development of LPE growth technology and small-scale production of any kinds of epitaxial Bi-substituted iron garnet films for magneto-optics.
• Search, investigation and development of new magnetic-ordering single crystal thin film materials of different types (spinels, hexaferrites, perovskites, etc.) through a complete cycle of "substrate single crystal – epitaxial grade substrate – epitaxial film".

We are suggesting:
- Film fabrication under customer requirements;
- Joint R&D projects;
- Licensing, joint ventures, etc.

Innovative Aspect and Main Advantages

Yttrium Iron Garnet (YIG) films grown by the liquid phase epitaxy (LPE) method on high quality single crystal gadolinium gallium garnet (GGG) substrates are an excellent material combining the unique properties of bulk YIG single crystals with the advantages of planar geometry and some other distinguished features.



Areas of Application

High quality active media for series of microwave magneto-electronic devices using a phenomenon of magneto-static wave transmission like for tunable band-stop, band-pass and rejection filters, delay lines, signal-to-noise enhancers, etc.

Stage of Development

Ready for production on laboratory and semi-industrial scale.

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SENSORS

YAG:Yb3+ SINGLE CRYSTALLINE STRUCTURES FOR POWER THIN DISK LASERS OF NEAR IR REGION

Description

Single crystals of yttrium-aluminum garnet $Y_3Al_5O_{12}$ (YAG) activated with ytterbium Yb^{3+} has attracted the attention of researchers in the last few years as high-performance materials for high power diode pumped wave-guide and thin-disk lasers. The main advantages of ytterbium ions in laser gain media in comparison to traditional neodymium ions are: high pump efficiency, low thermal load, wider pumping band, longer upper-state lifetime, and relatively large emission cross sections. The absence of concentration quenching due to cross relaxation between the active ions as well as the possibility of increasing the Yb concentration up to the full substitution of the Y ions in YAG single crystals are additional advantages. However, the Czochralski grown YAG: Yb single crystals usually have an inhomogeneous distribution of active impurities, which makes the laser beam quality worse and restricts the possibility for increasing the output power due to non-uniform thermal fields in the gain medium. Using YAG: Yb films instead as gain media for disk lasers manufactured by liquid phase epitaxy (LPE) has good prospects, because this technology allows the prodcution of homogeneous single crystalline epitaxial films with perfect structure and suitable thickness and composition.

Singe crystalline structures of doped with ytterbium ions (YAG) are created by the liquid phase epitaxy (LPE) technique on substrates of pure YAG and have the following parameters:
thickness of active medium, μm – up to 250
diameter of epitaxial structures, up to 76.2 mm
Yb concentration in relation to Y – 10…50 at %.
Yb3+ luminescence time, not less than 900 μs.

Innovative Aspect and Main Advantages

The main advantages of the active media on the base of thin film epitaxial structures of YAG doped with ytterbium in comparison with bulk single crystals grown by the Czochralski method are:
– higher structural perfection;
– absence of non-uniform mechanical stress;
– uniformity of active ion distribution in the active medium volume;
– higher thermo-mechanical resistance;
– cheapness of production.

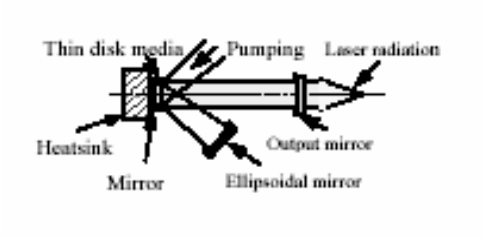

Fig. 1. Simplest scheme of thin disk laser

Fig. 2. Samples of YAG:Yb epitaxial films

Areas of Application

Multikilowatt-scale laser systems for both small- and large-scale materials processing applications, specifically welding of thin materials and use in conjunction with scanner optics for high-speed remote operation, robot-controlled scanner welding systems, etc.

Stage of Development

The fabrication technology for YAG:Yb films is well developed in its laboratory version.

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EXPERIMENTAL MODEL OF MOBILE RADIOMETER

Description

Radiometer provides simultaneous measuring and display of two parameters of ionizing radiation, as regards:
Neutron flux density (NFD);
Exposure dose rate of gamma-radiation (EDR).
Radiometer consists of:
Detecting unit, in which the fission chamber is used as a detector;
Portable measuring unit.

An experimental sample of the device was tested and received a certificate from the authorized Ukrainian state institution.

Our institute has the facilities to produce pilot device(s).

Innovative Aspects and Main Advantages

The inventors have not found any analogues for such a device.

A more detailed description of the proposed device can be found in the following articles:
Avgustov V. V., Ivanov I. V., Kuchmagra A. A. et al. Extension of detecting units network of systems for monitoring fuel-containing materials at the "Shelter" Object// Problems of Chernobyl. – Iss. 8. –2001. -P. 96-98
Ivanov I. V., Venediktov V. M., Kuchmagra A. A., Odinokin G. I. Development and production of portable instrumentation for investigation of access routes to fuel-containing materials // Problems of Chernobyl.– Iss. 9.– 2002 -P. 148 - 154.

Equipment capability

Value being measured ……. NFD and EDR

Detector type …… KNT31-1 (ionizing fission chamber)
NFD range, neutrons/cm^2·s ….. from 10 to 1·10^4
EDR range, R/h ……... from 50 to 1·10^4
Time for measurement, s ……..... 10
Power supply (self-powered), V …… . 12
Operation time, h ……... not less than 6
Weight of device, kg …….. 3.5

Areas of Application

Registration of fissionable nuclear material, tool monitoring of fuel assembly burn-up.
Operative diagnostics of capability of information-measuring channels of nuclear power plant monitoring system.
Extension and increase of self-descriptiveness of existing nuclear power plant monitoring systems.

Stage of Development

An experimental sample of the device has been created.
This device was tested on the Shelter facility at on the Chernobyl nuclear power plant.
We have potential customer for our product and we are looking for investment ($40,000) to start the production stage.

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SENSORS

PASSIVE RADIO WAVE SYSTEM FOR HIDDEN WEAPON DETECTION

Description

The development of a passive radio wave system for detection of hidden weapons underneath clothes is the main objective of the project. Receiving matrices together with the quasioptics systems will be located along the walls of a corridor, to form the image of persons which pass by a corridor. Accompaniment of the person and automatic focusing on him will be carried out by a computer.

The computer will also identify a hidden weapon by comparative information from the specific person with its own database of the weapon's image.

The main technical task of the project is to create a highly sensitive matrix. Two matrices will be developed in 8 mm and 3 mm ranges of waves, taking advantages of each of these ranges.

Preliminary tests showed that metallic objects could be identified by using the proposed method (see pictures on the right).

Innovative Aspects and Main Advantages

There are no industrial samples of such a system in the world at present.
The proposed system has a similar sensitivity level to an existing experimental sample produced by TRW. But our system is much cheaper.
Other experimental sample was produced by Furan. This sample is not adapted for inspection of the hidden weapon underneath clothes specifically for passenger traffic at airports.
The proposed system was designed specifically as a security application.

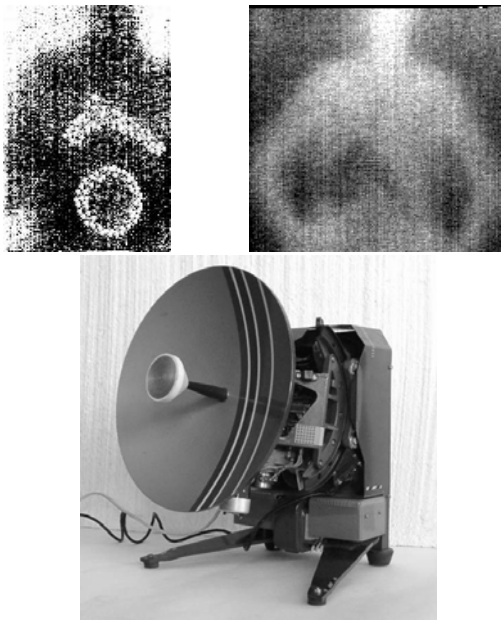

Fig. 1 Man body with hidden weapon
Fig.2 Receiving matrix.

Areas of Application

Inspection of passengers directly in the traffic flow of check points (airports, seaport, railway stations, etc.)
Veiled inspection of suspicious persons in the event of crowded events (concerts, football matches etc.).

Stage of Development

The inventors has created and tested the prototype of the system.

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SENSORS

EQUIPMENT AND DEVICES FOR DATAWARE OF BLIND PEOPLE

Description

Equipment and devices for providing information for blind people is proposed. The producer has designed and started to produce a specialized printer of Braille (see picture on the right).

The nomenclature of the devices for dataware of blind people also includes: four-band recorder for reading "talking" books, recorder for copying "talking" books, magnifier of text on TV screen, etc.
The hardware is supported by the corresponding software. In particular, the producer delivers "A talking library of 20,000 books" and "AWR" software for recording and editing digital originals of talking books to the companies and organizations of the Ukrainian Society of Blind People.

Innovative Aspect and Main Advantages

The producer is only one supplier of such type of product in Ukraine.

To provide the declared quality of the goods, the producer has invented a number of new elements. For example, "Virtual synthesizer of the Ukrainian language" software was created. Another example of the innovative element is the tactile indication for each of the four bands for a radio recorder. Proposed products are equipped with these items.

The producer provides services to maintain and to repair its products. The producer also has R&D facilities to modernize the existing product to customer requirements.

Areas of Application

The proposed product is used for Braille publishing industry. It also is used as equipment in specialized classes in schools for blind pupils, as well as devices for other blind people.

Stage of Development

The products are already on the Ukrainian market. The key elements of the proposed product were patented in Ukraine and Russia as an invention, or utility model, or production piece.

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SENSORS

RADIACTIVE AEROSOL EXPRESS ANALYZER

Description

A device for express analysis of the radioactive aerosols was created. The device consists of two parts: a) sampler and b) measuring instrument. The main parameters of the device are listed on the right side.

For sampler function, virtual impaction and "filter pack" are used, which allows for separate elimination of the main deficiencies of each of them. Measuring apparatus uses a set of coupled alpha- and beta-detectors with quasi-run out schemes, which enable to expressively obtain measurement results.

An experimental sample of the device was tested and received a certificate from an authorized Ukrainian state institution.
Our institute has the facilities for annual production of 2 – 3 of such devices.

Innovative Aspects and Main Advantages

The inventors didn't find any analogues of this device.

Two Ukrainian declaration patents confirm the priority for IPR, namely:
1. Declaration pat. 64309 A Ukraine, MKI 7 G01T7/04 - Device for clear evaluation of radioactive aerosols. Authors: O.O. Klyuchnykov, O.E. Melenevskiy, V.P. Badovskiy, et al. Published 16.02.2004.
2. Declaration pat. 63441 A Ukraine, MKI 7 G01T7/04 Method for clear evaluation of radioactive aerosols / O.O. Klyuchnykov, O.E. Melenevskiy, V.P. Badovskiy, et al.
Published on 15.01.2004.

Equipment capability

Minimally measured volumetric concentration of radioactive aerosols Bq/m^3:
Summary alpha-activity0,002
Summary beta-activity 0.1
Limits of measurement's relative error (P=0.95), not less %: 60
Aerosol distribution ranges according to aerodynamic diameters:
above 2.0 mkm;
from 0.6 to 2.0 mkm;
less than 0.6 mkm.
Specified volume of analyzed air m^3/min:
- from 2.6 to 3.0.
Maximum volume of air analyzed sample, m^3:

Summary power, kWt: - not more than 3.5.

Areas of Application

Radiation safety under operation of nuclear power engineering facilities.

Stage of Development

An experimental sample of the device was created.
This device was tested on the Shelter facility at the Chernobyl power plant.
We have a potential customer for our product and we are looking for an investment ($60,000) to produce the pilot facility.

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CONSUMER GOODS FOR BLIND PEOPLE

Description

A wide range of consumer goods for blind people is proposed. The range includes but is not limited to: mechanical "talking" watch, alarm clock, chess, Braille checkers and dominoes.

The range of the goods for blind people also includes medical devices, e.g.: "talking" scales (see picture on the bottom); "talking" tonometer (see picture on the right); etc.

Innovative Aspect and Main Advantages

The producer is the only supplier of such types of product in Ukraine. It has a multi-year history for improving its product up to the requirements of blind people. After step-by-step modernization of the products, they are: easy to use; blind people could easy learn the operation manual. Producer also has R&D facilities to modernize existing products to customer requirements.
The producer provides services to maintain and to repair its products.

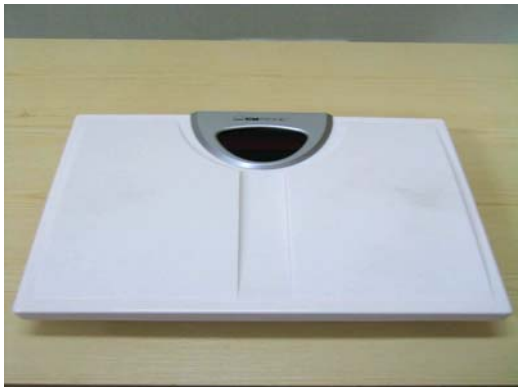

Fig.1 "Talking" scales

Fig.2 "Talking" tonometer.

Areas of Application

Proposed products are for use by blind people.

Stage of Development

The products are already on the Ukrainian market. The key elements of the proposed product were patented in Ukraine and Russia as an invention, or utility model, or production piece.

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SENSORS

COMPUTER HARDWARE FOR BLIND PEOPLE

Description

A wide range of computer hardware for blind people is offered. The range includes but is not limited by: Braille keyboard, Braille display, licensed software of display verbal input, television text enlarger, Braille digital notebook outlet, etc. The products offered are the result of long-term R&D efforts (since 1992) and provide the possibility for normal professional activity by blind people.

For example, the Braille computer keyboard (see picture on the right) entirely substitutes standard 102-button keyboard. The new product provides an opportunity for blind workers to operate without assistance after a very short term of training.

In addition to the single elements listed above, the producer can deliver a workstation combined according to a customer's request. Such a work station can be used as a work place for blind lawyers; blind economists; blind editors of Braille's issue; blind sound producers etc.

Innovative Aspect and Main Advantages

The producer is only one supplier of this type of product in Ukraine. It has multi-year history of improving its products up to the requirements of blind people. After step-by-step modernization of the products, they are: easy to use; blind people could easily learn the operating manual. The producer provides a turnkey set up, maintains and repairs its product. The producer also has R&D facilities to modernize existing products up to customer requirements.

To provide the declared quality of the goods, the producer has invented a number of new things (e.g. materials with effect of memory shape for Braille display) and equipped products with these new elements.

Areas of Application

The proposed product could be used:

a) for equipment of work places in specialized companies with blind employees;

b) as simulator for blind employee training;

c) for equipping specialized classes in schools for blind pupils.

Stage of Development

The products are already on the Ukrainian market.

The key elements of proposed product were patented in Ukraine and Russia as an invention, or utility model, or production piece.

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SENSORS

HIGH EFFICIENT ANALYZER ON THE BASE OF LIQUID CHROMATOGRAPH

Description

A specific analyzer for identification of explosives, narcotics and poisonous substances has been created. It also can be used for determining the nature of contamination in man-made catastrophes, etc.
The new device is based on standard hardware – liquid chromatograph of Milichrom A-02 type. Analyzer general view is on the fig. 1.
Specialized software and the database of the main types of investigated chemicals have been created. This "fixture" provides high accuracy quantitative and qualitative analysis without using standard samples. The analyzer works in automatic mode. The example of the measured "spikes" from investigated explosives is shown on fig. 2.
Created database VEZHX-UF allows control of the chromatograph's main parameters during the measurement process.
The device received a certificate from the authorized Ukrainian state committee.

Similar devices already are used by:
Expert-criminal center of the police department of Kyiv region, Ukraine;
Expert criminal center of the Russian police;
East-Siberian regional customs laboratory, Russia;
Other regional technical departments in Russia and Ukraine.

Innovative Aspect and Main Advantages

The following parameters of the created device have no analogues on the world market:
It price is lower by 2 – 2.5 times;
Maintenance charges are 20 times lower;
Because of its light weight (17 kg) and small size it can be used in mobile laboratories.

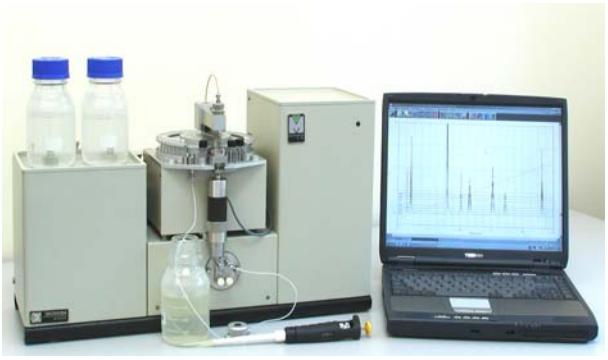

Fig.1 Analyser general view

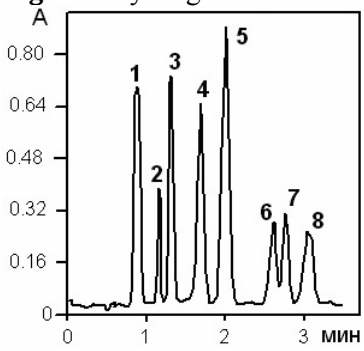

Fig. 2 Identification of the different types of explosives by using the proposed analyzer, e.g. 2 – cyclonite; 5 – TNT; and etc.

Areas of Application

The proposed analyzer can be used by technical departments of: a) the police; b) customs; c) frontier troops and other similar federal agencies.

Stage of Development

The product is already on the FSU market.
We are looking for partners in Europe and North America to promote our product.

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SENSORS

PORTABLE RADIO-METAL LOCATOR

Description

A portable radio-metal detector is offered. Its general view is shown on the right side. Detector sizes are 300*70*40 mm. Its weight is 0.33 kg. Power supply system is battery (9V).
Detector can work at:
ambient temperature from – 15^0 to 45^0 C;
relative humidity is up 98% at 25^0 C;
atmospheric pressure is from 630 to 800 millimeters of mercury.
The maximum distance for detection of the metal pieces is:
Single coin – 4 cm;
Pistol – 20 cm;
Hatch of the sewage well – 50 cm.
The device can be modernized according to specific client requirements.

Innovative Aspects and Main Advantages

The proposed device has the following main advantages compared with its analogues:

Lower price.
Simple structure, easy maintenance.
Two independent channels for detection of colour and ferromagnetic metals.

Areas of Application

Detector can be used in the following areas:

In the police; custom and security divisions for contraband detection; luggage inspection and premises examination.
In military medicine for bullet and debris localization.
In the construction industry for identification the places of reinforcement bars in concrete, etc.

Stage of Development

Pilot batch of the devices has been produced and was tested by the State Customs Service of Ukraine.
The product is being prepared for the mass production stage.
We are looking for partners for product promotion on the world market.

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TECHNOLOGY FOR EARLY DIAGNOSIS OF MALIGNANT TUMORS IN HUMANS

Description

There are 160,000 new cases of cancer in Ukraine each year. About 40% of patients die within one year after the cancer was detected, first and foremost, because of the late diagnosis.
A team of leading Ukrainian oncologists and computer engineers have been conducting scientific research and development of a Screening method for Early diagnostics of Malignant Tumors in Humans. As a result of their fifteen year long research a new technology, ONCOTEST-2, has been developed (fig. 1).
ONCOTEST-2 Technology is a biochemical method based on identification in the human blood of Calcium-Protein complexes which, according to the concept of the inventors, are "shed" into the blood at the initial stage of malignant transformation of cells, regardless of their histology structure or localization.
Oncotest-WM01 is telemedicine complex for automation of management of cancer screening on method Oncotest-2 (fig.2). At the present time, the client part of the telemedicine complex has been designed. The Client Oncotest-WM01 has at the input spectrophotograme, except for the database of patients and has a built-in module for working with the central server.

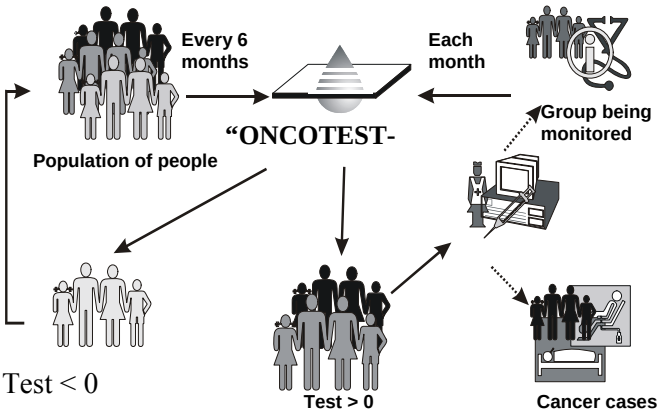

Fig. 1 General scheme for ONCOTEST

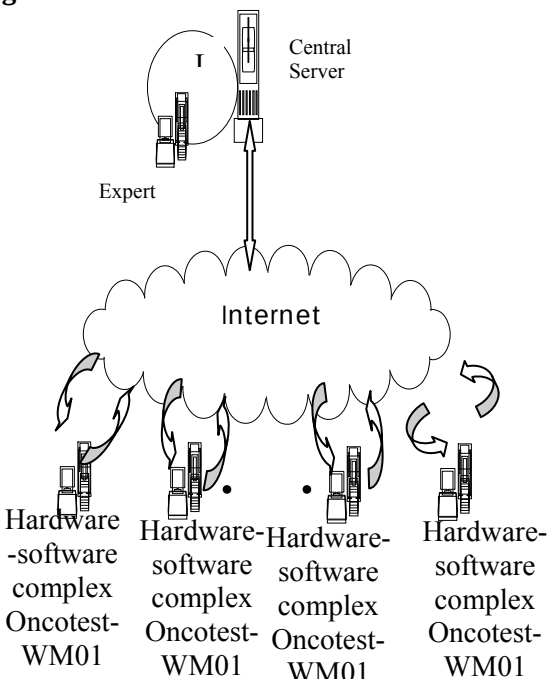

Fig.2. ONCOTEST network

Innovative Aspect and Main Advantages

Numerous clinical trials in Ukraine demonstrated consistently the high specificity and sensitivity of the ONCOTEST-2 (80-90%).
According to the last improving ONCOTEST technology the patients' blood serum should be used as test material. Three reagents should be added to the serum, one after each other, in 10 minute intervals.
After that it is put under daylight for an hour. The result is identified photometrically.

Areas of Application

Hospitals, insurance companies etc.

Stage of Development

Laboratory test are finished, the system is ready for field tests.

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CAVITATIONAL HYDRO-VIBRATOR

Description

A hydro-vibrator (fig. 1) is used for applying extra high-frequency dynamic loads to the rock-cutting tool of the drill device. The hydro-vibrator is designed using the unique concept of transformation of the stationary flow of the drilling mud in the pulsating flow. A part of energy of the drilling mud is used to do it (fig. 2). This causes longitudinal vibratory accelerations on the rock-cutting tool in the reciprocating motion of the drill device.

Its performance features are as follows:

- 36-250 mm diameter of hole drilling;
- Hole depth up to 4.000 m;
- 100 – 10 000 Hz frequency of the longitudinal vibration accelerations on the rock-cutting tool;
- 50 - 15 000 g range for impacts of vibratory accelerations of the drilling tool;
- Total length of the hydro-vibrator: no more than 1.2m.

We are seeking partners to start the production stage.

Innovative Aspect and Main Advantages

In comparison with existing analogues the hydro-vibrator differs as follows:

- No movable parts and springs, resulting in simplification of its design;
- Significant improvement of the drill device's reliability;
- Vibratory-rotary drilling long holes can be used;
- Drilling depth-based control is not needed;
- It is convenient in operation;
- The drilling speed and wear resistance of the drilling tool increase by more than double;
- Percentage of the drilling core increases in fissured-rock drilling.

Fig. 1 General view

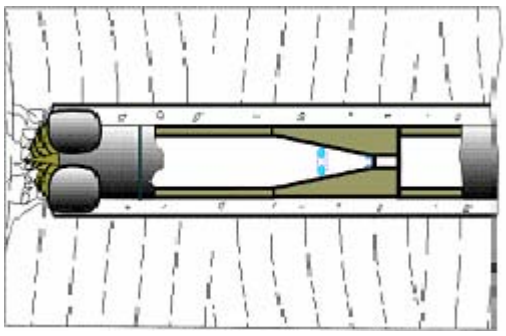

Fig.2 The scheme of vibrator

Areas of Application

Improvement of core and coreless hole drilling in intermediate and hard rock.

Stage of Development

Prototype has been created and passed the field tests.

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AERIAL APPARATUS MBA

Description

Apparatus has suspension, which enables its use both on the back and waist.
Little mass and sizes, simplicity of construction of MBA increase the sphere of apparatus use, as it can be used while carrying out different types of short-term and easy works during the examination of equipment, getting rid of gas and harmful liquid spills.
Existence of both a visual and sound control of the air remainder in a vessel increase the safety of apparatus use in emergency situations.

Modification	MBA -2-20	MBA -2-30	MBA -4-20	MBA -4-30	MBA -4.5-30
Volume, dm³	2	2	4	4	4.5
Working pressure, mPa	20	30	20	30	30
Breathing time, min	12	18	24	36	40
Overall dimensions, mm	450-220-170	450-220-170	700-220-170	700-220-170	500-220-175
Mass, kg	5.6	5.4	7.2	6.8	8.2

Innovative Aspect and Main Advantages

Lightweight and small, simplicity of construction of MBA increase the sphere of apparatus use. It can be used while carrying out different types of short-term and easy works during examination of equipment and getting rid of gas and harmful liquid spills.

Areas of Application

Aerial apparatus MBA is intended for the protection of respiratory organs from being affected by a highly toxic gas environment during rescuing and technical works being carried out at chemical, oil, gas, municipal and other types of facilities at enterprises.

Stage of Development

Already on the market.
Commercialized.

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UNIVERSAL ISOLATING GAS-MASK UIP-50

Description

Universal isolating gas-mask UIP-50 is intended for the protection of respiratory organs from any kind of gaseous harmful atmosphere.

UIP-50 is a mask with an intercommunication system. In order to switch it on automatically, there is a starting device, providing the fulfillment of the breathing bag with oxygen during it being switched on. UIP-50 can be used at temperature from –10 up to 40 °C.

UIP-50 with chemically bound oxygen belongs to apparatuses with economic use of oxygen. As it consists of a relative piece, the actual period of the protection time of the action apparatus contains at least 300 minutes.

There is a training modification of the UIP-50 (which can be used many times) for personnel carrying out UIP-50 gas-mask skills teaching.

Breathing time, min – 50

Overall dimensions, mm – 220×250×140

Mass, kg – 4.0

Service life, years – 7.5

Innovative Aspect and Main Advantages

UIP-50 is easy to service and use. There is the possibility of changing the used cartridge, which decreases expenses of use during the use of breathing apparatuses.

Areas of Application

UIP-50 can be used in the coal, metallurgy and chemical industries, during the liquidation of accidents in the metro and municipal economy. GAS-masks are created for daily wearing during the working shift, group storage in posts of switching on exit routes from a dangerous zone.

Stage of Development

Already on the market.
Commercialized.

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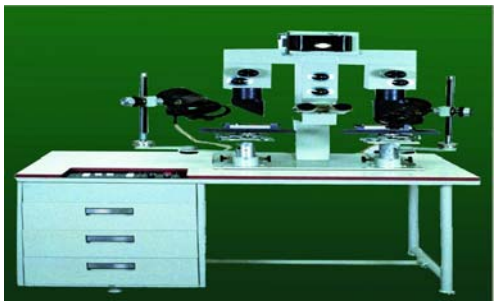
TWIN MICROSCOPE MP-1

Description

It is designed for reflection viewing and photography of two objects for comparison, which are simultaneously or separately visible in the field of view. The microscope is used in forensic medicine and for research purposes.



Smooth step-wise magnification, fold
from 2,7 to 70
Linear FOV in object plane, not less than:
2.7 X magnification 50
70 X magnification 2
Resolution in FOV center:
at 50X magnification, mm^{-1}, not less than:
for viewing 160
for photography 120
Range between axis of projecting systems, mm 330±2
Illumination in 50mm diameter FOV, mm, lx, not less than 10000
Films dimensions in the film-holder, cm 9x13; 9x12
Reel photographic film dimension in the film-holder cm 6 x 81.5
Exposition time, sec from 0.5 to 999
Power consumption, W, not more than 500
Microscope's overall dimensions in the operating position (length x width x height), mm, not more than 1008 x 640 x 1525
Microscope weight, kg, not more than 165.

Innovative Aspect and Main Advantages

It is possible to connect the microscope to a camera.

Areas of Application

The microscope is used in forensic medicine and for research purposes.

Stage of Development

Already on the market.

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INDUSTRIAL TECHNOLOGIES

EQUIPMENT SET FOR CARRYING OUT INSULATION OPERATIONS IN COAL MINES

Description

The equipment set guarantees erection of insulating and explosion-stable stopping, other insulating constructions (rib-side packs, "jackets") by the hydro-mechanical method in coal mines, as well filling of domes and packing of voids behind the supports of mine workings.
Capacity on mortar – up to 9.0 m^3/h.
Maximum discharge pressure – 1.0 MPa.
Maximum length of the mortar line during horizontal feed: that one of the cement-ash mortars – 200 m, that one of the gypsum binding agent – 50 m.
Mass – not more than 600 kg.

Innovations Aspect and Main Advantages

The development of the equipment and technology guaranteeing erection of insulating and explosion-stable stopping, other insulating and explosion-stable constructions (rib-ride packs, "jackets") by the hydro-mechanical method in coal mines, as well filling of domes and packing of voids behind the supports of the mine workings with the use of the materials that contain additives from industrial waste of regional enterprises, enables the quality of constructions to be improved, to reduce the cost and labour-intensiveness of insulating operations that will be carried out in the working and dismantling of mines.

Equipment set for carrying-out insulating operations in coal mines

Areas of Application

Mining industry and mine-rescue sub-units.

Stage of Development

The development is protected by patent of the Ukraine UA 55805, B28C 5/14, 2006.

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COMPLEX OF AUTONOMOUS MOBILE MODULES WHICH CAN BE QUICKLY ERECTED

Description

The complex of autonomous mobile modules which can be quickly erected was developed and produced on the order of the Ministry of Emergency Situations of Ukraine. It is used as a mobile hospital.
The complex consists of pneumo-frame rubber-textile modules and a life support system, which consist of the following elements:
-heating and inflation system;
-energy supply system;
-lighting and electrical distribution system;
-airlock system;
-furniture set;
-hot and cold water supply system.
The complex operates continuously under the following climatic conditions:
-environmental air temperature, °C + 50…-40
-temperature in the working rooms of the modules at an external environmental temperature of – 40 °C, °C not less than 17
-relative humidity at an environmental temperature of 25 °C, % up to 100
-atmospheric air pressure, mm of the mercury column 525…800
-wind velocity, m/sec up to 15
-type of the surface sandy, stony, clay soil, snow cover, moorland precipitation dew, rain, snow, hail.
The modules can have two types and sizes of building elements, m:
9.26 x 4.75 x 2.75 and 5.6 x 4.75 x 2.75
Territory occupied by the complex, m^2 1300
Useful square, m^2 365
Mass of the complex in the transport position, kg 3,700
The complex of the mobile modules is ready to receive victims for aid in 60 minutes after arrival at the operation site.

Innovative Aspect and Main Advantages

The modules are significantly smaller than the corresponding foreign analogues. The calorific power of the heating system is 20-30 % higher than that one of the analogous Swedish and American installations. The modules are made of rubberized textile that is more durable than the plastic one, which the Hungarian and French modules are made from.

Areas of Application

The complex of the autonomous mobile modules is used to create normal sanitary-and-hygienic conditions by rendering efficient medical help to the victims and by them being prepared for evacuation in stationary medical institutions in cases of emergencies, catastrophes, spontaneous disasters in various climatic regions, in places which are difficult to access or removed from stationary medical institutions. In addition, the separate modules can be used during the carrying out of emergency operations under field conditions to guarantee normal conditions for stay of the workers.

Stage of Development

The paperwork was developed and the complex of the modules was serially produced for the Ministry of Emergency Situations of Ukraine. The complex took part in getting rid of the effects of earthquakes in Turkey, India, Iran and Pakistan. It was used in Ukraine to give assistance to victims who suffered from flooding in the Transcarpathian region, too.

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INDUSTRIAL TECHNOLOGIES

MULTIPURPOSE FIRE-EXTINGUISHING DRY POWDER

Description

The multipurpose fire-extinguishing dry powder has high fluidity from the fire-fighting technical means (0.36-0.41 kg/s), increased vibration- (92-99 %) and heat resistance at a temperature from minus 50 ºC up to plus 70 ºC (92-98 %).

Innovative Aspect and Main Advantages

Addition of the inert hydrophobic dust to the composition of fire-extinguishing dry powder increases the fire-fighting ability of the powder and simplifies the process of production in comparison with the use of other additives that must be crumbled up preliminarily. Addition of the waste of the fire-resistant materials improves the operating features of the fire-extinguishing powder viz.: fluidity, vibration- and heat resistance at a temperature up to 70 ºC.
The multipurpose fire-extinguishing powder can be produced by industrial enterprises using standard equipment.

Areas of Application

The powder is intended to fight fires involving solid and smoldering materials, light inflammable fluids, combustible gases and electrical equipment energized up to 1140 V.

Stage of Development

The development is protected by patent of the Ukraine UA 75417, A62D 1/00, 2006.

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INDUSTRIAL TECHNOLOGIES

PORTABLE DIGITAL X-RAY TELEVISION SYSTEM

Description

The portable digital x-ray television system **is** destined for professional distribution in order to detect contraband, search for suspicious (forsaken) objects in populated places and to find objects in elements of building constructions and of transportation facilities, too.

COMPONENTS OF SYSTEM:
unit of x-ray emitter (renewable, for 100, 150 and 200 kV);
unit of x-ray conversion;
the control and image processing unit
The coupling of inter blocks is accomplished by a flexible cable which is up to 50 meter long. All components and the cable are packed up into suitcases during transportation.

FEATURES:
The control of objects is under non-stationary conditions.

Innovative Aspect and Main Advantages

The proposed development has the following advantages in comparison with analogues:

- cheaper;
- possibility to carry out the identification of substances of an organic and non-organic origin.

Areas of Application

Potential users of the proposed development may be:
Customs Service of the Ukraine;
Services of the Ministry of Internal Affairs;
Security Service of the Ukraine;
Services for safeguarding aviation security;
Frontier Service of the Ukraine.

Stage of Development

The pre-production model of the system has been created, the software is developed.
The developer is looking for partners in the making of small-sized x-ray radiation sources for voltage 100, 150 and 200 kV and small-sized x-ray detectors.

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PORTABLE X-RAY DEVICE OF DELTA TYPE

Description

The proposed device is a portable facility for express analysis of luggage for the presence of illegal objects. The device allows objects to be inspected without them being opened.
The main performance attributes:

Irradiator
Tube voltage … 50 keV;
Anode current … 7 mA;
Irradiation type … steady;
Exposition time … less than 5 sec;
Irradiator size … 240x200x160 mm;

Receiver and processing block
The square of the screen … 150x100 mm or 300x200 mm;
CPU … Pentium III and higher;
RAM … not less than 64 MB;
LCD … not less than 13''
HDD … not less than 1GB;
Receiver size … 145x166x460 mm
Transit pack size … 400x310x380 mm.
Distance from irradiator … 50 m
Radiation shielding … lead 2 mm
The device has a medical certificate for safe operation.
We are seeking partners for distributing the device on the European market.

Innovative Aspect and Main Advantages

The main advantage of this mobile device is the ability to identify small, even shielded objects.
For example, the minimum diameter of the shielded steel wire, which can be identified, is in the table below.

Wire is covered by	Processing	
	Computer	Manual
2 mm of Al	0.06	0.1
25 mm of plywood	0.12	0.16
20 mm of paper	0.12	0.16
45 mm of pine-wood	0.08	0.12

Fig. 1 General view of the device

Areas of Application

The device can be used for inspection of:
Luggage,
Light constructions;
Furniture;
Souvenirs, etc.
For the presence of explosives; weapon and electronic devices.

Stage of Development

The device is already on the market.

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INDUSTRIAL TECHNOLOGIES

ELECTROHYDRAULIC TECHNOLOGY USED FOR PROTECTING INSTALLATIONS FROM WATER

Description

An alternative application of dischargeimpulse technology is anti-terrorist protection. Shock waves, if generated with a high on-off time ratio, are able to prevent unauthorized entry to a guarded installation from water. The general layout is shown in the figure.

A guarded installation is covered with a set of electrodes connected via cables to a powerful source of electrical impulses. A randomizer output signal activates the control system of the powerful electric impulse source, and causes both random electrode activation and random time of protection response, which makes it impossible to resist the impulse-generating unit and the impulses themsleves.

Innovative Aspect and Main Advantages

The innovative techniques suggested make up part of the defensive measures based on electro hydraulics: safe, inexpensive, efficient, and eco-friendly, enabling multiple and repeated operation.

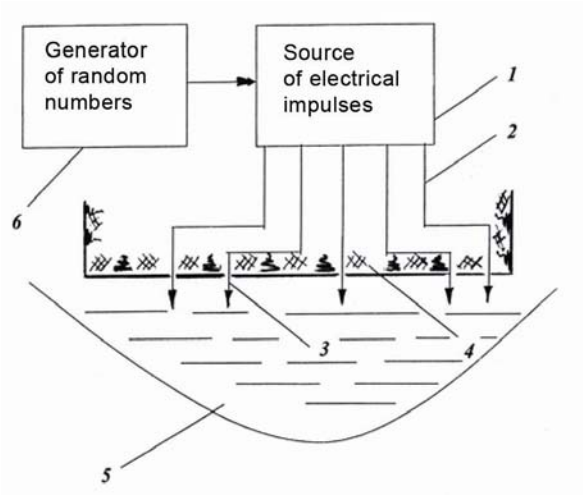

Fig. Protection of an object from the side of water area

Areas of Application

State and private security facilities, Security Service of Ukraine.

Stage of Development

Prototype tested, the inventor is searching for partners in order to complete it.

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SPHERICAL OPTICS: CONVEXO-PLANE, CONCAVO-CONCAVE AND CONVEXO-CONVEX LENSES, PLANO-CONCAVE, NEGATIVE AND POSITIVE MENISCUS LENSES

Description

The enterprise harnesses machining technologies for spherical optical parts, prisms, mirrors, including the application of multi-coated layers (both physical and chemical).

Optical parts are coated with anti-reflection layers featuring high strength characteristics and a residual reflection factor of 0.2-0.5% .

Lens diameters range, mm 4÷250
Accuracy of reproduction of the specified geometry of actuating surfaces, μ, not over 0.025
Refraction factors 1.47÷1,8
Alignment of optical and geometric axis, μ, not over 10
Two- or three-layer anti-reflection coatings.

Areas of Application

Stage of Development

Already on the market.

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REPRODUCTION MACHINE REUS-1

Description

It is designed for reproducing textual, graphic and half-tone images in reflected and transmitted light, and photography using IR or UV radiation.

Film size, mm, not less than	24 x 36
Max. object dimensions, mm	648 x 432
Image scale range	1:18 ÷ 1:9
Exposures setting range, sec	0,1 ÷999
Discharging created by vacuum pump, mmH_2O	900
Supply voltage from single-phase 50 Hz alternate current	(220±22) V
Overall dimensions, mm	500x810x2200
Weight, kg	350

Innovative Aspect and Main Advantages

Universal work place of the operator with compact arrangement of equipment for photographing almost all material evidence.

Areas of Application

The device is used in forensic medicine and technical photography and restoration work.

Stage of Development

Already on the market.

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INDUSTRIAL TECHNOLOGIES

PNEUMATIC VIBRATORY-DAMPING DRIVER SEAT

Description

Pneumatic vibration-damping system with quasi-zero rigidity for transportation facilities driver seat is proposed (fig. 1).

The maximum natural frequency of the seat vibrations does not exceed about 1.0 Hz, and the maximum amplification factor at a resonance vibration frequency does not exceed 1.5 Hz, resulting in lower permissible standards.

The low price and high operational quality of driver seat with the pneumatic vibration-protection module enables this module to be recommended for different applications.

We are seeking partners to start the production stage.

We are ready to modify the existing technical solution up to the customer needs.

We are open to different types of cooperation, including JV creation, licensing, etc.

Innovative Aspect and Main Advantages

A self-contained pneumatic vibration-protection module for multi-purpose transport vehicles driver seat allows the driver's reaction to vibrations to be decreased about 3 times in comparison with the best analogues in the world.

Fig. 1 General view

Areas of Application

The proposed module can be used in the driver seat for various transport vehicles: trucks, buses, tractors, trolleybuses, etc.

Stage of Development

Prototype has been created and passed the field tests.

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REPRODUCTION MACHINE REPROFOT – M

Description

It is designed for reproducing textual, graphic and half-tone images in reflected and transmitted light, and photography in stationary laboratories. It consists of an object stage with an illumination field, post with a rigidly mounted camera, floodlight projectors with luminescent lamps, ring illuminator, micro-illuminators.

Film size, mm, not less than	24 x 36
Max. object dimensions, mm	648 x 432
Image scale range	1:18 ÷ 1:9
Illumination field size, mm	650x360x100
Overall dimensions mm, not more than	980x710x1400
Power Supply	220 B, 50 Hz
Weight, kg, not more than	80

Innovative Aspect and Main Advantages

Compactness and usabilit.

Areas of Application

The device is used in forensic medicine and technical photography.

Stage of Development

Already on the market.

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COMBINED MEDICINAL AGENTS (PHYTOSILICS) ON THE BASIS OF HIGHLY DISPERSE SILICA SILICS AND HIGHLY DISPERSED MEDICINAL PLANTS

Description

Phytosilics is a novel class of medicinal agents consisting of comminuted native medicinal plants or extracts from medicinal plants adsorbed on highly disperse silica Silics. They are individual medicines of a targeted therapeutic action. Their medicinal forms are tablets, powders, capsules.

Innovative Aspect and Main Advantages

One of the principal assets of Phytosilics preparations is due to their ability to detoxify an organism in conjunction with the therapeutic effects of medicinal plants and adjuvants. Besides, they are notable for the possibility of a practically unlimited extension of therapeutic action through creation of diverse combinations of medicinal plants and various medicines.
Application of Phytosilics will make it possible to reduce the import of expensive preparations and, at the same time, to increase effectiveness of treatment of patients.

Areas of Application

Phytosilics can be effectively employed for treatment of various diseases with due account of administration of a specific medicine of a targeted action, which provides for increasing of bio-availability of the medicinal preparation, for detoxification of a person's body, for enhancement of therapeutic action, and for prolongating the curative effect of the preparation's constituents.

Stage of Development

Tested, available for demonstration – field tested.

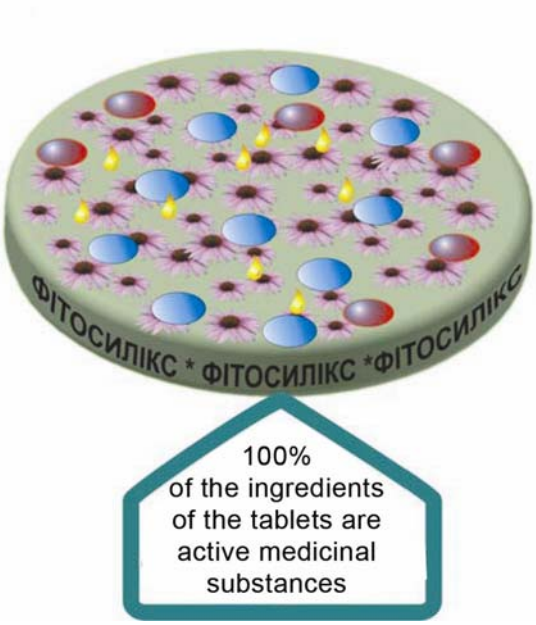

Fig.1. Combined medicinal agents Phytosilics

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TECHNOLOGY FOR WATER PURIFICATION

Description

Among the most potent contaminants of natural waters are petroleum products. Crude petroleum, mazut, heavy diesel fuel, lubricating oils all find their way into water during the ever-intensifying processes of production of petroleum, its refining, transportation, and consumption. It is appropriate to mention here that 1 litre of petroleum is capable of taking out 1 million litres of water from the potable water balance.

Fig. 1. Sorbents for purification of water

Innovative Aspect and Main Advantages

The Institute of Surface Chemistry of the National Academy of Sciences of Ukraine has developed, tested, and introduced into practice a hydrophobic fibrous sorbent on the basis of environmentally benign inorganic materials treated with compounds which impart to this sorbent an enhanced ability to absorb hydrocarbons.
The petroleum-absorbing material advanced is distinguished for its high absorbing capacity (more than 50 grams of petroleum products per gram of the sorbent). The sorbent is not wetted by water, does not sink; its density takes a value in the interval 25–36 kg m^{-3}. The sorbent can be wrung out and used repeatedly. An insignificant decrease in its absorbing capacity is observed only after a threefold wring.

Areas of Application

Handling the sorbent does not require any special training of personnel. The technology of its usage, recovery, and use is rather simple. The Ministry of Public Health of Ukraine has approved application of the sorbent as an agent to purify water basins, soil, any solid surfaces from petroleum products. The sorbent has been patented in Ukraine.

Stage of Development

Already on the market.

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INDUCTION STOVE "FEYA"

Description

It is intended for cooking and is used in laboratories for quick heating of precise doses of liquid.
It differs from electric and gas stoves due to its high heating rate, economy, inertia-free operation, improved safety in operation, smooth control, temperature security.
It is used with crockery which has a flat 100-220 mm diameter bottom made of iron, cast iron, stainless steel.

Supply voltage	220; 50
Maximum heating power, V	1200
Maximum heating temperature, ^{0}C	220
Overall dimensions, mm	392x320x100
Stove weight, kg, not more than	6
Weight of crockery being heated, kg, not more than	10

Innovative Aspects and Main Advantages

High heating rate, economy, inertia-free operation, improved safety in operation, smooth control.

Areas of Application

It is used in private and in laboratories.

Stage of Development

Already on the market.

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DEVELOPMENT OF EXPLOSION SAFETY ALLOY ON A COPPER BASIS AND TECHNOLOGY OF RECEIPT FROM IT OF POURED PURVEYANCES OF A METALWORK INSTRUMENT

Description

It is proposed to develop a new casting explosion safety alloy and technology of its receipt, instead of beryllium bronze, for making of a poured explosion safety instrument (ESI) and details of the technological rigging, which are used for production of works in explosive productions, where on the terms of technological process or the explosive mixtures of combustible gases or steams of all categories and groups of inflammability on classification of «Rule of arrangement of electrical engineering» can appear as a result of failure.

Today in Ukraine, on the basis of patent № 38127, beryllium bronze is a basic alloy on a copper base, which is used for ESI production and technological rigging. The ESI quality corresponds to regulation TC U NN 21624785.001 – 004. Melting and pouring of this bronze is carried out with the obligatory cleaning of stove gases from connections of beryllium, whose sanitary norms behave to the 1-mu class of danger (LDC equals 0.0001). Preliminary research showed that in total maintenance of titan and magnesium no more than 6% in an alloy on the basis of copper the absence of sparkling at the shock friktsionnom contact is provided. Durability at the tension of such alloys is 1500 MPa, and hardness is 4700 MPa on Brinellyu, that is, the value of mechanical properties of a new alloy compared with the mechanical properties of rental from beryllium bronze. Chosen as an object of research of a new casting explosion safety alloy not containing beryllium in the composition, it is conditioned by the requirement of improving the ecology of casting productions and large demand ESI on the market, ESI consumption will be 50 tonnes a year, which in the price index of purchase of instrument makes 150 million hryvnyas.

Innovative Aspect and Main Advantages

The use of research results will allow a reduction in the prime cost of ESI received by 2-4 times, to remove pollution of the environment by beryllium and substantially improve the terms of production of casting.

Fig. 1. Metalwork instrument from the new explosion safety alloy.

Areas of Application

Making of the poured explosion safety instrument and technological rigging from a non-sparkling and non-magnetic alloy.

Stage of Development

A conceptual stage on pre-election of the base system of alloying a new explosion safety casting alloy on a copper basis is carried out through personal funds.

Laboratory technology of smelting of a new alloy and technology of making experimental standards of an alloy is developed.

It is planned to conduct optimization of the composition and modes of heat treatment of a new casting explosion safety alloy, taking into account the certification tests of alloy on explosion safety, and to develop technology for making from a new alloy the poured purveyances of a metalwork instrument.

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INDUSTRIAL TECHNOLOGIES

DISCHARGE-IMPULSE TECHNOLOGY FOR BACTERIAL DECONTAMINATION OF WATER

Description

At present, the wide introduction of new advanced technologies is as urgent as never before; in addition to high efficiency and safety, they are to be energy-saving and eco-friendly.
Electro-hydraulic technology finds an ever-widening application in various industries, based on the use of powerful electric discharge of capacitor storage in ion-conducting liquid, often in water. The process is accompanied by powerful impulse liquid flows with high pressure at the front and a number of other physical and chemical phenomena that use can be made of. It should be noted that applications of this technology can differ significantly, in particular industries (mining, metallurgy, chemistry, transport, power engineering, construction, public utilities).

The electro-hydraulic effect is accompanied by a wide range of physical and chemical phenomena that intensively kill bacteria in water. This fact has been proven in practice many times and has initiated the development of special-purpose electro-hydraulic installations for bacterial decontamination of water. These installations have a set of cycles and energy for water treatment in a dicharge chamber, and are able to provide standard water treatment, consuming electric energy at 0.2 kopecks per 1 m^3. Structurally, the installations can be used both for treatment of running water and stationary water sources, such as wells and boreholes. Water treatment in boreholes can help to increase the borehole discharge.

Innovative Aspect and Main Advantages

High efficient, eco-friendly technology. Unique technology so far not rivaled in Ukraine, with few rival technologies of lower quality in the world.

Areas of Application

Mining, metallurgy, power engineering, construction, environment, transport, public utilities.

Stage of Development

Products and patents available, the developer is searching for partners for completion of some developments.

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DISCHARGE-IMPULSE TECHNOLOGY IN DIAMOND MINING

Description

Discharge-impulse technology enables to efficiently disintegrate concrete and mineral structures to be dismantled, to demolish and perform secondary crushing of oversize rocks with any hardness. It should be noted that, in addition to its high efficiency, this technology is highly safe, since the discharge-impulse disintegration is not accompanied by emission of hazardous substances, runs smoothly, without flying rock, and involves no additional security precautions which are usually necessary with explosives. Therefore, the work can be, and is, carried out even at active worksites (for example, the YenaKyivsky Metallurgical Works).
Oversize rocks not fit for crushing have accumulated at many diamond-extracting sites. Explosives can never be used for crushing these oversize rocks, considering nearby industrial and residential structures. However, these oversize rocks can be efficiently and safely demolished at low costs with the electro-hydraulic effect.

Innovative Aspect and Main Advantages

Highly efficient, eco-friendly technology. Unique technology so far unrivaled in Ukraine.

Fig. Very hard rubble stone crushed by electro-hydraulic explosion

Areas of Application

Diamond mining.

Stage of Development

Installation and patents available, the developer is searching for partners for its commissioning.

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TARGETED ELECTRO-HYDRAULIC EFFECT: THE METHOD AND DEVICE

Description

There are technologies enabling us to focus on impact action, but they are practically unable to increase the impact power at any distant point. An "impulse" electro-hydraulic plant offers a beneficial opportunity of energy generation for such tasks.

Considering the wavelike behaviour of emission, a method is suggested to obtain directed wave (sound) pressure with the help of a lattice where discharge electrodes (DE) are placed in the nodes.

A device is proposed for generating directed sound (wave) pressure when DE are activated. The device consists of a lattice with nodes spaced at λ/2. The lattice is placed on a fixed dielectric plane. Similar DE are located in the nodes and fixed on the plane. Discharge is generated by switching similar high-voltage capacitor banks to DE. The time of DE switching is not the same.

The device looks as follows (Fig.1). Electrodes 1 are placed on one plane of the base 2. Operating reservoirs 3 of capacitors are connected via a switching device 4 to unearthed electrodes. The switching device receives at a set time a steering command from a control unit 5, to which a signal is transmitted through a matching device 6 from a computing unit 7 equipped with an outside sequencer 8. Thus, setting any desired sequence with the outside sequencer 8, we can specify necessary conditions through calculation in the computing unit 7, match the signal in the device 6, and then transmit the signal at a set moment of time to the switches that close power circuits, resulting in discharger activation.

An alternative approach suggests a system of adjusting electrode positional relationship (Fig. 4). Here electrodes 1 are placed on a fixed base 2, while a travelling electrode 3 is placed on a travelling base 4 (travel direction is shown with an arrow). Electrode 3 is powered via flexible cable 5. Each capacitor 6 is closed on its electrode through switching devices 7. Impulses to the switching devices and to the drive control 9 with shifting base 4 are received from the control unit 8, through transmatches 10 from adding machine 11 supplied with data input device 12.

With this device, a signal delay can be adjusted through approaching to or moving away from a target unit in contrast to time adjusting (Fig. 2).

Possible applications are ice crushing near dams or ahead of icebreakers, breaking dams etc., bacterial decontamination of water, defensive operations (see torpedo, military mine).

Innovative Aspect and Main Advantages

The innovative technologies suggested constitute a part of defensive measures based on electro-hydraulics: safe, inexpensive, efficient and eco-friendly, enabling multiple and repeat operation.

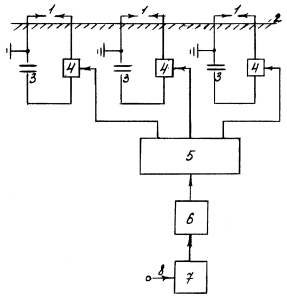

Fig. 1

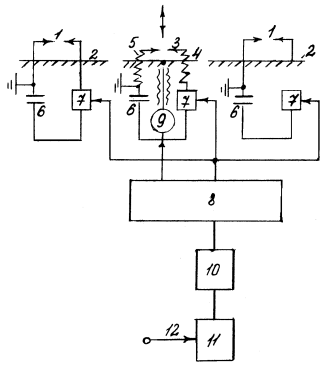

Fig. 2

Areas of Application

State and private security facilities, Security Service of Ukraine.

Stage of Development

Mathematic model available, the inventor is searching for partners for its completion.

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SEPARATION UNIT

Description

The unit feature has a unique advantage, suggesting no limitation as to explosive application.
The unit operates as follows. When a quick separation of the elements connected via a weak section is needed, an impulse voltage from an impulse current source is fed to the electrode and the section. It produces a spark and a discharge between the electrode and the section body. High pressure is generated in the liquid. The pressure can be as high as some tens of tons per 1 cm^2. The pressure can be adjusted through the pulse current source operation, and it is not a problem to set optimum pressure parameters needed to break the weak section.
The unit can be used for interlocking motor transport and other vehicles.

Innovative Aspect and Main Advantages

The innovative technologies suggested make up part of defensive measures based on electro-hydraulics: safe, inexpensive, efficient, eco-friendly, enabling multiple and repeat operation.

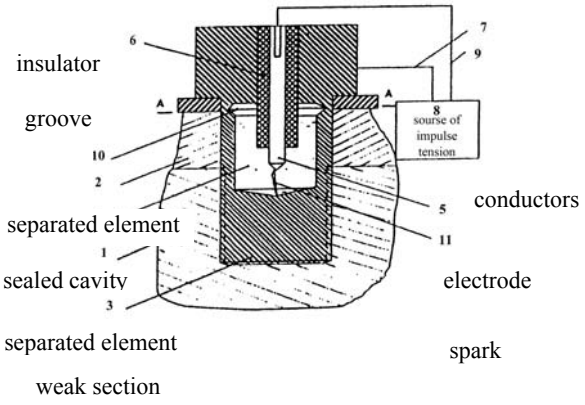

Fig. Separation unit

Areas of Application

State and private security facilities, Security Service of Ukraine.

Stage of Development

Mathematical model available, the inventor is searching for partners for its completion.

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DETECTING UNDERWATER STRUCTURES IN OFFSHORE ZONE

Description

A set of electrode pairs connected in series to an impulse oscillator are placed over a guarded offshore area around the periphery (better around the circle). Resulting pressure preset for every receiver is recorded at receiver points when electro-hydraulic impulses appear simultaneously at all electrodes. The resulting pressure in the receivers is converted into electric signals which are radio-transmitted to a common receiver, and then to an integrator additionally fed with reference voltage.

In the event of unauthorized intrusion of an underwater (partially underwater) facility into a guarded offshore area and shielding between a receiver and an electrode pair, the cumulative pressure at one of the receiving points is lower than the preset value as well as the signal transmitted to the common receiver. As a result, the integrator outputs a voltage to the alarm unit to activate an audio alarm signal.

Innovative Aspect and Main Advantages

The innovative technologies suggested make up part of defensive measures based on electro-hydraulics: safe, inexpensive, efficient and eco-friendly, enabling multiple and repeat operation.

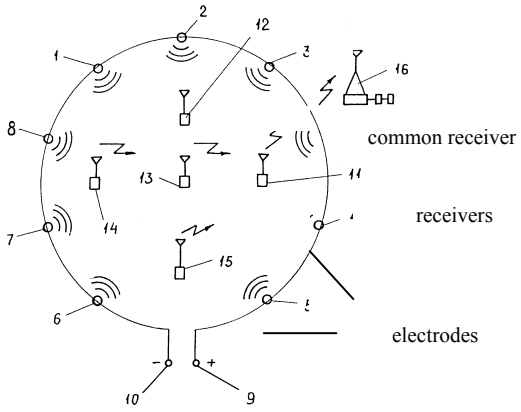

Fig.1 Location of energy sources and receivers

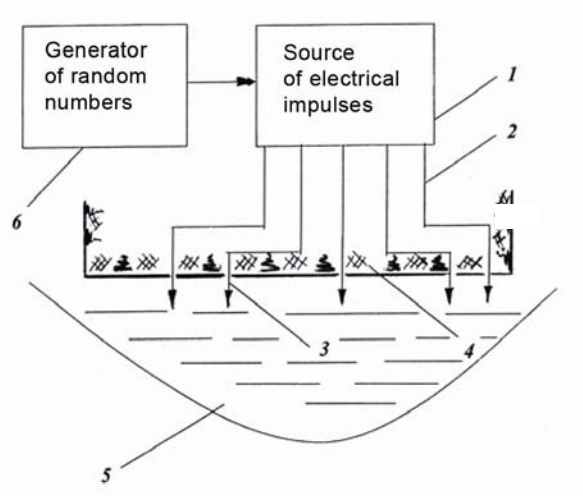

Fig.2 Signal receiving/processing unit

Areas of Application

State and private security facilities, Security Service of Ukraine.

Stage of Development

Mathematical model available, the author is searching for partners for completion.

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INDUSTRIAL TECHNOLOGIES

POWER INPUTS WITHOUT WASTE TECHNOLOGIES IN METALWORKING

Description

The concept of the work of the enterprise DOC Ltd – a collective member of Donetsk Regional Department of Academy of the Technological Science of Ukraine is the program of development of new technologies:
- small power consumption due to application of advanced methods of processing of raw material and materials;
- use of high and ultra-high pressure and temperatures, batteries and transformers of energy;
- low low-loss material of the equipment due to use of high-quality materials and compact circuits of base and peripheral units;
- high economy parameters of equipment, due to application of non-waste technologies, use of secondary raw material and continuous processes;
- comprehensible to small and average business cost of the equipment;
- fast input of the equipment in operation;
- opportunity of accommodation of equipment on small and insufficiently prepared platforms
- opportunity of merging equipment to solve sets of issues and major problems.

At the factory release, the following press equipment is planned:
1. Extrusion presses of various capacity for termo-extrusion alloys of non-ferrous metals (aluminium, copper, titan) and steel pressure from 320 to 2,500 tons.
2. Press hydraulic one and multi-storey for manufacture of sheet materials (compressed wood plastics, roofing materials, etc.) pressure up to 5,000 tons.
3. Press for liquid punching color and ferrous metals.
4. Hydro scissors, hydrostats.
5. Press for manufacture of brick and footway bars.
6. Press for landing in indistinct matrixes.
7. Forging presses.

A number of ready technical solutions have been made at the enterprises of Ukraine and Russia, in particular, rod-profile termo-extrusion presses on 320 tons, 630 tons for manufacture of a rod-profile from aluminium, copper, press on 630 tons for manufacturing Ni-Cr wire, etc.

Innovative Aspects and Main Advantages

1. The weight of press "Maljutka" and developed models "Hyperpress" is 10-20 times less, than in analogues.
2. The smaller established capacity of electric motors due to application of the whole complex power inputs technical decisions: electric motors with smaller dimensions, weight, higher efficiency in comparison with the standard; inertial stores, whose use enables power consumption of 3-5 times; the magnetic and hydrostatic bearings.

Areas of Application

Presses for manufacture of rods, structures and preparations from alloys of non-ferrous metals.

Stage of Development

Single patterns are on the market.
We invite partners for creating a mini factory producing new presses.

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IDENTIFICATION OF NARCOTICS AND EXPLOSIVES

Description

Development of mathematical models and application software of x-ray endoscopes systems for detection of narcotics and explosives in control objects.

Experimental development of application software in the series produced x-ray introscope systems of the POLISCAN family.

Installation of application software in the working x-ray introscope systems of the POL1SCAN family.

Modification of the POLISCAN x-ray introscope systems optimized on the identification of narcotics and explosives in control objects.

Innovative Aspect and Main Advantages

The proposed development has the following advantages in comparison with its analogues:

- cheaper;
- protection of home producers.

Areas of Application

Potential user of the proposed development may be:

- Customs Service of the Ukraine:
  - Services of the Ministry of Internal Affairs;
- Security Service of the Ukraine;
  - Services of safeguarding aviation security;
- Frontier Service of the Ukraine.

Stage of Development

POLISCAN X-ray introscope systems are series produced and provide identification of organic and non-organic substances. The mathematical model of the identification of substances according to the valid atomic number is developed.

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FOOD ADDITIVE 'SILICS'

Description

The food additive 'Silics' is an amorphous highly disperse silica (HDS). It is a snow-white fluffy powder consisting of silicon dioxide nanoparticles with a size of about 100 angstrom. Its particles, which have a chemically modified surface have a spherical shape, which is of great significance for their direct combination with a biologic medium.

Innovative Aspect and Main Advantages

The food additive 'Silics' is notable for its extensive specific surface area (up to 500 m^2 g^{-1}) and a number of other important properties, including:
– high hydrophilicity of surface;
– high protein-sorbing activity;
– ability to bind a great a number of microorganisms and microbial toxins;
– ability to adsorb low-molecular substances.

Areas of Application

These and other characteristics of HDS 'Silics' provide for its efficient application as a food additive in the food industry.
One area of application of HDS 'Silics' is its use in the capacity of a separating agent, which is a substance that prevents caking and clumping, which is of great importance for handling free-flowing products (in the USA silicon dioxide is used greatly as a food additive, with its approved amount reaching 2%).
The FAO–WHO Expert Committee of Food Additives registered amorphous HDS as food additive E 551 and gave its permission to employ it, without any restrictions, for stabilizing the physical state of food products.

Addition of HDS 'Silics' with its content of about 1% of the total weight of minced meat used to produce boiled sausages and hot dogs makes it possible to prepare products with improved organoleptic, physico-chemical, biochemical, and microbiological indices. The above-mentioned products with additives of HDS 'Silics' can be stored for longer periods of time in comparison to similar products which do not contain such an additive.

Stage of Development

Already on the market.

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PROTECTIVE-AND-STIMULATION COMPOSITIONS

Description

Developed at the Institute of Surface Chemistry under the Ukrainian SSR Academy of Sciences, it is an essentially novel process of incrusting seeds in the course of pre-sowing treatment, involving a nontoxic inorganic polymer featuring high adhesion to the surface of seeds.

The activated inorganic polymer readily mixes, within a wide range, with microelements, growth regulators, and also mineral fertilizers, thereby forming protective-and-stimulating compositions possessing a high degree of adhesion.

Application of the protective-and-stimulating compositions is a highly efficient, economically advantageous and an ecologically clean method of acting upon plants. It facilitates their reliable protection and optimization of mineral nutrition combined with a considerable decrease in fertilizer dosages to be introduced.

The process of treating seeds with protective-and-stimulating compositions is simple, consumes little energy and is based on existing equipment.

Innovative Aspect and Main Advantages

The new process ensures:

- reliable protection of seeds against mechanical damage and moisture;
- absence of seeds packing, invariability of grain size and increase in flowability;
- improvement of thermal conditions of sprouts;

increase of resistance to moisture and possibility to control access of nutrients.

Fig. 1. Protective-and-stimulation compositions
for pre-sowing treatment of seeds

Areas of Application

The employment of the compositions during the pre-sowing treatment of seeds has enabled an increase to be made in the yield capacity of seeds from 10 to 30 percent.

Stage of Development

Already on the market.

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INDUSTRIAL TECHNOLOGIES

APPARATUS FOR TREATMENT OF AMBLYOPIA BY PANORAMIC "DAZZLING" FIELDS "STIMUL" ST-1

Description

It is designed for the restoring central fixation and improvement of vision acuity of amblyopic eye for patients who have amblyopic concomitant squint, amblyopia of all types.

Specification:

Screen size , mm	200 x 200, which provides light stimulation of eye retina at a distance of 30-40 cm from the screen within 20-25 degrees
Supply voltage, V; Hz	220 , 50
Power consumption, W	200
Continuous operation, hrs	4
Weight, kg	10

Innovative Aspect and Main Advantages

The instrument has been designed in cooperation with the Filatov Ophthalmological Institute of the Academy of Sciences of Ukraine.

Areas of Application

It is used in specialized and non-specialized medical establishments and also in private.

Stage of Development

Already on the market.

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INDUSTRIAL TECHNOLOGY OF ELECTRON-BEAM RE-MELTING OF HIGH-SPEED STEELS

Description

The GEKONT Scientific-Producing Enterprise has produced effective source-saving electron-beam technology for obtaining high-quality ingots and slabs by recycling industrial waste from the tool industry.

Innovative Aspects and Main Advantages

- processes of re-melting and ingots forming due during one technological process without subsequent thermal-mechanical treatment (hammering, annealing);
- possible to re-melt chunk waste;
- fast changing of technological equipment for producing ingots with indispensable sizes;
- high-quality ingots after re-melting in a vacuum ;
- possible to produce small batches of ingots with indispensable sizes.

Areas of Application

- producing high-quality ingots and slabs from high-speed steels;
- producing tools from high-speed steels;
- recycling waste from the tool industry.

Stage of Development

- was patented (Patents of Ukraine № 37658 and № 18135 A)
- already on the market, commercialized.

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DIAMOND-LIKE COATINGS

Description

Technology has been developed and the equipment is modernized for industrial production of diamond-like coatings on metal substrates. The general view of the equipment is shown on the right.
The deposition methods are based on novel vacuum ion-plasma and plasma-chemical processes.
The wear resistance of the articles after deposition of the coatings increases by 8–10 times.
the technology was designed to industrial level for small size bits (e.g. dental drills) up to the industrial level.
Coated dental drills were tested in the U.S. and in Ukraine. Different types of substrates (uncoated drills) were used for tests (Swedish, American, and Russian etc. production). All of them showed above-mentioned improvement (8-10 times compared with the same uncoated one).

Innovative Aspect and Main Advantages

The main advantages of the proposed technology are as follows:

1. DLC is much more elastic than an ordinary diamond. So, DLC can protect even bendable surfaces, for example, medical scalpels or razor blades.
2. The heating of the samples during the deposition is much lower compared with the standard technology. So it means that the substrate temperature during deposition is lower than 100^0C.
3. It is possible to deposit the sub-layer of Ti under the DLC in order to increase adhesion.

Canadian and Ukrainian patents protect the novelties in the technology and the fixture, which support the method.

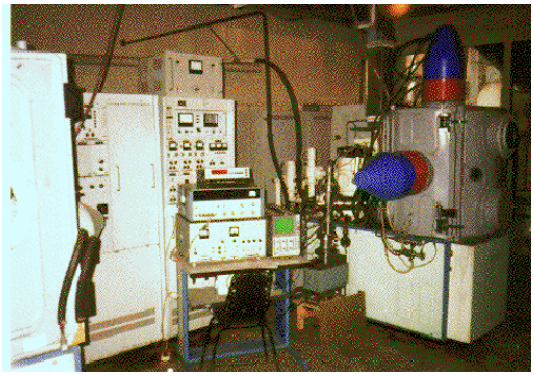

Fig. 1 General view of the equipment for DLC deposition

Areas of Application

The main application area is the dental drill.

Additional applications are improvement of:

- Cutting edges of knives, rotating shear blade, saw and other instrument for scission of paper, cardboard, tree, etc;
- Active parts of surgical medical tool;
- High-fidelity calibers.

Stage of Development

The equipment is ready for small-scale production (600 bits/day).
The design of the equipment for mass production (2,000,000+ bits/year) is ready.

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TECHNOLOGY AND EQUIPMENT FOR TREATMENT OF LIQUID RADIOACTIVE WASTE

Description

An experimental model of the mobile facility for purification of liquid radioactive waste (LRW) has been created. Cleaning from radionuclides is carried out by using the sorption method. Reacted sorbent is deposited on the filter at the end of the procedure. The next step is removal of used sorbent into the metal tank. The facility is provided by a large number of sorbents with targeted ability. Each type of these sorbents absorbs only a specific group of radionuclides.

Because of its small size (1460x600x800 mm) and weight (near 60 kg), this mobile facility can be easily delivered directly to places, where the LRW are generated, to support fixed means.

Innovative Aspects and Main Advantages

The created facility has irrefutable advantages, e.g.:
light weight;
small size;
possibility to clean the liquids from different types of radionuclides;
usability, etc.
No equipment similar to this facility exists in Ukraine.
New parts for the equipment were invented, in particular: a) new design of the reaction chamber with increased capacity; b) improved filter elements, etc.
All the parts of the innovation were patented in Ukraine.

Equipment capability

Facility output – 50 litre/hour;
Cycle time – 1 hour;
Sorbent loading volume (litre) – 1 litre;
Treated liquid temperature - +5C - +30C;
Pressure during work cycle – 2.4 kg/cm^2;
Pressure for extraction of the reacted sorbent – 2 kg/cm^2;
Power supply – 220 V; 50 Hz;
Watt-hour energy usage – 20 $kW\text{-}h/m^3$;
Relative humidity – up to 100%;
Environmental temperature, min - +1C.

Areas of Application

Novel equipment can be used as first aid equipment in emergency cases. It can be unfolded on-the-fly in the place of LRW discharge and can be adapted to a specific group of radionuclides.

Stage of Development

The experimental model of the facility has been created.
This facility was tested on the Ukritije (Shelter) facility at the Chernobyl nuclear power plant.
We have a potential customer for our product and we are looking for investment ($60,000) to produce the pilot facility.

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DEVICE FOR AUTOMATIC ANGULAR GAMMA-RADIATION MEASUREMENT

Description

An automatic device for angular gamma radiation measurement has been created (fig. 1). It can be equipped by different types of irradiation detectors (thermo-luminescent ones or CdZnTe) and can automatically measure the level of gamma-radiation in the range from 1 to 1,000 R/h.

It can also measure angular distribution of the external sources of gamma-radiation in the whole sphere. The scheme for the measurements is shown in fig. 2. The holes for detectors are uniformly distributed around the surface of the leaden sphere. Each detector can cover the cone with 45^0 angles. The total number of detectors is determined by the required accuracy. The proposed design provides irradiation of the detectors only. The leaden body protects the other components of the device.

The device provides the opportunity for measuring gamma radiation in places with limited access for personnel (storehouses for radioactive waste; atomic power plant compartments which contain high radiation levels; premises contaminated by a radiation accident, etc).
We are looking for a partner for industrial production of this device.

Innovative Aspect and Main Advantages

The device clearly demonstrated its advantages compared with similar existing instrumentation while solving specific tasks at the Shelter facility located at the Chernobyl nuclear power plant.
It was used for:
The basis of construction work carried out at the existing shelter;
Basis of the construction work in the area of the new "Arch" safety containment structure;
Optimizing the shielding of personnel.

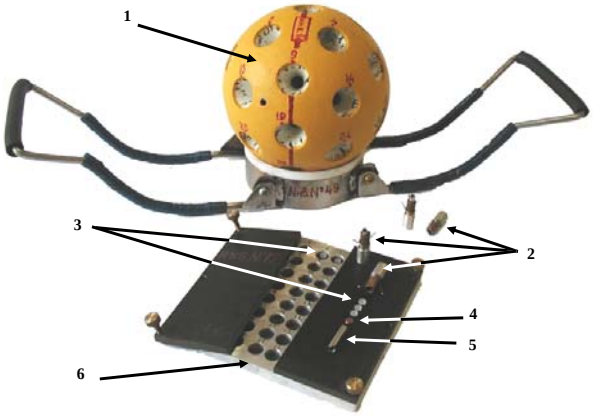

Fig. 1. General view of proposed device
1 – leaden holder for detectors; 2 – capsules with detectors; 3 – detectors TLD 500K; 4 –copper filters; 5 – holders; 6 – box to detectors transportation.

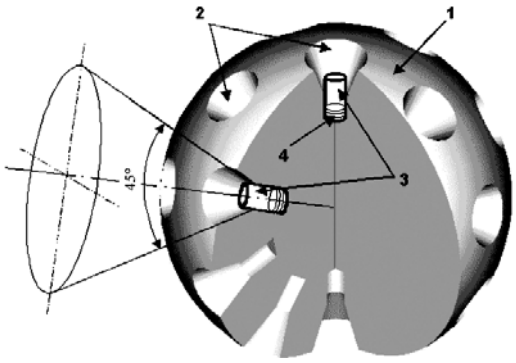

Fig. 2. Scheme of angular detection.
1 – leaden holder; 2 – collimating holes; 3 – capsules with detectors; 4 – thermoluminiscent detectors.

Areas of Application

Unmanned angular measurement of high levels of gamma radiation.

Stage of Development

The prototype of the device was successfully tested at the Chernobyl plant.

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MULTICRITERIA RANKING TECHNOLOGY USING EXPERT COMPETENCE

Description

The proposed group ranking determination technology involves taking relative expert competence and relative criterion weights into consideration during the process of global ranking determination. First of all, experts determine individual alternative rankings according to each criterion. Then group alternative rankings according to each criterion are built with the help of modified Condorcet or Bordas methods (modifications concern taking expert competence into account). The key idea of this approach is that a set of identical rankings is juxtaposed to rankings determined by experts: the number of these rankings corresponds to the relative expert competence. After the group rankings according to each criterion are built, the group global ranking is determined by Condorcet or Bordas methods using relative criterion weights. A set of identical rank vectors is juxtaposed to every ranking vector; their number corresponds to the relative criterion weight. The main difference between the suggested approach and Bordas method is that a weighted rank sum is used for group and multicriteria ranking determination. Relative expert competence and relative criterion weights are determined through paired comparisons.

Basic characteristics

Maximuml number of experts - 7±2 (the number is limited by the psycho-physical constraints of a human, since relative expert competence is also determined through paired comparisons in the process of expert evaluation).
Maximum alternative number – unlimited.
Maximum subcriterion number for each global criterion – 7±2 (relative criterion weights are also determined through paired comparisons during the process of expert evaluation).

Innovative Aspect and Main Advantages

A comparison made between the proposed technology (PT) and two analogues is shown in the table below.

Parameter	Re 1	Re 2	PT
Expert competence	-	-	+
Criteria weight	-	-	+
Max expert #	7±2	7±2	7±2
Max alternative #	UL*	UL	UL
Maximal sub-criteria #	7±2	7±2	7±2

* UL - unlimited

References:

1. Condorcet I. A., Exposition des motifs et des principes du plan de constitution. Ar. XIII. 1793, In: Mathematiques et sciences humaines, Paris: Centre de Mathematique Sociale. Ecole des Hautes Etudes en Sciences Sociales, 1976.
2. Bordas J. C. Memoire sur le selections au scrutin, Historia de l'academiedes sciences pur, Paris, 1781.

Areas of Application

Banking, economics or/and other sectors where the decisions are based on expert evaluation.

Stage of Development

The prototype of the software has been tested and is available for demonstration
Estimated price of software is $1,500.

We are looking for partner's product market introduction.

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SELECTION OF ALTERNATIVE DECISION BASED ON EXPERT EVALUATIONS

Description

The technology has been designed for decision support in situations, when certain variants must be selected from the total variants set: according to the results of expert evaluation, the variants selected are better than the rest. Variants are estimated according to several qualitative criteria.
Variant selection includes several stages.
A decision-maker, or a group of authorized experts, formulates the set of alternative evaluation criteria.
Experts conduct the paired comparison of the weightings of different criteria. The process envisions recruiting several experts and ensuring feedback with them in order to increase the evaluation consistency level.
The scales for qualitative criteria are calibrated (this stage does not take place if the number of variants is less than 7 ± 2).
Expert evaluation of variants is conducted according to selected criteria.
The consistency level is calculated for the evaluations of variants given by different experts. Also, the consistency level sufficiency is determined. In order to increase the level of consistency, feedback with the experts is provided.
Variant ratings are calculated.
Finances are distributed between variants in compliance with their ratings.
The technology is universal and flexible. It provides an opportunity for using the knowledge and experience of many experts.

Basic characteristics

Criteria can be combined into a hierarchical structure. The number of criteria on a single level must correspond to the psychophysical constraints of a human, thus it cannot exceed 7 ± 2. Criteria can be qualitative and quantitative ones.
The number of variants is limited by the number of experts: one expert should not evaluate more than 7 ± 2 variants.

Innovative Aspect and Main Advantages

A comparison between the proposed technology (PT) and two analogues is shown in the table below.

Parameter	Re 1	Re 2	PT
Number of variants		200	7 ± 2 / expert
Resource distribution facility	-	-	In prog.
Qualitative and quantitative criteria processing facility		-	In prog.
Opportunity for group criteria determination	-	-	In prog.

* In prog. – work in progress

References:

1. www.expertchoice.com
2. System for expert data processing "Project selection"//Softel: software for business (catalog business-soft, 1997-98), Moscow, Hamtech Publ, 1997, p.143 –149.

Areas of Application

Companies can apply the technology in project selection during competitions, during the selection of applicants for a vacancy, as well as for equipment, software, contractors, technical solutions selection, etc.
Created software has been tested at Ukrainian Ministries and Universities.

Stage of Development

The prototype of the software has been tested and is available for demonstration
The estimated price of the software is $2,000.

We are looking for market introduction from a partner.

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DECISION-MAKING SUPPORT FOR TARGET-ORIENTED PROGRAMS

Description

The technology is designed for decision support during theme planning for heterogeneous projects of a complex target-oriented program (CTP) and for relative project effectiveness estimation. This technology is implemented, when it is impossible to form a unified set of criteria, because of the miscellaneous nature of projects (social, humanitarian, ecological, technological), which makes it impossible to apply common decision support technologies based on multi-criteria evaluation. The technology is based on the original method of goal-oriented alternative evaluation.

The technology allows experts to build a goal hierarchy for the CTP; it also enables calculation of expert estimates of partial influence coefficients of goals on the next-level goals' achievement, to increase the internal consistency rate of every expert's estimates, define the external consistency rate of several experts' estimates and its sufficiency level, achieve a sufficient level of expert evaluations consistency, compute consistent integrated expert estimates of goal influence coefficients, calculate relative potential effectiveness of CTP sub-goals (define the directions of CTP implementation) and projects.

Basic characteristics

Goals number – unlimited. The largest CTP implemented in practice included 238 goals and 650 projects. The number of direct sub-goals must not exceed 7 ± 2, in compliance with constraints on human psycho-physical information processing ability.

Innovative Aspect and Main Advantages

A comparison between the proposed technology (PT) and two analogues is shown in the table below.

Parameter	Re 1	Re 2	PT
Feedback between sub-goals	-	-	+
Threshold sub-goals	-	-	+
Opportunity to take into account the sub-goal impact delay	-	-	+

References:

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Areas of Application

Proposed technology can be interesting for large companies; state departments and/or local government.
It was applied for the development of comprehensive target-oriented programs:

a) Building an open society in Ukraine;
b) To increase the competitive advantage of domestic industrial goods.

Stage of Development

The prototype of the software has been tested and is available for demonstration
The estimated price of the software is $2,000.
We are looking for product market introduction from a partner.

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THE MODELING OF THE RATING EVALUATION OF THE SME DEVELOPMENT OF A REGION (RURAL AREAS)

Description

Analysis of the trends of SME development is very important for local government. The results of such analysis can be used as one of the main factors for evaluation of the social and economic climate in the region.
A new model for such evaluation was suggested. It is based on the so-called RATING OF THE DEVELOPMENT model (RD-model). The RD-model is a dynamic model. It analyses the deviation of SME business parameters from their average values with time.
The RD-model was tested primarily in Kharkiv region (rural areas). The officers from the agricultural department of the Kharkiv governor's office entered the appropriate database into the model. The data treatment showed a zero or even negative rate of SME business in the majority of the "districts" of Kharkiv "oblast'". Such a result, undoubtedly, demonstrated that SME climate changed for the worse in the region in the last few years.

The rank of the first and the last "district" has been measured.

Some concrete recommendations/changes were made in the Regional SME development program as a result of the analysis.

Innovative Aspect and Main Advantages

The created technique of SME evaluation (RD-model) has the following innovative elements:
The RD-model extracts essential data about SME activity from the ordinary database of the Statistical Department of the governor's office. There is no need to require additional information from SMEs. At the same time, the results received by the RD-model are in harmony with ordinary statistical data.
The specific list of indexes for SME evaluation by the used RD-model was selected and based.
The RD-model is based on the analysis of time-dependent parameters.
The methodology of the rating theory was extended by including in the RD-model not only simple calculations but also economic interpretation of the ranking results.

Areas of Application

The proposed technique can be used, first and foremost, for evaluating the environment for SMEs in the specific region.
Potential users of the technique could be: a) growing companies from different sectors in FSU countries; b) similar companies in the new states of the EU; c) local governments; etc.

Stage of Development

The concept is 80% ready.
The pilot software is 80% ready.
The model was tested preliminarily in rural areas of Kharkiv region to evaluate more than 200 companies in nearly 20 different rural sub-regions.

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RATING SYSTEM FOR ECONOMIC DEVELOPMENT CONTROL OF KHARKIV REGION

Description

Rating systems are one of the most efficient bases for the making of decisions by local governments. Especially, such systems demonstrate their efficiency in case the territory, which is managed by the local government, consists of a number of smaller elements (sub-regions). At the same time, common rating systems don't allow for the local government to compare the results achieved by considerably different elements of this infrastructure. For example, how can one compare an agricultural rural sub-region with an industrial urban one?

A new computer-integrated model is suggested to solve this task. It is based on two main distinctions compared with well-known approaches.

Few different methods are used for primary evaluation of the level of development of each sub-region. The results of this initial analysis are combined to create an integrated rate. Then sub-regions are ranged by comparison of this last integrated rate value.
The new technique considers the intervals on the ranking axis instead of the points in the ordinary approach.

Innovative Aspect and Main Advantages

The competitive advantage consists of:

The use of three methods for primary evaluation;
Selection of the indexes for a specific case;
Economic interpretation of results;
Position data demonstration in the proposed scale.

Proposed technique provides the opportunity for local government to make grounded decisions and to carry out the monitoring of the development of a sub-region.

The novelty consists of the diagnostics of a sub-region's development by taking into account comprehensive analysis, unlike simple ranking.

Areas of Application

The created technique can be used by the governor's office for ranking territories like "a district" inside "an oblast'" in Ukraine or Russia.

It also can be used by local governments in new member states of the European Union (Poland, Lithuania, Estonia, Latvia, etc.).

Stage of Development

The concept is 90% ready.
The pilot software is 60% ready.
The model was preliminarily tested by Kharkiv governor's office and received a positive mark.

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ECONOMICS

RATING SYSTEM IN MANAGING THE PROCESS OF REGIONAL ECONOMIC DEVELOPMENT

Description

The rating procedure is a technique for obtaining comprehensive information about the financial status of the investigated object presented in the most compressed format. It is an hierarchical system of indexes, allowing the establishment of a correlation between the object's financial parameters, as well as identifying the advantages of some of them.

A new step-by-step (dynamic) technique/procedure for business ranking was suggested. A new ranking system was applied successfully for evaluation of the business position of a) insurance companies; b) industrial companies in the Kharkiv and Poltava regions. All of the businesses were evaluated for a certain period of time to see the changes.

The proposed approach for selection of the indexes of the businesses is considered as one of the pre-conditions for implementation of the credit rating system.

Innovative Aspect and Main Advantages

The developed technique for evaluation of the financial status of businesses at the regional level has the following innovative aspects:
A complex multidimensional analysis of complicated financial phenomena is applied;
A comparative evaluation is undertaken;
The flexible computational algorithm, which takes into account changes both in indexes or/and in methods, is used;
It was shown that the proposed technique can be applied for different types of businesses;
The new model gives the opportunity for an evaluation to be carried out not only for selected companies but also for entire business activity in a region. This opportunity can be used as an additional indicator of investment attractiveness of a region.

Areas of Application

The proposed technique can be used, first and foremost, for evaluating the financial status of companies and their branches. It also can be used to evaluate the business environment in an entire region.
Potential users of the technique could be: a) growing companies from different sectors in FSU countries; b) similar companies in the new states of the EU; c) local governments; etc.

Stage of Development

The concept is 70% ready
The pilot software is 80% ready.
The model was preliminarily tested in Kharkiv and Poltava regions to evaluate more than 50 companies in different sectors.

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THE EVALUATION OF THE SOCIO-ECONOMIC CONDITION OF KHARKIV REGION BY USE RATING SYSTEM

Description

It is very important for local government to have a correct ranking of the socio-economic condition of the components of the managed territory.
The new model was suggested for such a ranking. More then 30 indexes are used for evaluation of the socio-economic condition. These indexes are divided into four groups: industry; trade and service; agriculture; financial state. The appropriate user-friendly software also was created for use of this model by untrained staff.
To create the new model, the comparative analysis of the rate level in case of use of 1, 2, 3, … 30, … indexes is conducted. The factors/indexes, which complicate the rating process, were identified. The optimal list of indexes was selected as a result of such analysis.
Additional comparative integral ranking was carried out by using three different methods. The results of the analysis showed that the most important factors for the right evaluation are the list (and level) of the indexes, but not the methods themselves.
The model has been tested on the basis of the Kharkiv oblast (region in Ukraine) database. The difference was shown between the real leader (present model) and the number one according to the routine consideration.
It also was shown that the majority of Kharkiv's sub-regions have a tendency to develop at almost the same rate without depressed territories.

Innovative Aspect and Main Advantages

The developed ranking technique for comparison of the socio-economic condition of sub-regions on a certain territory has the following innovative advantages:
The optimum list of indexes is used in the present model;
The methods of evaluation were grounded, which increased the objectivity of the evaluation.

Areas of Application

The created technique can be used by the governor's office for ranking territories like "a district" inside "a oblast'" in Ukraine or Russia.
It also can be used by local governments in new member states of the European Union (Poland, Lithuania, Estonia, Latvia, etc.).

Stage of Development

The concept is 90% ready.
The pilot software is 80% ready.
The model was preliminarily tested by the Kharkiv governor's office and got a positive mark.

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THE GENERAL METHODOLOGY FOR THE RATING PROCEDURE FOR COMPANIES ON FREE MARKET

Description

The number of joint stock companies with a private shareholding of more than 50% is increasing rapidly in modern Ukraine. According to local legislation their financial condition must be open and transparent. Especially, such requirements concern banks and other financial institutions.
One of the important parameters for evaluation of the financial condition of a company is its rating level. Recent changes in legislation require the evaluation of such a parameter by a company itself and then its publication is obligatory.
Thus, the methodology of rating evaluation must be created for the majority of Ukrainian institutions.
The technique based on the theory of fuzzy set is created for such evaluation. The theory of fuzzy set allows the making of an objective evaluation even in cases of change of: a) index importance or b) the rank level itself.
The technique includes two main elements: I) a team of qualified experts; ii) permanent monitoring of the company's position on the stock market.
The technique allows evaluation not only of a single company rank, but also the trends in the whole sector. In this last case a group of companies in the selected sector must be monitored. This group must be compared with the rank of the companies from other industrial sectors. Similar changes of the ranking for each company from the selected group means growth/ extinction of the business in the sector being investigated.

Innovative Aspect and Main Advantages

The proposed technique of the rating evaluation of companies on the free market has the following innovative aspects and main advantages:

The technique works like an additional tool for stimulating the growth of the companies on the free market;
It uses alternative methods for rank evaluation;
The technique includes: a) a direct evaluation procedure; b) economic interpretation of the results obtained;
It could be applied both to joint stock companies and SMEs. In the latter case ordinary statistical reports are used for evaluation;
It also could be applied not only to the selected company but for an entire industrial or financial segment, e.g. for the insurance market.

Areas of Application

The created technique can be used in countries with a "young" stock market, e.g. for FSU countries.

It also can be useful for the new member states of the European Union (Poland, Lithuania, Estonia, Latvia, etc.).

Although the technique was tested for the insurance market, it also can be used for other industrial/financial sectors.

Stage of Development

The concept is 50% ready.
The pilot software is 80% ready.
The model was preliminarily tested for evaluation of Ukrainian insurance companies.

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ECONOMICS

THE RATING OF FOREIGN INVESTMENTS AT REGIONAL LEVEL

Description

Ukraine has a comparatively low level of foreign investment. To select the right strategy for increasing attractiveness of the country, the appropriate decision-maker from the government must have the correct picture of the present state.
A new method for evaluation of the investment environment at the regional level is proposed. Three areas were investigated:

The total value of foreign investment coming to the region;
The sub-values from each foreign country and the number of created companies;
The sub-values for each industrial sector.

The rating system uses the following indexes for the evaluation: a) changing of non-resident assets; b) total non-resident assets at the end of a reporting period; c) the number of companies, which received investments. It is based on official statistical reports.

The proposed method was tested in Kharkiv region. This region is ranked in the middle of the list of investment attractiveness of Ukrainian oblasts for foreign investors. The majority of foreign investment came from the USA. The most attractive sectors are: a) industry, especially the food industry; b) trade and c) financial services.

Local government got the correct investment picture after the end of this investigation.

Innovative Aspect and Main Advantages

The proposed technique of investment evaluation has the following innovative aspects and main advantages:

The indexes for evaluation of foreign investment use the data on which official statistical reports are based. Such an approach increases the level of confidence in the ranking;

It is suggested to calculate the rates for three different areas: a) countries; b) regions; c) industrial sectors;

The general methodology was modernized by including three types of indexes for evaluation;

The results of the investigation undoubtedly showed, that new approaches must be used for increasing the attractiveness of foreign investment into the region.

Areas of Application

The technique created can be used for the evaluation/comparison of foreign investment activity in different regions.

Potential users are local governments in FSU countries, as well as similar structures in new member states of the European Union (Poland, Lithuania, Estonia, Latvia, etc.).

Technique also can be useful for the Ministry of economics of Ukraine, National academy of sciences etc.

Stage of Development

The concept is 30% ready.
The pilot software is 70% ready.
The technique created was tested on the database, which was extracted from official statistical reports of Kharkiv oblast.

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THE IMPLEMENTATION OF THE CREDIT-RATING SYSTEM FOR INCREASING THE TRANSPARENCY OF EMISSIONS ON THE STOCK MARKET

Description

Transparency and openness of information about the financial activity of the players are the basic principles of stock market development in Ukraine. But the content of the ordinary published reports are not enough for the potential investor. This information requires additional analysis.
The model for credit rating of joint stock companies allows the investor to buy the most attractive stocks and thus to manage the profitability of his investment.
The National rating scale was used to calculate the level of investment risk. Some additional indexes, which were not published, were added to the National scale. There are few groups of indexes appeared as a result of created requirements for the correct evaluation. The multiple-factor correlation method is used for evaluation of financial parameters. The final credit rating was calculated as a total of marks.
The ranking of companies in the chemistry sector was tested by the proposed techniques.

Innovative Aspect and Main Advantages

The proposed technique of approach of credit-rating evaluation of the financial condition of joint stock companies has the following innovative aspects and advantages:
A correlation has been discovered between the rating level according to the National scale and the specific financial condition of a company;
A list of financial parameters has been identified, which have an influence on the credit-rating level;
The credit-rating evaluation of companies of the chemistry sector has been made. This evaluation was made by using published information only;
The efficiency and objectivity of the proposed technique has been proven.

Areas of Application

The created technique can be used in countries with a “young” stock market, e.g. for FSU countries.

It also can be useful for countries which are new member states of the European Union (Poland, Lithuania, Estonia, Latvia, etc.).

Although the technique was tested specifically for the sector, it also can be used for other industrial sectors.

Stage of Development

The concept is 40% ready.
The pilot software is 50% ready.
The model was preliminarily tested for evaluation of Ukrainian companies in the chemistry sector.

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ECONOMICS

THE RATING SYSTEMS FOR THE CONTROL OF R&D DEVELOPMENT IN THE REGION

Description

This technique was created under the order of the R&D department of the Kharkiv governor's office. Kharkiv is one of the leading R&D centers in Ukraine. It has more then 20 Universities and nearly 100 research institutes. The list of the professions of Kharkiv scientists covers: a) physics; b) chemistry; c) medicine; d) power engineering; e) geology; f) mechanical engineering; g) history; etc.
It is only one way of comparing such heterogeneous areas – one must use the results of ranking.
The created technique works according to the following scheme. The sum of the levels for each area was calculated at the first step. The values received show a preliminary ranking.
The essence of the second step is to include the figures: the number of articles; patents; etc.
The leaders on the second step were: physics; mathematics; pharmacy and medicine.
The sectors for different areas of knowledge were calculated after the second step. Engineering covers 35%; natural sciences – 35%; liberal arts – the rest.
It was determined without doubt at the third step (application of fuzzy set theory) that the leader of R&D in the region is power engineering.

Innovative Aspect and Main Advantages

The proposed technique of R&D activity evaluation has the following innovative aspects and main advantages:

The general rating methodology was applied for solving the specific task – evaluation of the R&D level for the different areas of knowledge;
The ranking level was determined by comparing the data in three areas: a) area of knowledge; b) percentage held on the scientific market; c) the position of the specific area compared to the whole science;
The technique was applied for ranking R&D activity funded by the state in Kharkiv region;
The leaders and outsiders were identified. The recommendations were prepared for increasing the efficiency of the R&D at regional level.

Areas of Application

Created technique can be used for the evaluation/comparison of the R&D activity in different sectors.

Potential users are the local governments in FSU countries, as well as similar structures in the new member states of the European Union (Poland, Lithuania, Estonia, Latvia, etc.).

The technique can also be useful for the Ministry of science and education, National academy of science etc.

Stage of Development

The concept is 50% ready.
The pilot software is 80% ready.
The author received Ukrainian patents for protection of this technique.
The created technique was tested on the database, which was registered in the Kharkiv regional R&D state system.

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THE METHODOLOGY FOR COMPANY RATING CREATION

Description

The technique describes the procedure of the selection of the indexes for rating evaluation. This procedure includes the following steps:

1) The rank of the investigated company determines according to each index. The name of "mini-rank" will be used for such evaluation;
2) Simplification of mini-rank. The whole scale of mini-rank divided into two intervals. In the event that the investigated company is in the lower interval, its mini-rank is equal to zero. In the opposite case it is equal to a unit;
3) A team of qualified expert determines the relative level of each mini-rank;
4) The new matrix for the evaluation of the company rank is built by using the theory of fuzzy set;

To get the final result, the matrix must be multiplied on the vector of place magnitude and a summary mde of obtained mini-ranks.

Innovative Aspects and Main Advantages

The proposed technique of the rating evaluation of the companies on the free market has following innovative aspects and main advantages:

- Suggested method of evaluation has multi-purpose (universal) application;
- The theory of fuzzy set is used for this technique. It is possible to decrease (or even exclude) the subjective factor (opinion of the experts) on the results by using this theory;
- The methodology was extended by establishing the priorities (for example, increasing the role of the leader).

Suggested approach could be successfully applied for the creation of a National Ranking Scale.

Areas of Application

The created technique can be used in countries with a "young" free market, e.g. for FSU countries.

It also can be useful for countries which are new member states of the European Union (Poland, Lithuania, Estonia, Latvia, etc.).

Although the technique was primarily tested for the insurance market, it also can be used for other industrial/financial sectors.

Stage of Development

The concept is 90% ready.
The pilot software is 100% ready.
The author got Ukrainian patents for protection of this technique.
The model was preliminarily tested for evaluation of Ukrainian insurance companies.

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ECONOMICS

THE RATING SYSTEMS OF THE ESTIMATION AND CREATION OF THE STRATEGY OF SME (URBAN AREA)

Description

The National Program of SME development is aimed at creating modern approaches for small/medium business support. Rating models are worldwide practice for the initial evaluation of the business environment in a region.
The model of rating development was applied for the evaluation of the business environment for SMEs in a large city (for example, Kharkiv,in Ukraine). Kharkiv has 1.5 million people and is divided into eight sub-regions.
The ranks of these sub-regions were identified with the help of the officers of the city administration. The evaluation was made by three independent methods with analysis of the SMEs development over a few years.
The three strategies for different types of SMEs
For the leaders;
For the stable middle part; and
For outsiders were created by the city administration on the base of the evaluation results.
These strategies became a part of the Program of the social and economic development of Kharkiv city.

Innovative Aspects and Main Advantages

The ranking approach became the basis for making decisions for SME support in Kharkiv city and its sub-regions. The proposed technique has the following innovations and the main advantages:

the advantages of ranking approach for support of the strategic management of city administration were shown;
a list of rating indexes was created. Routine statistical parameters are used to fill rating indexes. Such statistical parameters are part of the SME quarterly report;
very fast and inexpensive evaluation of the SME business environment was made in Kharkiv's sub-regions;
the results of the evaluation of the Kharkiv sub-regions made by the proposed model were compared with the ranking made by other methods. Proposed model showed its objectivity.

Areas of Application

The created technique can be used by the city administrations for ranking territories like "a district" inside large cities in Ukraine, Byelorussia or Russia.

It also can be used by local governments in new member countries of the European Union (Poland, Lithuania, Estonia, Latvia, etc.).

Stage of Development

The concept is 70% ready.
The pilot software is 60% ready.
The model was preliminarily tested in Kharkiv city and its eight sub-regions to evaluate more than 100 companies in different sectors.

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SECURITY

RADAR FOR DETECTING HIDDEN EXPLOSIVES

Description

The aim of the project is to create a radar for detection and identification of the explosives in the soils; on the roads; in the engineering structures.
New algorithms for identification and detection of the mines will be used in the proposed radar. These algorithms will separate “useful” signals from the noise from the soil and other surrounding objects. The computer will be used for signal processing. The general scheme of the proposed radar is shown in the diagram on the right.
Depending on the application the new radar could be placed on a truck or transported manually.

Innovative Aspect and Main Advantages

Proposed radar will have an extra high level of detection of hidden mines. Currently there are no operational devices, which can reach UN requirements (the probability of the right detection of the mine must be at least 99,6%). It is planned that the new radar will meet UN requirements.
The required high accuracy will be reached through the use of database of the reaction of different objects on the pulse interrogation. The difference in the response from the mine and, e.g., soil will provide the correct identification.

Areas of Application

Potential users of the proposed radar could be specialized departments of the police, emergency service, the army.
The radar also could be used in the areas for mine cleaning (e.g. Middle East).

Stage of Development

The designers created the algorithms for the radar and tested them in the lab. They also produced the main units for the future radar.

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SECURITY

FISSIONABLE MATERIAL DETECTION IN MARINECONTAINERS

Description

It is assumed that “the best shelter” is an object containing a large mass of iron or other materials with large “Z”. The examples of such shelter (fig. 1) are a machinery bed; large rolls for hot mills; transformers etc.

The proposed concept is based on the two-stage process of inspection: the first step consists of obtaining information about the location within the container of potential hiding places. It can be done by standard X-ray inspection. The second step is precise inspection of the potential shelters only. It will be carried out by irradiation of these places by high-energy electrons and gamma rays.

Detection of delayed neutrons, in the opinion of developers, will be irrefutable evidence of the presence of uranium or plutonium in the hiding-place.

We have: a) highly qualified team and b) all the components for field tests.

Innovative Aspects and Main Advantages

These are the following main advantages of proposed technology:

Increased accuracy for detection of the hidden fissionable materials compared to existing analogues.
Lower level of secondary radiation compared to PFNA.
Estimated inspection time on the level of less than 5 min/container.

PCT patent application is prepared for protection of the novelties in the technology.

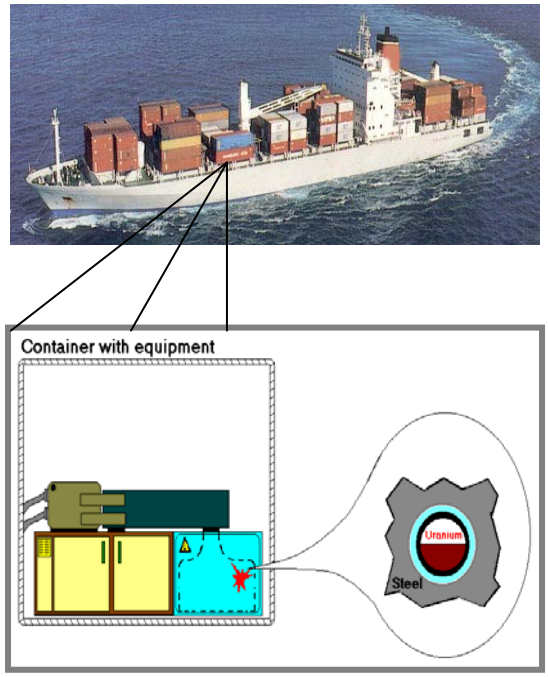

Fig. 1 General scheme of the container with hidden fissionable materials

Areas of Application

The technology can be used by the custom administrations; frontier troops; border guards or other similar state services.

Stage of Development

The concept of the detection facility is created.
Inexpensive components for creation the prototype are available.
We are looking for investors to create the prototype of the detection facility.

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