THE UKRAINIAN TIMES UPDATE
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TUESDAY, OCTOBER 13, 2015

UT DIARY

KAZAKHSTAN

October 21: The international exhibition KazFood will begin in Astana (to October 27).

UKRAINE

October 22: A mixed feed mill will be put up for sale by the Agency of Property and Bankruptcy in the city of Uzhgorod, Transcarpathian region. The initial bidding price of the mill amounts to 4.197 million grivnas.

October 25: Elections to local bodies are expected in the country.

October 26: Metallist Kharkov will play a match for the Ukrainian football championship against Chernomorets Odessa.

RUSSIA

October 27: St. Petersburg will host the Dental Expo (to October 30).

October 28: The 15th specialized industrial exhibition Electronics & Instrument-Making will take place in St. Petersburg (to October 31).

BYELORUSSIA

October 29: Minsk will host the 2nd international specialized exhibition Modern Office (to November 1).

RUSSIA

November 4: A monument to Russian Grand Prince Vladimir who adopted Christianity as the official religion of Kiev Rus will be unveiled in Moscow. It is worth remembering that under his reign Rus became a powerful medieval empire unifying Eastern Slavic nations in the expanse from the Baltics to the Black Sea, from the Volga to Tisza rivers. The empire had strong political, cultural and commercial links to Byzantium and other European and Middle East countries.

90th anniversary of Palladin Institute marks history of rise and development of biochemical science in Ukraine

BY SVETLANA SYTINA

THIS YEAR the Palladin Institute of Biochemistry under the National Academy of Sciences of Ukraine (NASU) marks two significant events: the 130th anniversary of birth of Alexander V. Palladin, founder of the Institute and NASU member (pictured), and the 90th anniversary of the official establishment of the Institute.

Alexander Palladin had been at the head of the Institute for 45 years. The theoretical and practical results of Institute's research at that time became the basis of the scientific trend, namely functional biochemistry and its integral part – neurochemistry. They brought international fame to the Ukrainian school of biochemistry and its founder Alexander Palladin.

At present, the Institute is directed by NASU member Sergey Komisarenko. Institute's activity is aimed to study top-priority, fundamental problems of animal and human biochemistry, molecular biology, biotechnology and nanobiotechnology, as well as to create drug preparations, diagnosticums and bioactive substances, among others, for medical practice, agriculture and veterinary medicine.

Although it is hard to estimate an economic, social and scientific contribution made by researchers of the Institute to a national economy over the course of 90 years of its existence, Dr. Komisarenko considers it very weighty. In addition to the fundamental results of research that were published in hundreds of monographs and textbooks, scientific articles, encyclopedic and historical books of reference, workers of the Institute obtained more than 300 certificates of authorship and patents on their inventions. Among inventions introduced earlier, it is worth noting Vicasol used for accelerating wound healing and blood clotting, the antimicrobic drug Microcide, the anti-cancer agent Mebiphon, the antialcoholic drug Medichronal, sets of highly efficacious additives to fodder, and others.

Thanks to advanced methods of investigation, in recent years scientists of the Institute have made the unique collection of producers of monoclonal antibodies which were the basis for creating test-systems to diagnose a threat of thrombosis and hemostasis on the whole, tuberculosis, diphtheria, whooping cough and some other diseases. They found new evidence of the existence of non-coenzymic mechanisms of the participation of thiamine in activity of nerve cells. This confirms the previously formed hypothesis in terms of the molecular mechanisms of the neurotropic effect of thiamine. Researchers of the Institute have obtained novel results whereby to develop high biotechnologies and nanobiotechnoligies, analytic biosensors, as well as to evolve methods of the chemical modification of naturally occurring bioactive substances.

Today fundamental research continues at 10 scientific departments and six laboratories of the Palladin Institute of Biochemistry and the workers' collective does it possible to carry on investigations up to world standards, preserving traditions established by its founder and retaining universally recognized leadership in its sphere.

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Economic indicators: output

THE LATEST NUMBERS from the State Committee for Statistics of Ukraine show that mining industries decreased output by 20.9% in January-August, compared with the same period last year.

The enterprises that produce food, tobacco and drinks decreased output by 12%.

Woodworking enterprises, pulp and paper, printing industries and publishing houses decreased output by 13.5%.

Chemical industries decreased output by 19.9% in January-August from the year-earlier period.

Metallurgical plants and metalworking industry enterprises decreased output by 22.9%.

Wages on the increase in Odessa oblast

AN AVERAGE MONTHLY WAGE has increased by 834 grivnas to 4,084 grn in the Odessa region since the start of this year. Transportation workers, workers of financial institutions and insurance companies receive the highest pay in the amount of some 7,000 grn per month. On the average 5,763 grn are monthly paid to workers of IT and telecommunication enterprises based in the Odessa oblast.

Unemployment rate declines in Russia

ACCORDING TO OFFICIAL DATA, 4.69 million citizens of Russia were qualified as the unemployed in July. The number of the unemployed was 22,000 less than in June. The Ministry of Economic Development of the Russian Federation forecast that the unemployment rate would account for 6%, or 4.4 million people, in the country this year.

Floating museum to open in Moscow

THE eco-center Museum of the Moscow River is expected to open in the Russian capital city next year. The motor ship Moscow Ecologist with a carrying capacity of 100 passengers will be converted into the floating museum.

The ship will house the interactive exposition River & Man. Not only can visitors to the museum learn about the diversity of flora and ichthyofauna of the Moscow River, but they could participate in all municipal eco-projects.

Russia & Ukraine stock markets (10/09): **MICEX** 1728.44 ▲2.32% **UX** 843.48 ▲0.73% **NEWS**

Ukrainian scientist pinpoints worthwhile directions of development of military technologies

BY SVETLANA SYTINA
THE UKRAINIAN TIMES

GOOD NEWS is that Ukraine has the scientific and technical potential that allows it to be one of the world's top ten manufacturers of military equipment. This potential brings Ukraine $1 billion in annual public revenues.

However, this country has much greater capabilities in the above sphere, according to Vladimir Maslov, head of a department at the Institute of Semiconductor Physics (pictured). For instance, during this year's exhibitions the Kiev-based enterprise Luch showcased its high-precision missiles that are better and cheaper than the latest NATO comparable models. And the Skif missile system rivals the touted U.S. Javelin and France's Milan ER. Developing its military equipment, Ukraine may well join the ranks of the world's top five manufacturers.

After analyzing materials published in open sources, Dr. Maslov pinpointed the most worthwhile directions of the development of modern military equipment and arms. Today it is necessary to elaborate new principles of the creation of defensive systems for armored vehicles, capable of protecting them from destruction by high-energy weapons, because an increase in the speed of missiles to a supersonic level makes protection of the vehicles by existent systems impracticable. There is a need to turn around active protection or apply new principles whereby to improve defensive systems.

Dr. Maslov thinks special attention should be also paid to an increase in the level of protection of electronic equipment from the influence of powerful electronic pulses, as well as to the shock resistance of optoelectronic observation systems. To this end, it is expedient to use the new methods of strengthening and joint of parts, which have been evolved at the Institute of Semiconductor Physics. In addition, the pressing directions of the development of military equipment include the miniaturization of devices, wide use of solid-state semiconductor sensors as well as new materials and nanotechnologies designed to disguise equipment in infrared radiation and radio waves.

Economic indicators: trade

THE EXPORT TURNOVER of Ukrainian goods amounted to $21,679.6 million and the volume of import to $20,267.5 million in January-July, a 34.8% and 37.8% decrease respectively from the year-earlier period. The favorable foreign trade balance worked out to $1,412.1 million, compared with $673.7 million in January-July 2014.

Importantly, export to the European Union fell by 33.9%, compared with January-July 2014. Within the period under review export to Russia, Turkey, China, Egypt and India recorded its biggest volume.

In January-August a retail trade turnover amounted to 647.8 billion grivnas in Ukraine. The share of organized and unofficial markets in the pattern of retail trade turnover accounted for 31%.

The turnover of enterprises of wholesale trade worked out to 744.6 billion grn in January-August.

Kherson shipyard builds tugboats for Panamanian company

THE TUGBOAT ALTAIR has been completed at the Kherson shipyard to order received from a Panamanian company. The vessel 24 meters long has a carrying capacity of 50 tons. At present, the second tugboat is on the stocks in Kherson.

Era of wise asceticism to replace Americanization

ACCORDING TO UKRAINIAN WRITER Andrei Dmitruk, the surrounding world is infected with the virus of liberalism today. "It is clear that capital wants freedom of its circulation, new markets and low-paid manpower doing quality work, among others," he said. "That is why globalization, liberalization and Americanization are well underway."

Their pressure removes any obstacles such as people's customs, the distinctive mode of life and religious dogmas, thereby transforming the patchy Earth into a monotonous market, where only sellers and buyers live.

However, some thinkers forecast the era of wise asceticism. It is essential that people should develop the ideas of a non-economic necessity, namely honesty, charity and a social duty.

Unlike America founded by adventurers and escaped convicts, the Roman Empire had given a good inoculation to Western civilization. Old European countries have retained the sparks of Roman honor and patriotism. Although the West is not so hopeless, the non-economic forms of relations as well as spiritual and moral ideals will very likely revive in the Slavic, Eurasian world.

Denmark to go over to using renewables, natural gas

PRODUCTION OF ELECTRICITY will be mainly based on biofuel, wastes, geothermal energy and wind power in Denmark by 2025. Plans are in hand to renounce production of thermal energy and electric power from coal and oil there by 2030. Reportedly, Denmark will go over to using renewables and the natural gas whose share in the power balance of the country is expected to account for about 45%.

Russia pays tribute to Grand Prince Vladimir the Great

BY VLADIMIR V. SYTIN

A MONUMENT TO RUSSIAN GRAND PRINCE VLADIMIR who adopted Christianity as the official religion of Kiev Rus will be unveiled in Moscow on November 4. Estimated at 94 million rubles, the monument is erected from the design by sculptor Salavat Scherbakov.

It is worth remembering that under St. Vladimir's reign Rus became a powerful medieval empire unifying Eastern Slavic nations in the expanse from the Baltics to the Black Sea, from the Volga to Tisza rivers. The empire had strong political, cultural and commercial links to Byzantium and other European and Middle East countries. Kiev, the mother of Russian cities, was one of the most famous centers of Christian civilization.

Kiev Mini Phone Directory

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INVESTMENT OPPORTUNITIES

Development of high technologies of directional, horizontal drilling to produce methane, shale gas

UKRAINIAN SCIENTISTS have developed the high technologies of directional and horizontal drilling of wells in coal-bearing and shale rocks, as well as in shelf zones of the seas. The technologies, which are now offered to drilling companies, provide for the simulation of processes of operation in consideration of disclosed shortcomings of the trajectory and characteristics of drilling.

Further developments require investments in the amount of $200,000.

The investment project envisages the creation of a mathematical model to describe mechanical behavior of a drill-rod in the shaft of the well that has the complex geometric structure; drafting of methodological recommendations to select the technological conditions of drilling in consideration of exposed imperfections of the trajectory of a well; methodological recommendations to select the trajectory and design of a well; methods for selecting the optimum mixtures of drilling solutions and their treatment; methodological recommendations to forecast complications and breakdowns during the construction of a well, and to select technological measures for their prevention and elimination; technologies of the initial opening of productive beds, their development, intensification of the influx of fluid and an increase in the yield of a well.

Mathematical programs are to be additionally drawn up in order to conceive new drilling projects and test the existent ones at all stages with the help of computer simulation, thereby avoiding breakdowns.

The advantage of the technologies, which will be created within the framework of the investment project, lies in the fact that they are unique in comparison with world techniques with expected characteristics.

The foreign companies, which are distinguished for the high level of drilling, build their approach to designing of oil and gas wells upon the accumulated experience. However, this approach is ineffective during drilling of the deep and extended, curved wells of recent design for lack of a large amount of experience to develop them.

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P.S. Three crucial things to look for when you invest:

1) Flexibility.

2) Emerging-market focus. Currently, multinationals and giant businesses are making hay while the sun shines over the Commonwealth of Independent States.

3) Small is beautiful. The smaller the business, the quicker it gets off the mark and the more likely it is to be innovative.

Advanced developments of Ukrainian chemical scientists are ready for introduction into production

GIVEN THAT water is a unique substance serving as a basis for life on our planet, questions about its structural features have been drawing attention of the researchers who work in the various fields of science over the last century. Liquid water is characterized by relatively low viscosity that suggests the presence of some structural elements (clusters) in it, whose lifetime exceeds essentially the formation and disintegration rates of hydrogen bonds.

The remarkable properties of cell objects such as the high permeability of cell membranes through water, aqueous solutions of salts, hydrophobic and hydrophilic organics can be connected with the cluster state of a substance. Most biocolloid emulsions can be virtually considered as a sort of cluster systems with the participation of different kinds of water aggregates. That is why the evolvement of new experimental methods for registering cluster structures with the participation of water is the urgent task of nanochemistry and nanobiotechnology, which have been developing on an extensive scale in recent years.

One of the few experimental methods that enables the determination of structural features and thermodynamic properties of water in the cluster state has become the method of nuclear magnetic resonance spectroscopy at a low temperature. Using this method, scientists of the **A.A. Chuiko Institute of Surface Chemistry** under the National Academy of Sciences of Ukraine conducted research on the processes of freezing water/organic mixtures in activated carbons, highly dispersed and structure-regulated silica, biopolymers (proteins, polysaccharides and DNA), cell objects for the purpose of finding out processes of the self-organization of a substance in confined space. The effects, which were discovered by them, have been used for improving the storage units of flammable gases (methane and hydrogen), developing bioactive nanosized materials, artificial bone tissues and selective enterosorbents, among others.

As a result, the Institute has prepared the following advanced developments for the introduction into production: the preparation for presowing seed treatment Ecostim that enables a 20-30% increase in the yield of many crops, the diet additive Balzasil ensuring quick detoxication of the organism in case of poisoning of various etiology, the group of bioactive preparations Phytosil that contain the activated mixture of silica and herbs. In addition, experts of the Institute created the effective absorbents removing petroleum products from water, which can be used both in open reservoirs and in torrents purification systems. Currently, bionanocomposite systems to be used for the directed delivery of drug preparations, stimulants of cell activity and bioreplaceable implants, among others, are being created on the basis of biopolymers and silica.

P.S. See business proposals in the Innovation Products & Technologies Exchange on http://vk.com/inexchange

INVESTMENT OPPORTUNITIES

IAPPB researchers develop device for checking carbon monoxide poisoning

CARBON MONOXIDE POISONING is the major cause of all deaths related to intoxication during a fire, the exhaust of fumes from the engines of automobiles, household heaters, boilers and fireplaces, among other things. The effect of carbon monoxide on man's health is due to its strong linkage with a molecule of hemoglobin and the formation of carboxyhemoglobin that reduces the blood's ability to carry oxygen.

In its turn, this entails tissue hypoxia in the organs, which need a lot of oxygen, particularly a heart and brain.

There are many groups of the population that are at high risk of being affected by carbon monoxide. Specifically, the groups include people suffering from cardiovascular diseases, the low level of hemoglobin and chronic lung diseases. The children can be referred to the risk group because they spend a lot of time in playing on the street and have larger lung ventilation as against adults. Further, roadmen, steelmakers, oil-industry workers and the like are also at high risk of being affected by carbon monoxide.

Smokers form the especially vulnerable group of people affected by carbon monoxide. On the average moderate and great smokers have a 5% and 15% carboxyhemoglobin content respectively. Given low concentration of carbon monoxide in the environment, the carboxyhemoglobin content of man's blood does not exceed 2%.

On the basis of their researches into the above problem scientists of the Institute of Applied Problems of Physics and Biophysics (IAPPB) under the National Academy of Sciences of Ukraine have developed a device for checking condition of a man suffering from carbon monoxide poisoning. The device is based on the comprehensive estimation of the parameters, which can determine the dynamics of condition of a person suffering from carbon monoxide poisoning. These parameters embrace concentration of carboxyhemoglobin in blood, activity of the cardiovascular system, hemodynamics, concentration of carbon monoxide and carbon dioxide in expired air. A microprocessor handles the gathered data, performing calculations that results in the determination of a level of carbon monoxide poisoning.

Researchers of the Institute of Applied Problems of Physics and Biophysics hold three patents of Ukraine on this advanced development.

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Hybrid nanomaterials created by Ukrainian scientists to enable increase in capacity of lithium batteries

NEW NANOCOMPOSITE HYBRID MATERIALS, in which the valuable potentialities of an organic and inorganic component are successfully combined, attract attention of many researchers. The organic-inorganic nanocomposites on the basis of conducting polymers and vanadium oxides that have guest-host structure, whose organic macromolecules are mainly located in nanoparticles of the inorganic component, can be used for creating electrode materials for chemical current sources and particularly lithium batteries.

Scientists of the L.V. Pisarzhevsky Institute of Physical Chemistry (www.inphyschem-nas.kiev.ua) have evolved a mechanochemical method for manufacturing nanocomposite hybrid materials. Owing to this method, it is possible to influence purposefully the course of a process and make the materials with preset properties. In addition, the method features high ecological receptivity, compared with traditional sol-gel techniques.

Currently, the advanced development is undergoing laboratory tests for functional electrochemical characteristics. The properties of hybrid nanocomposites are expected to feature a high specific capacity of more than 250 milliamperes per hour/gram over the course of no less than 100 cycles of a full charge/discharge in the potential range of 2.0-2.4 volts in relation to Li/Li. Given this indicator, the above nanocomposites will significantly surpass the existent cathode materials with a capacity of 170 mA per hour/gram, which are based on oxides of transition metals.

Authors hold the U.S. patent on the nanocomposite materials. Also, they are applying for patents in Germany, China and Ukraine.

Today lithium batteries are increasingly used in everything from screwdrivers to golf carts, lawnmowers and cars. They are small, light, hold more energy, keep it longer, run for many more years and do not suffer from not being fully discharged before a recharge. However, the truth is that the above brilliant ideas and techniques are not always commercialized well in Ukraine.The leap into the next generation of lithium batteries means only one thing: invest in the above hybrid nanocomposites.

It is important to note that a demand for better lithium batteries is skyrocketing and the price will soon make an astonishing leap. According to analysts, outside of specialist circles the ensuing shortages are usually a complete surprise that regular investors miss out on.

INVESTMENT OPPORTUNITIES

Technology developed by Ukrainian scientists to help purify air

THE TECHNOLOGY of manufacturing catalytic neutralizers on ceramic block matrices has been developed at the L.V. Pisarzhevsky Institute of Physical Chemistry (www.inphyschem-nas.kiev.ua). The catalysts are designed to purify exhaust gases of internal-combustion and diesel engines from toxic components of carbon monoxide, nitrogen oxides and hydrocarbons, among others.

According to experts' estimates, the share of exhausts of carbon monoxide from motor vehicles accounts for 60-80% of its total amount, which is discharged in the air in large cities. The imposition of rigid restrictions on the toxic content of exhaust gases discharged from motor transportation in the United States and European countries requires the improvement of existent materials and technologies as well as the creation of new ones to make more efficient purifiers of the exhaust gases of internal combustion.

Tests of the Ukrainian catalytic neutralizers, which were carried out at a combustion laboratory of the Pennsylvania State University and engine stands of the Kharkov-based Malyshev plant, showed that the catalysts are capable of purifying exhaust gases from 92-95% of carbon monoxide, 80-90% of hydrocarbons and 95-98% of nitrogen oxides. It has been established by comparative methods of investigation that the Ukrainian catalytic neutralizers surpass their foreign counterparts made by such firms as Walker of Germany and Linda Gobex of Poland in a number of characteristics including activity and efficiency.

The technology developed in the Institute enables 25-50% saving of platinum group metals consumption during the manufacture of catalysts without a decrease in the efficiency of purification and operating life of catalytic neutralizers. According to calculations done by Ukrainian experts, the catalytic neutralizers, which are designed for engines with the effective volume of 1.2-2.0 liters, may cost between 500 and 800 hryvnias.

Other worthwhile spheres of use of the catalytic neutralizers on ceramic block matrices could be purification of waste gases discharged by industrial enterprises and from the stationary engines of diesel electric plants. In addition, the catalytic neutralizers could be used in the high-temperature processes of producing catalysis, for instance, in the catalytic conversion of methane gas in the course of production of synthetic ammonia. Currently, experimental tests of the developed catalysts are being carried out at several chemical industry enterprises.

Scientists of ISP NASU create unique crystals of optical germanium

DURING SEVERAL DECADES optical germanium in the form of bulk single crystals and polycrystals has been one of the basic materials for producing optical elements of infrared devices - lenses, windows, etc. In recent years, however, in connection with the creation of complex infrared optical devices and systems (multiple-lens objectives, modern thermal-imaging systems, etc.), the commercial optical germanium has not always met the higher requirements for this material.

A team of the V. Lashkareov Institute of Semiconductor Physics under the National Academy of Sciences of Ukraine (ISP NASU) came to a conclusion that many shortcomings of the existent optical germanium are due to the fact that this material is doped with impurities replacing atoms of germanium in the crystal lattice (mainly by antimony). Scientists of the Institute proposed to use sodium as an impurity, whose atoms occupy interstices in germanium crystals, not lattice points. Previously, no one succeeded in creating germanium crystals doped with sodium. Moreover, it was regarded as the impossible. Nevertheless such material was developed and patented by the ISP NASU team.

A complete technological line for growing germanium crystals was set up at the ISP NASU, which is the only manufacturer of crystalline germanium in Ukraine today. In the past decade, more than a thousand kilograms of the new kind of optical germanium have been grown and delivered to the United States, Germany, Russia, Switzerland and other countries.

At present, the above-mentioned team of ISP NASU is working on the project that combines two original developments, namely development of a new kind of optical germanium (crystals doped with intersticed sodium) and the evolvement of a modernized method of directive solidification of germanium. The implementation of this project will make it possible to grow large plates of sodium-doped optical germanium with the area of 600 square centimeters, weighing up to 25 kg. The optical systems that include elements made from those crystals will have improved optical characteristics and particularly enhanced resolution.

INVESTMENT OPPORTUNITIES

Ukrainian compact biosensor opens up new horizons in medicine

THE NEW METHODS of medical research, which are based on such optical effect as surface plasma resonance (SPR) in metal films, have appeared of late. The SPR enables direct registration of the surface interactions of biomolecules and cells without use of a radioactive marker or enzyme marker. Undoubtedly, this opens up new horizons in the application of immunologic methods and creation of novel equipment.

Scientists of the V. Lashkareov Institute of Semiconductor Physics under the National Academy of Sciences of Ukraine conduct experimental research into applied aspects of the creation of biosensors on the basis of SPR. The operating prototype of a device (pictured), which has been developed by experts of the Institute, is used as a biosensor for scientific research, laboratory analyses and the diagnosis of diseases. By comparison with traditional methods, the main advantages of this device are the possibilities for getting rapidly information, doing the direct and noncontact examination of biological liquids, analyzing the dynamics of the disease process and the effectiveness of therapy, as well as for dispensing with the necessity of using expensive reagents.

In particular, SPR can be used to diagnose the glioma of the brain. Marker methods of the early diagnosis of cancer for this disease have not been discovered yet. Preliminary research done in cooperation with the A. Romodanov Institute of Neurosurgery under the Academy of Medical Sciences of Ukraine has pointed out the possibility for detecting the glioma at various stages of malignancy with the help of the above prototype of the device. In addition, the research proved viability of the device for determining the effectiveness of therapy of the disease and its relapses if any.

The device, which is called Plasmon, can be used to analyze a state of the immune system, genetically determined diseases and the processes of aging. The experts of the Institute have already accumulated positive experience of the use of Plasmon in veterinary medicine, particularly in the diagnosis of leukemia (a saliva test). Also, the device can be employed in pharmacology and the food industry, as well as in controlling potable water pollution and other spheres. Conducting research without such devices as Plasmon is like trying to send people upon the space shuttle with a pencil and paper.

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Ukrainian scientists work on project of creating space-based solar power satellites

ONE OF THE POSSIBLE PATHS of development of power engineering is the creation of space-based solar power satellites (SBSPS). An inflow of solar energy into the Earth exceeds the needs of mankind for it by 10,000 times.

However, this energy is rather dissipated: a daily level averages 0.243 kilowatt per square meter. At the same time, a stream of solar energy is continuous and it amounts to 1.36 kw./sq.m. in circumterrestrial space. Placing converters of solar energy in orbits of the Earth would enable a considerable increase in possibilities of the concentration and distribution of energy to consumers on the Earth's surface and in space. Also, the prospective trend of use of the SBSPS is the organization of production in space, particularly remelting of the last stages of carrier rockets for the purpose of processing aluminum.

At present, research on SBSPS is done by space agencies of the United States, Japan, Russia and Ukraine. France, Germany and Canada study the possibility for building such stations as well. Such companies and institutions as Boeing Aerospace Corp., Lockheed Martin Corp., Grumman Aerospace Corp., Rockwell Inc., EADS Astrium, Ontario Power Generation, Space Energy Inc. and the Lavochkin design office take a keen interest in space power engineering. Despite a considerable number of published works on various aspects of the construction of solar power stations, research on the development of attitude control algorithms of such objects is virtually absent.

The purpose of the project, which employees of the S.P. Timoshenko Institute of Mechanics under the National Academy of Sciences of Ukraine work upon in conjunction with the Institute of Technical Mechanics, the State Space Agency of Ukraine and the state design office Yuzhnoe, is the creation and development of mathematical models, methods for the analysis of dynamics as well as SBSPS attitude and configuration control algorithms. It is expedient to use the results of the project for designing of the control systems of SBSPS and other spacecraft. In particular, economic advantages and reliability of such systems would enable a considerable cutdown in SBSPS building time.

It is worth noting too that the market for the geostationary satellites – that hang in a high orbit above the equator – is set to skyrocket by 10-20%. Experts value the commercial satellite market at $52.7 billion in the next 10 years.

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INVESTMENT OPPORTUNITIES

Helios-1 cryometer designed to determine mass of organic compounds, polymers

SPECIALISTS of the Institute of High-Molecular Compounds under the National Academy of Sciences of Ukraine have developed and manufactured the prototype of a device for determining the mass of organic compounds and polymers. Unlike the comparable devices that are used today, the brainchild of Ukrainian scientists called Helios-1 is compact, user-friendly and inexpensive.

Its design allows simultaneous measuring of the freezing point of a solution and solvent by means of two probes. A measuring procedure embraces the whole range of low-molecular polymers that are widely used for the technologies of making polymeric products. The accuracy of chemical analyses accounts for ±5% and measuring lasts no more than an hour.

According to experts of the Institute of High-Molecular Compounds, their device is unique and its manufacture can be rapidly organized because the prototype of Helios-1 has already been made and it tested successfully.

Ukrainian scientists develop technology of purifying sewerage in towns

A GROUP OF SCIENTISTS of the Institute of Bioorganic Chemistry and Petrochemistry under the National Academy of Sciences of Ukraine has developed the new concept of the intensification of biological processes of purification designed for small cities. In particular, the concept provides for the replacement of primary settlers by anaerobic EGSB-reactors with the expanded layer of granules and sand. This concept formed the basis of the innovation technology of purifying the municipal drains and has already been applied in the course of reconstruction of sewage purification plants in the town of Kanev, Cherkassy region.

Traditional technologies require two-hectare areas under sludge of sewage water from the Kanev purification plants, whereas only 0.5 hectare was allocated for applying the new technology. As a matter of fact, the results of exploitation of sludge areas over the course of two years showed that a mere 0.12 out of 0.5 hectare was used. In addition, one-time discharge of sludge from the reactors was determined in rated operating conditions. It amounted to only 50 cubic meters within 15 days.

The technology developed by researchers of the Institute of Bioorganic Chemistry and Petrochemistry does not require large outlays for energy, sludge gives away water readily and the obtained material can be easily transported and processed by means of certain methods.

Using nanotechnologies to enhance selectiveness of action of anti-cancer drugs

IN CONSIDERATION OF EXISTENT NOTIONS about the molecular-biological nature of changes in malignant cells the modern strategy of solving the problem should build upon the utilization of new technologies of diagnostics and target therapy. Such approach can be ensured by the application of innovation nanotechnologies.

At present, a technology has been developed at the **R.E. Kavetsky Institute of Experimental Pathology, Oncology and Radiobiology** to produce a nanocomposite containing the nanoparticles of ferric oxide (III), which have been obtained by means of a chemical synthesis and quantum-beam technologies:

- methods of control over the physicochemical properties of components of the nanocomposite have been selected at the every stage of its creation;
- various methods for producing liposome complexes of anti-cancer drugs with ferric oxides have been approved;
- a series of experiments have been made, and it is established that the obtained nanocomposite demonstrates high cytotoxic activity aimed at malignantly transformed cells, compared with the free form of a chemotherapeutic drug;
- dependence of a mass of accumulated particles of magnetite in capillaries on the velocity of magnetic fluid and duration of the action of a permanent magnetic field upon it has been established;
- the time, which is required for concentration of magnetic nanoparticles in capillaries of a model system at the steady velocity of the flow of liquid, has been specified.

As a result of further studies, a new pharmaceutical form will be developed on the basis of nanocomposites and preclinical research into its efficacy is to be done. Also, the complex of equipment will be designed for concentration of magnet-guided ferrous particles.

Technology enables Ukrainian scientists to make unique ceramic coats, materials for medical implants

THE ACHIEVEMENTS OF MODERN BONE SURGERY are mainly determined by quickly improving quality of the implants used as spare parts to repair bones. The number and variety of operations with the application of implants are on the steady increase. In many cases implantation is the only method for saving not only the ability to work but also a life.

Metal is the main material for making implants because it has high strength. However, metal and a bone cannot knit as the former blocks all electrical nervous impulses and discharges toxic ions into the body. On the other hand, bioactive ceramics and a bone knit well, though mechanical properties of the ceramics are much worse than the properties of metal. It is possible to combine the best qualities and correct defects of the above materials by using ceramic coats on metal implants.

The technology developed by scientists of the V. Lashkareov Institute of Semiconductor Physics, together with research workers of the I. Frantsevich Institute of Problems of Materials Science under the National Academy of Sciences of Ukraine, has allowed them to get various ceramic coats whose characteristics surpass the bioactive ceramic coats, which are industrially made by world leading producers today. Given that this technology is highly efficient and has low power and materials consumption, the cost of Ukrainian mass-produced implants will be 5-10 times lower than the cost of imported implants. The needs of Ukraine for hip joint implants alone exceed 15,000 while the needs for dental implants are estimated at millions of pieces.

The purpose of further work of the Ukrainian scientists is to bring laboratory findings to experimental-industrial technologies, improve the properties and materials of coats, expand their assortment as well as to develop new generation bioactive nanostructured ceramic composites for tackling diverse tasks in medicine. Bioactive ceramics have unique biocompatibility since an organism does not take them as a foreign body. Moreover, the ceramics never trigger negative immune, enzyme, allergic or other reactions.

In addition, the bioactive ceramics can be given bactericidal properties, thereby liquidating centers of infections and inflammations in the body. Also, the ceramics can be used to maintain the homeostasis of bioactive elements as well as to deliver and isolate locally drug preparations that reduces substantially negative side effects, for instance, in the course of oncotherapy.

Threads with bioactive coat designed by Ukrainian scientists for surgery

TODAY surgical threads must meet many requirements. They are supposed to be strong; the sutures must not disturb the flow of blood and cause inflammation.

Importantly, the surgical threads must have such properties as biocompatibility, nontoxicity and the color that facilitates their visualization, among others.

Characterized by the "nucleus-coat" structure, the surgical threads, whose surface has a medicinal coat made from a biocompatible polymer, satisfy the above requirements. Given the rational selection of a composition and thickness of the coat, this simple technique enables a substantial improvement in the quality of the sutures produced from synthetic polymers.

Scientists of the Institute of Applied Problems of Physics and Biophysics under the National Academy of Sciences of Ukraine chose the naturally occurred polymer chitosan as a coat put on the surgical threads. Chitosan is totally harmless to the human body and this polymer endures the requisite sterilization without changing its properties.

It should be mentioned that specialists of the Institute conducted laboratory tests of the technology of making the sutures with a bioactive, polymer coat based on a nanocomposite containing chitosan and the natural aseptic *propolis,* or bee glue.

Applying this technology, the Ukrainian scientists have created 10 kinds of the surgical threads whose advantages include a cut in capillarity by 6-10 times and the regulation of a time of their absorption.

Researchers of the Institute of Applied Problems of Physics and Biophysics hold five patents of Ukraine on the aforesaid products.

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Screener tests body for radionuclides, selects efficacious therapies

DEVELOPED BY SCIENTISTS of the Institute of Geochemistry of the Environment, the automated complex Screener is used in clinics in many countries today. It is designed for the snap analysis of contamination of the human body with radionuclides.

Specifically, Screener enables quick monitoring of the whole body, testing it for low-activity radionuclides. Moreover, the complex can be used for selecting the most efficacious sorbents and other therapies to remove radionuclides from the body.

It is important to note that a gold medal was awarded to the Ukrainian development engineers of Screener at the international high-tech forum in Brussels.

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INVESTMENT OPPORTUNITIES

Nanotechnologies enable creation of reliable joints of parts of optoelectronic devices

AS IS KNOWN, the reliability of joints of parts ensures the efficiency and precision of optoelectronic devices. This is very important for operation of the devices under extreme conditions. For instance, malfunctioning of the Hubble space telescope in 2007 was due to the loss of properties of glued joints of parts of a spectrophotometer.

Today it is possible to improve substantially the mechanical potentialities and reliability of joints with the help of nanotechnologies. Experts of the V. Lashkareov Institute of Semiconductor Physics under the National Academy of Sciences of Ukraine have established that new physical effects of strengthening develop in connecting nanolayers. Specifically, it is established that the connecting layer of aluminum less than 100 nanometers thick becomes highly strong and loses ductility in the nanodiffusive joint of parts made from the optical glassceramics Zerodur (Schott, Germany). That is why the parts, which are connected by the developed technique, retain a position relative to each other to a high precision and stability.

At the same time, the new nanoglue materials, which were developed by the Ukrainian scientists, have brought the properties of glued joints nearer to indices of the strength and reliability of the nanodiffusive joint of parts. This has enabled the creation of the innovation package entitled "New Substances and Technologies for Precise Joint of Parts of Optoelectronic Devices". In particular, the Ukrainian scientists have found several scientific-technical solutions for making the cell sandwich structures from the glassceramics Zerodur or silicon carbide whose degree of lightening can account for 90-92%.

Creators of the new materials and technologies of the joint of precision parts are open to cooperation and can offer manufacturers and developers worthwhile solutions for making unique devices.

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Surfactants synthesized from renewable raw products are the basis for lubricants, composite technological systems

TODAY the greater part of raw materials and energy turns into wastes in 42 days after material values have been produced. And wastes make an unfavorable effect on the environment.

One of the ways of slowing down the negative influence of technical activity on the biosphere is the application of renewable vegetable raw products in combination with a simultaneous increase in the efficiency of resources both at the stage of processing and in the course of creating and using new substances and materials. Development of the world biomaterials market on the whole and particularly its essential part – the market for surfactants, oils, lubricants and functional additives – looks dynamic and promising.

Headed by Grigory Pop, Doctor of Chemistry, scientists of the department of surfactants at the Institute of Bioorganic Chemistry and Petrochemistry under the National Academy of Sciences of Ukraine have synthesized numerous surfactants from vegetable oils and byproducts thereof as well as created composites with several technical uses on their basis. In particular, for the first time in world practice they proved conclusively that the optimal combination of the properties of natural phospholipids with deepening of synthetic transformations and the adding of nitrogen, phosphorus and sulphur enables an increase in surface activity and resistance of synthesized surfactants to oxidation as well as the extension of a complex of new useful properties to them. The uncovered mechanisms of their regulation form the basis of the creation of efficient composite lubricants providing long-term protection and high tribochemical activity on the surfaces of friction nodes. In quality motor, hydraulic and transmission oils developed by the scientists of the Institute are second to none of the best comparable products the world over. Further, conservation oils created by the Institute provide the long preservation of metal structures and hardware while plastic oils possess improved anti-wear, tearproof, protective and ecological characteristics.

Using oleosynthetic surfactants, specialists of the Institute have also drafted scientific laws of the creation of water-fuel microemulsions whose application ensures 10% saving of hydrocarbon fuel, a reduction in thermal stress of engines and 10-15% increase in their service life. At the same time, the application of the microemulsions enables a 30-40% decrease in the toxicity of exhaust gases and noxious nitric oxide, carbon monoxide, sulphur oxide, as well as hydrocarbons and the solid particles of soot.

Stabilized by oleochemical surfactants, light invert dispersions (LID) whose density amounts to 480 kilograms per cubic meter, as well as the LID-based technology of damping and developing oil and gas wells form the unique technological system with software support and the automated selection of ingredients. At present, such system provides reliable and quality damping of wells under conditions of reservoir pressure ranging between 0.3 and 0.6 of the hydrostatic one. Its essential factor is the maximum level of safety from gushers during repairs. The technology tested good at gas wells of the Yamburskoe condensed gas deposit in Russia. The introduction of LID during the repair of a well yielded the economic effect in the amount of 4-8 million rubles.

After conducting market research the scientists of the Institute of Bioorganic Chemistry and Petrochemistry calculated that production of 10-15 million tons of rape oil per year and its use for domestic consumption could allow Ukraine to embark upon the path of step-by-step transition to renewable energy and raw materials, which would lead to an improvement in ecological condition of the earth, reservoirs and the air.

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INVESTMENT OPPORTUNITIES

Ukrainian scientists develop new magnetically sensitive pharmaceutical form to be applied in oncology

IN RECENT YEARS work on the creation of nanoclinics, namely magnetically sensitive nanocomposites with multi-level hierarchical architecture and functions of biomedical nanorobots, has acquired priority significance in world science. This complex of functions includes recognition of specific microbiological objects in biological media, the delivery of drugs to targeted organs and cells, magnetic resonance diagnosis and cytotherapy, adsorption of cellular debris after the therapy and their removal from the body with the help of a magnetic field.

Scientists of the A.A. Chuiko Institute of Surface Chemistry under the National Academy of Sciences of Ukraine (NASU) conducted thorough research for the purpose of substantiating the concept of chemical design of magnetically sensitive nanocomposites with multilevel hierarchical architecture and functions of biomedical nanorobots, as well as proved their functional potentialities by experiments.

One of the practical results of the above work is the development of a new magnetically sensitive pharmaceutical form, which will be applied in oncology. Experts of the R.E. Kavetsky Institute of Experimental Pathology, Oncology and Radiobiology under the NASU, together with their colleagues from the A.A. Chuiko Institute of Surface Chemistry, have evolved and patented a method for enhancing antitumor activity of the chemotherapeutic drug called cysplatin. The cytotoxic effect of the drug is heightened in vitro and in vivo owing to its combination with the nanoparticles of magnetic fluid that brings about a twofold increase in destruction of tumor cells without additional toxicoallergic side effects, compared with the free form of a drug. This method can be used now in clinical practice for treating malignant growths.

To implement the results of scientific research in practice and organize the mass production of a new pharmaceutical form, specialists of the A.A. Chuiko Institute of Surface Chemistry have elaborated a provisional flow chart in terms of the manufacture of the substance Magnetite-U and obtained patents on it.

New technology can help resolve MSW problem

RESEARCHERS of the Institute of Bioorganic Chemistry and Petrochemistry under the National Academy of Sciences of Ukraine have developed the complex technology of purifying filtrates of a dumping ground with municipal solid wastes (MSW). In addition, the technology can help resolve the problem of concentrated residue, which is left at various stages of purification. Overall, this method includes stages of the preliminary reagent-oxidizing purification of filtrate, its final purification by the system of back osmosis, and discharge of purified water in the environment through a bioplateau.

A process chart provides for the formation of two flows: clarified filtrate and concentrated residue. To fix the residue, specialists of the Institute suggest the original recipe: the homogenization of filler, namely cinders from thermal power stations, in the amount of concentrate. The unique properties of such cinder ensure the irreversible adsorption of components of the concentrate. To effectuate the above process, a pilot plant was designed and manufactured at the Institute. Also, the researchers have evolved another method for molding the obtained substance into articles that can be used as building materials.

The technique is simple and it does not require the considerable expenditure: disposal of one cubic meter of concentrate by cinders from thermal power stations costs no more than five hryvnias. The obtained material can be effectively substituted for clay, which should be used on a point of order for burying garbage under its layers in landfills. Besides, one of the clear advantages of this technique lies in the fact that to dispose of one toxic product of technogenic origin, other technogenic wastes are used, and safe material comes out. According to the findings of a sanitary examination by public health experts, the product binding MSW concentrate in Kiev-based landfill No. 5, which has been made by means of the pilot plant, does not entail environmental pollution but complies with sanitary legislation of Ukraine. The experts also came to the conclusion that operation of the Institute's pilot plant did not cause abuse of the environment.

Innovative engineering solutions, methods for diagnosing solar panels

A GROUP OF UKRAINIAN SCIENTISTS seeks partners (investors) to implement the project, which will enable an increase by 20 years in service life of solar panels as a result of the possibility for diagnosing defects in photoconverters at all stages of production and operation of solar batteries without their dismantling. In particular, the project provides for new solutions for the more effective (10 times as much) heat removal that will permit prevention of degradation of photoconverters, maintaining the efficiency of solar panels.

These engineering solutions are supposed to enable a cut in the cost of electricity, which is generated by solar panels; lessening of the risk of fire and shutdowns due to overheat of a defective battery; as well as a reduction in the negative impact on the environment by decreasing the amount of waste batteries by 5-10% for each year of service.

The Ukrainian scientists offer to form a joint venture in Ukraine or other country. Also, they may sell a license including a know-how transfer and training of personnel that is feasible within six months.

Ask for more information at any point below:
tel.: +380 97 207-3122, e-mail: ukrtimes@yandex.ru

Results of fundamental research done by IMP have wide application in actual practice

THE DEVELOPMENT OF TECHNOLOGIES of making materials with preset properties, particularly the Invar steel alloys containing some 36% of nickel that have a low coefficient of thermal expansion, is one of the most important lines of activity of the G.V. Kurdyumov Institute of Metal Physics (IMP) under the National Academy of Sciences of Ukraine. However, using standard Invar alloys as structural materials is restricted because of their insufficient strength.

Applying their new technology, scientists of the Institute have obtained materials containing the much less amount of expensive nickel. Importantly, their research also resulted in the creation of materials with anti-Invar properties, which expand when a temperature goes up. In addition, this research serves as a basis for development of a device for testing materials for their thermal expansibility.

Another technology developed by researchers of the Institute enables the cost-effectiveness and streamlining of production of components from titanium alloys since it is geared to make titanium alloys by means of powder mixtures, as well as with the help of simple techniques of pressing and sintering.

Titanium is the unique material. Whereas the stress-strain properties of titanium are similar to those of steel, the former is two times lighter and has high resistance to corrosion. Given its biological inertness, titanium is used as the basis for making medical implants.

Furthermore, Ukrainian scientists are tackling the problem of methane emissions in coal mines. IMP experts worked out the technique of obtaining methane from mined coal. The technique enables further use of this coal, although it will burn with less heat. Meanwhile, researchers of the Institute of Mining Process Physics have designed a device for forecasting methane emissions.

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Nanotechnology developed by ISM can provide consumer goods with antibacterial properties

THE EFFICIENT TECHNOLOGY of producing concentrated liquid additives of nanometals – silver, gold, copper and their mixtures on the basis of food glycerin, polysaccharides, natural and synthetic oils – has been developed at the V.M. Bakul Institute of Superhard Materials (ISM) under the National Academy of Sciences of Ukraine (NASU). The innovative physical method for producing nanometals and implanting them in liquid bases in a single technological cycle in a vacuum provides for the exceptional purity of liquid nanoadditives and the absence of the slightest chemical contaminations. The technological capability to control the sizes and concentration of these nanoparticles enables specified antibacterial, antiviral and fungicide properties of the nanoadditives that easily mix health-and-beauty aids such as liquid soap, shampoos, fungicidal foot gels and impregnating compounds for bactericidal napkins. Moreover, the above nanoadditives provide the health-and-beauty aids with the novel antibacterial and antiviral properties, which have been unattainable up to now.

The tests of properties of nanoadditives developed by the ISM were conducted at the D.K. Zabolotny Institute of Microbiology and Virology under the NASU in accordance with methods adopted by the World Health Organization. It must be noted that the tests proved high activity of the specified concentrations of suspensions of the biocide nanoproduct Silver Shield-1000 in relation to herpes viruses, stomatitis and influenza including the swine flue H1N1.

All over the world the great sector of the application of nanoadditives embraces the modification of paints, varnishes and plastics for the purpose of providing them with self-sterilization properties so that they can be used in hospitals, means of transportation, densely populated areas and veterinary medicine. The nanoadditives Silver Shield-1000 and Nanoagent+ developed and produced by the ISM are easily added to finished products because they can be made on the basis of ingredients of these products that gives them new consumer qualities without changing the traditional technology of their production.

Exceptionally pure and nontoxic nanoadditives can be used for preserving foodstuffs as well as for treating contact surfaces at public catering establishments and in everyday life. Conducted at the L.I. Medved Institute of Toxicology & Ecohygiene under the Health Ministry of Ukraine, a series of tests of the nanoproduct Silver Shield-1000 proved the lowest possible level of its toxicity for a man and animals. The ISM received a relevant toxicological-hygiene passport of a colloid solution of silver in the food glycerin Silver Shield-1000.

Together with the Sumy-based National Medical University, the ISM took out patents on the use of solutions of the nanoproduct Silver Shield-1000 for sterilizing milk infected with staphylococcus. In this way the problem of disinfection and utilization of the substandard milk, whose share in large farms accounts for 25%, can be resolved today.

Authors of the technology and equipment for the production of nanoadditives in various liquids on an industrial scale are ready to sell the equipment and are open to the joint development of new special-purpose nanoproducts.

Team of British, Ukrainian and Turkish scientists is ready to include first investors in applications for international grants for innovation project in the field of medicine

THE PRESENCE of pathogens (viruses, the simplest microbes) in human blood plasma plays an important role in development of many serious diseases including HIV, hepatitis C, sepsis and a number of other dangerous infections.

As is known, virtually all pathogens of a man contain nucleic acids. If certain chemicals called photosensitizators are added to the pathogen-containing medium, say, human blood plasma, and this mix is irradiated by visible light or soft ultraviolet, these photosensitizators are irreversibly bound with nucleic acids and they stop the replication of pathogens.

At present, this principle is applied to guaranteed elimination of viruses from donor's blood plasma. However, this process takes several hours.

The international team of scientists has evolved the one-minute method of deactivation of pathogens found in human blood plasma. The basic element of this method is the original sorbent whose application enables an increase in photosensitizator concentration and, therefore, a decrease in the time of plasma photoprocessing. After this, the photosensitizator is completely removed from the fluid, and live pathogens decrease in number by 1,000 to 100,000 times.

Previously, these sorbents were widely used in therapy of hepatic, kidney and multiple organic insufficiencies in Ukraine, Russia and Uzbekistan as well as during treatment given to Chernobyl victims.

The proposed concept and device can be used in bioprotection to cure victims of terrorist attacks made by means of the natural and genetically modified pathogens, which are not sensitive to conventional antibiotics treatment.

This method may be the vital element of comprehensive treatment for the hepatitis C (300 million victims in the world) and AIDS (more than 50 million victims) because it will lessen a body viral load and bring about positive changes in body immune defenses. For instance, the 12-month program of treatment for the hepatitis C that costs $23,000 on the average can become a six-month program owing to only one photodynamic seance before treatment. There are good grounds to think it is feasible to cut the incidence of the hepatitis C, which is resistant to modern therapy, that is equal to 40-50% of the total number of diseases today.

In addition, the method can be used in treatment for the relapsing infections whose reliable therapies have not been developed yet.

The proposed project has a solid scientific and technological basis formed by Ukrainian, British and Turkish scientists. A period of preclinical trials of the method, including tests of the unique device designed for the extracorporeal "sterilization" of human blood plasma, will range from three to four years. The work is valued at five million euros. The research will be financed at the expense of international grants, support of charitable foundations and the medical industry.

POSSIBILITIES FOR REPAYMENT OF INVESTMENTS

1. Inclusion of an investor in applications for international grants.
2. Issue of joint patents.
3. Sale of licenses of the technologies, which are being developed.
4. Manufacture of equipment for treatment according to the method.
5. Opening of the clinics that will employ the method.

The Brighton University (UK) has been defined as a business partner in charge of financial matters of the project.

Authors of the project herewith inform interested partner(s)-investors that they are open to discuss and receive venture capital participation through their representative, the investor relations agency *Ukrainian Times*.

If you are interested in participation, please send your e-mail to **ukrtimes@yandex.ru** for the attention of Svetlana Sytina, director of the IR agency *Ukrainian Times* that represents the interests of the Company.

ISM designs precision diamond tools for turbine construction industry

AT PRESENT, the United States, Japan, Germany, Britain, Italy and France use up to 80% of minable, natural and synthetic diamonds for outfitting tools with them. Some 70% of superhard materials are employed for tooling.

The potential of scientific research on the improvement and development of the processes of working various products by tools made from hard alloys and superhard materials is on the steady increase. Importantly, the V.N. Bakul Institute of Superhard Materials (ISM) under the National Academy of Sciences of Ukraine is one of the world centers of diamond business. Activity of the ISM is directed towards the formation of scientific basics of creating the novel technologies of metal and nonmetal working by tools made from hard alloys and superhard materials, as well as towards the development of techniques of using new tool materials in key industries.

The innovative character of ISM engineering developments lies in the fact that a high-precision correcting tool made from synthetic diamonds has entered the tool products market. This tool enables precision profiling of abrasive discs up to the FEPA standard.

To supply such tools to Ukrainian industry with a view to introducing extensively deep polishing of the conjugated surfaces of vanes of gas-turbine engines, the ISM has designed galvanic correcting rollers on the basis of synthetic diamonds and developed the technological process of their manufacture. This technology ensures enhanced durability and precision of the rollers. The cost of rollers made from synthetic diamonds is 10-15 times less than the cost of their counterparts produced from natural diamonds.

Operation testing of the rollers showed that the correcting tool of ISM make fully meets technical specifications set by customers.

Ukrainian scientists innovate water purification technology

TODAY various sorbents, which collect contamination, are used for purifying water. However, sorbents often take up so much dirt that they turn into dangerous sources of environmental pollution.

That is why scientists tackle the alternative technologies of water purification, which are based on a physical effect on liquid and do not require costly materials, filters and sorbents. One of these technologies has been developed by scientists of the Institute of Geochemistry of the Environment under the National Academy of Sciences of Ukraine.

Based on the use of electric current, the technology enables not only purification of water but also its disinfection. At the heart of it there is the powerful discharge of electricity akin to lightning, which is passed through water in a chamber.

Despite its large size, a purification plant designed by Ukrainian specialists is easily transportable. Therefore, it is capable of purifying liquid wherever there is need.

According to the inventors, their plant can purify liquid from any substances, even from radionuclides. It was oftentimes used for purifying waters at uranium mines and urban agglomerations, as well as for desalinating water. The high temperature and pressure, which are caused by the powerful discharge of electricity, destroy all microorganisms while water is automatically decontaminated.

The plant has a capacity to purify one ton of liquid per hour and its efficiency can be increased to 10 tons/hour. Importantly, the scientists point out energy efficiency of the plant as the purification of one cubic meter of water requires no more than two kilowatts of electric power.

The water, which has been purified by electric current, is suited for industrial use only. Additional purification with the help of standard techniques can make it drinkable. No other method can disinfect water at such a high level as the above technology, to say nothing of decontamination from radioactive products.

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Institute of Gas develops up-to-date technologies in the field of energy resources

ACCORDING TO SCIENTISTS of the Institute of Gas under the National Academy of Sciences of Ukraine, use of alternative energy should be combined with the introduction of the energy saving technologies that do not envisage the replacement of natural gas by biofuel. Today the Institute conducts research in the field of the applied theory of combustion, thermodynamics, interphase heat and mass exchange whereby it projects new thermotechnological processes and designs novel equipment.

The greater part of Institute's engineering developments is designed for use in industrial production and the metal industry in particular. Given that the energy intensity is one of the vulnerable spots of Ukraine's metallurgy, scientists of the Institute are developing the technologies of recirculation of gas.

A switchover to alternative fuel is connected with the problem of technical re-equipment. That is why natural-gas production in Ukraine, from scientists' point of view, will remain a strategic priority for a long, long time.

Specialists of the Institute of Gas are studying the possibility for production, storage and transportation of the hydrates of methane, which are sea crystal compounds formed by the chemical combination of water and gas. In prospect the hydrates of methane could become an alternative to liquefied natural gas. Currently, the scientists are simulating the techniques of production of the hydrates of methane through their displacement by carbon dioxide.

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New techniques of early diagnosis developed at Institute of Molecular Biology and Genetics

THE PROBLEM OF MODERN DIAGNOSTICS in the sphere of public health services is vital to all countries and Ukraine in particular. Unfortunately, this country still lacks a program for the early diagnosis of such serious cases as diabetes mellitus, cardiovascular and oncologic diseases.

The existent, relatively reliable techniques of the diagnosis, for example, tomography, are either harmful to a living organism or too expensive for wide-scale application. Moreover, these techniques cannot locate pathology in cells.

However, scientists of the Institute of Molecular Biology and Genetics under the National Academy of Sciences of Ukraine have developed the new techniques of the early diagnosis. Although this is fundamental research, the results enable development of monoclonal antibodies to detect proteins, which are used in diagnostic test systems. Analyzing blood of a patient, even now it is possible to detect pathology even so there is only one damaged cell.

ISPE, Byelorussian partners organize production of sorption columns with novel hemosorbent

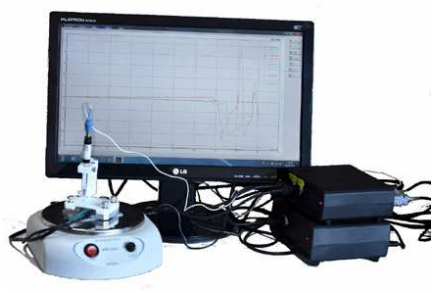
SCIENTISTS of the Institute of Sorption and Problems of Endoecology (ISPE) under the National Academy of Sciences of Ukraine developed the new generation carbonic hemosorbent Karbon. Thanks to original scientific and technological solutions, Karbon enables the efficient removal of not only small molecules from the blood during hemosorption, but also molecular compounds.

The results of comparative clinical trials showed that Karbon has a more marked sorption capacity and other superior qualities than commercial carbonic hemosorbents within the Commonwealth of Independent States.

Karbon is designed for the purification of blood in the cases of a liver coma, poisoning by various toxins, acute and chronic kidney insufficiency. It is the therapeutic substance, which is efficacious against toxicoses caused by tissue inflammation and breakdown, as well as against peritonitis, pancreatitis, sepsis and burns in particular.

The ISPE, together with the Byelorussian Medical University and the Minsk-based firm Pharmavit, have implemented a comprehensive innovation project that resulted in the organization of production of sorption columns with Karbon in Byelorussia. These columns are used for purifying blood.

Unique multibiosensor set is capable of enhancing efficiency of hemodialysis



AS IS KNOWN, hemodialysis is the system of procedures, which saves millions of lives. However, it has two serious disadvantages: a high price and inconvenience to patients.

Happily scientists of the Institute of Molecular Biology and Genetics under the National Academy of Sciences of Ukraine, together with the Institute of Semiconductor Physics, have developed a unique multibiosensor set and successfully tested it in laboratory conditions. The set is capable of cheapening hemodialysis, streamlining it and enhancing its efficiency.

A part of research was done in cooperation with experts and scientists engaged to work in the industrial sector. In addition, it is important to note that the Toulouse-based firm Hemodia, which manufactures sets designed for hemodialysis, takes a keen interest in the Ukrainian biosensor with a view to determining creatinine in the blood of hemodialytic liquid.

Designed for chemical, medical and ecological monitoring, Ukrainian multisystems envisage use of small, fast sensors that are compatible with standard microelectronic technologies and suited for mass-production.

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IED has experience of many years to design electromobiles

SCIENTISTS of the Institute of Electrodynamics (IED) under the National Academy of Sciences of Ukraine have experience of many years to design electromobiles, electrocycles and even electric tractors.

Five models of electromobiles were designed in cooperation with specialists of the Russia's biggest auto maker AvtoVAZ and the Zaporozhye-based automotive factory AvtoZAZ on the basis of electrical equipment developed at the IED. Two electrocycles with a carrying capacity of 400 kilograms have been successfully operating at the Grishko Botanical Garden in Kiev for several years.

Also, experts of the Institute participated in development of the electromobile ZAZ Lanos Pick-up, hybrid electromobiles on the basis of the passenger car Tavria, the passenger and freight vehicle GAZ-2752 Sobol (pictured), and the farm machine using a chassis of the tractor T-16 as the base. It must be noted that the hybrid electric tractor, which passed field tests in 2013, is equipped with the unique system of recharging an accumulator. This system stabilizes operation of a diesel generator and thereby makes it more economical on fuel.

In addition to power equipment for electric transportation, IED scientists developed an auxiliary semiconductor device, as well as the original system that enables registration and the collection of data when testing electric vehicles in operation.

The Institute of Electrodynamics invites manufacturers and investors concerned to consider cooperation with it.