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MESSAGE FROM NEIL B. GODICK

Russia, the world's largest country in terms of land mass, is divided into 7 federal districts. For regional governing, these 7 federal districts are broken into 47 oblasts, 22 republics, and 9 krais. Individual retailers and the districts will be affected in different ways by Russia's recession. The effect will largely depend on the unique local markets' characteristics. The local markets are shaped by their specific economic and retail environment development stage.

The Russian retail market was $558bn in 2008, having recorded growth of close to 28% over 2007. According to the latest report by research and consulting company PMR, each of seven federal districts (Central, Volga, Southern, Siberian, Urals, Northwestern and Far East) exhibits significant differences regarding the current stage of retail markets, existing competition, and their future prospects.

The smallest district by land mass but the most populous, Central Federal District, which includes Moscow, is the largest retail market. This market accounts for 34% of country sales. Interestingly, the Northwestern Federal District, which includes St. Petersburg and Leningrad Oblast, is not among the greatest contributors to Russian sales. St. Petersburg accounts for less than 10% of the country's retail sales. This district's retail sales are larger than only the Far East, which traditionally has the lowest share of retail sales (4%).

The Central Federal District leads in terms of retail sales per capita, €5,100. The Urals follows with €4,890. The Urals district population spends as it has the money. The average wage in the district is highest amongst all the regions of Russia.

We do not intend for these reports to solve any need our readers may have. We do intend to keep everyone current on technology developments in Russia. If you would like any additional information on any of the developments reported – send us a note.

New generation of soft displays

Russian scientists are on the brink of developing a new generation of soft displays. The scientists developed a multi-layer organic electro luminescence that paves the way for producing television screens, notebooks, mobile telephones, and other electronic equipment.

Experts at the **Frumkin Institute of Physical Chemistry and**

Electrochemistry developed a thin organic light emitting diode, OLED. This diode is the basis for the new generation of screens and displays. According to Professor Yevgeny Maltsev, electroluminescence structures promise boundless opportunities for developing the new displays. The new displays will be significantly better than the contemporary liquid crystal displays or plasma displays.

The new display systems have an important advantage: they work on low voltages. They are unlike traditional equipment. Current equipment requires high voltage and consumes considerable energy. The new systems do not require high voltage and they consume low power. Equipment produced using OLED technology is very thin (the thickness of the film is several millimeters), and it is flexible. These properties allow an OLED screen to be rolled into a tube or folded down and are transportable. OLEDs enable greater range of colors and consume less power than current displays.

The challenge still facing OLEDs is that they need serious protection. The protection required as they have no resistance to humidity and oxygen. This requirement has hampered OLEDs' mass production. Using glass for protection deprives OLEDs of their flexibility. Russian scientists believe they will solve the problem shortly.

A unique method to treat malignant tumors

Russian scientists using genetic engineering developed a new chemotherapeutical medication to treat malignant tumors. The medication is based on special proteins used as a “speed train” to deliver the medicine right into a tumor cell.

General Director of the **Moscow Research Institute of Medical Ecology**, Professor Sergey Severin says, “Today we know a lot of efficient medications against cancer. But, unfortunately, they are mostly inapplicable as these substances are toxic for human tissues. Doctors when they prescribe medicines have to move, figuratively speaking, between Scylla and Charybdis.”

The scientists have developed an alternative method to deliver a medication into a tumor cell without affecting the tissues around the tumor.

A significant problem with chemotherapy treatment for tumors is that the medication is not targeted exclusively at cancerous tumor cells. Cancerous tumor cells together with and healthy cells are exposed to the same toxic substances. To ensure the medication’s targeted delivery directly into the cancerous tumor cells the scientists used the differences between surface proteins of a healthy cell and a tumor cell. The scientists used numerous fetoproteins or growth factors, which interact with tumor cells as carriers of chemical medications. For this purpose a special chemical medications complex with these proteins was developed. Once intravenously injected these medications will interact specifically, penetrate into tumor cells, and kill the cancerous cells. This targeted intervention produces reduced toxic side-effects. During the experiments toxic affect was reduced by 15-20 times.

The new medications are produced from cord blood, which is usually collected shortly after birth. According to Severin, his institute has developed and patented two antitumor medications Flustat (to treat prostate cancer) and Sintazin (to treat breast cancer).

Russian scientists develop a method to restore neurons

Experts from the **Scientific Research Centre of Pharmacology Institute** of the Siberian branch of the Russian Academy of Sciences in Tomsk developed a method to restore brain tissues damaged by encephalopathy. To achieve this result the scientists activate the patient’s own stem cells. According to external experts, the method developed by Siberian scientists marks a new trend in rehabilitation medicine.

The method is based on activating stem cells. The patient is injected with the medicine “Cytochin”. The medicine was developed by the institute together with the Vector Research Centre in Novosibirsk. The medicine makes it possible to replace the damaged nerve tissue cells with new ones. During the experiments test animals with damaged brain tissues accompanied by serious psycho-neurological

and somatic disorders were cured and side effects were held to a minimum.

At present, a series of drugs for rehabilitation medicine are being developed using nanotechnology and electron beam synthesis.

The method has been patented in leading countries throughout the world.

A small installation to produce hydrogen using aluminum

Scientists from **Applied Chemistry Research Center in St. Petersburg** have developed a small installation that produces hydrogen. The hydrogen produced from these installations is to be used as an alternative fuel for power generation.

The technology for obtaining hydrogen from water has ceased being a fiction - many scientists are engaged in solving the problem. Hydrogen so produced could be used for generating electricity in fuel cells or in combustion engine cylinders. With such a process there would be no need to equip a vehicle with explosion hazardous cylinders filled with gas under high pressure. Some metallic elements, especially platinum are capable of absorbing large hydrogen volumes. The hydrogen so stored is released later upon heating. The best and the simplest method to obtain stored hydrogen is by adding water to specially produced small aluminum granules.

The first step in this process is to use the installation as an electrochemical generator to generate electricity. The second step is to use hydrogen in traditional gas turbines and piston engines to produce rotating movement or to convert mechanical energy into electrical energy using a power generator. This change will allow for replacing peat, shale and coal with less expensive hydrogen. Hydrogen can also be used to improve internal combustion engines' characteristics by adding it to fuel.

Hydrogen produced by this method could be used in railway transport, tractor-trailers, and other self contained units, to run steam turbines and heat houses remote locations. Further, after producing the hydrogen, the aluminum can be reprocessed or used in chemical industry.

Presently, Russian scientists are engaged in implementing a project aimed at producing hydrogen directly from aluminum plates. They anticipate developing a new effective installation to serve small facilities in the next few years.

Biosensors for glucose, lactate, H_2O_2 detection

Scientists at the **Chemistry Department, Moscow Lomonosov State University** have developed high-sensitivity biosensors for determining glucose, lactate, hydrogen peroxide, and other compounds.

The devices are improvements over currently available sensors and have many potential applications from medicine to industrial ecology.

The scientists combined scientific approaches as they developed an efficient converter for hydrogen peroxide signals and the optimal enzyme immobilization on a transducer surface. During this work the scientists also developed a glucose biosensor. The biosensor possesses excellent analytical characteristics: it enables analyzing glucose in a flow-injection system down to a concentration of 10^{-7} M with a sensitivity of 0.05 A $M^{-1}cm^{-2}$.

In terms of sensitivity, this sensor is superior to existing analogs by two or three orders of magnitude. Additionally, the scientists developed a method to maintain electrode stability and activity for a year.

For most functions, analyzing glucose in blood with such sensitive sensors is not needed. But for developing noninvasive diagnostic methods – these biosensors are indispensable. With these sensors it will be possible to complete diagnosis by implanting a sensor in a blood vessel. With the implantation continuous control of the key blood components is possible. For this work, more and more attention is given to biosensors' miniaturization.

In addition to glucose biosensors, the Department also developed biosensors for determining lactate, ethanol and several other substances in biological media, including foodstuffs. For these sensors a special enzyme is introduced into the composition of one of the electrodes. The electrode selectively catalyzes the substrate's oxidation by atmospheric oxygen. During this process, peroxide is released and, by determining its concentration, it is possible to determine the substrate's content.

Energy savings voltage regulator

A Russian company has developed a novel energy saving multistage alternating voltage regulator.

The voltage regulator operates with much more efficient technical, cost, and maintenance parameters when compared to standard equipment used in industry. The device is protected by a Russian patent. Trial production has begun. The device's versatility provides the potential for a wide application range.

It is possible to build the regulator into industrial power supply equipment. Presently every type of electric load requires specific technology to stabilize and regulate voltage. This technology's unique solution uses the same method for different networks. The technology includes energy saving voltage regulators for its end user. It regulates voltage without switching equipment with strict requirements to voltage regulation.

The technology is based on novel system for switching, commutating and connecting a stabilizer to a circuit or grid. It has the ability to regulate voltage within a narrow voltage range with simultaneous reduction of losses on the stabilizer.

A novel power and voltage sensor coupled with standard measurement devices is used.

The development's principal advantages are:

- Coefficient of power transfer from main network to a load by electromagnetic field is 1:15 whereas standard solutions provide 1:2. Therefore an installed power of autotransformer should be no less than a half of power of a load. This novel technology allows reducing power, dimensions and cost of autotransformer at least 1.5 to 2 times.
- Power consumed by a load can vary in 0 to 100% range without affecting regulation quality.
- Stabilizer high performance. For instance, switching time is less than 20 ms.
- The equipment has low weight, small dimensions, and low cost.
- Increase in efficiency coefficient to 99.6% as compared to 96% for standard stabilizers.
- Reliable protection for distribution networks.
- Significantly simpler control system based on simple commutation, using standard microchips, and novel sensors.
- Simpler design by eliminating complicated thyristor circuits.
- Eliminating complex filters which are used in standard solutions to cut higher harmonics of voltage which are built by standard equipment.
- Eliminating distortions in circuits.
- An opportunity to arrange commutation at currents which are a few times lower than in distribution network. This is done without breaking up the circuit.
- An opportunity to make commutation at currents which are a few times lower than in distribution network. This is done without breaking up the circuit.
- An opportunity to use single technical solution for different operations: "Normal" operation when voltage on a load and voltage in the main circuit is the same; operation by reducing main voltage on a load; operation by increasing main voltage on a load.
- Wide application range built on a single technical solution;
- Forming additional protection for end-users from failures in main network;
- Solving an inverse stabilizing voltage problem generated by different power sources, for instance, by a wind farm.