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IN THIS ISSUE:

MESSAGE FROM NEIL B. GODICK

Doing business in Russia might appear to be similar to elsewhere, but it is really unlike anywhere else in the world. We always advise customers to have a *friends program. Friends programs* are legal networks with friends (not bribes) that enable one to work through Russia's unique bureaucracy. Here is an example of the reason why:

IKEA has been tremendously successful in Russia. And, it has had its bureaucratic challenges. IKEA said that it was reconsidering new investment in Russia and that it would have to lay off 245 employees after months of delays kept it from opening a store in Samara.

IKEA has invested more than $3 billion in the past decade and was planning to add four stores this year to the 11 it already operates. Russia bureaucrats have often delayed the openings of major foreign retailers' stores, insisting on compliance with various regulations. The Samara opening has been held up since late 2007.

The Samara store and accompanying mega-mall are finished, but documents permitting them to open are delayed. IKEA's board is "questioning future IKEA investments in Russia due to unpredictability of the administrative processes in some regions."

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.

Catalyst for Ethanol Fuel Cells

New catalyst for ethanol fuel cells

In hydrogen fuel cells, electric current is generated by the interaction between hydrogen and oxygen. The interaction forms water. Hydrogen production, storage, and used in transportation fuel cells is an extremely labor-intensive and ineffective process.

Researchers are trying to find alternative methods for using hydrogen-rich compounds, e.g., ethyl alcohol, directly in the fuel cell system.

Ethanol is an ideal reagent for these purposes. It is easy to produce and it is an easily renewable substance, it is nontoxic, relatively easy

to transport, and it has a high energy density. Moreover, with certain modifications, it is possible to use the existing gasoline storage and distribution infrastructure.

The principal obstacle to the commercial application of ethanol directly in the fuel cell system is its slow and ineffective oxidation. The oxidation should result in forming the hydrogen ions and electrons that are necessary for electric energy generation. Until recently, no known catalyst could break the bond between carbon atoms in ethanol.

Russian scientists have developed the needed high-efficiency catalyst. Its components are platinum and rhodium atoms applied onto a carbon substrate. Tin dioxide nanoparticles are applied onto the carbon substrate. This combination is able to break carbon-carbon bonds at room temperature. The catalyst is able to efficiently oxidize ethanol into carbon dioxide. Other catalysts form acetaldehyde and acetic acid as products. These byproducts make other catalysts unsuitable for electric energy production.

Breaking the carbon-carbon bond at room temperature while at the same time generating CO_2 makes this a new catalyst. The results achieved by this technology open up prospects not only for fuel cells, but also for other catalytic processes.

Carbon Nanomaterials

Patented: new methods for obtaining carbon nanomaterials
Central Aerohydrodynamics Institute (TsAGI) specialists have developed and patented new methods to obtain high-quality fullerenes, carbon tubes and synthetic diamonds. The method uses a special compact device. The patented methods enable obtaining higher quality carbon nanomaterials while simultaneously reducing the process labor requirements.

The method follows:

- two mixtures with different carbon-containing substance ratios (acetylene or kerosene) and an oxidizer are introduced into a special chamber
- one mixture delivered via a supersonic nozzle
- both flows are intensively mixed
- a special initiator is fed to the chamber causing the mixture to detonate
- carbon clusters (several carbon atom compounds) are formed on the detonation wave front
- the detonation products flow out and, upon rapid cooling, are crystallized to form nanostructured carbon
- while the carbon clusters are crystallized, a new mixture portion is fed into the chamber and the process is repeated.

The method results in higher quality fullerenes, nanotubes, and

diamonds compared to other techniques. For example, synthetic diamonds contain fewer impurities because the detonation products are retained in the chamber for only a short time.

The device's products are used as additives for modifying and developing enhanced property materials. The main carbon nanomaterial applications are: microelectronics, optics, medicine, and the aircraft industry. It is expected that applying high-strength materials and coatings developed using nanotechnologies will reduce aircraft weight. Nanostructured radiation absorption coatings will help develop 'invisible' military aircraft. In addition, nanotechnologies are used to develop high-accuracy aircraft instruments that measure temperature and pressure.

Ceramic Scalpel

Ceramic scalpel that is sharper than a Damascus steel blade
Russian scientists from D.I. Mendeleyev State Chemical Technology University have developed a scalpel using nanotechnology. It is intended for vascular, cosmetic and other delicate operations that require intricate techniques. The ceramic scalpel's sharp edge thickness is just 0.1 micron. That is 3-4 times less than metal surgical instruments. A metal scalpel's cutting edge seems to be thin and even. When viewed under an electron microscope, it's apparent that its surface is uneven at 10 micron thickness. Its edge is like a jagged saw blade at that thickness. On the metal surface there are always microparticles that could get into the patient's blood stream during surgery. An incision made by an ordinary scalpel produces somewhat uneven wound edges. Such microdefects could result in postoperative complications: keloid scars' growth, emerging intracavitary commissures, vessel microtrombosis, etc. These results are especially undesirable in cardio and neurosurgery, vascular and embryonic surgery, cosmetology and gynecology, and ophthalmology. All eye surgeries require the best and least traumatic instruments.

The new scalpels contain a special ceramic with zirconium dioxide. It is as dense as phianite — synthetic diamond — and has almost no porosity. This is the strongest existing ceramic. A blade made from it is so sharp and smooth that the wound edges remain very even. As a result, the incision area from surgeries using the new ceramic scalpel heal two times faster than an incision made by an ordinary scalpel.

Drug for treating blood diseases

Drug for treating blood diseases
In Russia, a new drug for treating blood diseases has been registered. It was developed by **scientists from Novosibirsk**. Development for the new treatment identified *Neutrostream* began in the mid-1990s. Its clinical tests took six years. It is based on a protein produced by the body and regulates the blood formation process. The drug stimulates neutrophils formation — blood cells that set up a barrier against viruses and bacteria. The number of neutrophils can be reduced by viral infections, radiotherapy and chemotherapy.

Neutrostream helps quickly restore the neutrophil population.

Device for deep earth scanning

A deep earth scanning device

According to Russia TV channel REN, the world's first device for deep earth scanning has been invented by **scientists from Academgorodok (Novosibirsk).** This portable instrument makes it possible to see everything under a 10m-deep soil layer. Until recently it was thought theoretically impossible to "look underground" in this way.

Dr. Yuri Manshteyn, researcher at the Institute of Oil-and-Gas Geology and Geophysics, RAS (Siberian Branch) says: "One can see the vertical structure organization of the underground space. If you have a series of some communication lines, you can see which of them lies deeper or shallower".

The device can be useful for adventurers looking for buried treasures, geologists, and builders. The researchers have already received orders for their unique device from several countries.