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MESSAGE FROM NEIL B. GODICK

The Service Industry. The Russian newspaper *Gazeta* reports shop assistants are not known for their smiles. According to a survey of 14 countries' service industries, Russia ranked 12th.

For this survey mystery shoppers counted the smiles of the service employees in stores, restaurants, banks and tourist agencies, and found that Russian staff smiled 65% of the time. When asked the people survey blamed customers' rudeness, boorish bosses, poor salaries, and ingrained habits.

Within Russia, the newspaper reported, that tourism sector personnel smiled the least. The survey showed that Russian fast-food restaurants also suffer from a non-smiling staff.

The Highways. Moscow's transport and communication department reported last month that Moscow's road accident rate is the worst in Europe. About 600,000 road accidents occur in the Russian capital every year, "several times more than in any other large European city," they said. There is a decline in the fatality rate in accidents. However, the rate remained high.

The Russian Chief blamed the high road accident rate on drivers' rudeness and poor training

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

**A new technology for
obtaining practically
pure nanodiamonds**



Detonation nanodiamonds are obtained by utilizing explosives from old ammunition. The resultant nanodiamonds are coated with contaminant molecules. Therefore they must be cleaned before application. They are primarily used to produce experimental materials in search for commercial applications. As research is

conducted worldwide; a nanodiamond market already exists. SKTB Technology (St. Petersburg) specialists have developed a technology to obtain nearly pure nanodiamonds. Applying the new technology results in doubled nanodiamond yield. From this technology, the carbon content is 96-98 % compared to the usual 88 %. The impurities decrease from 1.5-2 mass % to 0.1 %. These improved nanodiamonds are purified under pressure in hot nitric acid. By doubling the nanodiamond yield it is possible to reduce their cost from \$2.5 to \$1.25 per gram. A nanodiamond production facility was established (annual capacity: 1,500 kg).

#2010-04-086

**Multi-purpose
disposable
thermostabilizing
materials**

Kuban State Technology University (Krasnodar) scientists have developed multi-purpose disposable thermostabilizing materials. They are designed to thermally protect electronic equipment and solid-state memory modules. They can also protect other objects exposed to external high heat flows. These thermostabilizing materials, as active components, contain phase-transition agents with high endothermic decomposition energy consumption. Active components can be inorganic or organic. The materials, resulting from their gel-forming and binding components, have a stable solid form. They are nontoxic, fire- and explosion-safe and are available at affordable prices. These materials provide thermal protection for solid-state memory modules under exposure to low temperatures (260 °C for over 10 h) and high temperatures (1100 °C for 1 h). The materials meet ED-56A, TSO C 124A standards. The thermal effect of melting with subsequent decomposition is up to 1700 kJ/kg in the 120–2600 °C temperature range.

#2010-04-087

**Methods for
developing new
electroluminescent
light sources**



Researchers from P.N. Lebedev Physical Institute, RAS (FIAN, Moscow), jointly with scientists from Moscow Physico-Technical Institute (MFTI) and Institute of Physics, Ukrainian National Academy of Sciences (Kiev), have developed methods for producing new planar metal-organic structures. These structures can serve as a solid base for developing submicron sized electroluminescent light sources with controllable spectrum. The method to obtain a light source planar structure involve thermal spraying a gold film into a 30 µm gap between two film electrodes on a glass substrate. This is accomplished in a superhigh vacuum at about 10 Torr. The resultant film is not continuous. It consists of separate islets and therefore is a discontinuous metal film. This structure was studied many years ago. But it was not only a metal film that the authors studied; they studied a composite (i.e. they sprayed an organic layer over the film). In this case, the metal

discontinuous film and the organic component contribute to the radiation. By selecting the organic component, the spectrum character can be varied. In this way, submicron (under 1 μm) light sources with controllable spectral composition can be developed. The scientists used rare-earth Alq_3 and β -diketonates: $\text{Eu}(\text{DBM})_3\text{bath}$, $\text{Eu}(\text{DBM})_3\text{phen}$, $\text{Eu}(\text{DBM})_3 \cdot 2\text{H}_2\text{O}$, $\text{Tb}(\text{thd})_3$ for the organic component.

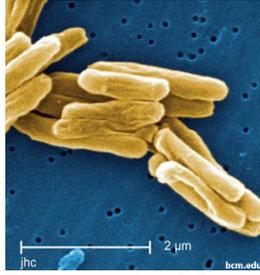
The FIAN luminescence section researchers developed planar light-emitting devices. They are based on discontinuous films from gold and rare-earth metal complexes containing europium (Eu) and terbium (Tb). They also established the electroluminescence mechanism for the structure dominated by the organic component. The scientists found that planar structures based on rare-earth β -diketonates can serve as light sources. The sources are submicron sized and have a narrow radiation spectrum in the red (organic Eu complexes) and green (organic Tb complexes) regions. From these findings, planar light-emitting devices with various properties.
#2010-04-088

Nanoporous polyethylene for prosthetics

Specialists from A.N. Nesmeyanov Institute of Organoelement Compounds, RAS (Moscow) have discovered a new effect. They found that, within superhigh-molecular weight polyethylene powder particles treated in supercritical carbon dioxide, closed 5-15 nm pores are formed. The pores contain residual CO_2 . From this discovery, the scientists developed three biocompatible self-lubricating materials: a) nanoporous superhigh-molecular weight polyethylene; b) metal-polymer composite based on the new polyethylene with gold and silver nanoparticles; and c) polymer-polymer composite with acrylic polymer. They are all suitable for making endoprosthetic joints because they have a low friction coefficient. It is half as low as any material based on ordinary superhigh-molecular weight polyethylene. A polymer-polymer composite showed the same coefficient as natural cartilage – it was also half the metal friction on cartilage value. The new material production technology is ecologically clean as it makes use of carbon dioxide. The best application prospects for the new materials are in manufacturing artificial hip joints.
#2010-04-089

Liposomes as a means of anti-TB drugs delivery

Nicotinic acid hydrazide is the main anti-TB preparation. If it is packed into liposomes, it will enable targeted drug delivery to TB mycobacteria.



Mycobacteria – TB pathogens

Studies in this area are conducted by specialists from the Center for Clinical and Experimental Medicine, RAMS, Siberian Branch (Novosibirsk). During TB inflammation, granulomas are formed. They are immune system macrophage cells filled with TB mycobacteria. The drug must be delivered to macrophages. Targeted delivery will reduce toxic loads on the liver. Macrophages can swallow small particles. The new drug, nicotinic acid hydrazide, is packed into liposomes. Novosibirsk scientists have developed molecular-liposomal hybrid compositions (MLHC) sized from 200 to 450 nm. They contain oxidized dextrans bound with the drug. Currently the researchers are checking which factors affect phagocytes' efficiency in swallowing MLHC. Experiments were made on murine macrophages. The researchers concluded that macrophages actively capture the drug enclosed in liposomes. Therefore MLHC can be used in targeted drug delivery to TB mycobacteria.

#2010-04-090

**Gas analysis method
and ionization detector
for carrying out said
method**

New VUV-photoionization detectors based on Collisional Electron Spectroscopy (CES) being developed by OOO SpectrMicro (St. Petersburg) may become an individually used gas-analyzer. It can be used to monitor bio-markers and quickly diagnose significant diseases like lung and breast cancer, tuberculosis, kidney disease, diabetes, etc. This concept is protected by RU patent 2217739, US patent 7,309,992, China patent ZL200380106502.2, patent application 2004-545113 with the Notice of Allowance at Japan Patent Office and patent application 03808922.3 pending at European Patent Office. Respiratory tests provide an opportunity to reveal heart transplant problems without biopsy. Acetone odor is related to diabetes and ammonia may indicate *Helicobacter pylori* inside the alimentary canal. A mold smell can signify liver problems, a urine aroma is related to kidney disease and a decay smell may indicate a lung dysfunction.

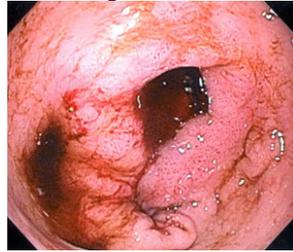
In CES, the energy distribution analysis for characteristic electrons released from the atoms or molecules ionized by VUV-photons is carried directly in the gas filled ionization chamber. This energy

analysis is provided by scanning the retarding electric field taking into account collision effects. It is possible due to non-local electron diffusion between the ionization chamber electrodes. The diffusion is ensured by properly choosing the chamber geometry, inter-electrode gap value and gas concentration used. I.e., for CES detectors there is no need for a large electron energy analyzer operating at high vacuum to provide necessary electron dispersion in “energy-coordinate” space. CES detectors can function in a wide gas pressure range up to atmospheric, are universal in applications and are able to provide qualitative and quantitative multi-component admixture analysis. The CES detector is small (some cubic cm), uses less than 1 W power supply, has less than 1 second response time, and low detection limit for various molecules – better than 1 ppm.

#2010-04-091

Calcium pectate helps stomach ulcer

Non-starch polysaccharides have anti-ulcer action. Specialists from NII of Pharmacology, RAMS, Siberian Branch (Tomsk) and A.V. Zhirmunsky Institute of Marine Biology, RAS, Far-Eastern Branch (Vladivostok) have determined the most active polysaccharide is calcium pectate.



Peptic ulcer – one of the most widespread diseases of digestive organs

The scientists have tested several polysaccharides on no-breed mice and rats with ulcers induced by different methods. The most active preparation turned out to be calcium pectate obtained from commercial citrus pectin. It was produced using a novel technology at the Laboratory of Pharmacology, A.V. Zhirmunsky Institute of Marine Biology. It efficiently heals stomach mucous membrane lesions caused by stress, drugs and chemicals. The scientists recommend it for use as the base for drugs treating gastric ulcers. In an acid medium, such as the stomach, pectins form a gel on the mucose membrane surface. This protective layer is not absorbed in the stomach or intestines. It protects the stomach against damaging factors and creates favorable conditions for cell regeneration. Moreover, as polysaccharides break up in intestines, they form monocarbonic acids that feed intestinal epithelium cells. Calcium pectate absorbs and neutralizes hydrochloric acid, and stimulates cell regeneration processes. On the 21st day of administering this preparation to the animals the following results were measured:

- stomach wall edema and reddening disappear,

- ulcer lesion becomes much smaller than in the control group,
- the tissue that fills it looks more mature, and blood vessels are formed in it.

Pectic ulcers often disturb intestinal motor function. Calcium pectate restores peristalsis, increases intestinal mucus secretion and eliminates intestinal spasms. Additionally, the preparation acts as a pain-killer.

#2010-04-092