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February 2011

IN THIS ISSUE:

Message from the President
New device for solar energy transformation and accumulation
A Ural University scientist applies a new technology to LED lamps
Printer manufacturer learns to print on water
Ecologically safe plastic bags invented
New sensor for toxic agents
Clinical trials of an anti-HIV vaccine

MESSAGE FROM NEIL B. GODICK

According to the Russian Public Opinion Research Center (VCIOM), most Russians, on a daily basis, see their rights abused and freedoms encroached on. Russians when asked what and whose constitutional rights were regularly being encroached upon had some interesting answers.

Rights abused	% of Respondents
Right to medical treatment	38
Housing	35
Education	32
Leisure	21
Social Security	20
Personal Security	19
Life and labor	18
Political Freedoms	16
Freedom of Conscience	15

When these same sociologists asked whose rights they thought were most regularly abused, 39% said orphans. Others mentioned were pensioners (35%), juveniles and youths (26%), and the homeless (23%).

In another study unrelated to the first it was learned that Russians are getting tired of excessive stability and want more change.

One immediate reaction to the survey results was by President Medvedev. He posted an entry in his blog calling for the country's political system to be revitalized through more competition.

It seems his feeling is shared by many Russians. For the first time, the percentage of those who see the current situation in the country as a "slowdown and stagnation" exceeded the number of those who think that the nation is still in the stabilization phase. Only 24 per cent of those polled believe Russia is still in the development stage.

The President called for modernization. The age breakdown of the poll shows that the younger generation is ready to follow the call.

At the same time, the polling center said that despite general

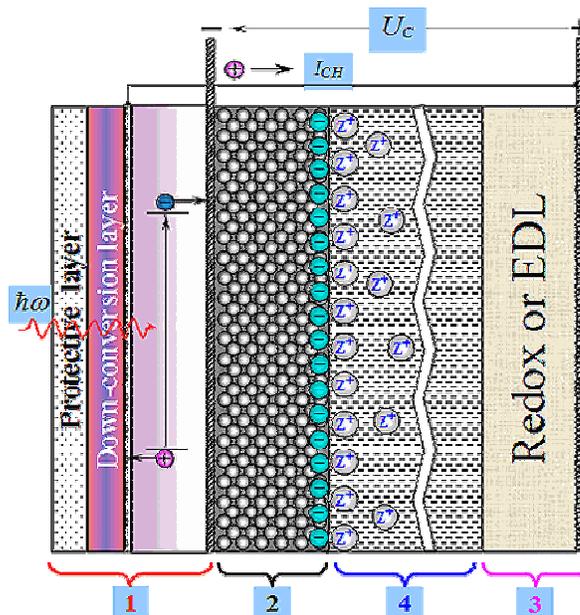
discontent, Russians show little interest in active protest. While most people said they were not content with the economic, social and even moral situations in the country, the current political course is supported by 48 per cent of people, with 44 per cent of those wanting political changes.

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 device for solar energy transformation and accumulation

Researchers from **P.N. Lebedev Physics Institute, RAS (FIAN)** have developed a novel device, a photoelectrochemical supercapacitor (PES). The device can convert sunlight directly into electricity while simultaneously storing it. The PES has high energy density. It is stored in a double electric field generated on nanoporous material based electrodes.

Valve-regulated lead-acid (VRLA) batteries are typically used for energy storage in standalone solar power applications. However the service life cost for 1 kWh produced by this battery is \$0.3–0.35. The FIAN researchers have found a way to reduce the solar energy cost.



PES-photocapacitor design and operating principle: 1 – photoelectrode, 2 – negative electrode, 3 – positive electrode, 4 – separator, the electrolyte is in electrode and separator pores.

Nanoporous carbon materials with predetermined nanopore size are used to manufacture these electrodes. Their nanoporous structure results in one gram having surface area up to 1400–1600 m², and capacitance up to 1500 farad. This means that each cubic centimeter can, on the average, accumulate 1,000,000 times more energy than a

classic capacitor.

The estimated price for 1 kWh produced by a PES-photocapacitor is about \$0.1; 3–3.5 times lower than its analogs.

A Ural University scientist applies a new technology to LED lamps

The **Laboratory of Energy Saving (MIP LES)**, a small innovation business established by the Ural State University (UrGU), will soon produce ultrastrong LED lamps. These novel LEDs are superior to both traditional incandescent lamps and ordinary LEDs.



An ordinary LED lamp is more economical than current street lamps. Current street lamps consume 500 W, while a LED lamp consumes 100 W to provide the same illuminance. However it has several disadvantages, primarily, it is too large and it cannot tolerate temperatures above 70 °C.

The inventor created a patented solution enabling LEDs to function at full capacity while making the lamp lightweight and compact. The lamps use the same system as CPUs and space satellite cooling. This makes the lamps small hand-held devices.

Printer manufacturer learns to print on water

Engineers working for a **Novosibirsk** producer of large-format printers (www.sun-nsk.ru) can print on water. Water surface tension is about 70 dyne/cm; in nanoink it is 28-29 dyne/cm. Interphase tension on the liquid-liquid division boundary results in a nanoink image printed with nanoink being retained as a thin film on the water surface. The ink is instantly hardened using UV light turning the image into a polymer film. The film is retained on the water surface due to a difference in densities.



A saucer with water is placed under the printing carriage, filled with ink, and the image is immediately hardened on

the water and saucer edges.

Using UV cured ink to print on different surfaces is a well-known technology. The Novosibirsk scientists use superbright UV LEDs as the radiation source. These LEDs are based on gallium nitride heterostructures. With this technology it is possible to print an image on any surface using a single dye type and a single printer. This technology can print on wood, tiles and glass. Additionally, the system can produce raised printing with the image as high as 5 mm.

Ecologically safe plastic bags invented

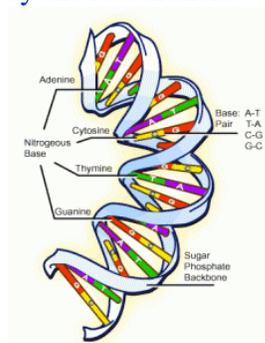
Russian scientists have invented a new ecologically safe film that biodegrades in soil within two weeks. Polyethylene, a commonly used plastic film, takes 10 years to biodegrade. This novel development from **Stavropol State University** is based on methylcellulose and protein complexes.



This biodegradable film is as strong as polyethylene but it preserves food better because it blocks UV light. Bags made from the new film can be used in the home, in food-processing industry, cosmetology and medicine. Pilot samples and patents have been obtained. The film is also used as a base for wound-healing bandages.

New sensor for toxic agents

Scientists from the **Institute of Spectroscopy, RAS**, jointly with researchers from **V.A. Engelgardt Institute of Molecular Biology, RAS**, have developed a novel high-precision biosensor for detecting compounds that are toxic to DNA. The sensors are DNA molecule nanostructures that change their optical properties when interacting with toxicants. The change in the optical properties is detected by a novel device developed by the researchers.

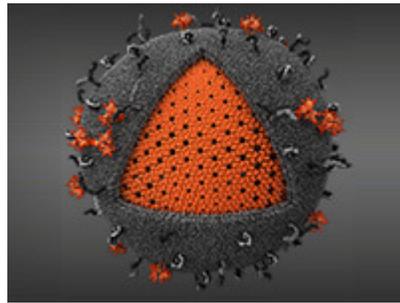


A prototype has been successfully tested. The system can be used in healthcare facilities to detect agents that are toxic to DNA in liquids. The DNA molecules used as biosensors are immobilized in optically transparent, isotropic and chemically neutral hydrogels and have

abnormal optical activity. The detector is a compact single-wavelength dichrometer that measures circular dichroism. Biologically active compounds' presence and concentration in the sample liquid diffusing into hydrogel are determined by changes in the biosensor signal value. The change is detected by the dichrometer in one visible spectral band. The device can also be used for determining the diffusion rate of various liquids in a gel nanobiomaterial.

Clinical trials of an anti-HIV vaccine

Clinical trials of Russia's first anti-HIV/AIDS DNA-vaccine have begun in St. Petersburg. The vaccine was developed by **Prof. Andrei Kozlov's research group at St. Petersburg State University's Biomedical Center.**



HIV model

The vaccine was administered to the first volunteers in November. Twenty-one healthy young people were recruited for the trials. They were administered the vaccine in various concentrations. It will be tested for safety and immunogenicity. According to the researchers, the vaccine is safe for humans. It had been comprehensively tested on animals (rabbits, mice, guinea pigs). The volunteers for the Stage 1 clinical trials will be closely watched by the researchers for about two months. Then the results will be analyzed and the following stage prepared.

Stage 2 will take a year and Stage 3 about two years. The vaccine being tested in St. Petersburg is a DNA-vaccine type. These vaccines are considered the most promising. This vaccine is the first of this type in Russia.

This is a new-generation genetically engineered recombinant vaccine. While it is thought that these vaccine types will very soon be tested for efficacy, Professor Kozlov's vaccine is already in first stage clinical trials.