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## MESSAGE FROM NEIL B. GODICK

This summer Russia has suffered from extreme high temperatures, drought, forest fires, and resultant smog. Drownings, (people drinking and then swimming), respiratory disease causing death, people walking the streets wearing face masks, and fire deaths are all at record levels. Generally there is no air conditioning in either offices or at home. With temperatures at 100F/38C, it's just too hot to work. Business and commerce are affected as people are fleeing the smoggy city to be at their forest fire ravaged dacha (summer cottage).

In typical Russian style someone has to be blamed. What follows are two excerpts from news reports placing the blame:

### The Devil!

Perception of the current heat wave in many parts of Russia as an act of 'divine scourge' is somewhat simplistic and vulgar, the Reverend Vsevolod Chaplin, the chief of the Russian Orthodox Church's department for communications between the Church and society said Friday.

"But the fact that the heat wave has prompted people to think about the divine scourge is a good thing in itself," the Rev Chaplin said.

The anomalous heat that has struck many parts of European Russia this summer "has most obviously reminded everyone of how fragile people actually are and has shown we must help one another," the priest said.

Along with this, he called on the people associating themselves with the Orthodox Church "to refrain from showing the approaches typical of paganism or treating these /prayers and sermons/ as acts of witchcraft and treating God like someone whose favors can be purchased for money or for rituals."

### The other Devil

Some scientists think that the United States' High Energy Active Auroral Research Program Station in Alaska is being used to modify the ionosphere in order to control the climate over Russia. "The

## Heat Wave in Russia--Is It the Result of the Testing of a Climate Weapon in the United States?"

Some specialists suspect that it is not global warming that is to blame for the current record temperatures but the use of military developments by the Americans.

Scorching Egyptian heat in the center of Russia--an improbable phenomenon! Researchers are looking for a reason for this phenomenon and some are setting forth the most astounding versions, including climate weapons. The HAARP (High Frequency Active Auroral Research Program) Station, about which Komsomolskaya Pravda has reported more than once, was the first to fall under suspicion. It is located in Alaska 250 kilometers north-east of the city of Anchorage. In appearance, this is an enormous field with an area of 14 hectares. It looks like a cushion stuck full of needles. There are 180 antennae and 360 radio transmitters. The height of each "needle" (that is, antenna) is 22 meters.

Georgiy Vasilyev, a professor in the physics department at Lomonosov Moscow State University, answers that question as follows: "The American explanation that this station was built for the study of the aurora effect is not very believable. Especially since, for some reason, the station belongs to the military. Moreover, (the United States) has spent almost 20 years and 250 million dollars on equipment for the study of such a very complex natural phenomenon! Radiating 3.6 million watts into the heavens (the effective radiated power is 75 times greater than that of a commercial radio station. The station is now the most powerful device in the world for modification of the ionosphere. Some military specialists think that this it is a geophysical or ionospheric weapon. Especially since, as strange as it may seem, the most severe (sic) cataclysms in Russia and the world all occurred after the station was put into operation in 1997:

*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 concept for next-generation passenger aircraft**

**The Central Institute of Aerohydrodynamics (TSAGI, Moscow)** has developed a new concept for next-generation aircraft with a moderate passenger capacity. The aircraft are designed using the flying wing (FW) aerodynamic scheme. This concept provides passenger seating arrangement in the wide wing centerpiece.

*Airbus and Boeing* are considering applying this concept for their next generation passenger aircraft. The original goal aim was to design planes with superlarge passenger capacity (700-1000 people).

This was required as it was thought that with smaller dimensions it would be difficult to accommodate the passenger cabin within usable FW volumes. Unlike their Western colleagues, TSAGI managed to solve this problem and develop the new concept. Theoretical studies and experiments in wind tunnels proved that passenger capacity at 150-200 people does not deprive the flying wing of its advantages (lower air drag, weight and fuel reduction, and 20 % higher aerodynamic quality). By 2025 TSAGI expects to be applying its design concept in next generation aircraft. This design change will reduce fuel consumption by more than 15% and reduce noise levels by 30 dB.

#2010-07-099

Russian physicists know how to extend OLED service life

**RAS Lebedev Physical Institute (Moscow)** has found a way to extend organic LED service life. They achieve this life extension by adding long-lived nanocrystals based on cadmium chalcogenides to the OLED organic base. These inorganic luminescent dots will:

- take over the work from organic chromophores that “get tired” very quickly, and
- greatly simplify LED production technology.

Organic LEDs have several advantages over other light-emitting devices.

- First, organic chemistry is very diverse, and selecting the right radiation wavelength is conditioned by selecting the appropriate agents.
- Second, synthesizing new organic substances does not require sophisticated devices like those necessary for radiation epitaxy or precision precipitation.

However, as chromophores are short-lived, long-lived organic LEDs remain a development problem.

The new OLEDs use inorganic luminescent centers that replace organic chromophores. They are based on semiconductor nanocrystals. Nanocrystals based on cadmium chalcogenides have quite strong bonds and are not destroyed during operation. In addition, these nanocrystals have very interesting properties – with changes in the object size the luminescence wavelength also changes. To obtain another wavelength it is necessary to only change the substance's dimensions.

The production technology for organic LEDs with embedded inorganic nanocrystals is practically the same as the pure organic LED production technology. However, there is one exception – preliminarily admixed to the organic semiconductor are semiconductor nanocrystals synthesized in colloidal solution form. Here the resultant conducting part is organic, while the luminescent part will be a long-lived inorganic admixture.

To determine whether recombination takes place, the charge carriers' mobility in films from a semiconductor matrix doped with cadmium selenide with a cadmium sulfide shell, and cadmium selenide without a shell was studied. It was found that the structure with a shell captures charges and therefore is capable of irradiation. Pure cadmium selenide does not capture charges. This difference is explained by what happens when coating the nanocrystal with a shell from a material with a wider forbidden gap than that in the nucleus. In this case the luminescence probability (and efficiency) increases. This is because the probability of the electron and *hole* transition to the center (where the potential pit is located) is much higher than that of radiationless transition states on the surface. This makes sense if potential pits for both charges are in the same place – in the nanocrystal center. Then, being surrounded by a potential barrier, they recombine. This is the first type of heterojunction in nanocrystals. It was this type that was observed in cadmium selenide with a cadmium sulfide shell. If the potential pit for the electron is in the nucleus, and that for *holes* – on the surface, their meeting probability is extremely low. Therefore the luminescence probability is also low. This is suitable for extending OLED service life. One key OLED application is *organic* displays. These displays have more attractive properties than plasma and LC displays. These include lower power consumption and the possibility to develop flexible displays with smaller dimensions.

#2010-07-100

A power generating unit for the world's first floating NPP

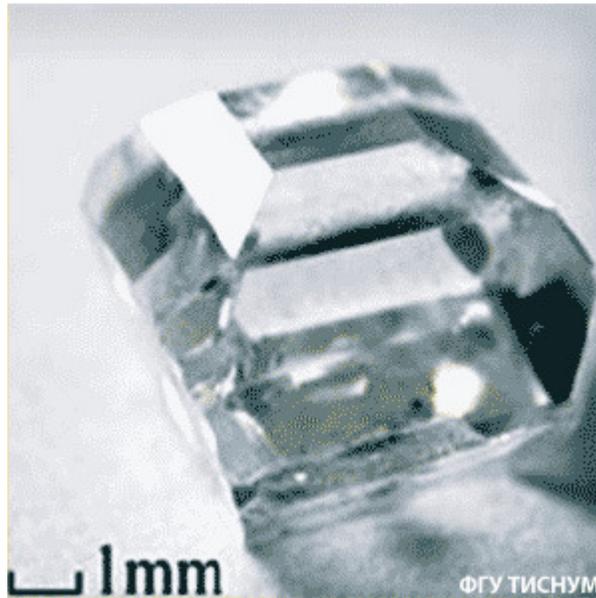
Baltiysky shipyard (Saint-Petersburg) will hold a ceremony to launch a floating power generating unit (*the Akademik Lomonosov*). It will become the key element in the world's first floating nuclear thermal power station (FNTPP) built by **Rosenergoatom Concern**. The contract includes construction, launching, erection, testing and commissioning a floating mini-NPP (design 20870) for FNTPP. In late 2012, after being tested within FNTPP, the floating power generating unit will be handed over to Rosenergoatom for operation on the NPP site.

Similar nuclear power units will open allowing Russia to radically and rapidly modernize its power supply infrastructure in its remote regions. It will enhance the Arctic regions' energy security; reduce the volume of goods that have to be brought to northern areas before every winter, and support mineral deposit development in Russia's Far North regions and on the Arctic shelf.

#2010-07-101

A hard nut

**The Technology Institute of Superhard and New Carbon Materials (Troitsk)** has been conducting research in nanotechnologies for many years. For approximately 15 years its scientists have been growing artificial precious stones used by nanotechnology research groups all over the world.



Diamonds have excellent optical properties. Among all solid bodies, diamonds hold the record for thermal conductivity. They are also absolutely resistant to aggressive acid and alkali media, X-ray and other radiation exposure. Diamonds also have the lowest metal friction coefficient. This quality makes diamonds ideal cutting tools. Diamonds have the highest (among all the existing materials) modulus of elasticity and the lowest compression coefficient. Today, diamonds continue to be used in practically every hi-tech area. And, analysts predict that their role will keep growing.

Diamonds are being used for developing a new generation of semiconductors. A silicon transistor, in response to even an insignificant temperature or radiation level increase, changes its characteristics and causes it to lose its capability for quality functioning. The newly developed diamond sensor enables highly accurate temperature measurements from  $-200$  to  $+500$  °C. The diamond transistor has tremendous advantages over the silicon one in measuring background radiation. This is of key importance for sensors used in nuclear power stations, submarine reactors and spacecraft. The technology developed by the Institute can be used for growing semiconductor *p*-type monocrystals with a wide resistivity range (from 0.1 to  $10^9$  ohm·cm).

#2010-07-102

### Laser prospects

*Lazernye Sistemy Company (St. Petersburg)* develops laser technologies for security applications. Its *Alcolasers* are capable of remotely identifying drunken drivers directly in traffic flows. In pilot production, these mobile Alcolasers cost €10,000. Continuing development is needed to provide traffic police a system that is as user-friendly as a speedometer.

The Alcolaser is a complicated device. It determines alcohol vapors content at minimal concentrations – about 1 *ppm*. This concentration results from drinking one liter of beer or 100 g of vodka or brandy. On identifying alcohol vapors, the Alcolaser system, data on the offender's vehicle (including license plate photos) is transmitted to the nearest traffic police.

#2010-07-103

Global situation is calm,  
no typhoons are  
expected

As early as 2030, TV news programs will end, not with today's customary weather forecast, but with a geo-situation forecast. The broadcaster will report on expected earthquakes, hurricanes, the status of oil tankers, and the like. This future is being brought closer by a technology developed by **General A. A. Maksimov NII of Space Systems (NIIKS)**. The Institute is developing a system that would predict natural and technogenic disasters. It must be accessible free of charge.

Huge computation systems that can predict disasters with a probability of 95-98 % will be installed in countries that wish to have disaster precursors monitored. These countries' governments will be able to timely evacuate people and avoid huge human life losses. The system named International Aerospace System for Monitoring Global Geophysical Phenomena and Prediction of Natural and Technogenic Disasters (IASMS). It is different from other similar recently developed systems by its comprehensive character and free access.

The plan is to base the IASMS orbital equipment on the optoelectronic remote Earth probing microsatellite *SoyuzSat*. This microsatellite takes photos with a 2-3 m (black & white) and 5 m (in color) resolution. However its chief distinction from the existing satellites is weight. It weighs just 153 kg while its analogs weigh from 500 to 1,000 kg. The microsatellite can be used for monitoring emergency aid vehicles, cargo transportation and river boats, and gas emission levels from production facilities. It can also predict earthquakes and snow avalanches.

#2010-07-104