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MESSAGE FROM NEIL B. GODICK

Russia's economy has been hit hard in the world wide recession. Even with a strong third quarter and a spectacular fourth quarter the decrease in GDP is expected to be 8.9%. The Russian economy faired far worse than the other BRIC members.

Within Russia there has been lots of soul searching and finger pointing. A number of ideas have bubbled up to fix the economy and prevent a reoccurrence. The following are excerpts from an interview with President Medvedev.

The President has been calling for *modernizing* the entire Russian society. Further he says there can be no modernization without freedom of enterprise.

"The key lies in unshackling private initiative and freedom of enterprise. That is because innovations, their development, implementation, proliferation and, especially, export - if Russia really wants to be a strong country in that respect - are not a problem the state has to occupy itself with. The state should not be doing much more than just watching all of this very discreetly."

"There are various types of modernization. There is so-called catch-up modernization, which involves, for example, us buying something that has proved itself abroad. This involves no more than merely copying something. This could be appropriate in some cases. However, that is not the path to genuine modernization because if we as a country set ourselves ambitious tasks, if we want to be in the top 10 of the world's most developed countries, we should be a country that sells something."

"Unfortunately, we are not used to thinking long term. Because nanotechnologies require a lot of investment. Russian business is a little afraid of doing this at present because it is not known at all if this will be profitable and when. The government will have to be involved."

"The same applies, for example, to the development of new drugs, another area we could be successful in. There is a lot of talk about

this in the modernization debate. But you are well aware of the technological cycle between the idea and such drugs going on sale. A couple of months are not even enough to see the initial results. First of all, conditions should be created, I repeat, for private initiative, free enterprise and attracting investment to Russia. Then we will see the results in a few years' time."

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.

Nanosized catalysts for pharmaceuticals

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Chemists from A. N. Nesmeyanov Institute of Organoelement Compounds, RAS (Moscow) and Tver State Technical University (Tver) have developed formation methods for mono- (Pt, Ru, Pd), bi- (Pt-Pd, Pt-Ru, Pd-Ru) and trimetallic (Pt-Pd-Ru) nanoparticles in super-crosslinked polystyrene pores. The result is active, stable and selective nanocatalysts. These nanocatalysts can be used for synthesizing vitamins, food supplements and medicinal agents. The nanocatalysts are scientifically interesting and have practical potential.

The catalysts have a low raw materials' purity requirement. The catalysts utilize a simple production process. High target product yields, environmental safety, and high stability are also attractive for industrial applications. The authors think that, by developing high-efficiency nanocatalysts for oxidation processes, they can also solve other pharma industry problems. These nanocatalysts can be used to obtain insulin injection solutions on an industrial scale. Metal-containing nanosized systems also look promising for catalytic wastewater purification by removing phenol-type compounds.

Geneticists improve antibiotic production technology

One of the most popular antibiotics against infectious diseases are preparations from the cephalosporin group. Cephalosporins belong to one of the largest antibiotic classes. Cephalosporins from their efficacy and low toxicity are now widely used in clinical practice.

Cephalosporins are synthesized from a common precursor – cephalosporin C (cefC). It is produced by the *Cephalosporium acremonium* ascomycetous fungus. Efficient microorganism strains are needed to synthesize cephalosporins. To improve the synthesis processes, cephalosporin C biosynthesis mechanism in the *Cephalosporium acremonium* filamentous fungus was studied.

Research teams at *Bioengineria* Center of RAS (Eldarov, M. A., Zhgun, A. A., Bartoshevich, Yu. E. et al.) and G. K. Skryabin Institute of Microorganism Biochemistry and Physiology of RAS (Bezsonov, E. E., Kalebina, T. S.) study this problem. Earlier these scientists obtained an industrial strain – cephalosporin C superproducer. It was noted for complete prototrophicity and a low level of cefC intermediate metabolites are needed. At the same time the impurity content in the final product is reduced. Microbiologists and geneticists developed an agrobacterial transformation protocol for laboratory and industrial *Cephalosporium acremonium* strains. Comparative molecular-genetic analysis studies are currently being completed on these strains.

New method for obtaining nootrops

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“Nootrop” was first suggested by K. Giurgea, piracetam preparation’s author. It was used to designate products that cause specific activating effect on brain integrative functions. Today nootrops often dominate in psychic and neurological disorder therapies. Synthetic nootrops’ action is accompanied by side effects. This leads to a greater interest in obtaining vegetable-origin preparations that would combine high activity with safety. Since imported products are quite expensive, Russian developments are attractive. One promising plant is the perennial Siberian liana (*Atragene speciosa Weinm*). A safe nootropic phyto-preparation has been developed using the plant. It has a pronounced antistressor and adaptogenic action. Prof. Raisa Karnachuk (Tomsk State University) heads a team engaged in studies on improving production methods and cost reduction. The authors obtained growing plant cell cultures capable of producing necessary physiologically active agents. Appropriate conditions were selected for production process optimization.

Development of a new sensor for toxic agents

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A research team headed by Oleg Kompanets from Institute of

Spectroscopy of RAS jointly with scientists from V. A. Engelhardt Institute of Molecular Biology of RAS have developed a new high-precision biosensor to determine compounds that are toxic for DNA. DNA molecules' own nanostructures are used to sense these compounds. They are capable of changing their optical properties during interaction with toxicants. Changes in these properties are, in their turn, measured by the authors' original device. The work's goal is nanosensors for biologically active compound. These new devices for toxic agent determination will be compact and inexpensive. A new biosensor system mockup has already been successfully tested. According to the authors, it will be used to directly determine agents toxic for DNA present in liquids. The DNA molecules are immobilized in optically transparent, isotropic, and chemically neutral hydrogels with anomalous optical activity. The measurement device is a compact single-wave dichrometer transforming the circular dichroism optical signal (DOS). DNA nanostructure formation is accompanied by anomalous optical activity in the daunomycin chromophore absorption region (~520 nm). The presence and concentration of biologically active compounds in the liquid being analyzed are determined by the DOS change value. This device can be used for measuring liquid diffusion rates in a gel nanobiomaterial.

Automated analysis

Automated analysis

Scientists from the Institute of Molecular Biology of RAS are developing a technology for clinical samples' automated processing (whole blood, blood plasma, saliva, mycobacterial cell lysate, bacterial cells and/or viral particles). This will significantly speed up and simplify the analysis procedure. The Russian Government allocated about $55M USD for developing this novel technology.

All manipulations with the clinical sample are automated. They are made in an environmentally isolated, disposable module. A sample taken from a patient is immediately placed in the disposable module reception chamber. Every processing stage proceeds within the device – in containers, microchannels, reactors, etc. The process output is a pure DNA or RNA solution. It is absolutely harmless, nontoxic and can be analyzed by any molecular method. Modules that contain bacteria, blood or its component residues are disposed as biohazard waste. The method does not require highly qualified personnel. It is enough to charge a sample in the module, place it in the receiver and press "start".

With the new technology, clinical sample processing will take less than 30 minutes. This saves a considerable amount of time and labor. Additionally, it leads to more efficient laboratory equipment use.

Participating in the project are the Moscow City Center for TB Control (Moscow Health Protection Department) and Biochip-IMB, DNA-Technologia (one of Russia's major suppliers of equipment and systems for medical diagnosis).

Introducing energy-efficient technologies in construction

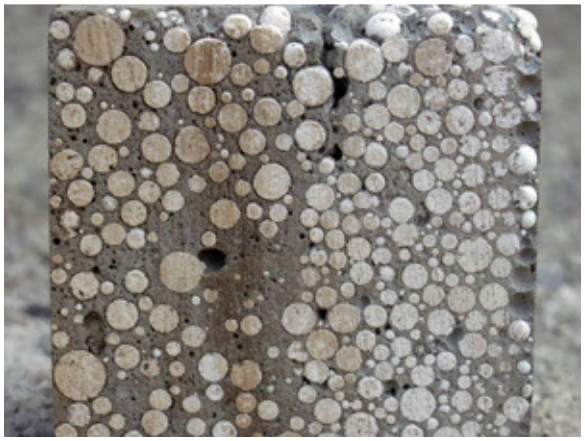
Introducing energy-efficient technologies in construction

Today' construction industry faces two key technical problems:

- to ensure buildings' strength and durability.
- to ensure favorable thermotechnical parameters for the buildings.

Is it possible to develop materials and construction structures with long-term energy efficiency?

Russian scientists and engineers have developed a new construction material from polystyrene concrete. This material has all the thermotechnical advantages of foam polystyrene. According to this technology, polystyrene granules are uniformly distributed within the cement-sand matrix. It does not burn or support combustion unlike pure polystyrene. Exposure to sun rays does not destroy the material because foamed substance granules are within a protective concrete shell. It has an elevated heat resistance and high thermotechnical characteristics.



Polystyrene concrete was developed by using innovative technologies that enable obtaining a material with controllable properties. The scientists developed a theoretical foaming model for cement-sand matrix filler polystyrene granules. The model describes dependence of the material strength, density and heat conduction on its source components' composition and quality. *VNII-Zhelezobeton* has developed and is introducing a system for construction using precast and cast-in-situ polystyrene concrete. The technology and equipment for making whole plates and reinforced blocks from the new material have been mastered.