सत्यमेव जयते

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Dear Readers,

Greetings from Science & Technology Wing, Embassy of India, Moscow!

I take this opportunity to wish you and your family a happy and prosperous New Year 2016. I have taken over the charge of Counsellor (S&T), Embassy of India, Moscow in the month of December 2016. S&T Wing has been a strong pillar of the Embassy of India, Moscow. My predecessor Dr. Rama Swami Bansal has made outstanding contribution for strengthening of Indian-Russian scientific cooperation and I hope to take the legacy forward. She is back to the Head Quarters of Council of Scientific and Industrial Research in New-Delhi. I wish her all the best for her future endeavors.

The Embassy of India, Moscow happily welcomes the new Ambassador Shri. Pankaj Saran who considers S&T cooperation between India and Russia as high priority.

The year 2015 ended with the successful visit of Hon'ble Prime Minister of India, Shri Narendra Modi to Moscow for the Annual Summit, which resulted in the signing of an ambitious cooperation plan in the sphere of Super Computing Education between C-DAC Pune, IISc Bangalore and MV Lomonosov Moscow State University. Among the other bilateral activities during January/February 2016 were the successful completion of the 2nd meeting of organizations supporting research, technology and innovation in the BRICS countries. The first Joint meeting of the Indian-Russian Network of Institutions of Higher Education was organized at IIT Bombay with participation of 13 representatives from eight Russian Universities and ten Indian Higher education institutions.

The present issue of the Newsletter gives glimpses of the latest S&T developments in Russia. The Russian Government announced the creation of a new Agency for Technological Development, which would support projects in the high-tech sector and focus on imported technologies which have no domestic analogues. The Russian Ministry of Education and Science would establish 11 supporting Russian universities, which would receive state subsidies for the further development. Kazan Federal University plans to produce a wide range of genetic drugs for clinical trials and later for the general market to treat ischemia, locomotory impairments, neurodegenerative diseases and spinal injuries. Scientists of Tomsk Polytechnic University (TPU) jointly with Krasnoyarsk Institute of biophysics SB RAS have developed biodegradable hydrophilic biopolymers used to replace damaged human tissues. Tyumen State University have developed the world's first electronic book named "Seeall" for visually impaired people. Samara State Aerospace University (SSAU) have developed an advanced space radiolocator for mapping and agriculture, which would enable the specialists to observe both the visible surface and subsurface objects. MV Lomonosov Moscow State University have come up with a low-cost method to grow organic semiconductor crystals with a record high light sensitivity, which promises a revolution in organic optoelectronics.

Looking forward to take Indian-Russian Relations in Science and Technology to new heights and this is possible by continued support from you and your valued team.

We hope our Newsletter facilitates identification of potential Russian partners by Indian organizations. Your queries on Russian S&T developments and suggestions for improving the impact of the Newsletter are welcome.

Dr. Abhishek Vaish

I. Bilateral / Multilateral Cooperation

1) MoU between C-DAC, IISc and MSU in High Performance Computing signed

A Tripartite MoU in the sphere of High Performance Computing Education has been signed during the Hon'ble Prime Minister Shri. Narendra Modi Visit to Moscow, 24th Dec 2015, between C-DAC, Pune & IISc Bangalore on the Indian side and Moscow State University on the Russian Side. The aim of this MoU is to create an Education platform for High Performance computing that can be replicated throughout the country as well as to develop Certification Methodology and to promote joint research and exchange visits between both the countries.

MV Lomonosov Moscow State University (MSU) is considered as one of the leaders in the area of High Performance Computing. Currently, a consortium of universities led by MSU had developed extremely powerful program for HPC at UG level and a few faculty members have also developed a set of modules even for school level to get the students acquainted with HPC. MSU had already implemented this framework at National level and achieved good results.

The Super Computing Education developed by MSU has components like high performance computing, ekzaflops computing technologies, programming of homogeneous multi-core computing and hierarchical systems with accelerators, in the areas of parallel processing of data of supercomputing modeling, supercomputing technologies, and the use of high-performance computing to process 'Big Data', and cloud computing.

The Operating model of this project is:

Task 1. Creation of the System of Research and Education Centers for Supercomputing Technologies. The implementation of the task is aimed at the accumulation of scientific and educational capabilities in higher educational institutions, having all resources and considerable experience in the SCT development.

Task 2. Provision of educational and methodological maintenance of the SCT highly qualified specialist training, retraining and skill development system. The task is aimed at the creation of scientific and methodological basis originating from the new generation educational standards and the Body of Knowledge in the SCT.

Task 3. Implementation of educational programs for the SCT specialist training, retraining and skill development. The task is aimed at the formation of a scientific and academic capabilities, providing a high quality SCT specialist training for all target-oriented groups of students and for all forms of education.

Task 4. Development of an in-depth integration of fundamental and applied research and education in the SCT, provision of the Russian Academy of Sciences, industry and business collaboration. The task involves the formation of effective feedback, emphasizing essential educational forms and trends.

Task 5. Expansion of the international collaboration in Supercomputing Education. The task involves inviting leading foreign specialists, establishing partnership relations with foreign organizations, training Russian teachers at Schools of Higher Education, participation of foreign professors in developing and implementation of joint educational programs.

Task 6. Development and implementation of the highly integrated system of information coverage to publicize the SCT achievements.

The MoU will be useful for National Educational platform on HPC for India, it is expected to enrich the talent pool in the area of High Performance Computing and to assist India in realization of the Super Computing Mission.

2) BRICS to Launch Pilot Coordinated Call in Research and Innovation

The 2nd meeting of organizations supporting research, technology and innovation in the BRICS countries took place on 19-20 Jan 2016, in Beijing, China. Over 30 representatives of BRICS ministries, R&D foundations and agencies supporting research, technology and innovation took part in the event. The main agenda of the meeting was the launch of a pilot coordinated call for multilateral projects in the area of research and commercialization of innovation technologies. The eligible topics were fixed in the Memorandum on the cooperation in the area of research, technology and innovation between the governments of Brazil, Russia, India, China and South Africa of 18 Mar, 2015.

The BRICS Group of Research Funding Parties, namely Department of Science and Technology (DST, India), Foundation for Assistance to Small Innovative Enterprises (FASIE, Russia), Russian Ministry of Education and Science (RMES, Russia), Russian Foundation for Basic Research (RFBR, Russia), Ministry of Science and Technology (MOST, China), National Natural Science Foundation of China (NSFC, China), National Council for Scientific and Technological Development (CNPq, Brazil), and National Research Foundation (NRF, South Africa) attended the meeting. Indian delegation was represented by Smt. Sadhana Relia, Scientist "G" and Head, and Dr Arvind Kumar, Scientist "E" from International Multilateral & Regional Cooperation Division of Department of Science and Technology.

The parties successfully developed the documents for launching the coordinated call and agreed the schedule of contest procedures. The call is planned to be announced in March 2016 to be launched in ten thematic priority areas indicated in Implantation Plan traceable to BRICS STI MoU namely Material science including nanotechnology; Biotechnology and biomedicine including human health and neuroscience; Geospatial Technology Applications for development; Prevention and monitoring of natural disasters - a priority area for India.

Another upcoming event within the framework of BRICS includes the 1st BRICS working group on Geospatial Technology meeting in Greater Noida, scheduled on 2nd Mar, 2016. The Russian delegation would consist of the following participants:

- Mr Tsadikovsky Eugeny, Head of Division, Russian Space Systems;
- Mr Sergey Pulinets, Chief Researcher, Russian Space Systems;
- Mr Sergey Nehin, Head of Department of geodesy cartography and Spatial Data Infrastructure;
- Mr Andrey Mukhin, Rosreestr;
- Mr Victor Nepoklonov, Vice Rector for Science, Moscow State University of Geodesy and Cartography;
- Mr Dimitry Ershov, Deputy Director for Science, Centre for Forest Ecology and Productivity, Russian Academy of Science.

3) Indian-Russian Network of Universities create Roadmap for Scientific and Educational Cooperation.

Indian-Russian Network of Institutions of Higher Education (RIN) was created in 2016 and includes 21 Russian and 9 Indian universities. RIN aims at uniting the efforts of the leading institutions of higher education in India and Russia to promote cooperation in the fields of science, education and technology. Indian coordinator is Indian Institute of Technology, Bombay, the Russian coordinator is the Tomsk State University.

On 11-12 Feb 2016 the first meeting of RIN was held at IIT Bombay. The participants discussed the issues and prospects of cooperation in the field of science, technology and education, to develop mechanisms of joint projects and programs implementation, and identification of an action plan for 2016-2017.

Indo- Russian partipants at IIT-Bombay

The participants from both sides presented their educational programs, scientific potential and capacities of high-tech products development. Participants also got acquainted with intricacies of scientific and educational process in both countries. For instance, major obstacles in creation of double degree programs due to the difference in the legislation of India and Russia in this area were identified. As a result, the participants concluded that it is necessary to implement joint educational programs, when undergraduate or graduate students can have courses at the partner university, but get one diploma of the parent institution.

The participants further discussed the issues of scientific and educational cooperation, and the coordination of proposals on the RIN's activities. Participants reached a consensus with regard to the main vector of scientific cooperation development. Any potential joint project begins with the personal interaction of scientists. They create the foundation for further promotion of cooperation and its transformation in joint research activities, or in joint doctoral programs. In view of the current difficulties in the creation of programs of double diplomas and degrees, the parties proposed to start cooperation through joint supervision of PhD students. Many participants of the meeting already have successful experience in this sphere mainly with European countries.

During the discussion of mechanisms of interaction of RIN members it was decided to create a data repository, which would include a database of summer and winter schools, scientific laboratories, equipment for joint R&D work, scientific themes for collaboration, accessibility of educational courses and scholarship programs, and postdoc job vacancies. The Resource Center "Russia-India" was entrusted to performing these tasks. Joint workshops (online and offline) were defined as the other effective mechanism of scientific cooperation that contributes to the gradual formation of the joint research teams to address vital scientific issues.

Discussions on cooperation of universities in technological field focused on establishing cooperation of RIN's members with industry. Indian and Russian participants noted the lack of contracts and projects with industry. As a

possible solution to this problem it was proposed to hold workshops on important technologies for business and industry on the basis of business/industry associations such as FICCI (Federation of Commerce and Industry of India), CII (Confederation of Indian Industry), Business Council for Cooperation with India. These workshops could help industry to get information about the possibilities of the academic sector for the development of new high-tech products. For RIN's members these workshops provide the actual picture of technologies in demand. As a result, universities and institutes could adjust their R&D, focusing it on the existing demand.

The participants concluded the meeting by expressing their readiness to actively collaborate and develop scientific and educational cooperation further on.

Participants of RIN Meeting:

India:

- Indian Institute of Technology Bombay;
- Indian Institute of Technology Kharagpur;
- Indian Institute of Technology Madras;
- Indian Institute of Technology Kanpur;
- Indian Institute of Technology Hyderabad;
- Indian Institute of Technology Patna;
- Indian Institute of Technology Gandhinagar;
- Indian Institute of Technology Indore;
- Indian Institute of Technology Gawhati;
- Indian Institute of Technology Roorkee.

Russia:

- Moscow State University;
- Kazan Federal University/Institute of Geology and Petroleum Technologies;
- Magnitogorsk State Technical University;
- Tomsk State University;
- Novosibirsk State University;
- Russian Union of the Scientific and Engineering Organizations;
- Moscow Automobile and Road Construction University;
- Peter the Great St. Petersburg Polytechnic University;
- Ural Federal University.

4) Indian-Russian Team explores Antarctica meteorites

Scientists from India and Russia will be part of the next meteorite expedition to Antarctica. The research is supported by Ural Federal University and the Russian Academy of Sciences. Indian scientists would reportedly provide snowmobiles to get around the ice cap. Experts from Finland are also expected to join the next Antarctic expedition for joint research. A possibility of cooperating with other countries is being discussed.

The first Russian Antarctic meteorite expedition was held between December 2015 and January 2016. The expedition's budget was estimated at between 8 and 12 million Rubles, most of which was provided by the Ural Federal University for research and development. Work on finding meteorites was held in the Queen Maud Land area, located 100 km from the Russian Novolazarevskaya station. Scientists were able to collect more than 300 rock samples for further investigations, two of which have already been classified as meteorites. Further study would allow scientists to gain new information about the origins of the universe and the future of the planet.

5) Russian Science Day celebrated in New-Delhi

On Feb 8th, 2016 Delhi's Russian Centre of Science and Culture (RCSC) marked the Day of Russian Science. Eminent scientists and supporters of Indian-Russian science cooperation participated in the event. Students from Delhi University and Indian Institute of Technology along with representatives of international Federation of Indian-Russian Youth clubs also joined the programme.

Day of Russian Science celebrated in Delhi.

Alexander Zhmyrev, Head of Science and Technology, RCSC paid tribute to the signal contributions made by outstanding Russian scientists in different faculties, who became Nobel Laureates. Vivek Singh, OSD, Department of Space, GoI outlined vital Soviet and Russian help and support to India's space programmes, focusing on Soviet cooperation in India's remote-sensing rocket launches, launching of Aryabhata, Bhaskara-I, and Bhaskara-II satellites, students satellites, Indo-Soviet joint space travel, the Brahmos project and a series of joint space programmes on a wider perspective aimed at the country's scientific developments. Dr TV Venkateswaran, Scientist "F", Department of Science and Technology emphasised that as close friends and strategic partners India and Russia should have a clear perception of making a philosophic approach to science in its exploration and application in everyday life. CB Devgun, President, Science Popularisation Association of Communicators and Educators (SPACE) underscored the landmark achievements in science, and space science. Citing his own experience of covering the Solar Eclipse in Siberia, he commended the scientific quest, spirit and consistent hard work and dedication of Russian scientists.

6) Indo-Russian Joint Research Call for Proposals 2016 launched

Call Open: 5th Feb, 2016
Deadline Date: 5th May, 2016
Full Details:
http://dst.gov.in/sites/default/files/rfbr-interdisciplinary-call-05-feb-2016.pdf

Department of Science & Technology (DST), GoI and Russian Foundation for Basic Research (RFBR) invite Indian and Russian scientists / researchers to submit proposals for Joint Research Project in the following areas of basic sciences under DST-RFBR cooperation:

- Fundamentals of Nuclear Sciences;
- Development of methods for structural diagnostics for interdisciplinary research on the source of synchrotron radiation and neutrons;
- Basics and interdisciplinary problems of neutrino physics;
- Nonlinear optics: methods of research with ultra-high spatial and temporal resolution;
- The fundamentals of nano-micro-meso-macromechanics deformation and fracture;
- Energy storage;
- High performance computing and big data;
- Energy materials.

6) Exchange Visits

Indian Scientists to Russia:

- Dr Balchandra Yadav, Department of Applied Physics, Babasaheb Bhimrao Ambedkar University, visited Institute of Problems of Chemical Physics (IPCP RAS), Chernogolovka, during Feb 26 - Mar 04, 2016, under the DST-RFBR project.

Russian Scientists going to India:

- Prof Kholmirzo Kholmurodov, Leading Scientist, Joint Institute of Nuclear Research, visited NIT, Patna, during 1 - 19th Feb, 2016 for joint collaborative research work.
- Prof Oleg Teryaev, Head of Research Group, Laboratory of Theoretical Physics, Joint Institute of Nuclear Research would be visiting to IIT Bombay for a period of one month starting from 14th March, 2016 as a visiting Professor to the Department of Physics, IIT Bombay.
- Prof Nikolay Tyurin, Joint Institute of Nuclear Research Institute of Mathematical Sciences, Chennai visited during 10th Feb - 03rd March for Research and academic collaboration
- A 13-member delegation from Russian Universities - members of RIN Network visited during 11-12th of Feb, 2016 for First meeting of Network of Indian-Russian Institutions of Higher Education.

II. Science, Technology & Innovation in Russia.

1. A Chip replacing Complex Laser Units created

A Russian-Swiss group of scientists has developed a chip based on the "optical frequency comb" technology, a solution that may replace complex laser units. This chip generates femtosecond pulses of light with a peculiar frequency range referred to as "optical frequency comb" which means the chip does what only large and complex laser units have been able to achieve so far.

Femtosecond optical frequency combs were first discovered in the late 1990s and have since then been found useful in an array of applications, including telecommunications, laser spectroscopy, astrophysics, and other areas. To create the new comb, physicists at the Moscow Lomonosov State University and the Russian Quantum Center suggested that the so-called "solitons" be used. The latter are compactly packed waves which could be likened to electromagnetic tsunamis and act very much like particles. In the most recent effort, the duration of pulses was reduced from a typical 100-200 fs to just 30 fs, which does not only make it possible to use smaller, cheaper and less complicated comb generators but also enables the use of combs in modes "unattainable with other methods."

2. Kazan to produce Genetic Drugs for Clinical and Preclinical Trials

Kazan Federal University plans to produce a wide range of genetic drugs for clinical and preclinical trials. These products will become the first GMP-certified line of such type in the country. The necessary equipment is up and running, and the first laboratory samples have been produced for preclinical trials. According to developers, they would be able to have their genetic medications manufactured for preclinical and clinical trials and in the future – for the general market. Their products can be used to treat peripheral nerves, ischemia, locomotory impairments (like osteanagenesis), neurodegenerative diseases (Alzheimer's, lateral sclerosis), cirrhosis, spinal injuries. They also plan to tackle strokes and infarctions.

There are now only four genetic drugs certified in the world. Two of them (of Chinese origin) were designed to battle oncological diseases, the third one (by the

Human Stem Cell Institute) – against leg ischemia, and the fourth one (from Europe) – to treat a rare lipoprotein deficiency. Kazan University started working on genetic medications back in 2007. After that another boost was given by the cooperation between KFU and Human Stem Cell Institute – the sides are now planning to establish a joint venture.

According to Prof Albert Rizvanov, the medication mechanism works in a way that scientists can treat cells outside of the body and then return them into the organism, and they can administer the medication internally as well. This is basically the same process. The medication contains a fragment of genetic material that is essentially a programming language for cells. So by providing this information they can make cells produce the necessary substance.

3. Next-Gen Biocompatible Materials for Medicine created

Scientists of Tomsk Polytechnic University (TPU), Krasnoyarsk Institute of biophysics SB RAS and several German scientific centers have come up with a method to improve biodegradable biopolymers used to replace damaged human tissues by making them hydrophilic. This modification enables much stronger coupling of polymer material with cells of connective tissue (fibroblastama) and enhances cell growth.

For several years Krasnoyarsk biophysics successfully worked with biodegradable polymer polyhydroxybutyrate (PHB). This biopolymer is emitted from bacterial biomass, cleared and used in medicine to make coverings for wounds and designs for restoration of cartilages and joints. It is important that the artificial design should interact with the living human cells. However, initially its surface is generally hydrophobic and therefore does not interact well with connective tissues. To improve its biocompatibility the scientists suggested treating PHB with reactive radio-frequency plasma in the atmosphere of either pure oxygen or ammonia. The advantage of plasma treatment is its ability to modify only a thin near surface layer of the material while keeping its overall structure unchanged. As a result, the interaction between upgraded biopolymer films and connective tissue became highly strong while other already existing medical properties remained the same.

Until now tests have been carried out only on films, but the ambitious team plan to work with other biodegradable polymers and further switch to implants. In the near future they aim at starting clinical trials for further implementation of the development into applied medicine.

4. Novel Approach to Wireless Energy Transmission developed

Researchers working on metamaterials at the University of IT, Mechanics and Optics (ITMO) jointly with colleagues at "Girikond", a local research institute, have shown that using ceramic dielectric diodes can lead to developing efficient wireless energy transmission systems. In a lab experiment, the developers have reportedly been able to light up a LED bulb at a 20-30cm distance without any wires.

According to Dr Polina Kapitanova, ITMO research fellow, it is but pioneering work, but the system does already work for a 20cm distance and 1W capacity. Her colleagues at "Girikond" have come up with new samples of ceramics with an augmented dielectric permittivity and reduced losses, which is expected to help increase distances for energy transmission and also shift to megahertz range operating frequencies that are not harmful to man. In 2007, Massachusetts Institute of Technology conducted a similar experiment and lit up a 60W bulb at a 2.5m distance by using two copper coils interacting with each other in

resonance, but at ITMO, the scientists replaced the coils with dielectric ceramic resonators which are said to enable the excitation of magnetic fields with reduced losses of energy.

5. First Braille E-Book for Visually Impaired developed

Tyumen State University have developed the world's first electronic book named "Seeall" for visually impaired people. The idea behind the invention was to ease the complex process of education. Thee-book includes separate modules for students and teachers, i.e. during the training they could transmit messages to each other. The device can receive files of any format, including audio and video. The user inserts a flash carrier into the textbook, after which the program converts the information. Then, the information is displayed on the operating panel in the form of Braille script, which the user can read by touch. Using a special pencil lead, the user can also set up font sizes on a separate panel to train his writing skills.

According to Aydar Fakhrutdinov, team researcher, the next step in the development of this technology would be connection of the e-textbook to the Internet. With the help of this next-gen device, visually impaired people would be able to gain access to any materials.

6. Space Technologies for Air Disinfection to be installed in Schools

Russian facility for disinfection of air "Potok" ("Flow"), which was first used in space, would be installed in schools, hospitals and other public facilities. Earlier the facility was tested on board of "Mir" and ISS orbital stations. According to specialists, "Potok" helped during emergency situations related to excess concentration of microorganisms in the air and presence of toxic emissions from "fire" aerosol.

"Flow" operates on the basis of a new technology of bioactivation. What makes this technology different from existing world analogues, is that the facility destroys 99% of harmful microorganisms without the use of hazardous chemicals. After that high-performance filtration of inactivated biomass and aerosol particles starts. This helps to eliminate the accumulation of viable microorganisms on the filter parts and ensures high microbiological purity and safety of the treated air.

7. SSAU creates Space Radiolocator for Mapping and Agriculture

Samara State Aerospace University (SSAU) have developed an advanced space radiolocator, which would enable specialists to observe from space not only the visible surface, but the subsurface objects, even when they are disguised by vegetation. The device has been designed at Volga State University of Telecommunications and Informatics. It has been already installed on the spacecraft "Aist-2D", planned for launch from the Vostochny Cosmodrome.

The monitoring would take place using passive location of the Earth in a new P-band with a spatial resolution of up to 5m. The device would be able to create radar images of the surface within a radius of 20 km around the terrestrial stationary reception point several times a day. The radiolocator is at present dependent on terrestrial reception points. But with the help of it scientists plan to improve new technologies of remote sensing of the Earth in order to create space radar with even better resolution and independent of the ground equipment. Now the radiolocator enables the specialists to observe agricultural facilities for precision farming, to follow changes in the terrain, to create topographic maps and monitor changes in the terrain with precision up to several centimeters. The specialists would also carry out tomography of the Earth's ionosphere.

According developers, the depth of penetration of the locator through the surface of the Earth is much greater than of existing orbit analogs, and depends on the moisture level and the type of soil structure - from several dozens of centimeters in ordinary soil to dozens of meters in the desert. Such equipment is reportedly. Monostatic P-range radar with a resolution of 30m "BIOSAR" is scheduled for launch by ESA in 2020.

8. New Agency for High-Tech Development to be established

The Russian Government announced the creation of a new Agency for Technological Development by 01 Jul, 2016. The Agency would support projects in the high-tech sector and focus on imported technologies which reportedly have no domestic analogues. The agency's main goal would be to identify opportunities for applying advanced technologies to support domestic producers and facilitate Russia's non-commodity exports. It would support creation of joint ventures and encourage Russian companies to produce locally foreign high-tech products that are currently only made abroad. Priority sectors are reported to include mechanical engineering, machine-tool manufacturing, construction, pharmaceuticals, and biotechnologies.

The Agency's board of directors would reportedly include representatives from Russia's development institutions, including government-owned Rosnano, Skolkovo, RVC, and the Industry Development Fund. The agency is also expected to work with the state-owned Industry Development Fund to provide low-interest loans to support high-tech projects.

9. Young Scientists awarded in Moscow

The All-Russian competition "Engineer of the Year" is aimed at identifying the best representatives of the scientific and technical intelligence. The founders of the competition are the Russian Union of Scientific and Engineering Organizations, the International Union of Scientific and Engineering Associations, the Academy of Engineering Sciences named after AM Prokhorov and the Interregional Public Fund for Scientific and Technological Progress. The jury and expert committees are composed of leading scientists, engineers and specialists from various sectors of the national economy.

XVI All-Russian Contest "Engineer of the Year" and Youth Award in the field of science and technology "Hope of Russia" in 2015 was also dedicated to the 150th anniversary since the establishment of the Russian Technical Society. According to the organizers, this time the competition was attended by about 100 young scientists and engineers. As a result, three winners were identified:

a) The team from St Petersburg Center of Shipbuilding and Ship Repair Technology: Vladimir Bukata, Nikolay Nosyrev and Artem Zhmurenkov. They are awarded for research, development, manufacturing and implementation into the industry of high-performance laser technologies and equipment for shipbuilding and mechanical engineering.

b) Scientist Alexey Arkhipov from Research Institute of the Gubkin Russian State University of Oil and Gas for development and implementation of information and measurement system of control of the distance between boreholes in cluster drilling;

c) The team from Technology Center of the Moscow Institute of Electronic Technology (MIET): Natalia Komarova, Maria Andrianova and Alexander Kuznetsov. They developed a platform of bioelectronic detectors for rapid analysis of nitrobenzene compounds.

10. MSU grow Best Crystals for Organic Electronics

The Faculty of Physics of Moscow State University in cooperation with Russian and foreign colleagues have come up with a way to grow organic semiconductor crystals with a record high light sensitivity, which promises a revolution in organic optoelectronics. Moreover, they made a double breakthrough using much simpler and cheaper technologies that previously were considered impractical.

The team selected so called thiophene-phenylene oligomers (TPCOs) as work-horse molecules. TPCOs are among the most promising materials for organic light emitting devices. The desired molecules were synthesized for them by chemists from Moscow State University and Enikolopov Institute of Synthetic Polymeric Materials of RAS. At the faculty of physics, crystals were grown from solution of these molecules. Their luminescent and electrical properties were measured there, as well. As a result, solution-grown crystals are stronger luminescent than vapor-grown crystals in contrast to a common believe that the vapor-processed organic electronic materials show the highest performance. Their quantum yield (i.e. the ratio of the number of photons emitted to the number of absorbed ones) reached 60%, whereas vapor-grown crystals presented no more than 38%.

In one of the recent studies, the group also determined that crystals can be grown on the surface of the solution instead of a solid substrate due to the surface tension forces. Because the liquid surface is almost perfect, the crystals grown on it are of good quality, and owing to their high electronic performance, they are preferable to the vapor-grown ones. Moreover, the surface of the solution-grown crystals is molecularly smooth with angstrom-scale roughness, which allows the scientists to create field-effect transistors of high quality.

The new method opens possibilities for the applicability of such crystals in light-emitted transistors, and therefore in organic optoelectronics. The scientific group also speculates about creating lasers controlled by electric current obtained on the same basis. The combination of good conductivity and high efficiency allows them to hope that the first electrically pumped laser would be created on the basis of such crystals.

11. Novel Large-sized Pipe Manufacturing Technology developed

The developer of Skolkovo's nuclear tech cluster "Optogard Nanotech" has come up with a new laser-plasma technology to strengthen metals, a method believed to be highly useful in pipe production. The technology is reportedly best applicable to manufacturing large-sized pipes, up to 12m, without using vacuum, enabling workers to strengthen the surfaces of large-diameter pipes both on the inside and on the outside.

"Optogard Nanotech" focuses on the development, commercialization and fine-tuning of cutting-edge laser-plasma technologies for industry which are expected to boost wearproof, shockproof and chemical and corrosion resistant properties of both new and repaired mechanical engineering parts."ChelPipe", leader in this national sector and a regional pipe maker in the Urals, may become the first buyer of the new domestic technology.

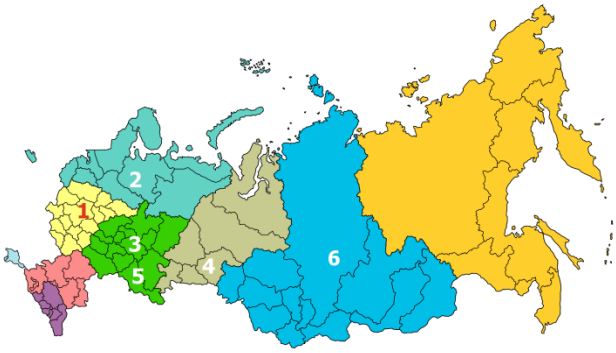
12. New Sensor and IC Building Technique developed

Moscow Institute of Physics and Technology (MIPT) jointly with Semenov Institute of Chemical Physics, Department of Chemistry MSU and Institute of Problems of Chemical Physics RAS have come up with a new method enabling fast and inexpensive design of very small sensors and ICs by using a mechanism of laser application of structures to glass with a resolution of less than 100 nm.

The scientists used a femtosecond laser to apply structures to the surface of a transparent material, in this case glass. A beam of light was used to create a sort of trap in liquid where glass microspheres were placed. The device can be moved around to focus the laser on certain parts of the glass. When impacted by a laser beam and heated, pits are produced in the laser-affected zones which are then subject to etching. To demonstrate their technology the researchers wrote the abbreviation of the Institute of Chemical Physics (ICP), a project participant, on the glass surface. According to Mr Alexander Shakhov, team researcher, the new method could be used in developing super-precise circuits operating with liquid.

III. Profile of R&D Institutes and Industry in Russia

1. Region-wise Russian Scientific & Educational Institutions from Section II



- Region 1: Moscow Region (Moscow Institute of Physics and Technology; Russian Quantum Center; MV Lomonosov Moscow State University; Enikolopov Institute of Synthetic Polymeric Materials of RAS; "Optogard Nanotech" company; "Potok Inter" company; Semenov Institute of Chemical Physics; Department of Chemistry MSU; Institute of Problems of Chemical Physics RAS)
- Region 2: Leningrad Oblast (University of IT, Mechanics and Optics (ITMO))
- Region 3: The Republic of Tatarstan (Kazan Federal University)
- Region 4: Ural Federal District (Tyumen State University)
- Region 5: Volga Federal District (Samara State Aerospace University)
- Region 6: Siberian Federal District (Tomsk Polytechnic University; Krasnoyarsk Institute of Biophysics SB RAS)

2. Supporting Universities to be formed in Russia

The Expert Council of the Russian Ministry of Education and Science would establish 11 supporting Russian universities, which would receive state subsidies for the further development:

- Volgograd State Technical University;
- Voronezh State Technical University;
- Vyatka State University;
- Don State Technical University;
- Kostroma State Technological University;
- Omsk State Technical University;
- Oryol State University named after IS Turgenev;
- Samara State Technical University;
- Siberian State Aerospace University named after Academician MF Reshetnev;
- Tyumen State Oil and Gas University;
- Ufa State Oil Technical University.

Each university would strengthen its capacity by adding another institution of the same region to it or by merging with it. Supporting universities would become the basis for creation of strong regional universities through combining scientific centres, personnel and financial resources. This change is expected to make it easier to create new scientific laboratories and attract strong Russian and foreign students and to ensure

cooperation with major industry enterprises in the region and abroad. The programme involves the allocation of additional subsidies to 200 million rubles annually for each supporting university for the period of three years. The funds released as a result of merging would be spent on further development of university programmes. Supporting universities will be focused on tasks posed by regional economies and training qualified personnel for labor markets.

3. AN Nesmeyanov Institute of Organoelement Compounds of Russian Academy of Sciences (INEOS RAS)

Director : Acad Aziz Mansurovich Muzafarov
Address : 119991, Moscow, Vavilova st 28 GSP-1
Contacts: Tel: +7(499)135-93-84, Fax: +7(499)135-50-85; Email: mg@ineos.ac.ru; aziz@ineos.ac.ru ; Website: http://www.ineos.ac.ru/en.html

AN Nesmeyanov Institute of Organoelement Compounds of Russian Academy of Sciences (INEOS RAS) is a worldwide-recognized research institution with profound expertise in organoelement and macromolecular compounds chemistry. The present director of the Institute is Academician AM Muzafarov, a leading specialist in polymer chemistry. INEOS RAS has over 38 laboratories and 18 research groups. INEOS RAS focuses on fundamental and applied research with concentration on prospective materials (including polymers, nanostructured materials, organoelement compounds Si, F, P, materials for medical applications). The basic directions of activity include:

- Chemistry of organoelement compounds;
- Chemistry and physics of high molecular weight compounds;
- Biological active compounds;
- Physical methods of investigations.

Subjects of scientific researches of institute cover topics such as Synthesis and structure, reactivity and properties investigation of organometallic and coordination compounds as well as organophosphorus, organofluorine and organoboron compounds; asymmetrical synthesis and catalysis in organoelement compounds chemistry; fullerenes – a base for the synthesis of new compounds and novel type materials; synthesis of biological active compounds of organic and ornganoelement compounds and biological active high molecular compounds; organoelement and metal containing polymers: synthesis, structure and properties investigations, application; functional and intellectual polymers and multi-component polymeric systems; catalytical and ecological safety processes of low molecular compounds and polymers formation; development and application of experimental and theoretical methods for investigation and analysis (X-ray analysis, optical spectroscopy, NMR, chromatography, mass-spectrometry, quantum chemistry, microanalysis, electron spin resonance, nuclear quadrupole resonance, X-ray photoelectron spectroscopy, paleography); theory and mathematical modeling of polymeric systems; metal-complex catalysis: activation of small molecules and inert molecules, new catalysts for polymerization and other processes. Alkanes as nontraditional raw material for the synthesis of organic compounds; development of new approaches to a nanoparticles formation in liquid and condensed medias; polymeric supramolecular structures and nano-composites.

INEOS RAS has signed numerous contracts with many research institutions of Russian Academy of Sciences, universities, industrial centers and multinational companies in Russia and abroad. It also supports research linkages

with Bhabha Atomic Research Centre and Indian Institute of Science. The institute is very keen to extend its cooperation with India.

4. Samara State Aerospace University (SSAU)

Rector : Prof Evgeniy Shakhmatov
Address: 443123, Russia, Samara, Moskovskoye shosse 34
Contacts: Tel: +7(846)335-18-01;
E-mail: shakhm@ssau.ru; teach@ssau.ru; intdep@ssau.ru;
Website: http://www.ssau.ru/english/

Samara State Aerospace University (SSAU) is a research–and-educational center of the aerospace cluster of the Samara region. SSAU has at its disposal powerful resources for educational, research and outside training activities. In 2009 the University was granted the prestigious status of "national research university". In 2015 it became participant of Russian-Indian Network of institutions of higher education. Major research areas of SSAU include:

- Space Engineering;
- Aeronautics;
- Aerospace Engine Construction;
- Dynamics and Vibroacoustics of Machines;
- Perspective Material and Technologies;
- Laser and Biomedical Systems;
- Radioelectronics, Micro- and Nanoelectronics;
- Information Technologies, Computer Optics and Image Processing;
- Space Geoinformatics and Information Security;
- Physics, Chemistry and Gas Dynamics.

5. Ural Federal University named after President of Russia BN Yeltsin

Rector: Mr Victor Koksharov
Address: 620002, Yekaterinburg, ul Mira 19
Contacts: Ms Anna Boikova, Project management specialist, Tel :+7(912)246-04-08; E-mail: boikova.anna@urfu.ru ; Website: http://urfu.ru/en/;

The Ural University is the core of a research cluster that also includes scientific institutes of the Ural Branch of RAS, specialised laboratories and hi-tech industry companies. UrFU is among world leaders in 40 research competencies, mainly connected with mathematics, physics and chemistry. UrFU's powerful research infrastructure includes dozens of research centres, innovation infrastructure, several museums and specialized collections.
29 research laboratories including 12 laboratories headed by the leading foreign researchers have already been established at UrFU. The areas of research considered a priority include:

- Information Technologies and Human Being in the Information Society;
- Power Engineering, Resource Saving, and Environmental Management;
- Flexible Technologies and New Materials;
- Living Systems and Health.

The Ural Federal University (UrFU) is one of the top ranked scientific centres in Russia that strives to develop a broad scope of research subjects in natural, technical and social sciences, the humanities and economics.

6. National Research Tomsk Polytechnic University

Director : Prof Petr S Chubik
Address : 634050, Tomsk, Lenin Avenue 30
Contacts : Tel: +7 (38-22) 56-34-70; Fax: +7 (38-22) 56-38-65; E-mail: tpu@tpu.ru;
Website : http://tpu.ru/en/about/

Tomsk Polytechnic University (TPU) is the oldest engineering higher school in the Asian part of Russia. The University's world-wide acknowledged scientific schools have a significant impact on the development of science, with the four of them having obtained the state support under the Russian President's grants.

Five Priority Development Fields of the University include:

- Rational Management and Advanced Processing of Natural Resources;
- Conventional and Nuclear Power Engineering, Alternative Technologies of Energy Generation;
- Nanotechnologies and Plasma-Beam Technologies of Materials Generation with Defined Properties;
- Intelligent Information-Telecommunication Monitoring and Control Systems;
- Non-destructive Testing and Diagnostics in Manufacturing and Social Sectors.

The scientific achievements of the University are recognized by numerous awards received by its employees with the most outstanding of them being the discovery "Crystals structure arrangement with small ionizing radiation doses" that made eight University employees become the laureates of the RF Government Reward in S&T; the grand prix «TFFIE» and "Golden Palm" prize awarded under EEC International Program "Partnership for the progress" (France) for the development of international cooperation.

IV. Forthcoming Workshops and Conferences in Russia

1. XII International Conference GeoRaman-2016

Dates : 9-15 Jun, 2016
Place : Novosibirsk, Russia
Coordinator: Dr Andrey Korsakov**, Co-chair**
Contacts : Email: akorsakov74@gmail.com; georaman2016@gmail.com;
Website: http://georaman2016.igm.nsc.ru;

The Conference scope covers all scientific aspects on the border where Raman spectroscopy and geology meet. The Conference list of topics includes: mineralogy; archaeometry; petrology; forensics; inclusions; astrobiology; fossils; instrumentation; gemstones; planetology; etc.

2. The 3rd International Conference on Digital Information Processing, Data Mining, and Wireless Communications 2016 (DIPDMWC2016)

Dates : 6-8th Jul, 2016
Place : Moscow, Russia
Coordinator: Lindielyn, Conference Coordinator
Contacts : Email: dipdmwc16@sdiwc.net;
Website: http://sdiwc.net/conferences/dipdmwc2016/;

The conference welcomes papers on the following (but not limited to) research areas: digital information processing; data mining; wireless communications.

3. 21st International Conference on Photochemical Conversion and Storage of Solar Energy (IPS-21)

Dates : 24-29 Jul, 2016
Place : St Petersburg, Russia (St Petersburg State University)
Coordinator: Ms Valeria Limonova, Conference manager
Contacts : Phone: +7(812) 645-35-90; E-mail: post@ips21-spb.com,
Website: http://www.ips21-spb.com/

IPS-21 will provide a versatile platform for formal and informal discussions with colleagues both from academia and industry. The conference would cover: Solar to Electricity Conversion (Photovoltaics/DSSCs/Perovskite SCs/Organic

polymer SCs); Solar to Chemical Energy Conversion (Solar fuel/Water splitting/CO2 reduction); Artificial Photosynthesis; Photocatalysis; New Photoactive Materials; Mechanistic Studies, Engineering, Modelling.

4. POLYCONDENSATION 2016

Dates: 11-15 Sep, 2016
Place: Moscow and St Petersburg, Russia
Coordinator: Prof Alexander Shaplov, Conference Coordinator
Contacts : Tel:+7(499)135-92-44; +7(499)135-92-77;
Email: polycon2016@gmail.com;
Website: http://www.polycondensation2016.ac.ru/

"Polycondensation 2016" would be held in Moscow (AN Nesmeyanov Institute of Organoelement Compounds RAS) during 11-13 Sep and at the Scientists Palace in St Petersburg during 14-15 Sep. The conference would cover a wide range of topics, showcasing the most exciting fields of condensation polymer science and technology: new methods for the synthesis of condensation commercial and research polymers; polymers for biomedicine, pharmaceutics, engineering plastics and fibers, energy, optics, photonics and electronics.

5. "All-Wave Astronomy. Shklovsky-100" International Conference

Dates : 20-22 Jun, 2016
Place : Moscow, Russia
Coordinator: Dr Alexey Abramov**,** Conference Coordinator
Contacts:
Email: Shklovsky100@asc.rssi.ru;
Website:
http://shklovsky100.asc.rssi.ru/index.php/en/ .

The conference will be held at Astro Space Center of Lebedev Physical Institute and include the results of modern research in wave astronomy-related issues. Topics would cover: cosmic microwave background; the early Universe; supermassive black holes; active galactic nuclei; supernovae; supernovae remnants; gamma-ray bursts; interstellar medium, stars; planets; the SETI problem.

6. 17th International Conference "Laser Optics 2016"

Dates : 27 Jun - 01 Jul, 2016
Place : St Petersburg, Russia
Coordinator: Mr Antov V Kovalev, Conference Secretary
Contacts : Tel: +7 (812)323-63-48;
Website: http://www.laseroptics.ru/;

Email:conference2016@laseroptics.ru .

The Conference topics would cover: solid-state lasers, high power lasers; semiconductor lasers; materials and applications; laser beam control; nonlinear photonics; optical nanomaterials; free electron lasers; ultrafast processes; super-intense light fields; lasers for satellite ranging systems; space geodesy; global navigation.

1. "The Future of Agriculture: Grand Challenges and Technological Change" International Conference

Dates: 03 Mar, 2016
Place: Moscow, Russia (NRU Higher School of Economics (HSE))
Coordinator: Ms Elena Nasybulina, Conference Coordinator
Contacts: Tel:+7(495)6219604,+7(495)772-95-90,ext.115-40; Email: enasybulina@hse.ru;
Website:
https://www.hse.ru/news/174872024.html

The workshop aims to discuss and identify pertinent research topics of mutual interest for science, technology and innovation cooperation between the EU member states, Horizon 2020 associated countries and

countries of the Black Sea region in the following thematic areas:
- Towards sustainable agriculture based on new technologies and new institutional designs;
- Genetic engineering: future prospects;
- Food security: new challenges for agricultural countries.

Representatives of Russian government authorities, foreign embassies to the Russian Federation, and leading international and Russian research organisations will take part in the event.

V. Academic Programme offers of Russian Universities.

1) National Research Novosibirsk State University (NRU NSU)

True Data Scientist solves the problem by combining the hardcore science and breakthrough data mining technologies with inexplicable art of human understanding. As a student you will take part in real projects, working with the team through all the project stages to acquire deep knowledge and master your skills in analyzing the core problems of your customer, planning and managing project resources, engineering software, collecting and processing all sorts of data, and discovering the precious insights that put the whole data puzzle together.

Term: 2 years
Language of instruction: English
Entrance requirements: For both foreign students and graduates of the Russian higher education institutions (including bachelor graduates of NRU NSU):

- Educational diploma (certificate or analogous document) on program of level of a bachelor degree or of a specialist qualification of any specialization;
- Strong motivation to be Data Scientist;
- Proved background and strong knowledge of statistics and programming.

The application procedure and deadlines

Till May, 25, 2016 the applicant needs to send the following copies of documents via e-mail to Mr Pavlovskiy Evgeniy Nikolaevich, Programme Supervisor (e-mail: pavlovskiy@post.nsu.ru):

- Application for admission to the master program;
- Diploma (or some analogous document) on program of level of a bachelor degree or certificate (ordering) about passing now such program.
- TOEFL certificate (score 50-70: intermediate or upper intermediate level) or other international certificates (BEC etc.) of similar level.
- Curriculum Vitae of the applicant.
- Motivational letter (1-2 pages) on entrance to the Program.
- Recommendation of the professor of mathematics, informatics, director of software engineering company, or head of information technology department of state organization.

Till July, 1 the procedure of selection of applicants for testing passing is carried out. Till July, 15 the interview with committee of leading professors of the Chair of General Informatics DITNSU is carried out (on site or via remote conferencing (Skype/Hangouts)). Features of this interview are reflected in the following section of the Program. Till July, 20 the admittance to the Program occurs.

2) Ural Federal University (UrFU)

Currently the university is home to more than 30 000 students from 60 countries of the world and more than 2 000 faculty members including the top-notch global

experts in the spheres of natural sciences, engineering and social sciences. Our 17 Institutes offer more than 350 Bachelor, Master and Doctoral Programs in natural sciences, engineering, social sciences, humanities, economics and management taught in Russian and English. The number of UrFU alumni exceeds 300 000 people.

URFU offers:

1) 3-4 year Doctoral Programs;
2) accommodation in a University dorm;
3) the possibility to be employed as a researcher in the group of your thesis advisor;
4) free Russian language courses;
5) the possibility to defend the Candidate of Science* thesis or an UrFU PhD thesis.

*The first doctoral degree in Russia (Candidate of Science). It is gained after 3 to 5 years in a post-graduate school. The qualification requirements include mandatory publications in peer reviewed journals and approval on the Federal government level.

Entry requirements:

- Master's Degree in a field related to the field of Doctoral Studies
- B2 level of English or Russian
- Interview

Application deadline: 30th June 2016.

Short Description of Doctoral Programs

- Physical Chemistry
- Organic Chemistry
- Theoretical Physics
- Condensed Matter Physics
- Plant Physiology and Biochemistry
- Mathematical Analysis and Function Theory
- Theory and methodology of physical education, sports training, improving and adaptive physical culture
- Nuclear power plants
- Sustainable Development
- Human Capital Research

Contact persons:

1) Mrs Olga Malik, Lead Manager, Center for International Student Mobility and Recruiting , Tel: +7 (343) 374-54-34, Email: o.v.malik@urfu.ru
2) **Mrs. Anna Boikova**, Project Manager (Research), Email: boikova.anna@urfu.ru

In 2014 Ural Federal University launched the annual **"UrFUPostDoc"** contest to support research projects carried out by young promising international scientists at UrFU. Every year UrFU awards 20 grants for foreign postdocs. The main objective of the contest is to select the most promising research projects developed at UrFU Competence Centers, as well as to attract talented young international scientists for the development of such projects. **The contest supports projects in the following fields:**

- information technologies
- energy and resource saving
- flexible technologies and new materials
- living systems and health

The contest is divided into two stages: project contest and post-doctoral candidate contest. The candidates have to be researchers under 35 years of age, that have defended a PhD thesis no longer than 7 years before the announcement of the contest, with a good knowledge of English and publications in journals indexed in Scopus and Web of Science databases.

Contacts: Mr Sergey Zvonarev or Ms Anna Boikova, Project management specialist, International research collaboration support, Tel:+7(912)246-04-08; E-mail: boikova.anna@urfu.ru; Website: http://urfu.ru/en/;

3) Moscow Institute of Physics and Technology (MIPT)

MIPT offers International Master's Programmes:

1) Physical Sciences
   - Physics of Nanostructures ;
   - Physics of Radiation-Matter Interaction;
   - Planetary Science Mathematics;
   - Advanced Combinatorics;
2) Computer Science
   - Advanced Cybernetics (Cybernetics 2.0.)
   - Neural Networks & Neural Computers
3) Engineering & Technology
   - Aerodynamics
   - Materials Design
   - Beam Plasma Systems and Technologies
4) Life Sciences
   - Omics Technologies

Duration: 2 years (full-time)
ECTS credits: 120
Language of Instruction: English
Degree Awarded: Master of Science
Entry Requirements:

- Bachelor's Degree or equivalent;
- High academic results;
- Proof of English language knowledge equivalent to level B2 (TOEFLiBT, IELTS or equivalent).

Admission Tests: Examination and/or an Interview with a programme coordinator (option via-Skype)

List of documents required:

- Passport (scanned copy);
- Diploma(s) and official academic transcript(s) of records (scanned copy);
- Resume (including educational awards, results of academic competitions, scientific publications)'
- Statement of purpose;
- 2 letters of recommendation;
- Certificate of language proficiency (IELTS, TOEFL) (scanned copy).
- **All documents should be submitted in English or Russian language to the Department of International Affairs of MIPT at:* programmes.eng@mail.ru

Application deadlines:
Early admissions deadline: **January 31, 2016**
Reply deadline for early admissions students: March 01, 2016
Regular admissions deadline: **May 31, 2016**
Reply deadline for regular admissions students: July 01, 2016

Conditions Provided:
Tuition fees (Governmental full-tuition scholarship (early application recommended) or Standard tuition fee in amount of 190 000 Rub (per year))
Accommodation: Residence at MIPT modern student's dormitory with a living cost in amount of 600-1300 RUB per month.
Medical insurance: Costs 7000 Rub per year and is free for students applying for the full-tuition scholarship
How it works: After the documents are accepted you will be sent a letter with further instructions within one week
Contact information: Department of International Affairs, 9 Institutskiy per., Dolgoprudny, Moscow Region, 141700, Russian Federation, Tel: +7 (495) 408-7563, E-mail: programmes.eng@mail.ru