



## BEGINNING OF LONG JOURNEY IN NUCLEAR INDUSTRY

On November 29, the final events of Career Days of the State Corporation Rosatom have been held in MEPHI

This year more than 4,000 students and graduates, representing 80 leading Russian universities sent applications for participation in the Career Days.

The central event of Rosatom's Career Day was the lecture of the General Director of the Rosatom State Corporation A.E. Likhachev.

In a form of active dialogue A.E. Likhachev told about the future of the nuclear industry. He paid special attention to experts which Rosatom needs today. He emphasized that the



hallmark of employees of the nuclear industry is a good education. Expressing confidence that MEPHI provides its students with a quality education,

he suggested to pay great attention to language skills, which will be a benefit when applying for a job at the State Corporation.



## MEPHI IN THE TOP THREE OF RUSSIAN UNIVERSITIES ACCORDING TO STUDENTS' FEEDBACK

MEPHI has entered the top three of national universities according to the students feedback. Perhaps this is one of the most challenging tests conducted by the project "Social Navigator". The study was conducted on the reviews and comments of students on their universities.

Students' opinion has become a kind of a university's expert judgment and one of the most important factors which influence university's image and reputation

in the information environment.

All in all, students sent 1000 reviews, a half of which didn't pass, and 500 censored ones were left, which provided the basis for the rating.

In students' opinion, positive factors include interested lecturers, the complexity of studying, good upkeep and infrastructure of buildings, absence of corruption, university atmosphere, notable graduates, university positions in the ratings and others.



# SHANGHAI RANKING

## SHANGHAI GLOBAL RANKING MEPHI RECOGNIZED AS THE BEST RUSSIAN UNIVERSITY IN ENGINEERING EDUCATION

"Social navigator" project of "Rossiya segodnya" with the participation of Shanghai Ranking has represented the first Russian version of Shanghai Rankings Global Ranking of Academic Subjects 2016.

This year for the first time universities have been evaluated in 7 engineering directions – chemical engineering; civil engineering; electrical and electronic engineering; energy science and engineering; environmental science and engineering; materials science and engineering; mechanical engineering.

It is important to mention that MEPHI has entered Shanghai Ranking for the first time and has been acknowledged as the best Russian university in engineering education among the ones represented in it, once again confirming its competitive advantages on the way to the global leadership in the sphere of technical education.

"Shanghai Ranking is the most difficult one for Russian universities which is confirmed by Shanghai Rankings Global Ranking of Academic Subjects 2016 in which only three Russian universities were short-

listed," MEPHI rector Mikhail Strikhanov commented on the results of the ranking. "It is great that MEPHI has entered their number with the best result," he added.

He connected the fact of MEPHI's high results in "electronics and electronic engineering" with its participation in the Russian Academic Excellence Project 5-100. "In March, 2016 MEPHI was supported by the International Council of 5-100 Project for creation of 5 strategic academic units – institutes, among which there is MEPHI Institute of nanotechnologies in electronics, spintronics and photonics," he explained.

According to Mikhail Strikhanov, thanks to MEPHI scientists, a new scientific direction of SHF electronics has been formed, connected with the raising of energy efficiency of devices of electronic component base on the basis of gallium nitride with the usage of graphene film for thermal dispersion. "These and other works of our scientists have been reflected in top scientific journals which contributed to this ranking", noted rector, adding, that it is only the start of intense work of new institutes.



Every year student family of MEPHI becomes more and more international. For example, over the past three years the number of foreign students has increased three times and now the university has about a thousand of citizens from 34 countries.

## FUEL OF THE NEW CENTURY

Postgraduate student of the Laboratory No. 346 Maria Yurlova has won a scholarship of the President of Russia for young scientists for 2016 - 2018. Project title: "Development of technology for fabrication of mixed uranium-plutonium nitride fuel by electric pulse consolidation".

One of perspective kinds of fuel is nitride nuclear "fuel" which will contain plutonium, as well as americium nitrides and other actinides. Nowadays there is a problem in production of this fuel. Making tablets of necessary density from initial powder is rather labour- and energy-consuming. Quick wear of press tooling and furnace equipment takes place under such process.

A new method of high-voltage electropulse consolidation of nitride fuel has been worked out in MEPHI interdepartmental laboratory of perspective technologies of new materials' creation №346. Electropulse method is based

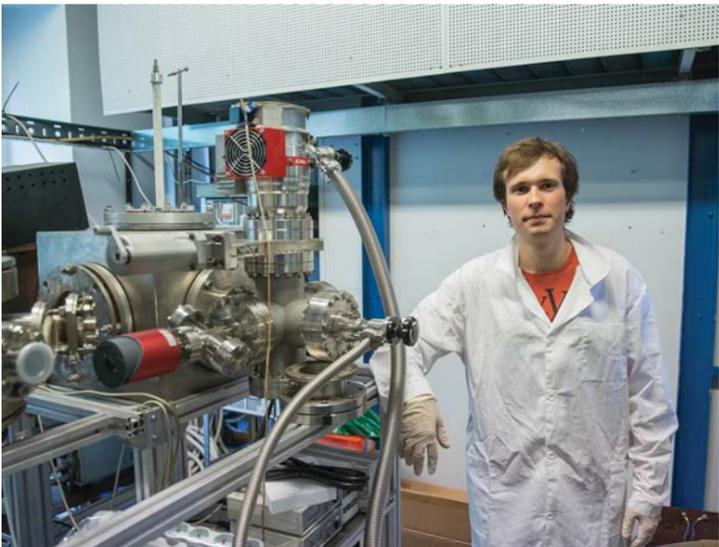


on electropower impact of powerful short-term (less than 1 msec) high-voltage electropulse and at the same time mechanical pressure on powder material. Material in the influence zone is warmed up to very high temperatures up to plasma condition. Pressure in the influence zone forms required properties of received products. The advantages of this technology are ecological cleanness, high efficiency: its energy consumption is 10 times lower than in the same

purpose powder and plasma technologies.

"Nowadays technology of high-voltage consolidation of powder materials has proved itself in production of hard-alloy and diamond-bearing instruments, making of hard alloys on the basis of tungsten, production of high-efficiency magnetic materials, porous materials, which have high open porosity and large surface area", said the Head of the laboratory №346 E. Grigoriev.

## UNIQUE PLASMA GENERATOR



**MEPHI scientists have worked out a plasma generator, which creates high current pulse magnetron discharge in vapours of the melted material.**

The device consists of a plasma node and a power source, and works in special modes of the magnetron discharge: intensive evaporation of the melted material, from which the coating is formed, takes place at the same time as the diffusion. The new technology will allow quickly and qualitatively put on thin films, which are in demand in the hi-tech sphere.

A huge market share of creation of metal and dielectric coatings for electronics, machine-building, architecture and other spheres belongs to the magnetron deposition.

Thus, magnetron deposition is the only way of energy saving coatings' deposition on buildings' glass. Moreover, this method is used for putting solid coating on cutting tools along with decorative coatings (titanium nitride on churches' cupolas instead of gold). In microelectronics such method is used for metallization of electronic circuit cards, in optics – for creation of light filters.

The discovery of the high current pulse magnetron discharge in 1980-s in MEPHI has become a real push in this sphere. In 2000-s the technology of high-power impulse magnetron sputtering (HiP-IMS) has been incorporated in Europe and in the USA.

"The low speed of the films' growth on the details in com-

parison with vacuum evaporation, for example of the magnetron deposition has been a lingering problem," said MEPHI engineer Alexander Tumarkin, adding, that coatings, obtained by the vacuum evaporation, have a significantly lower quality in comparison with the magnetron one. According to his words, people in industry always had to choose between the quality of articles and the productivity of the enterprise.

"We managed to unite the advantages of both technologies in the created device for radiation of pulse magnetron discharge with a melted cathode," said the scientist, adding, that the high-current sputtering of the melted target has a great technological potential.

Specialists are currently working on industrial samples of the device, that is to be incorporated on industry in future. "The industrial samples of the device will be used as plasma generator in industrial and laboratory facilities as a separate module for creation of high-quality coatings," said another MEPHI engineer Andrey Kaziev, adding, that potential customers are enterprises on creation of low-emissivity glass, modern energy cells, and multiprofile machine-building enterprises.

## OUR VICTORY MEPHIsts – WINNERS OF RUSSIAN ENGINEERING COMPETITION

On November, 16-18 St. Petersburg has hosted the closing event of the Russian engineering competition, which was attended by more than 2000 engineering students from almost 150 universities in the country.

Following the final two our girls – Margarita Karaseva and Anna Belozubova – won the Competition of individual projects of the Russian engineering competition.

Let's ask for what they received such high honors!

**Margarita Karaseva, graduate of the Department "Molecular physics" (became the absolute winner of the Competition of individual projects):**

I defended the project "Removing of easily passing impurities from natural gas"; my supervisors – Associate Professor N.I. Laguntsev and Associate Professor I.M. Kurchatov. The aim of the research work was to develop a membrane schematics of purification of natural gas from carbon dioxide, characterized by high energy efficiency, for the creation of innovative domestic technology of natural gas liquefaction.



**Anna Belozubova, first year postgraduate student of the specialty "Information security":**

My project title is "Adaptive method to counter the information leakage through the network of hidden channels at the time". Proposed method consists in introducing delays before sending of packets, which allows to limit the bandwidth of a potential covert channel. The advantage of the



method lies in the possibility to regulate the load on the communication channel.

MEPHI student **Sergey Nomoev** received a special prize from the company "Prepreg-SKM" for the project "Development of antenna for terahertz radiation, which is a safe alternative to x-ray methods of control".

In total the competition received 54 entries from 19 cities of Russia.



# MEPHI ACADEMIC MALE CHOIR WINS AT WORLD CHOIR GAMES IN SOCHI



From 6 to 16 of July 2016 Sochi has hosted the IX World Choir Games, which were attended by more than 12 thousand choral singers – 283 teams from 36 countries.

The World Choir Games is the largest choir competition, which is one of the most prestigious in the world and is held every two years in different countries on all 5 continents.

The jury of the competitive events involves leading figures of choral art. 60 experts, including eight from Russia, assess the quality of compositions performance and their compliance with traditions of national culture.

The Academic male choir of MEPhI took part in the Champions' contest in two nominations: "Male choirs" and "Folklore a Cappella" and everywhere our Choir were successful!

Following the competition MEPhI Choir became the Champion of the World Choir Games in nominations "Male choirs" (C14) and "Folklore a Cappella" (C27), received gold medals and diplomas.

On July 10 at the ceremony in the Bolshoy Ice Dome the Choir was presented with awards; in their honor the flag of the Russian Federation was raised and the anthem of Russia was played.



CITIUS, ALTIUS, FORTIUS!

## RUGBY FEDERATION RECOGNIZED RUGBY TEAM OF MEPHI AS BEST STUDENT'S CLUB OF MOSCOW

On the 17th of February 2016 Moscow Rugby Federation has summed up the past season following all the competitions held in the city in 2015.

The team of MEPhI is also among the nominees for

the title of winners. By the decision of the Commission of the Federation, the team of the National Research Nuclear University «MEPhI» became the winner in the category "Best student club of Moscow" by the end of 2015!

Congratulations to our students, coaches, staff of the Department "Physical culture", Center of physical culture of the Youth policy Department and the entire staff of our University with such a high place in the sports rating of the city of Moscow!



## OUR WRESTLERS WIN TWO GOLD MEDALS AT SAMBO TOURNAMENT!

On February, 28 Bauman Moscow State Technical University has held a Tournament in Sambo dedicated to the Defender's Day, which was attended by more than 20 wrestlers of MEPhI. The competition was held between athletes of 1994-2000 years of birth.

As a result of a bitter fight the first place in the weight category up to 68 kg was won by

a Candidate Master of Sports, the second year student of the Faculty "Cybernetics and Information Security" Mikhail Ulizko.

And a first year student of the Faculty "Cybernetics and Information Security" Yevgeny Frolov became the champion in weight category up to 100 kg.

Congratulations to the winners of the Tournament and let's wish them victory in future competitions!