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INFORMATION BULLETIN

NATIONAL CENTER

OF

MECHATRONICS AND CLEAN TECHNOLOGIES

2020

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Project BG05M2OP001-1.001-0008 funded by the Operational Programme Science and Education for Smart Growth, co-financed by the European Union through the European Regional Development Fund.

MODERNIZATION OF THE EXISTING RESEARCH INFRASTRUCTURE

FIRST DIG IN STUDENTSKI GRAD CAMPUS

The symbolic first dig in campus “Studentski Grad”, one of the three campuses of the Center of Excellence in Mechatronics and Clean Technologies, took place on March 13, 2020. This marked the beginning of reconstruction of the hall in the lower body of block 8 of the building stock at the Technical University in Sofia.



Due to the declared emergency situation in the country related to the covid-19 pandemic, in the ceremony participated a representative of the construction organization, the Rector of TU - Sofia, Prof. Ivan Kralov and scientists from the university, the Rector of the University of Chemical Technology and Metallurgy, Prof. Senya Terzieva – Zhelyazkova and Prof. Georgi Todorov, member of the Management Board of the project and a head of the campus “Studentski Grad”.

Prof. Kralov wished the campus to gather many young people, and they to transfer knowledge to business and industry. He said that the project “National Center of Excellence in Mechatronics and Clean Technologies”, intended as a center to support scientific activity in the country, excellence, convinced us from the start that it is worth investing all efforts to implement it.

For the head of the campus, Prof. Todorov, the most important is to populate the new



laboratories with young researchers, and they to work under the leadership of prominent scientists. Thus, in times of rapid change, science will take its place, which will become increasingly important. In the completely modernized low body of block 8 it is planned to create 16 laboratories with the most modern equipment. During the reconstruction, a second stage will be built and the building will be externally renovated. This will form a new center for the development of research and

science, as well as a base for training specialists and supporting business in innovation.



After the renovation and reconstruction, the research infrastructure of the Studentski Grad campus will be a serious prerequisite for advanced research in the fields of mechatronics, virtual engineering and digital production, robotic systems and mechatronic technologies, biomechatronics, micro/nano engineering for mechatronic technologies, mechatronic technologies, additive technologies, functional coatings and new materials, control systems, energy efficiency, sustainable use of raw materials and resources, transport engineering, electromobility, etc.



RECRUITMENTS

The main part of the scientific potential of the country in the M&CT area is concentrated in the partner institutions. Nevertheless, there are still a lot of staff problems, the main ones being the low relative part of young researchers and the necessity of increasing the qualification in definite fields which are of strategic importance for the country. In the process of project realisation it is foreseen to promote its research staff with a view to providing and maintaining a critical mass of scientists. To this purpose young specialists and prominent scientists will be looked for.



Assoc. Prof. Dr. Giovanni Spinelli graduated at University of Salerno (UNISA), Italy, Faculty of Electrical Engineering in 2007 with a Master's degree in Electronics Engineering. He obtained his PhD degree in 2012 at UNISA, where he defended his doctoral dissertation entitled "Electromagnetic characterization and modelling of carbon nanotube -based composites for industrial applications". After obtaining the PhD degree, he was employed at the University of Salerno and since 2020 he has been appointed as Associate Professor at the Institute of Mechanics, Bulgarian Academy of Science (Sofia) in the professional area *Materials and Material Sciences*, scientific specialty *Methods for Controlling and Testing of Materials, Products and Apparatus*.

The research interest of Assoc. prof. Spinelli covers electromagnetic (EM), thermal and mechanical characterization of innovative materials based on carbon nanostructures (as well as their multiphysics modelling), 3D-printing, analytical and numerical methods for design and optimization of materials, EM-systems and processes in the field of engineering and nanotechnology.

In different laboratory years, he has mastered the use of several equipment including latest technologies available such as the Tunneling Atomic Force Microscopy (TUNA) for exploring at nanoscale levels the electrical performance of composites, as well as the new flash laser method for performing their thermal characterization. In this last field Dr. Giovanni Spinelli is developing theoretical models and experimental methods for characterizing unconventional samples both in terms of geometry and component materials (multiphase nanocomposites). He is also developed a significant expertise in morphological characterization (SEM analysis) of nanostructured materials in order to correlate features observed at microscopic level with physical properties revealed at the macroscale.

Dr. Spinelli has been actively involved in different European projects funded by Horizon'2020 and FP7 as Graphene Flagship. His research activity has led to more than 50 scientific publications in international journals and conferences proceedings, as well as 3 international patents (Italy, Europe, USA) concerning a developed method of monitoring a composite material.



Dimitar Shandurkov graduated in 2014 at High School of Natural Sciences and Mathematics “Acad. Ivan Gyuzelev” in Gabrovo. During his training he won two medals in competitions and Olympiads in Chemistry. He continued his education at Sofia University “St. Kliment Ohridski”, where he studied Chemistry, and received a Master's degree in Functional Materials. During his studies he was actively involved in research at the Department of Physical Chemistry and the Department of Chemical and Pharmaceutical Engineering. He has also participated in several national competitions in computer mathematics and has won four silver medals.

Dimitar Shandurkov holds bachelor's and master's theses at the Department of Physical Chemistry under the supervision of Prof. Stoyan Gutsov and thoroughly studies the luminescent properties of complexes of rare earth elements, as well as synthesizes aerogel matrices, which successfully function and receive new modern optical materials. The results of his research were presented at several conferences, including an international conference in Rome, May 2018, and are summarized in an article published in Proceedings of SPIE (2019). In the last months of his bachelor's degree he was working on various projects at the Central Laboratory of Solar Energy and New Energy Sources - Bulgarian Academy of Sciences and the company RLG 2016. During his master's degree Dimitar participated in the research activities of the Department of Chemical and Pharmaceutical Engineering, where he studied the surface and cleaning properties of various surfactants. His work there ended with a publication on the biodegradable sulfonated methyl esters of higher fatty acids in a prestigious American magazine Journal of Surfactants and Detergents.

After defending his master's thesis, Dimitar Shandurkov began working on the project “National Center of Mechatronics and Clean Technologies”, again under the guidance of prof. Stoyan Gutsov, on obtaining new “green” luminescent materials, processing data and searching for spectroscopic techniques to study the structure and surface properties of silicate aerogels.



Blagovest Zlatev graduated in 2013 from the Technological School Electronic Systems associated with Technical University in Sofia, and during his studies in Software Programming participated in the international student competition Google Code-In 2012. At the Technical University, Sofia he studied Mechanical Engineering and received a master's degree in Computer-Aided Design and Technology in Machine-building with top honours. During his studies he was actively engaged in research at the Scientific Research Laboratory "CAD/CAM/CAE in industry" and participated in two international competitions for Hot Forging technologies, ranking first on a national level and third internationally.

Blagovest Zlatev holds bachelor's and master's theses in the Department of Technology of Machine Building and Metal-Cutting Machines under the guidance of Prof. DSc. Eng. Georgi Todorov and examined in detail the benefits of parametric optimization in mechanical engineering, affecting both structures made from isotropic materials and those of anisotropic materials – such as carbon fibre composites. The results of his research have been presented at international and national conferences, and have been published in several peer-reviewed publications, one of which is Lecture Notes of the Institute for Computer Science, Social-Informatics and Telecommunications Engineering, LNICST, 2019. In the last year of his bachelor's degree he started working as an intern at Scientific Research Laboratory

“CAD/CAM/CAE in industry“, where he supported the development of industrial and national projects and improved his skills throughout his master's studies.

After defending his master's thesis, Blagovest Zlatev began working in the project “National Center of Mechatronics and Clean Technologies” and under the leadership of Prof. DSc. Eng. Georgi Todorov he deals with researching the technologies of Virtual Engineering and more specifically researching the concept and application of Digital Twins.

RESEARCH CENTERS IN THE COUNTRY ESTABLISHED WITH THE PARTICIPATION OF THE PROJECT

RESEARCH CENTER FOR MECHATRONICS AND NANOTECHNOLOGIES AT THE CLAP OF THE BAS IN PLOVDIV

The Research Center for Mechatronics and Nanotechnology at the Central Laboratory of Applied Physics of the Bulgarian Academy of Sciences (CLAP – BAS) in Plovdiv was opened on September 17, 2020. The official opening of the scientific complex was attended by the President of the Academy Acad. Julian Revalski, the Mayor Zdravko Dimitrov, representatives of the municipality, OP “Science and Education for Smart Growth”, scientists and guests.



The establishment of the center began in 2007 and it is a result of funding for several projects, the last of which is BG05M2OP001-1.001-0008 “National Center of Mechatronics and Clean Technologies” under OP “Science and Education for Smart Growth”. It consists of a Clean Room class 100 000 with Technological and Research complexes. They are supplied with modern equipment that is used for scientific, scientific-applied and innovative activities, and according to Assoc. Prof. Kolaklieva Deputy Director of the CLAP, the work of the center is aimed at creating new materials for surface modification. The received/obtained coatings are used in many areas of industry, including mechanical engineering, aircraft and automotive and are used in medicine, orthopedics and booth covering.

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The President of BAS, Acad. Julian Revalski, expressed his satisfaction with the fact that the Central Laboratory of Applied Physics with the Research Center is an example of how research leads to innovation. Foreign companies working in the field of nanotechnologies are interested in the activity and those who generally use their own development bases are looking for cooperation.



The Plovdiv center is an example of the synergy of science, production and business. His clients are over 30 Bulgarian and international companies. The Mayor of the city Zdravko Dimitrov noted that the research centers as newly opened are an important bridge between business and science and make the Bulgarian economy stronger and more competitive. He thanked the Bulgarian Academy of Sciences, which is developing applied science for the benefit of Bulgarian industry.

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TECHNOLOGY PARK AT THE TECHNICAL UNIVERSITY OF GABROVO

A Technology Park was opened on November 20, 2020, at the Technical University of Gabrovo. The Park includes a total of 18 laboratories. They were created with funds from 4 projects funded by the Operational Program “Science and Education for Smart Growth”, co-financed by the European Regional Development Fund. One of them is for the construction of the center of excellence “National Center of Mechatronics and Clean Technologies”, and the other three are for the establishment of centers of competence: “Intelligent, mechatronic, eco- and energy-saving systems and technologies”, “Quantum communication, Intelligent Security and Risk Management Systems” (QUASAR), “Digitalization of the economy in a big data environment”.

The ceremony was attended by the Mayor of Gabrovo Tanya Hristova, the Regional Governor Nevena Mineva, the Executive Director of the Executive Agency of OP “Science and Education for Smart Growth” Kiril Geratliev, representatives of partner organizations and businesses. The Minister of Education Krassimir Valchev virtually greeted the participants in the opening.



The Technology Park of TU - Gabrovo is the first outside the capital technology park. According to the Rector of the university, Prof. Dr. Eng. Iliya Zhelezarov, this significant infrastructural achievement on the territory of the university with its unique equipment allows researchers to make not only better developments, but those that are aimed to the needs of the business. Almost all systems in the laboratories of the Technology Park are computer controlled with modern connections for presenting the information.



The technique is extremely useful and allows to make accredited measurements and tests and to give conclusions about quality, safety, etc. In addition, students and doctoral students will study and work on extremely modern equipment, and pupils from schools in Gabrovo and the country will be able to touch it, which would induce in them an interest in engineering science and high technology.

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ASSOCIATE PARTNERS IN SCIENCE

In order to ensure a higher scientific level of the Centre, structures from 3 world renowned universities in Tel Aviv and Delft as well as the Institute of Robotics and Intelligent Systems at the Federal Technical University, Zurich were attracted as associated partners. This is done because the partner organizations in the project are among the leading research institutions in the country (not only in the M&CT area) and have traditional relations with scientific centers.

FACULTY OF APPLIED SCIENCES AT DELFT UNIVERSITY OF TECHNOLOGY, NETHERLANDS



The Faculty of Applied Sciences is the largest of Delft University of Technology and focuses on finding innovative solutions to some of the problems faced by society. In this effort, development of the fundamental knowledge needed to underpin technical developments that can be widely used throughout society is of paramount importance.

The Faculty offers research oriented education at both undergraduate (BSc) and postgraduate (MSc, PDEng, PhD) levels. The scientific staff, which includes about 50 professors across the seven research departments of the Faculty of Applied Sciences, has an excellent reputation for both teaching and research.

Faculty of Applied Sciences has more than 200 academic members of staff and approximately 400 post-doctoral researchers and PhD students operating in a wide range of research areas. The Faculty is equipped with advanced laboratory and experimental facilities. Researchers have access to a vast amount of scientific material via virtual knowledge centers. They collaborate with national and international institutions and industry and student associations intermediate between our students and industry. Many of the members of academic staff are prize-winning scientists and engineers internationally known in their fields of research.

Research areas of the Faculty of Applied Sciences are Bionanoscience, Chemical Engineering, Imaging Physics, Biotechnology, Quantum Nanoscience, Radiation Science & Technology.

The Scientific research program, planned in cooperation with the Technical University of Delft includes joint collaborative research work in the field of metal-organic frameworks, which appear to be a new class of contemporary materials having numerous potential applications, in particular as selective adsorbents. TU Delft is among the leading universities in the field of synthesis and structural characterization of metal-organic structures. The sorption and catalytic properties of materials, synthesized at the university, will be investigated in the laboratories of CoE by means of operando, in situ and catalytic methods, as well as in some other laboratories – depending on the potential application of the material. The future collaboration with TU Delft is based on the already existing contacts and the first joint publications with scientists from the Institute of General and Inorganic Chemistry-BAS.

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IN BISSNESS

For establishing close links with the business, on the basis of a publicly declared competition, the Cluster on Mechatronics (unifying the main business structures in the field of mechatronics), Sofia Tech Park and the firm Borima Ltd (leading producer of some mechatronic products on the Balkans) were attracted as associated partners. The planned relations with the business will contribute to the market orientation of the research and effective development activity, which will ultimately lead to an increase in the competitiveness of the Bulgarian economy.

SOFIA TECH PARK



Sofia Tech Park is the first science and technology park in Bulgaria, created with the aim to be established as a platform for exchange of knowledge and ideas between the academic field, the business, the government and the society. Its mission is to enhance the system for support of innovation and new technologies by providing aid to companies, which contribute to the development of the economy and the knowledge in the country, to unite the efforts of the business and science, by focusing mainly on development and implementation of projects in the three focal points of the park – ICT, life science and clean energy.

The park's goal is to enhance the competitiveness of science and entrepreneurship in Bulgaria through improvement of exchange of knowledge between academic field and the business. To act as a platform for development of innovation ideas and to catalyze the commercialization process of scientific research.

A Laboratory Complex has been established in Sofia Tech Park to carry out research. It is managed by an independent Consortium, established specifically for that purpose. The R&D&I Consortium is a non-profit legal entity, operating in the public interest. The main aims of the Consortium are to conduct independent scientific research and to disseminate publicly the results of these activities through teaching, publications and knowledge transfer. The members of the Research and Innovation and Development Consortium are leading academic institutions such as Sofia University, Technical University Sofia, Medical University Sofia and others.

The Laboratory Complex is one of the key elements of the park, consisting of 11 laboratories furnished with specialized equipment. The laboratories are managed by prominent Bulgarian scientists, who have appointed their teams. In them with the help of the laboratory teams the academic community and the business have the opportunity to develop their own scientific projects, as well as the development of products and services, so that they can reach successfully the market.

Sofia Tech Park is a project partner in the activities associated with CAD systems and software assisted management with application in industry.

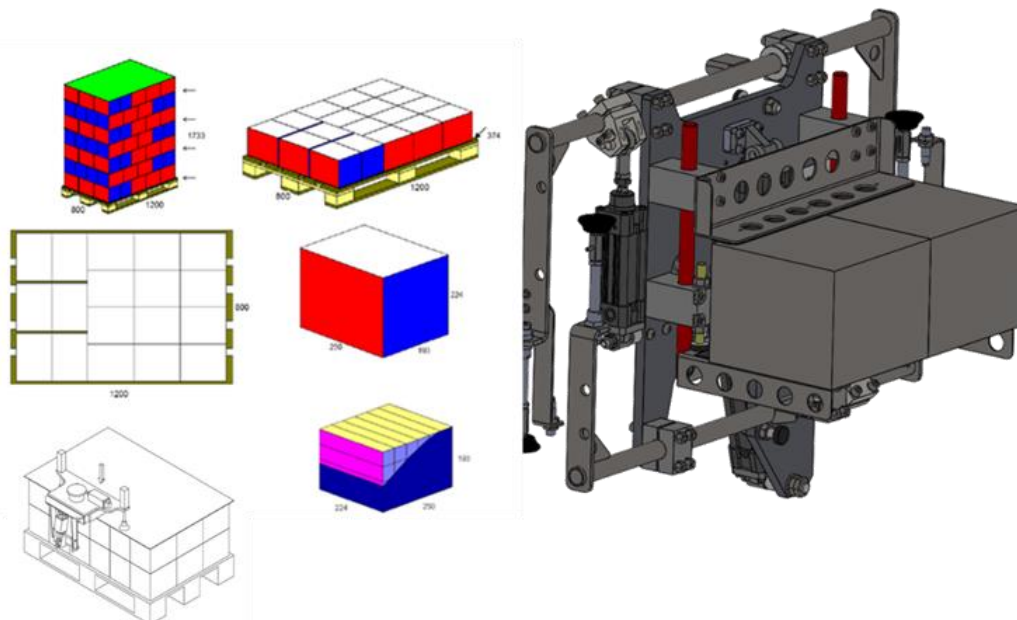
COLLABORATION SCIENCE AND BUSINESS

PROJECT OF THE CAMPUS *STUDENTSKI GRAD* WITH SPESIMA LTD

As part of the research activity of the Laboratory of Design, Virtual and Physical Validation of Mechatronic Systems within the Center of Excellence in Mechatronics and Clean Technologies collaborating with company SPESIMA Ltd. was developed End Effector for a robotic system for manipulating group packaging. This type of systems has wide range of use in modern highly automated logistic processes, connected to production spedition.

SPESIMA Ltd. is a member of the Cluster “Mechatronics and Automation” (CMA), which is an associate partner of the project “National Center of Mechatronics and Clean Technologies”. CMA is one of the first clusters in Bulgaria, working in the field of mechatronics and automation. It acts as a bridge between applied research and industrial applications, combining the benefits of avant-garde thinking with rational management and supporting the development of high-tech, export-oriented products, technologies and services that have high added value.

SPESIMA Ltd. is a company with main activity - development and implementation of specialized systems for automation of industrial production and produces about 100 specialized robots per year, which are exported to more than 30 countries worldwide. Its products are patented and characterized by high reliability. In April 2020, the company developed a disinfection cabin DISINFECTA, designed for disinfection of staff working in hospitals or other areas at high risk of contamination, as well as for preliminary disinfection of people working in areas requiring high hygiene.



The contract with SPESIMA Ltd. ensures the implementation of one of the objectives of the project “National Center of Mechatronics and Clean Technologies” - supporting the market orientation of the research activities of leading scientific organizations in Bulgaria. It is a continuation of existing successful cooperation of company with part of the team, involved in CoE project. The project allow the scientists at the Laboratory of

Design, Virtual and Physical Validation of Mechatronic Systems, headed by Prof. D.Sc. Eng. Georgi Todorov, to realize their scientific idea and create an innovative product as the developed End Effector.

THE CENTER OF EXCELLENCE IN MECHATRONICS AND CLEAN TECHNOLOGIES - ASSOCIATED PARTNER OF DIGITECH 4.0

The Center of Excellence „Mechatronics and Clean Technologies“ considered a proposal and accepted at a meeting of the Management Board a decision to participate in DigiTech 4.0 as an associate partner.

Bulgarian Innovation and Technology Hub - DigiTech 4.0 was founded by the ICT Cluster Foundation in partnership with MOVE.BG and Innovation Center of excellence, development and technology transfer to the Technical University of Sofia.



The main goal of DigiTech 4.0 is the development of innovations, supporting the digital transformation in the automotive industry, mechatronics and ICT sector in Bulgaria by facilitating cooperation between technology experts, stakeholders, investors, public administration and academic community.



DigiTech 4.0 addresses the challenges facing Bulgarian industrial companies, for example: access to intelligent machines and technologies, remote support, intelligent control over logistics connections and networks, digital marketing and sales, availability of qualified staff and an effective personnel management system. It provides the following services to the small and medium-sized companies:

- Technological support- access to infrastructure, technologies and instruments and solutions
- Access to knowledge and expert reports
- Evaluating the readiness of small and medium-sized companies for digitalization
- Capacity building for human resources
- Access to financing and investment services
- Building cooperation between stakeholders

The goals, issues and services provided by the Bulgarian Innovation and Technology Hub - DigiTech 4.0 correspond to the activities of the Center of Excellence in Mechatronics and Clean Technologies to support business with innovative solutions, technology transfer and provision of highly qualified specialists.

THE PROJECT AND THE CENTERS OF COMPETENCE FOR FINDING ORIGINAL SOLUTIONS IN OVERLAPPING ECONOMIC SEGMENTS



Within the Center of excellence in Mechatronics and clean technologies and the Center of competence “Sustainable utilization of bio resources from medicinal and aromatic plants for innovative products” the scientists from the Institute of Organic Chemistry with Centre of Phytochemistry at BAS have joined their efforts and with the help of the purchased new equipment are carrying out high-level scientific research.

The research is targeted towards the development of clean technologies for intelligent utilization of Bulgarian medicinal and aromatic plants to innovative products, as well as of the waste biomass, which is left after the extraction of their valuable compounds. For this purpose new, highly-efficient, stable and cheap catalysts aimed at the carrying-out of processes for the utilization of the obtained biomass to chemicals and fuels that are industrially valuable are being developed.

The scientists are also aiming for the joint development of a new type of adsorbents for the capture of CO₂ and its conversion into chemicals, biopolymers etc. This approach will lead to the development of technologies targeted at reducing the harmful impact of large CO₂ emissions and the development of sustainable and waste-free manufacturing plants.

SCIENTISTS FROM THE PROJECT IN THE STANFORD RANKING

PROJECT SCIENTISTS AMONG THE FIRST BEST SCIENTISTS IN THE WORLD

Eight scientists from the project “National Center of Mechatronics and Clean Technology” are among the top scientists in the world, according to a ranking by Stanford University.

The ranking groups all researchers in 22 scientific fields and 176 sub-fields. It is compiled on the basis of a complex analysis which includes information on the number of citations, H-index, corrected in co-authorship hm-index, citations of articles within different positions of authorship and others. Bulgarian scientists from different fields of science occupy a leading position in the ranking of the American University in competition with millions of their colleagues from around the world.

The researchers from the project, who are among the first best scientists in the world, are: prof. Konstantin Hadjiivanov (# 53 in Physical Chemistry), prof. Nikolai Vitanov (# 228 in General Physics), prof. Georgi Vayssilov (# 352 in Physical Chemistry), prof. Stanislav Vassilev (# 573 Energy), prof. Dora Karagiozova (# 985 Mechanical Engineering & Transports), prof. Petar Kralchevsky (#1098 Chemical Physics), prof. Vessela Tsakova (#2163 Energy), prof. Krassimir Danov (#1899 Chemical Physics)



Prof. Konstantin Hadjiivanov is Chairman of the Project Management Board. He is a doctor of chemical sciences (2001) and a corresponding member of the Bulgarian Academy of Sciences (2012). Hadjiivanov is the author of more than 200 publications with over 10 000 citations and is one of the most cited Bulgarian scientists in international literature with a Hirsch index of 51.

Prof. Hadjiivanov's scientific activities are related to the use and development of the infrared spectroscopy for characterization of surfaces, studying adsorption phenomena and elucidation of the mechanisms of catalytic reactions.

Prof. K. Hadjiivanov is doctor honoris causa of the University of Caen, France, a member of the Academia Europaea, awarded the Jiangnan Distinguished Professorship in China and the winner of the Pythagorean Prize 2020 for overall contribution to the development of science.



Prof. Petar Kralchevski (1956-2020) is a head of the Laboratory for development and application of new methods for characterization of surface energy and wetting in Lozenets campus until the end of 2020. He graduated from the Faculty of Physics at Sofia University with a degree in Atomic Physics with honors. Since 2002 he has been a professor of condensed matter physics at the Faculty of Chemistry of Sofia University. For his high scientific achievements he was elected a corresponding member in chemical sciences at the Bulgarian Academy of Sciences in 2004. He has been a full member of the Bulgarian Academy of Sciences since 2012 and has been the youngest Academician for many years.



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Prof. P. Kralchevski has an impressive scientific and educational activity, which is highly valued. He is one of the most prominent Bulgarian scientists - author and co-author of over 220 publications, 14 chapters in books and the monograph *Particles at Fluid Interfaces and Membranes*. His works have been cited more than 10 000 times in the scientific literature and his Hirsch index is $h = 46$.

Prof. Kralchevski has a serious contribution to the research and theoretical modeling of the forces acting between colloidal particles. He discovered a new type of force, called immersion, and together with colleagues from Bulgaria and Japan established their role. He is Secretary of the European Colloid & Interface Society (ECIS), a member of the Council of the International Association of Colloid and Interface Scientists (IACIS) and of the Academia Europaea.

He was awarded the *Young Professor of the Year 2007* by Sofia University, *the Pythagorean 2016* by the Ministry of Education and Science and the *Liklema 2020* by the European Colloid & Interface Society



Prof. Vessela Tsakova is a leading scientist at the National Center for Mechatronics and Clean Technologies, engaged in the building of a Laboratory of Electrochemical Technologies. She is a Doctor of chemical sciences (2010) and a Professor at the Institute of Physical Chemistry - BAS (2011), representative of the famous Bulgarian school in Physical Chemistry. Prof. Tsakova is co-author of over 100 publications with over 2000 citations and an h-index of 25.

Prof. Tsakova's research contributions are in the field of electrochemical synthesis and characterization of electroactive materials, in particular of electronically conductive polymers and their composites. They are related to the production of highly efficient electrocatalytic materials for applications in alternative energy sources, electrochemical sensors for bioactive substances, etc.

The entire professional and scientific career of Prof. Tsakova is related to Institute of Physical Chemistry-BAS, including as a long-term head of Department and Director in the period 2012-2020.

As an internationally recognized scientist, she is nowadays representative of Bulgaria in both the International Electrochemical Society (ISE) and the Division of Physical and Biophysical Chemistry of the International Union of Pure and Applied Chemistry (IUPAC).



Prof. Dora Karagiozova is a head of the Laboratory for mechanical tests and express diagnostics on the Geo Milev campus. She is professor of Solid Mechanics at the Institute of Mechanics, BAS. Prof. Karagiozova has published more than 100 scientific articles which have received more than 1650 independent citations (Hirsch factor 25) in the open literature.

The major scientific contributions of Prof. Karagiozova are related to the mathematical modelling of the behavior of structural elements and intelligent materials subjected to blast and impact and to the development of theoretical methods for characterization of cellular material with different topologies.

Prof. D. Karagiozova is a member of the editorial boards of respected international journals among which the International Journal of Impact

Engineering and International Journal of Mechanical Sciences.

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INFORMATION DAY

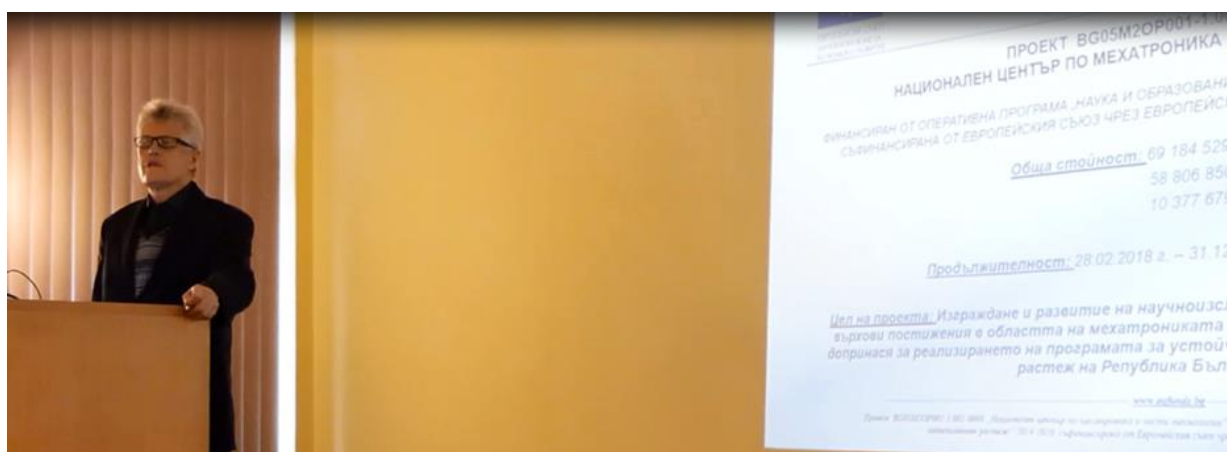
IMPLEMENTATION OF THE PROJECT

NATIONAL CENTER OF MECHATRONICS AND CLEAN TECHNOLOGIES

IN 2020

An Information Day took place on December 16, 2020 in order to raise awareness of the society, business and research organizations, government agencies and the media with the results achieved in establishment the research infrastructure of the Center of Excellence in Mechatronics and Clean Technologies.

Due to the epidemic situation in the country, the Information Day on “Implementation of the project *National Center of Mechatronics and Clean Technologies* in 2020” was held with the participation of project coordinator Prof. Plamen Stefanov, monitoring and control expert Tsvetelina Vladimirova, representatives of the campus “Geo Milev” Prof. Bogdan Rashkov and Prof. Neli Koseva, Corr. Member Toni Spasov, head of the Lozenets campus, and Prof. Georgi Todorov, head of the campus “Studentski grad”.



The event was opened by Prof. Stefanov, after which Tsvetelina Vladimirova reviewed all activities performed on the project and the achieved indicators in 2020.





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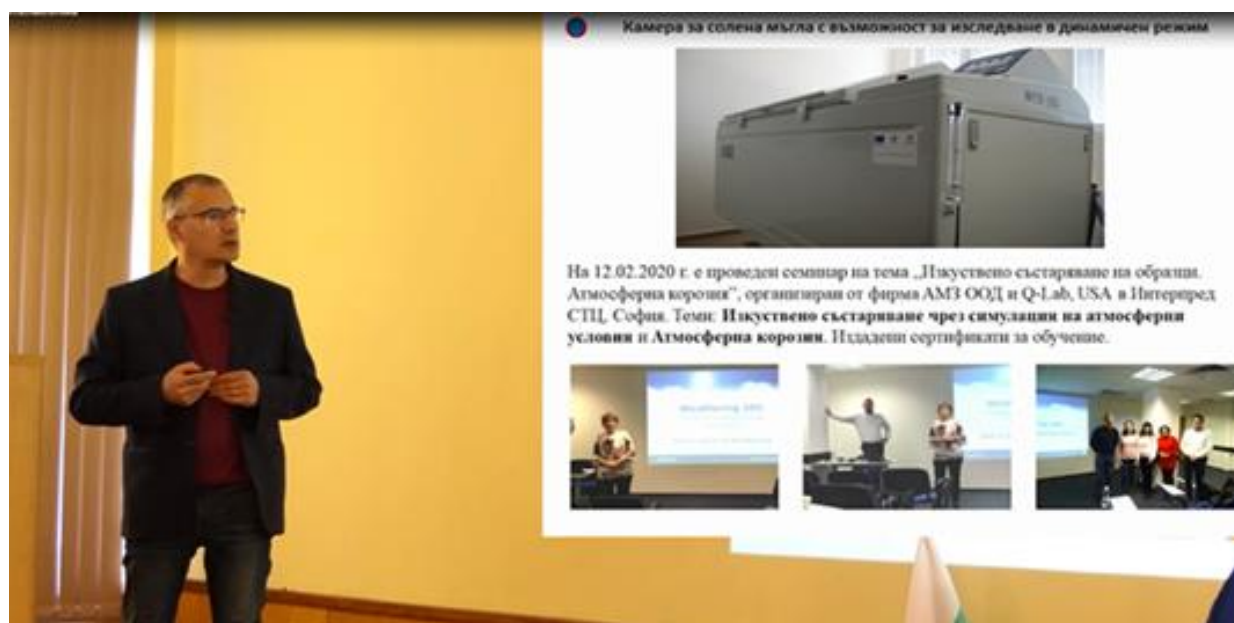


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Along with construction and repair activities, which will continue in 2021 and the purchase of equipment necessary for the performed research in the laboratories of the three campuses “Geo Milev”, “Lozenets” and “Studentski grad”, in 2020 57 researchers were hired and 73 articles were published in journals with impact factor, 2 of which fall in the top 10% according to WoS. Funds from the project were used for the establishment of laboratories in the Research Center for Mechatronics and Nanotechnology at the Central Laboratory of Applied Physics of the Bulgarian Academy of Sciences, Plovdiv and the first outside Sofia Technology Park at the Technical University, Gabrovo.



The presentation of Corr. Member Toni Spasov was for the fulfilled tasks at the Lozenets campus. He spoke about the possibilities and application of the research equipment purchased under the project in 6 laboratories, its successful use, and the topics being the scientists worked on, as well as the stages of reconstruction of the main building on campus.



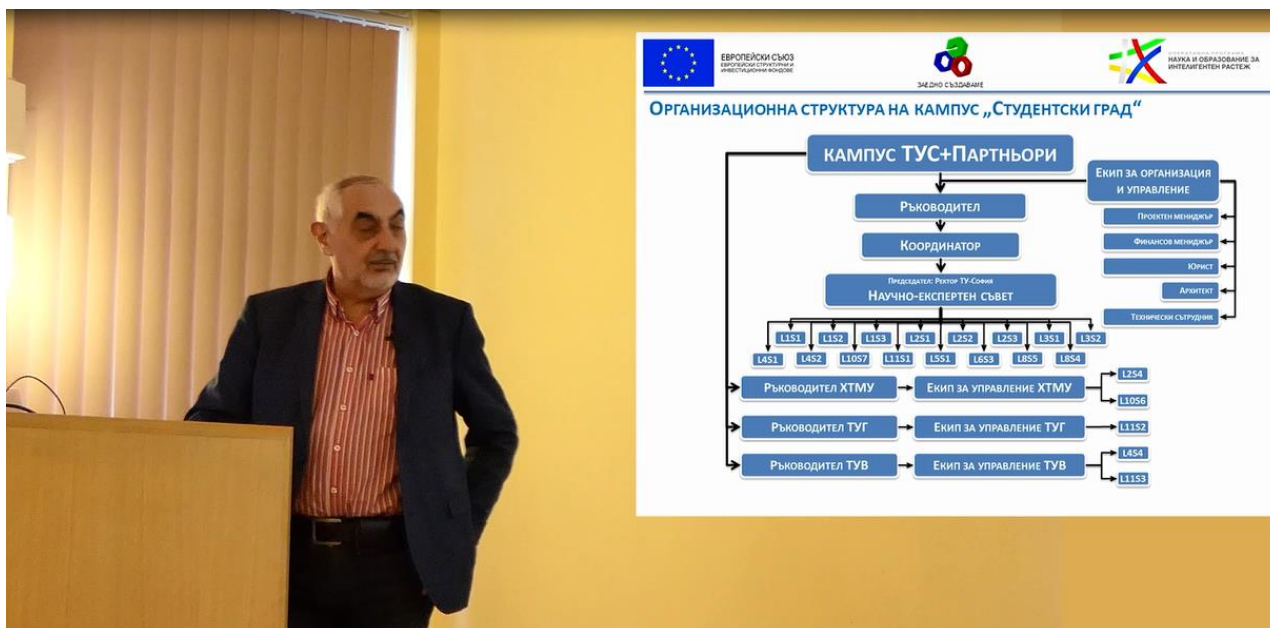
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The achieved results from the implementation of the project in Geo Milev campus were proposed by professors Bogdan Rangelov and Nelly Koseva. The presentation of Prof. Rangelov includes “advertising” research, made with delivered equipment, which would expect interest from the business and the realization of economic activity in 2021. A video of the research and modeling processes in the field of clean technologies and ecology in some of the renovated and equipped with modern equipment laboratories on campus was shown.



The head of the campus „Studentski grad” Prof. Georgi Todorov presented the repair work of bl. 8 and of the laboratories in the complex in 2020. Some of the main goals of the project have been achieved. Results with the equipment delivered under the project have been reported at a number of international scientific forums. Two young researchers who have completed their master degree with excellent results and are currently doctoral students have been hired on a permanent contract.





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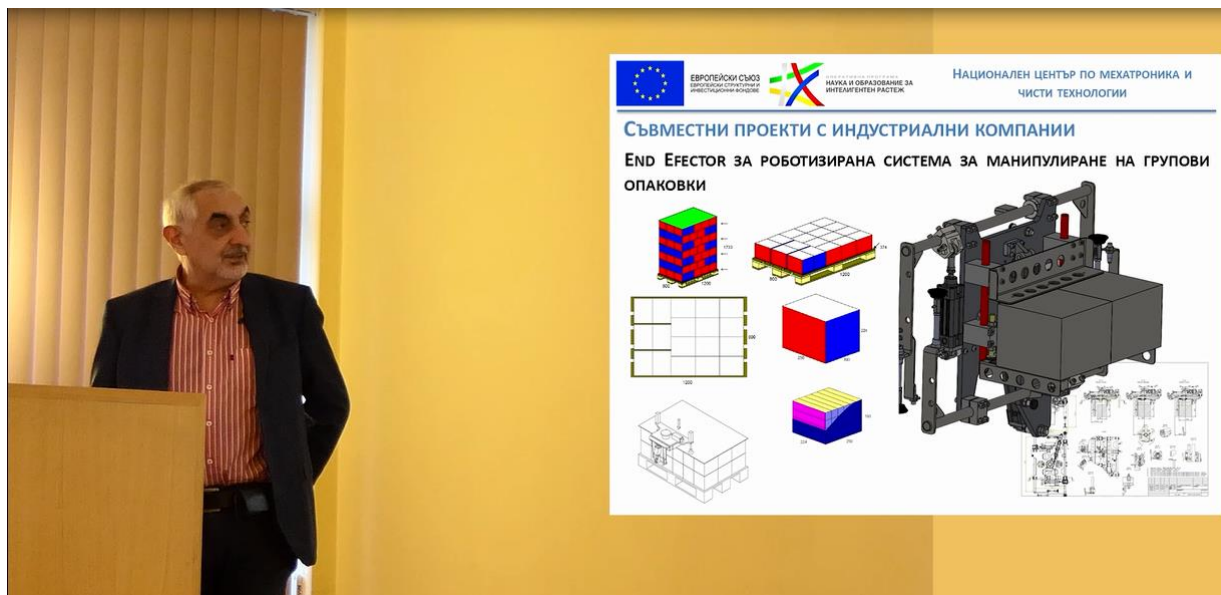


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Business support is provided and as part of the research activities of the Laboratory of Design, Virtual and Physical Validation of Mechatronic Systems under a contract with Spesima Ltd., End Effector has been developed for a robotic system for handling group packaging for drug references.



As a result of the successful cooperation with the Competence Center „Intelligent Mechatronic, Eco- and Energy-Saving Systems and Technologies“, there are already two joint publications. The increase of the research capacity provided by the project “National Center of Mechatronics and Clean Technologies“, is the basis of the application of the campus “Studentski grad” for participation in a project under the procedure “Modernization of higher education in Bulgaria”.

The presentations of the participants were filmed and finished film, which includes the video for the research of the laboratories on the campus “Geo Milev”, was distributed on social media.