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Knowledge map with links between NCMST and other relevant national, European and international organisations

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Executive Summary

This deliverable has been prepared in the context of the EC funded project NanoMedTwin “Promoting smart specialization at the Technical University of Moldova by developing the field of Novel Nanomaterials for BioMedical Applications through excellence in research and twinning”. One of the objectives of the project is to build NanoMedTwin’s network of regional, national and European contacts (EU member states and Associated States) based on activities of mutual interest and building existing and new collaborative links.

The project aims to extend networking and collaboration and create capacities for broader participation of National Center for Materials Study and Testing (NCMST) at the Technical University of Moldova and other linked research groups in Moldova in the Horizon 2020 Programme and future FP9 Programme. It will be achieved through strengthening networking on a national and European level in the field of nanotechnologies and nanomaterials for biomedical applications, based on existing and new collaborative links at regional, national and European level.

The deliverable 6.1 “Knowledge map with links between NCMST and other relevant national, European and international organisations” aims to strengthen networking activities of NCMST on a national, European and international levels in the field of nanotechnologies, based on existing and new collaborative links. These networking activities will be used for preparing joint national, European and international research projects and to plan future twinning activities with centers of similar expertise.

A Knowledge Map is a guide to, or inventory of, an organization's internal or external repositories or sources of information or knowledge. These sources may include documents, files, databases, recordings of best practices or activities, or web pages. One of the typical considerations driving a knowledge map effort includes increasing network connectivity between internal and external individuals.¹

The aim of this deliverable is to map the activities of NCMST and TUM to leading universities, research institutes and other organisations in EU MS and AC. It aims to identify profiles and points of contact of NCMST and other Moldovan Institutions/ departments and commercial organisations working in Nanotechnology fields, in EU member states and associated countries.

It should be noted that the information for this deliverable was obtained from existing sources of information such as studies, websites, directories that were available to the NanoMedTwin partners when they were carrying out their research.

The information from this deliverable should in no way be understood as definitive or endorsed by the European Commission but is rather representative of the best efforts of the NanoMedTwin project partners in carrying out this task, with limited resources and access to information.

The potential area of application for this deliverable includes:

- identifying profiles and contacts of NCMST and other organisations from the Republic of Moldova active in nanotechnology area
- enabling the set up of collaborative networks in nanotechnology area between Moldovan and international organisations

¹ www.businessdictionary.com

- extending existing collaborative links among NCMST and national, regional and international nanotechnology organisations.

Information in this deliverable includes profiles of NCMST and other 7 Moldovan institutions working in Nanotechnology fields, as well as points of contact of NCMST at national, European and international levels: 30 organisations in 14 countries across Europe, Asia and North America.

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Brief overview

Technical University of Moldova (TUM) is the only technical higher education institution in the Republic of Moldova. The university has 9 faculties, with approximately 9.000 students, guided by over 800 members of the scientific-didactic staff. The scientific strategy of the university is implemented by 6 research centers, which participate in the implementation of national and international scientific projects. International cooperation in education and research is one of the university's priorities. TUM has over 60 cooperation agreements with universities and scientific centers in Belarus, Bulgaria, Canada, Germany, France, the Netherlands, Romania, Ukraine, Spain, Sweden, Russia, etc. The University is regularly organizing international scientific symposia and conferences in the field of nanotechnology and biomedical engineering. The Department of Microelectronics and Biomedical Engineering, together with the National Center for Materials Study and Testing are TUM departments, that aside from the training activities, carry out research in the field of nanotechnologies, with applications in sensory and biomedicine.

Research areas

Nanomaterials; nanomedicine; nanosensors; innovative materials, technologies and products; hybrid nanomaterials.

Keywords on core nanotechnology capabilities

Nanotechnologies, nanowires, nanomembranes, nanomedicine, porous semiconductor compounds, nanosensors, nano photodetectors, gas sensors, hybrid materials, layered oxides.

Research infrastructures

National Center for Materials Study and Testing (NCMST) is a leading research center in materials science and nanotechnology. NCMST activity is focused on complex investigation of properties of various materials, the development of methods for directing properties of materials, the development of new multifunctional materials and their implementation in structured devices in the fields of nanoelectronics, photonics, biomedicine, etc. The total area of NCMST laboratories is 240 square meters and includes: Atomic Force Microscopy Laboratory; Electron Microscopy Laboratory; Optical and Photoelectric Characterization Laboratory; Electrical Characterization Laboratory; Electrochemical and Photoelectrochemical Nanostructuring Laboratory; Photolithography and Thin Film Deposition Laboratory.

NCMST infrastructure comprises the TESCAN VEGA 5130 MM electron microscope, equipped with the INCA Energy 200 EDX (OXFORD Instruments) system for chemical composition analysis; Surface Imaging Systems Atomic Force Microscope (NANO Station II Scanning Probe Microscope). Carl Zeiss Axiotech 100 H optical microscope equipped with a camera; Plasma etching system "CYLOS 160 RIE"; Incubator SANYO-MODEL 5M; "Elipor" electrochemical etching installation with etching cell; I-V measurement devices, Keithley 2400, Keithley 6430; C-V, C-t Keithley 590 measuring devices; photolithography equipment Karl Süss AG; equipment for

oxidation, diffusion and thermal treatment; Cressington Sputter Coater 108 auto; monochromators (MДP-23, MДP-2); LTS-22-C-330 cryogenic closed-loop system for optical and electrical characterization in the 10 - 300 K temperature range, Boxcar integrator, etc.

Department of Microelectronics and Biomedical Engineering (DMBE) trains highly qualified engineers in the fields of microelectronics, nanotechnologies and biomedical engineering based on modern study programs, combining theoretical aspects with practical excellence. The students of the department benefit from a competitive education environment, which stimulates creativity, scientific and technical initiative, personal development and active involvement in building the knowledge society. Maintaining excellence in research is one of the priorities of the department, research activities being carried out in the framework of national, European and international projects and programs.

DMBE has scientific laboratories, equipped with relevant infrastructure: Keithley 2400, Keithley 6485; Keithley 2410 SourceMeter Instrument; Agilent U2722A; Bronkhorst flowmeter; Rig DSG815; HMC 8012; AX502; GX1025; DOX2040; MCS PRO 8i54570R; National Optical DC5-169 Digital Microscope and Software; 'Accta 401; automated deposit robot; Boeco WS 4000; BYII-4, BYII-5; WTW Inolab Oxi 7110 Oximeter; GlassChemSO2-2, etc.

International cooperation experience

Projects

- [DNMF_net - The Danube Nano Micro Facility Network](#), sponsored by German Federal Ministry of Education and Research (BMBF-ANCD) – 2017-2019
- Development and characterization of ultra-thin membranes of GaN and related nitride materials for sensor and piezo/acoustophotonic applications (2015-2017), SCOPES-Swiss project nr. IZ73Z0_152273/1
- [MultiComp - Multi-Functional Nano-Carbon Composite Materials Network](#) (2016-2020), COST Action CA15107
- [NanoMedTwin - Promoting smart specialization at the Technical University of Moldova by developing the field of Novel Nanomaterials for BioMedical Applications through excellence in research and twinning](#) (2018-2021), H2020 project, grant agreement nr. 810652
- Localized synthesis and integration of semiconductor oxide nanostructures for applications in gas sensors and biosensors (2017-2019), STCU project nr. 6229
- Chemical sensors and bio-sensors based on nanostructured semiconducting oxides (2016-2017), STCU project nr. 5989
- Nanostructures of metal oxides for applications in sensorial devices (2014-2015), STCU project nr. 5833
- Education in Biomedical Engineering, TEMPUS IV Initiative for Eastern Neighborhood countries (2013-2016), TEMPUS project, nr. 543904-TEMPUS-1-2013-1-GR-TEMPUS-JPCR
- Three-dimensional hierarchical hybrid nanoarchitectures based on graphitic aerogels and nanocrystalline semiconductor compounds for multifunctional applications (2017-2019), STCU project nr. 6222

Organisations

- [Christian-Albrechts University of Kiel](#), Germany
- [Karlsruhe Institute of Technology](#), Karlsruhe, Germany
- [Hannover Medical School](#), Germany

- [The Royal Institute of Technology](#), Sweden
- [Bristol University](#), UK
- [École Polytechnique Fédérale de Lausanne](#), Switzerland
- [National Institute for Research and Development in Microtechnologies](#), Bucharest, Romania
- [Joint Research Center of the European Commission](#), Ispra, Italy

Relevant publications

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- Braniste, T., Tiginyanu, I., Horvath, T., Raevschi, S., Cebotari, S., Lux, M., Haverich, A., Hilfiker, A. (2016): Viability and proliferation of endothelial cells upon exposure to GaN nanoparticles. *Beilstein Journal of Nanotechnology*, 7(1), 1330–1337.
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Brief overview

The current research activities at IEEN are closely related to nanotechnologies and electronic engineering for biomedicine, and they comprise the growth of novel nanomaterials and the preparation of device structures on their basis, including electronic equipment for biomedicine, as well as the exploration of new physical phenomena in low-dimensional structures of metals, semimetals and semiconductor materials.

Research area

Nanotechnologies, industrial engineering, products and new materials.

Keywords on core nanotechnology capabilities

Functional nanostructures, nanosensors, superconducting spintronics, nanowires, iron nanoparticles.

Research infrastructures

- Atom force microscope (AFM) "Park" - for investigation of surface and morphology of layered nanostructures
- Microraman spectrometer MonoVista CRS - installation for measuring microraman spectrum
- Installation for preparation of semiconductor templates - for preparation of templates with nanopores by the electrochemical method
- Technological installations VUP-5 & „Sputter.Coater” - for vacuum deposition of nanolayers and nanoparticles by the magnetron, electron beam and thermal evaporation methods

International cooperation experience (2015-2019)

Projects

- [SPINTECH - Boosting the scientific excellence and innovation capacity in spintronics of the D. GHITU Institute of Electronic Engineering and Nanotechnologies of the Academy of Science](#) (2018-2021), H2020 project, grant agreement nr. 810144
- [BSB Net-Eco - Research networking for the environmental monitoring and mitigation of adverse ecological effects in the Black Sea Basin](#) (2013-2016), Black Sea Basin Program

Organisations

- [Institute of Nanotechnology, Karlsruhe](#), Germany
- [Max-Planck Institute Stuttgart](#), Germany
- [University of Twente, MESA+Institute](#), The Netherlands

Relevant publications (2015-2019)

- Klenov, N.; Khaydukov, Y.; Bakurskiy, S.; Morari, R.; Soloviev, I.; Boian, V.; Keller, T.; Kupriyanov, M.; Sidorenko, A.; Keimer, B. Beilstein J. Nanotechnol. 2019, 10, 833–839. doi:[10.3762/bjnano.10.83](https://doi.org/10.3762/bjnano.10.83)
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Brief overview

The Engineering Faculty of the Alecu Russo Balti State University (USARB) was established in 2012, with the support of the German DAAD Foundation. In the same year, the Interuniversity Research Centre "Nanotechnologies of Resonance" was opened, as a result of international collaboration, with financial and logistical support from the U.S. Civilian Research and Development Foundation (CRDF). The main goal of Research Centre "Nanotechnologies of Resonance" is to lead the implementation of an economic development strategy based on acquiring new knowledge and training of human capital. The shared infrastructure of the center (research laboratories, industrial equipment, modelling using 3D printers, precision analytical balance, KANBAN) is regularly used by USARB and the enterprises operating in the Northern region of the Republic of Moldova.

Research area

Nanoparticle production, surface structuring and nanofilm formation

Keywords on core nanotechnology capabilities

Technology, micro, nano, plasma, films, structures, applications, particles, asperities

Research infrastructures

- Optical microscope, with digital camera
- Razread-3 – device for powders and compact materials depositions, for plasma discharge, for manufacture of micro- and nano asperities, for production of oxide and hydroxide films
- Fully equipped scientific laboratory of Micro and Nanotechnologies, with a surface of over 150 square meters.

International cooperation experience

Projects

- [PBLMD - Introducing Problem Based Learning in Moldova: Toward Enhancing Students' Competitiveness and Employability](#) (2015-2018), Erasmus + Programme of the European Union
- [Central European Exchange Program for University Studies - CEEPUS III](#), CIII-BG-0613-01-1112, Nanotechnologies, materials and new production technologies – university cooperation in research and implementation of joint programs in study by stimulate academic mobility
- [Central European Exchange Program for University Studies - CEEPUS III](#), CIII-AT-0063-07-1112, Applications and diagnostics of electric plasmas

- [TecTNet - Technological Transfer Network](#) (2013-2016), Tempus Programme of the European Union
- [MOLD-NANONET - Enhancing the capacities of the ELIRI Research Institute in applied research to enable the integration of Moldova in the European Research Area on the basis of scientific excellence](#) (2012-2014), FP7 Project, grant agreement ID: 294953

Organisations

- [Technical University of Ostrava](#), Czech Republic
- [Christian-Albrechts-Universität zu Kiel](#), Germany
- [University of Aveiro](#), Portugal
- [Technical University of Sofia](#), Bulgaria
- [Vienna University of Technology](#), Austria

Relevant publications

- TOPALA P., OJEGOV A., HARBU A., BESLIU V., GUZGAN D. Physical and chemical phenomena at the interaction of EDI plasma with electrodes surfaces. American Institute of Physics. AIP Conference Proceedings. 2019, 2075 (1), 060013. ISBN: 978-0-7354-1803-5. DOI: [10.1063/1.5091191](https://doi.org/10.1063/1.5091191)
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- Marin Laurentiu, Topala Pavel – Obtaining of spatial formations fullerenes type, made up of carbon Atoms, by Applying Discharges Pulsed Electric Process – EDI – Over Metallic Surfaces, With Graphite Catode, In: Progress of Cryogenics and Isotopes Separation. Volume 19, issue 2/2016, pag. 81, ISSN 1582-2575.
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- TOPALĂ P., TIGHINEANU I., STOICEV P. Aplicarea descărcărilor electrice în impuls în micro- și nano-tehnologii, Buletinul AGIR. Nr. 3/2015, p. 70-75. ISSN – L 1224-7928, ISSN (online) 2247-3548.
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Brief overview

"ELIRI" is a company specialized in the production of sensors, microconductors, nanoconductors and products based on them. "ELIRI" is active in the field of new materials and technologies, which are the basis for the development of new types of products. It is a leading organization in the development of microconductor based components cast in glass insulation.

The company has developed the technology of casting microconductors in glass insulation with diameters from less than 1 μm to tens of microns. The ultrafine diameter of the conductors leads to new applications in medicine, aeronautics, microelectronics. The characteristics of the microwires made with the hybrid technology, developed within the company, facilitate their application in different working environments: underground, under water, in the air and even in space.

Currently, the company carries out research, development and production of nanowires, as well as filiform nanocomposites.

Research areas

- Production of amorphous and nanocrystalline microconductors, based on gold and platinum for biomedical electrodes.
- Production of copper nanoconductors with a diameter of 500 nm.

Keywords on core nanotechnology capabilities

Nanowires, nanoconductors, nanostructures, nanotechnology, nanocomposites, sensors

Research infrastructures

- 3 modern installations for casting nanoconductors from various materials in glass insulation
- Nanoconductor casting technology - the use of nanoconductors and nanostructures in electronics and medical devices.
- Over 40 items of technological equipment
- Chemistry lab
- Microelectronic lab

International cooperation experience

Projects

- “[Innovative Business Development for local sustainable economic growth](#)”. Production of amorphous and nanocrystalline microwires based on gold and platinum microwires for biomedical electrodes (2014-2017), UNDP project
- [MOLD-NANONET Enhancing the capacities of the ELIRI Research Institute in applied research to enable the integration of Moldova in the European Research Area on the basis of scientific excellence](#) (2012-2014), FP7 project, grant agreement nr. 294953

Organisations

- [Christian-Albrechts-Universität zu Kiel](#), Germany
- [National Institute for Research and Development in Microtechnologies IMT Bucharest](#), Romania
- [University of Aveiro](#), Portugal
- [National Institute for Medical Research](#), UK

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Brief overview

The Institute of Applied Physics, established in 1964, is a public institution in the field of science and innovation, subordinated to the Ministry of Education, Culture and Research of the Republic of Moldova. The main objectives of the Institute are to carry out scientific investigations in the field of fundamental and applied physics, followed by practical implementation of results in the national economy.

Research areas

- theoretical and experimental research into physics and physico-chemistry of condensed matter, design of high technologies and multifunctional nanoscale electronic, optoelectronic and photonic devices;
- theoretical and experimental research on modification of surfaces of materials by electro-physical and electrochemical methods at nanoscale;
- theoretical study of quantum technologies in artificial or real atomic and opto/nanomechanical systems, respectively, the investigation of quantum coherence or quantum interference, quantum inseparability and control of quantum dissipations.

Keywords on core nanotechnology capabilities

Nanostructures, nanoscale electrophysical/ electrochemical technologies, quantum technologies, opto/ nanomechanical systems.

Research infrastructures

- Laboratory of Physical methods for studies of the solid matter - the study of structure using X-rays (X-Calibur E automated diffractometer);
- Laboratory of Mechanical properties of materials - study of mechanical properties of materials, composites and structures (Nanotester PMT-3NI-02 nano-micro-indentation device);
- Laboratory of Materials for photovoltaics and photonics - technology for obtaining multilayer planar nanostructures for photonics applications, the study of surfaces using the digital holographic microscope;
- Laboratory of Electrochemical and electrophysical methods of material processing - electrophysical and electrochemical technologies for nanoscale processing of metal surfaces.

International cooperation experience

Projects

- [SMARTELECTRODES - Multiscaled Smart Metallic and Semiconductor Electrodes for Electrochemical Processing and Devices](#) (2018-2021), H2020 project, grant agreement nr. 778357

- [INFINITE-CELL - International cooperation for the development of cost-efficient kesterite/c-Si thin film next generation tandem solar cells](#) (2017-2021), H2020 project, grant agreement nr. 777968
- Aerosol Robotic Network - AERONET 2010-2020, NASA project
- Physical and photoelectrocatalytic properties of (Ag,Cu)₂ZnSn(S,Se)₄ for environmental friendly photovoltaic and photoelectrocatalytic devices (2015-2017), STCU project nr. 6224
- [HOLO - Boosting the scientific excellence and innovation capacity in digital holographic microscopy of the Institute of Applied Physics of the Academy of Sciences of Moldova](#) (2016-2018), H2020 project, grant agreement nr. 687328
- Energy - efficient decontamination by UV & cold plasma using metamaterials (2015-2018), NATO project, EAP.SFPP 984890
- [TIDE - Tangential Impulse Detonation Engine](#) (2013-2016), FP7 project, grant agreement nr. 335091
- [OIL&SUGAR - Training and collaboration on material developments and process improvements in oil and sugar production](#) (2012-2016), FP7 project, grant agreement nr. 295202
- [SECURE-R2I - Reinforcing cooperation with Eastern Partnership countries on bridging the gap between research and innovation for inclusive and secure societies](#) (2013-2016), FP7 project, grant agreement nr. 609534
- The electrophysical processing of whey for obtaining of healthy and environment products: technology and installation (2015-2017), STCU project nr. 6011

Organisations

- [University of Pardubice, Center of Materials and Nanotechnologies – CEMNAT](#), Czech Republic
- [University of Debrecen, Institute of Physics](#), Hungary
- [University of Stuttgart, Institute of Applied Optics](#), Germany
- [Vilnius University](#), Lithuania
- [Clarkson University](#), USA

Relevant publications

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Brief overview

State University of Moldova (SUM) is the largest public higher education institution in the Republic of Moldova, established in 1946. Scientific research at SUM is carried out in the framework of educational departments and the Research and Innovation Institute (ICI), consisting of 21 laboratories, 1 doctoral schools, 5 centers of excellence, the Office of Technology Transfer and the Innovation Incubator "Inventica USM". The scientific potential of SUM is represented by 1,050 teaching and scientific staff.

Internationally recognized research in the field of nanotechnologies is carried out at the Scientific Research Laboratory "Physics and engineering of nanomaterials and synergetics "E.Pokatilov" and at the Regional Interdisciplinary Scientific-Educational Center for Study of Advanced Materials ([CaRISMA](#)).

Research areas

- New models and theoretical solutions linked to theoretical interpretation of experimentation results, which will find applicability in different economic branches (energy, ICT, machine building, electronics and robotics, geological exploration, pharmaceuticals, cosmetology, food industry etc.);
- Development of alternative energy converters based on layers dimensionally reduced, using economically accessible and environmentally attractive technologies for microelectronics, medicine and spintronics, etc., in particular: theoretical research of the energy states of charge carriers and phonons in nanodimensional multilayer structures; development of the theory of phononic thermal conductivity in nanodimensional multilayer structures and in multilayer graphene; experimental research of nanodimensional films, etc.

Keywords on core nanotechnology capabilities

Nanodimensional multi-layered structures; theoretical and experimental research; semiconductor nanostructures; modeling; physical parameters optimization

Research infrastructures

- X-ray diffractometer (XRD) – the equipment is used for X-ray analysis of solids, thin films, powders and nanomaterials.
- Atomic Force Microscopy – used for a variety of measurements and analyses (e.g. lateral force, true non-contact, tapping, nano-characterisation of mechanical properties etc.)

International cooperation experience

Projects

- Highly-efficient thermoelectric energy conversion based on hybrid crystal-amorphous cross-section-modulated nanowires for secure energy future (2014-2015), SCTU project nr. STCU.A/5937

- Research in the field of phononic thermal conductivity theory in multilayered nanodimensional structures, DAAD project

Organisations

- [Department of Electrical and Computer Engineering](#), University of California, USA
- [Leibniz Institute for Solid State and Materials Research, Institute for Integrative Nanoscience \(IIN\), IFW Dresden](#), Germany
- [School of Materials Science and Engineering, Gwangju Institute of Science and Technology](#), Republic of Korea
- [Nanoscience and Nanotechnology, Pusan National University](#), Republic of Korea
- [Helmholtz-Zentrum Berlin, Institute for Heterogeneous Materials Systems](#), Germany

Relevant publications

- COCEMASOV, A.; ISACOVA, C.; NIKA, D. Thermal transport in semiconductor nanostructures, graphene, and related two-dimensional materials. *Chin Phys. B.* 2018, 27, 056301 (9 pages). ISSN: 1674-1056. DOI: [10.1088/1674-1056/27/5/056301](#) (IF: 1.603).
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- NIKA, D.L.; COCEMASOV, A.I.; BALANDIN, A.A. Thermal Conductivity of Segmented Nanowires. In: TIGINYANU, I.; TOPALA, P.; URSAKI, V. eds. Nanostructures and thin films for multifunctional applications: Technology, Properties and Devices (Nanoscience and technology). Springer International Publishing Switzerland, 2016, Ch. 16, pp. 507-531. DOI: [10.1007/978-3-319-30198-3](https://doi.org/10.1007/978-3-319-30198-3)

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Brief overview

Institute of Chemistry is a research organisation, with over 100 researchers, structured into 3 research centers: Center for Physical and Inorganic Chemistry, Center for Ecological Chemistry and Environmental Protection and the Center for Organic and Biological Chemistry.

The Laboratory of Bioorganic Chemistry and Nanocomposites focuses its activity on carrying out research in order to obtain magnetic nanomaterials, nanocomposites, nanostructured catalysts, nanocomposite materials based on biocompatible polymers for "drug delivery systems", anti-tuberculosis compounds based on micro- and nanoparticles and clusters formed of superparamagnetic iron oxide nanoparticles and heterocyclic compounds.

Research areas

- Scientific research in the field of obtaining magnetic nanomaterials, nanocomposites, nanostructured catalysts, nanocomposite materials based on biocompatible polymers for drug delivery systems.
- Production of micro- and nanoparticle systems of alginate-chitosan-cyclodextrin, doped with isoniazid, isoconazole nitrate, the active substance being a 1,3,4-oxadiazole - compounds with antimicrobial properties.
- Obtaining new anti-tuberculosis compounds based on clusters of superparamagnetic iron oxide nanoparticles and heterocyclic compounds, with antituberculosis activity, which exhibit a minimal inhibitory concentration against Mycobacterium tuberculosis H37Rv (ATCC 27294).

Keywords on core nanotechnology capabilities

Nanomaterials, nanocomposites, superparamagnetic nanoparticles, nanostructures catalysts

Research infrastructures

- IR and UV-Vis spectroscopy - study of iron oxide nanoparticles and heterocyclic compounds.
- Mössbauer spectroscopy - study of iron oxide nanoparticles, structured as nanowires obtained using Mossbauer spectroscopy, in order to determine their composition.
- MRI spectroscopy - study of heterocyclic compounds with antituberculosis activity.
- Laboratory equipment for the synthesis of nanoparticles and nanocomposites.

International cooperation experience

Projects

- [NanoMed - Nanoporous and Nanostructured Materials for Medical Applications](#) (2017-2020), H2020 project, grant agreement nr. 734641
- [NanoBioMat - Nanostructured Biocompatible/Bioactive Materials](#) (2014-2017), FP7 project, grant agreement nr. 612484

- [Innovative multicomponent nano-scale pharmaceutical solids containing hexamminecobalt\(III\) with antiviral and antibacterial properties](#), STCU project nr. 6245
- [DANUBIUS-PP - Preparatory phase for the Pan-European research infrastructure Danubius-RI “The International Centre for Advanced Studies on River-Sea Systems”](#) (2016-2019), H2020 project, grant agreement nr. 739562

Organisations

- [University of Alicante](#), Spain
- [Pharmidex Pharmaceutical Services Limited \(PPS\)](#), United Kingdom
- [NOVA.id.FCT - Associacao para a Inovacao e Desenvolvimento da FCT](#), Portugal
- [Aristotle University of Thessaloniki](#), Greece
- [Budapest University of Technology and Economics](#), Hungary

Relevant publications

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- Fifere, A.; Lungoci, L. A.; Minea, B.; Roșca, I.; Duca, Gh.; Boldescu, V.; Marangoci, N.; Simionescu, B. C.; Pinteală, M.; Macaev, F. Cyclodextrins as molecular delivery systems for drugs with antifungal activity: from design to application. In: «Compounds and Materials for Drug Development and Biomedical Applications». Ed. Gh. Duca, F. Macaev. Editura Academiei Române-Editura Istros, București-Brăvila. 2018, p. 181-214.

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Brief overview

The Institute of Microbiology and Biotechnology is a research organization, focused on carrying out research in the field of microbiology and biotechnology of microorganisms. The institute's organizational chart includes 5 research laboratories, including the National Collection of non-pathogenic Microorganisms - a national repository for documenting and maintaining strains of microorganisms of biotechnological importance.

Since 2011 the Institute has initiated research in the field of bionanosynthesis, gathering experience and important results in the field of biosynthesis of silver and selenium nanoparticles. Another concern is developing effective methods for assessing the toxicity of nanomaterials (especially metallic nanoparticles) for aquatic organisms. The third research direction in the nano field is the application of the nanotechnological potential for remediation of polluted soils. Recently, researchers from IMB in collaboration with researchers from Germany, Romania and Russia obtained hybrid nanowires from synthetic polymers and biomass of cyanobacteria, with sorbent potential for heavy metals.

Research areas

- Biosynthesis of nanoparticles
- Application of nanomaterials for remediation of soil and polluted waters
- Assessment of the toxicity of nanomaterials
- Obtaining hybrid nanomaterials

Keywords on core nanotechnology capabilities

nanoparticle biosynthesis, toxicity assessment of nanomaterials, hybrid nanomaterials

Research infrastructures

Phycobiotechnology Laboratory - equipped with the necessary equipment for the growth of cyanobacteria and microalgae, as well as performing biochemical and microbiological tests.

International cooperation experience

Projects

- [NUTRILAB - NUTritional LABELing Study in Black Sea Region Countries](#) (2013-2015), FP7 project, grant agreement nr. 318946

Organisations

- [Faculty of Chemistry, University "Al. I. CUZA"](#), Romania
- [Joint Institute for Nuclear Research](#), Russia

- [Faculty of Technology and Bionics, Rhein-Waal University of Applied Sciences](#), Germany
- [Research Institute for Analytical Instrumentation, ICIA Susidiary](#), Romania
- [Yanka Kupala State University of Grodno](#), Belarus

Relevant publications

- SHAMMAS, M.; ZINICOVSCAIA, I.; HUMELNICU, D.; CEPOI, L.; NIRWAN, V.; DEMCAC S.; FAHMI, A. Bioinspired electrospun hybrid nanofibres based on biomass templated within polymeric matrix for metal removal from wastewater. *Polymer Bulletin*. 2019, DOI: [10.1007/s00289-019-02916-7](https://doi.org/10.1007/s00289-019-02916-7)
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Points of contact of NCMST at European and international levels

Belarus

- Belarussian Republican Foundation for Fundamental Research, Minsk (*Prof. Sergei Gaponenko*)
- B.I. Stepanov Institute of Physics of the National Academy of Sciences of Belarus, Minsk (*Prof. Nikolai Gaponenko*)

Belgium

- The Joint Research Centre (JRC) of the European Commission, Brussels (*Dr. Pascal Colpo*)

Canada

- Department of Electrical and Computer Engineering, University of Alberta, Edmonton (*Prof. R. Fedosejevs*).

Germany

- Department of Material Science, Christian-Albrechts University of Kiel (*Prof. R. Adelung, Prof. L. Kienle*).
- Hannover Medical School (MHH) (*Dr. Andres Hilfiker, Dr. Serghei Cebotari*)
- The Leibniz Institute for Solid State and Materials Research in Dresden (IFW Dresden): Institute for Metallic Materials (*Prof. Kornelius Nielsch*) and Institute for Integrative Nanosciences (*Prof. Oliver Schmidt, Prof. Vladimir Fomin*)
- Institute of Polymers and Composites, Hamburg University of Technology (*Prof. Bodo Fiedler*)
- Bremen University (*Prof. Jürgen Gutowski*)
- Institute für Hochfrequenztechnik, Technical University Darmstadt (*Prof. H. L. Hartnagel*).
- Karlsruhe Institute of Technology (*Dr. Malik Sharali*)

Greece

- National Technical University of Athens (*Dr. Y. Raptis*)

Italy

- Cagliari University (*Prof. Carlo Ricci*)

Japan

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- Department of Electrical Engineering, Faculty of Engineering, Tokyo University of Science (*Prof. Shizutoshi Ando*).

Portugal

- Aveiro University (*Prof. Teresa Monteiro*)

Romania

- The National Institute for R&D in Microtechnologies - IMT Bucharest (*Prof. Mircea Dragoman, Dr. Adrian Dinescu*)
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- Institute of Solid State Physics RAS, Moscow (*Prof. G. Emelchenko*)
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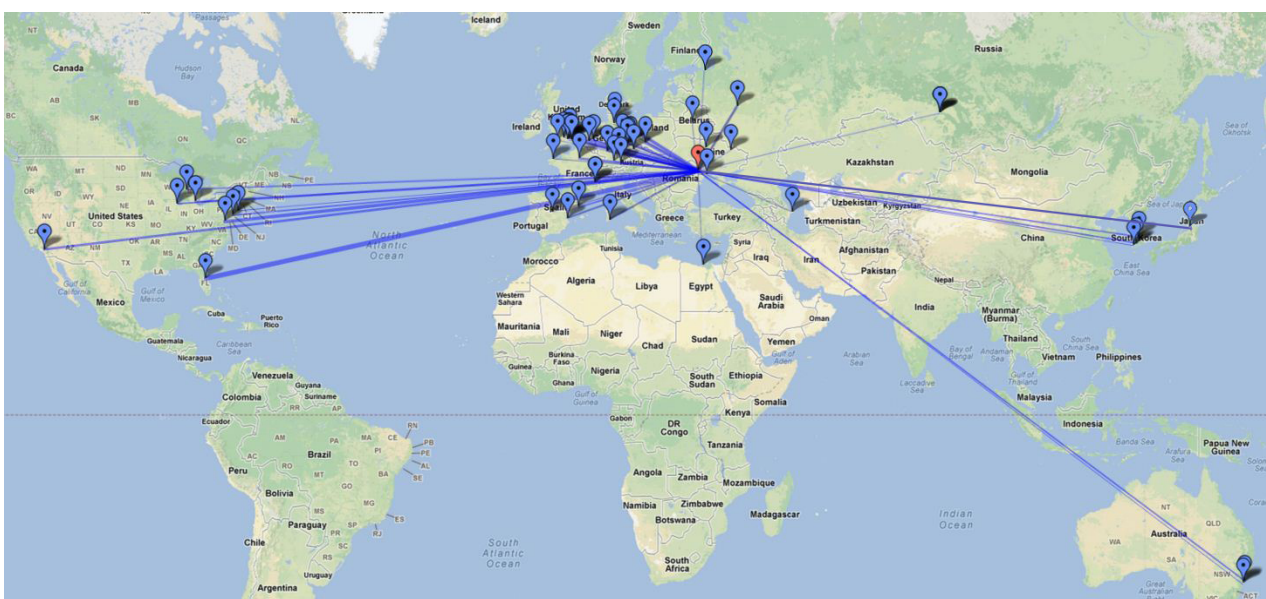
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Links of NCMST with other research institutions worldwide
(based on publications in internationally recognized scientific journals)