

INVESTMENT OPPORTUNITIES

Nanotechnology and Advanced Materials



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Welcome to the Czech Republic

The Czech Republic at a Glance



Population (million)	10.5
Labour force (million)	5.3
Unemployment rate (% , October 2015)	5.9
GDP per capita (€, PPP, 2014)	28,466
Inflation (% , October 2015)	0.4

Source: Czech Statistical Office 2015, Czech Ministry of Finance 2015, IMF 2015

Industry Specialisation – Nanotechnology

Location	Rank	Total
USA	1	8,5
Czech Republic	2	7,38
Germany	3	7,15
UK	4	6,15
Japan	5	5,85

Source: Financial Times: fDi Benchmark 2015

“ Nanofiber materials have great potential. Market analysts forecast 30-40% annual growth. That is probably the main reason why our current customers are ordering more production lines to meet their customers' demand. ”

Ladislav Mares
founder of Elmarco

Introduction

Over the last decade, the area of nanotechnology and advanced materials has attracted more and more attention worldwide with a lot of new, promising applications in the fields of medicine, textiles, surface treatment and filtration, among others. The Czech Republic has established its own respectable position in the world of nanotechnology and advanced materials thanks to its industrial tradition, growing state-of-art research infrastructure with institutions cooperating on the most prestigious projects, university education offering high-quality doctoral studies and a number of companies developing final products and coming up with many innovative ideas.

Industry specialisation

Current specialisation in the field is the result of decades of research and development, whereas the outstanding findings of Professors Armin Delong and Oldrich Jirsak are arguably the most influential. The former introduced the first electron microscope into production in 1949, which later led to the fact that the city of Brno is considered to be the global centre of electron microscopy thanks to the Czech-based TESCAN ORSAY HOLDING and the American firm FEI Company, which has a branch in Brno. More recently, in 2003, Professor Jirsak developed a reliable method of spinning fibers measuring 200 nanometres in diameter.

Based on Professor Jirsak's patent, the Czech company Elmarco became the first supplier of industrial-scale nanofiber production equipment in 2007 and allowed other Czech enterprises to process nanofibers in order to produce, for example, membranes for water and air filtration and functional textiles.

Apart from those mentioned above, there are still other remarkable fields in which Czech companies are highly competitive on the global scale:

- production of monocrystalline materials
- electron lithography for holography applications
- wound healing and tissue regeneration
- research of nanostructured and cross-linked polymeric materials
- production of nanoparticles for special purposes

Nanotechnology itself could not exist without a robust industrial base comprising the chemical, textile and electronics sectors and strong capabilities in the area of developing new materials. The field of advanced materials is highly attractive to major foreign companies, and it stands to mention at least the ongoing investments of Fibertex Nonwovens A/S and Pegas Nonwovens in nonwoven textiles, Toray in waterless printing technology and AGC in advanced glass, while for the Saint-Gobain group the Czech Republic is a key location with many branches and investments of more than EUR 65 million in expansions in 2015 alone from Sekurit, ADFORS and ISOVER only.

Highlights

The rapid development of nanotechnology and advanced materials has been enhanced by available support. In the Czech Republic, there are a number of possibilities of research funding offered by different state bodies as well as access to EU programmes (HORIZON 2020, COSME, etc.) and other international projects (e.g. Eurostars EUREKA).

Therefore, the combination of the aforementioned industrial tradition and capacities with the Czech Republic's regulatory and patent environment, which is in accordance with EU standards, and governmental and supranational support has resulted in an increasing number of research institutions and private companies working in nanotechnology and advanced materials and excellent research and human-resources potential of Czech small and medium-size enterprises.

Labour Availability, Skills and Education

Nanotechnology & Advanced Materials at Universities



Source: Ministry of Education, Youth and Sport, 2015

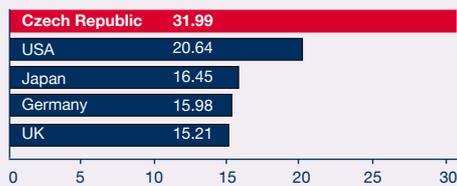
Note: Until academic year 2013/2014, statistics include only study programmes in Nanotechnology and related fields, but from 2014/2015 on statistics include both Nanotechnology and Advanced Materials

One of the main attractions of the Czech economy is its skilled and well-educated workforce available at very favourable costs compared to other countries. A key benefit for the nanotechnology and advanced materials sectors is the country's traditionally strong technical education, with universities able to meet the requests of new, developing areas of the economy. In addition, long-term specialisation in chemistry, electronics and related areas has fostered the skills needed in research and development conducted by any high-tech enterprise.

Thanks to growing support from the Czech government as well as from the European Union, several new, outstanding research facilities have been established. Having the most advanced equipment and the infrastructure of well-established universities, these facilities are able to participate in top-level basic and applied research projects worldwide with strong emphasis on meeting the needs of industry. At the same time, they provide high-quality education for doctoral students from all over the world. New centres in the cities of Brno (CEITEC), Olomouc (Regional Centre of Advanced Technologies and Materials) and Liberec (Institute for Nanomaterials, Advanced Technology and Innovation) serve as very good examples.

As of 2015, there are more than 9,900 university students enrolled in studies programmes related to nanotechnology and advanced materials in the Czech Republic; this number follows the upward trend of the last ten years. Approximately 1,800 other students are enrolled in doctoral programmes.

Specialisation in Chemicals

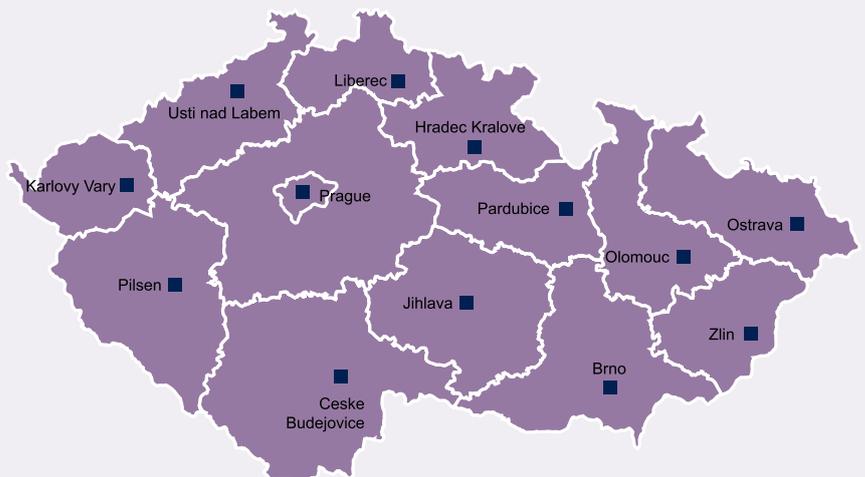


Source: Financial Times: fDi Benchmark 2015

Note: Number of companies in chemicals per 100,000 population

Number of Students and Graduates at Universities in Nanotechnology & Advanced Materials (2014/15)

Czech Technical University in Prague Students: 2,297 Graduates: 653	Palacky University, Olomouc Students: 305 Graduates: 90	University of Pardubice Students: 671 Graduates: 149
Charles University, Prague Students: 639 Graduates: 111	Technical University of Liberec Students: 594 Graduates: 109	VSB – Technical University of Ostrava Students: 614 Graduates: 155



TOTAL NUMBERS 2014/2015 Students: 9,926 Graduates: 2,179	Institute of Chemical Technology, Prague Students: 996 Graduates: 159	Tomas Bata University in Zlin Students: 472 Graduates: 88
University of West Bohemia, Pilsen Students: 189 Graduates: 38	Masaryk University, Brno Students: 98 Graduates: 7	Brno University of Technology Students: 2,855 Graduates: 605

Source: Ministry of Education, Youth and Sport, 2015

Annual Labour Costs – Laboratory Specialist

Location	Rank	Total (EUR)
Czech Republic	1	27,821
UK	2	52,654
Japan	3	55,674
USA	4	63,174
Germany	5	73,261

Source: Financial Times: fDi Benchmark 2015

Annual Labour Costs – Head of R&D

Location	Rank	Total (EUR)
Czech Republic	1	96,782
USA	2	128,717
UK	3	137,814
Germany	4	155,704
Japan	5	170,152

Source: Financial Times: fDi Benchmark 2015

Available Financial Support

Among the possibilities to obtain a certain level of financial support, the most attractive in R&D are listed in the table below, which provides a brief overview of available programmes. Funding is provided by Czech government through its agencies (Grant Agency, Technology Agency) and the Ministry of Industry and Trade, as well as by the European Union. The EU has created huge budget of nearly EUR 80 billion (Horizon 2020) to support its competitiveness in the most advanced technologies, whereas nanotechnology and advanced materials attract a large part of this amount, which is accessible also for non-member countries.

Apart from these programmes, there are a number of other support schemes available. Facilitating access to financing for SMEs is the main aim of the EU's COSME programme. Implemented on the national level, EU structural funds are another important resource for enhancing innovation, efficiency, commercialisation and internationalisation in business. From outside of the EU, the EUREKA organisation offers the Eurostars programme, which provides funding for transnational innovation projects as an incentive for small and medium-sized enterprises conducting research.



T A
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Programme	Activities supported	Beneficiary	Basic conditions	Amount of contribution/grant
Grant Agency of the Czech Republic	Support for basic research on the basis of public tenders	Legal entities and individuals, research organisations	Objectives and methods of addressing the project are determined by those who propose the projects and are responsible for them.	Subsidies up to 100%
Technology Agency of the Czech Republic EPSILON Programme	Support for applied research and experimental development	Research organizations and enterprises	High potential for fast application in new products, production processes, and services.	Subsidies up to 60%
Technology Agency of the Czech Republic GAMA Programme	Support for verification of the results of applied research and experimental development	Research organizations or enterprises	The supported project must lead to at least one of these results – patent, technically executed results, pilot plant or verified technology, software, industrial and utility model.	Research organizations 90%; Enterprise 35-80% depending on multiple criteria
Technology Agency of the Czech Republic DELTA Programme	Support of collaboration in applied research and experimental development projects through joint cross-border projects of enterprises and research organizations	Research organizations and enterprises	At least one international candidate and at least one candidate from the Czech Republic, which is an enterprise. Research organization may be an applicant only if there is at least one enterprise from the Czech Republic among the other project participants.	Up to 100% while respecting the highest possible support rate per project which will be set ad hoc for each public call
Technology Agency of the Czech Republic Competence Centres Programme	Support of establishment and operation of centres for R&D and innovation in advanced fields with a perspective for making a contribution to the growth of competitiveness	Enterprises or research organizations cooperating with at least 3 enterprises	Fulfillment of the National priorities of targeted research, experimental development and innovation.	The maximum level of support per project is 70% of the total eligible costs
Horizon 2020: The EU Framework Programme for Research and Innovation	This financial instrument aims at strengthening the EU's position in science, innovation and R&D and tackling societal challenges by helping to bridge the gap between research and the market	All entities actively carrying out as well as supporting and enhancing R&D, innovation related activities and technology transfer	H2020 combines all research and innovation funding provided through the Framework Programmes for Research and Technical Development, the innovation related activities of the Competitiveness and Innovation Framework Programme and the European Institute of Innovation and Technology.	Funding will depend on respective R&D support programme
Ministry of Industry and Trade of the Czech Republic TRIO Programme	Objective of the programme is at developing the potential of the Czech Republic in the area of Key enabling technologies	Applicants for subsidy must be enterprises that solve the project in effective cooperation with at least one research institution	The program will be implemented in the years 2016 - 2021 and the total amount of subsidy in the program will be in this period amount 3.7 billion CZK. Calls for the selection of projects will be announced in 2015, 2016 and 2017 with the launch of projects in the years 2016, 2017 and 2018.	Research organizations up to 100% with a limit of CZK 20 mil.; Enterprises up to 80% with a limit of CZK 20 mil. for one project

Major Investments



www.fei.com

FEI Company

FEI Company designs, manufactures and supports the broadest range of high-performance microscopy workflows that provide images and answers on the micro-, nano- and picometre scales. FEI's origins in the Czech Republic date back to 1996, when Philips Electron Optics acquired a Czech company called Delmi, which was founded in 1993. In 1997, the firms became part of FEI Company. Continuously expanding its activities in the Czech Republic, FEI established one of its hubs in Brno (the others are in Hillsboro, Oregon, and Eindhoven, Netherlands) with 600 employees (approximately one-fifth of the company's worldwide total). The production site in Brno accounts for 60% of the company's product revenues.

In Brno, FEI produces a wide range of scanning and transmission electron microscopes, systems with focused ion beams and its DualBeams™ technology for various customers in electronics, material science and natural and life sciences for use in both R&D laboratories and industry. In 2014, the company invested more than USD 29 million in relocating to a new facility, which currently is the largest electron microscope factory in the world with 27,000 m² including 8,500 m² of cleanrooms. The company plans to expand the facility in the future.

FEI Company chose the Czech Republic primarily due to the country's stable business environment and competent yet affordable workforce. FEI based its business in Brno due to the fact that it is a dynamic and modern city of science and research with a strong industrial tradition and a very accessible location, while also being a significant university centre.

Fibertex Nonwovens a.s.



www.fibertex.com

Fibertex Nonwovens, a.s. in Svitavy, Czech Republic, is a subsidiary of the Danish company Fibertex Nonwovens A/S, a market-leading manufacturer of needle-punch nonwovens for industrial and technical applications. Fibertex has continuously expanded and today manufactures nonwovens for use in many different areas – civil engineering, construction, geotextiles, the automotive sector, filtration, furniture and other advanced applications. With its corporate office in Aalborg, Denmark, and manufacturing sites in Denmark, the Czech Republic, France, the United States, Turkey and South Africa, Fibertex is represented globally.

Fibertex Nonwovens A/S entered the Czech market in 2004 with the acquisition of Vigona, a Czech nonwovens producer. Fibertex established the subsidiary Fibertex Nonwovens, a.s. and opened a new plant in the Czech Republic in the Paprsek industrial zone in 2005. The investment in the project totalled approximately EUR 32 million and continued in 2008, when Fibertex opened the second phase of the plant. At a cost of roughly EUR 10 million, the buildings were expanded with the addition of new production facilities, warehouses and a new logistic centre, and new production lines installed. Fibertex also purchased additional land for future development. In 2014 Fibertex decided to invest EUR 24 million to build a new production facility and warehouses and to set up a new needle-punch production line.

“ Apart from identifying the right acquisition target, the company Vigona, to expand our portfolio of activities into new segments, we chose the Czech Republic for several reasons. The most important were the country's highly skilled workforce, good location in terms of logistics and stable political system. ”

Bjarne Knudsen
CEO, Fibertex Nonwovens, a.s.





www.toray.cz

Toray Textiles Central Europe s.r.o.

Toray Industries began its activities in the Czech Republic in 1997 by establishing Toray Textiles Central Europe s.r.o. (TTCE) with the purpose of opening a factory in Prostějov, where production began in 1999 following the initial investment of about EUR 30 million. As a global, integrated chemical group that fuses nanotechnology into its operations, Toray Group's core technologies are organic synthetic chemistry, polymer chemistry and biotechnology. The Czech branch of Toray specialises in technical textiles. The branch's first key product was 100% polyester filament woven fabric.

Through a number of additional investments, the company has finished several new projects involving airbag fabrics and waterless plate printing technology. In 2006, TTCE added its second key product, 100% polyamide airbag woven fabric, which required an expansion worth EUR 15 million. Another major expansion allowed TTCE to build a new facility focused on waterless plates for printing, which is the first installation of this unique technology outside Japan.

From 2013 to 2015, TTCE also enlarged its weaving capacities in the area of automotive airbag fabrics and started to use new lines for coating technologies. The total sum of investments reached approximately EUR 80 million. TTCE currently employs 360 people.

Saint-Gobain

Founded in 1665, Saint-Gobain is the world leader in the habitat and construction markets. The company designs, manufactures and distributes building and high-performance materials, providing innovative solutions to the challenges of growth, energy efficiency and environmental protection. Saint-Gobain is one of the top 100 manufacturing companies in the world.

Saint-Gobain entered the Czech Republic in 1992 and eventually grew into a local conglomerate of seven companies with 14 production facilities and 11 brands employing 4,100 people and with annual turnover of approximately EUR 600 million. After its first acquisition in the field of abrasives in 1992, Saint-Gobain built a new Sekurit production facility. Subsequently, a number of acquisitions were carried out by its various brands (e.g. ISOVER, VERTEX) or by the group itself (Raab Karcher) and related diversified activities were implemented.

The rapid expansion of Saint-Gobain required vast funding – in 2015 alone, the company planned to more than double its investments of 2014 to the amount of approximately EUR 74 million. The most important projects in this round of investment were those of Sekurit (EUR 44 million, new production facility for automotive glass), ADFORS (EUR 18.5 million, new glass-melting furnace, 200 new jobs), and ISOVER (EUR 4.5 million, new packaging centre). Saint-Gobain believes the key to its success is the enthusiasm of its employees, whose potential was also the essential factor for the company's growth in the Czech Republic.

“ We have been operating in the Czech Republic since 1998. For the expansion of local production with this new technology, we based our decision on, among other things, the good work ethic and professionalism of the local workers. Favourable conditions, including the helpful approach of Czech authorities, also played a role in the decision. ”

Akihiro Nikkaku
President of Toray Industries



Research and Development



www.ceitec.eu

CEITEC

CEITEC is a multidisciplinary science centre focused on life sciences and advanced materials and technologies whose aim is to establish itself as a recognised centre for basic as well as applied research. It is a consortium whose partners include the most prominent universities and research institutes in Brno, and it benefits from the support of the Region of South Moravia and the City of Brno.

CEITEC offers state-of-the-art infrastructure for research divided into 64 groups and seven programmes: Advanced Nanotechnologies and Microtechnologies, Advanced Materials, Structural Biology, Genomics and Proteomics of Plant Systems, Molecular Medicine, Brain and Mind Research, and Molecular Veterinary Medicine.

New, modern laboratories with an area of 25,000 m² and nearly 700 special instruments and unique facilities will arise in Brno in 2016. The advanced technologies at its disposal will facilitate synergistic study in the subjects of life and material sciences on all currently available levels of complexity, starting with individual atoms, through molecules, molecule groups and cells to whole organisms. Nine core facilities will allow specialised research, higher expertise, higher-quality facilities for advanced education and mainly close, multidisciplinary cooperation.



www.rcptm.com

Regional Centre of Advanced Technologies and Materials

The Regional Centre of Advanced Technologies and Materials (RCPTM) is a scientific and research centre connected to the Faculty of Science at Palacky University in Olomouc. Its chief objective is to produce superlative research and to transfer high-tech products and advanced technologies into medical, industrial and environmental practice with pronounced emphasis on connecting the centre to international networks and collaborations.

The centre is involved in prestigious international cooperation with institutions like the Pierre Auger Observatory and CERN-ATLAS. In addition, it has a long tradition of collaboration with industrial and public organisations in the area of applied research. RCPTM has approximately 160 scientific team members, 25% of whom are foreign specialists.

RCPTM focuses primarily on chemical, material and optical research. Priority research areas include metal oxide nanoparticles for catalytic, magnetic and biomedical applications, carbon nanostructures based on graphene and carbon quantum dots; metal nanoparticles for antimicrobial treatments and water-treatment technologies; medical, computational and coordination chemistry; photonics and the development of instrumental techniques for applications in optics and analytical chemistry. Each year, the centre publishes more than 240 original publications in prestigious foreign journals (average IF ~ 3.9) and collaborates with more than 30 leading world scientific institutions.



www.eli-beams.eu

ELI Beamlines

Extreme Light Infrastructure (ELI) is part of a new generation of large European research facilities with the main goal of creating laser equipment with unique parameters. ELI's research projects will cover the interaction of light with matter at an intensity levels ten times higher than current values. ELI will provide ultra-short laser pulses of a few femtoseconds (10-15 fs) duration with performance up to 10 PW.

The ELI Beamlines facility in the Czech Republic will create a portfolio of unique radiation sources covering photons in a broad spectrum of wavelengths as well as accelerated electrons, protons and ions for interdisciplinary applications in physics, medicine, biology and material sciences. Specific applications are in cancer treatment, 3D diagnostic methods and material structures, among other areas. These state-of-the-art sources will be driven by ultra-intense lasers with the possibility of synchronising them in unique combinations with near-absolute precision. Two other centres will be set up in Hungary (ELI Attosecond – ultra-short optical pulses) and Romania (ELI Nuclear Physics – photonuclear physics).



www.hilase.cz

HiLASE

The main goal of the HiLASE facility is to develop laser sources having breakthrough technical parameters. In general, the lasers will be significantly more powerful and efficient, more compact, more stable and more easily maintained than those using the currently available technology.

HiLASE focuses on the development of high-repetition power laser systems that will find uses in industry, small- and medium-scale research laboratories and large-scale facilities. The key technology of laser sources is DPSSL (diode pumped solid state laser).

The HiLASE facility has great application potential in the commercial sphere. Outputs of the project are used in, for example, micro-machining technologies, surface hardening, testing of the resistance of optical materials, cutting, welding and removal of deposits.



www.synpo.cz

SYNPO

SYNPO is a commercially oriented, privately held R&D centre which arose in 1992 from a government-owned research institute specialising in R&D of coatings and resins. Their products are new technologies based on applied polymer science and new products, primarily coatings, adhesives, composites and various binders. Main strengths of SYNPO are their people and the system that support, encourage and reward their initiative and creativity.

SYNPO has recently invested significant funding in the establishment of the Czech Centre for Nanostructured Polymers and Polymers from Renewable Resources. Several teams work there on projects ranging from development of new, high-performance liners for liquid hydrogen tanks for a new generation of space launchers (funded by the European Space Agency) to a new process for making iron-free perovskite superparamagnetic nanoparticles for hyperthermal treatment of malignant tumours.



cxi.tul.cz

Institute for Nanomaterials, Advanced Technologies and Innovation

The Technical University of Liberec and its Faculty of Textile Engineering have become well known due to their international patent for the industrial production of nanofibers commercialised as Nanospider™ by Elmarco. This was also an important impetus for the creation of the Institute for Nanomaterials, Advanced Technologies and Innovation (Cxl).

Cxl is involved in competitive engineering with the main goal of long-term support for industrial research activities focused on the development and manufacture of machinery and vehicles, mechatronics, robotics, management and utilisation of artificial intelligence and the utilisation of new technologies and technological methods in production.

Materials research within Cxl is presently focused on the physics involved in nanomaterial creation and electrostatic spinning. The application of nanofiber materials has been developed in a number of areas, e.g. air and fluid filtration, sound-absorbing materials, open-wound bandages and other medical materials, materials for remediation processes, and nanosurfaces and nanofiber materials for implants and tissue engineering.

“ We have developed long-term, trusting relationships with several key clients for whom we have been doing R&D for more than 15 years. This trust and reputation are by nature very personal. Therefore, we encourage direct and frequent communication between our technical staff and our clients. ”

Martin Navratil
Chairman of the Board, Synpo



Company Focus – Czech Republic

Nanofibres



www.elmarco.com

Elmarco

Elmarco is the industry's first supplier of industrial scale nanofiber production equipment. Elmarco's Nanospider™ equipment is designed for the production of all sorts of nanofibers. The product line ranges from laboratory equipment to industrial-scale, high-volume production equipment that delivers millions of square meters of cost-effective, uniform nanofiber webs. With over 180 field installations, Nanospider™ is the world leader in high performance nanofiber membrane production.

Elmarco benefits from the revolutionary Nanospider™ technology that enabled the building of industrial-scale production equipment without nozzles, needles or spinnerets. Elmarco's electrospinning technology uses simply shaped electrodes, so it has no parts easily clogged, unlike needle-type electrospinning. Nanospider™ technology brings opportunities to create new, unique materials in numerous applications, including air and liquid filtration, barrier textiles, acoustic materials, battery separators and medical applications, among others.



www.contipro.com

www.4spin.info

Contipro

Contipro has been involved in research, development and biotechnological production of active ingredients for the cosmetics and pharmaceutical industries for over twenty five years. With excellent production quality and research facilities, Contipro is one of the world's leading manufacturers of hyaluronic acid and applications thereof.

The company places strong emphasis on research with almost 40% of its employees involved in R&D. One of the latest achievements of the company's scientists is the development of 4SPIN, the first desktop device for laboratory and small-scale production of nanofibers, designed to influence the final arrangement of fibres in layers. It is targeted at laboratories engaged in research and development of new nano-applications from biopolymers.



www.pardam.com

Pardam

Pardam, s. r. o. produces high-quality nanofibrous materials (inorganic NnF CERAM® and polymer NnF MBRANE®) manufactured using industrial – Centrifugal Forces production technology. Pardam has been focusing on production and development of nanofibrous materials since 2009 and has extensive experience with electrospinning and centrifugal forces spinning technology.

Pardam provides its customers with several services such as development of new nanofibrous materials (inorganic/polymer) and products, post-production treatment of nanofibrous materials in accordance with customers' needs, industrial-scale production of nanofibrous materials, and material analyses. Pardam is also SME partner for 7FP / Horizon 2020 projects.



www.nafigate.com

Nafigate

NAFIGATE Corporation Inc. is a global centre of excellence in the field of nanofibers and new technologies. The company is the originator of the www.nafigate.com portal, whose objective is to build a global nanofiber community and to inform the members of that community about the latest innovations in research and development, as well as about the applications of nanofibers.

In 2013, NAFIGATE Corporation Inc. established the Global Innovation Centre of Nanofiber Applications, which fulfils the vision of creating a truly global networking and cooperation platform for the world's top experts in the field of nanofibers. This cooperation is essential to accelerate the process of bringing final nanofiber applications to consumers. In May 2013 the platform was launched in China as well, and the first application projects are already being implemented there.



www.nanovia.cz

Nanovia

Nanovia Ltd is the first company in the Czech Republic and practically even the first in Europe to have the capacity for industrial production of nanofibrous material. This capacity is used for manufacturing barrier fabrics introduced to the market under its own brand names Nanovia AntiAllergy, Nanovia AntiMicrobe and Nanovia Waterproof, as well as Nanovia filtration materials.

Apart from manufactured materials, Nanovia is the only company in Europe to offer its own production capacity for custom-made nanofibrous materials for different applications and final products. This offer is aimed at companies that are considering bringing nanofibrous products to the market without their own production facilities. Nanovia also offers help with the optimisation process of nanofiber production.

Optics, Microscopy and Lithography



www.crytur.com

CRYTUR

CRYTUR is one of the world's leading companies engaged in crystal manufacturing and processing with a strong focus on material research and development of crystal-based applications. CRYTUR is continuing the tradition of growing and processing crystals dating back to 1935. In recent decades, CRYTUR has gained worldwide recognition as a provider of integrated crystal-based solutions for science and industry.

Synthetic crystals grown in the company's modern 4,500 m² facility originate in a strictly controlled environment and have to be precisely tuned to gain the desired physical characteristics which then allow for them to be used as components for a wide variety of crystal-based detectors and devices. Artificial garnets and preovskites are the key component of unique solutions provided by CRYTUR such as precise detectors for electron microscopy or high resolution imaging systems.



www.sqs-fiberoptics.com

SQS Vlaknova optika

SQS Vlaknova optika is a private technology company, a manufacturer of fiber optics, optic and optoelectronic components and a photonics research centre. SQS concentrates on the fabrication and assembly of customized fiber optics, optic and optoelectronic high precision modules including high precision CNC machining with accuracy up to 100 nm, laser machining in submicron precision and 5 nm accuracy, and nano positioning of optical components.

SQS products find their application in telecommunication, automotive and aerospace industry, mining, chemical, or defence sector.

The production focuses on the products of in-house development and on contract manufacturing including optimization of production processes. SQS has a large R&D team well-connected with local technical universities and the Czech Academy of Sciences with more than 10 years of experience in the field of photonics, optoelectronics, telecommunication, sensors, materials, material processing and nanoparticles.



www.tescan.com

TESCAN ORSAY HOLDING

TESCAN ORSAY HOLDING is a multi-national company established through the merger of the Czech company TESCAN, a leading global supplier of SEMs and focused ion-beam workstations, and the French company ORSAY PHYSICS, a world leader in customised focused ion-beam and electron-beam technology. Over the course of more than twenty years in existence, the TESCAN brand has built a formidable reputation for designing and manufacturing scanning electron microscopes and system solutions for micro- and nanotechnology and related applications.

TESCAN's product range meets customers' requirements at all levels in fields such as material sciences, industry, biology and life sciences and forensic sciences. Over 1,600 SEMs installed in over 60 countries are a testament to TESCAN's first-class quality and proven technology. TESCAN's product range includes thermal emission systems, LaB6 systems, field emission systems and FIB systems.

IQ STRUCTURES

www.iqstructures.com

IQ Structures

IQ Structures is a technology company focusing on incorporating of micro- and nanostructures into different materials and approaches for production of high-end products for end consumers, business to business, governments and scientific institutions.

IQ Structures uses cutting-edge technologies and equipment to develop special surface structures that enhance materials with specific mechanical, optical, electrical and physical and chemical properties. The company has a team of top experts in the fields of optics, theoretical and applied physics, chemistry, and material science.

IQ Structures applies nano- and microstructures in a broad portfolio of solutions for protection of documents, valuables, banknotes, personal and travel documents, and branded products against counterfeiting. Other areas on which the company focuses include micro and nanostructured optics for interiors and exteriors and the automotive industry. The company uses nanotechnology to increase the efficiency of catalysers in fuel cells and air purifiers.

Special applications

NANO IRON

NANO IRON, s.r.o. is engaged in production of nanoparticles of elementary iron (Fe(0), nZVI = nanoscale zero-valent iron) and technical support in their application. Innovative in-situ remediation of groundwater (usually polluted by chlorinated hydrocarbons and heavy metals) is the primary application of this product.

The company possesses a unique, environmentally friendly and wasteless technology enabling industrial-scale production of Fe(0) nanoparticles with almost unlimited production capacity. It is currently the only large-scale European producer of such material.



www.nanoiron.cz

Advanced Materials – JTJ

Advanced Materials – JTJ was founded in 2003 with the main focus on commercialization of photocatalysis, material chemistry and development of new applications of nanomaterials. The company introduced its own industrial process of manufacturing of photocatalytic multifunctional paints for air purification. A number of patents protect the technology in the Czech Republic, Canada, China, South Africa, USA, and many others are pending. Simultaneously, Advanced Materials - JTJ has developed a patented large-scale technology to produce TiO₂ nanoparticles with high efficiency.

Working with several universities and international companies on variety of R&D and commercial projects, Advanced Materials – JTJ delivered many revolutionary technologies in the field of material science, photocatalysis and energy accumulation and participates in two EC grant consortia on photocatalytic water decontamination.



www.amjtj.com

HE3DA

HE3DA Ltd. is an innovator in applied research and commercialization of battery technologies. The company's 3D technology and Li-battery production processes are based on three dimensional electrodes using lithium nano-materials (patented HE3DA[®] technology). HE3DA[®] is a technological platform meeting all requirements for mass market application. HE3DA has developed an accumulator/battery with technical and economical parameters prepared for utilization in high capacity frequency stabilization and energy storage system for energy sector as well as other applications.

HE3DA technology eliminates the ballast from batteries, and optimizes the qualities of nano-materials and the morphology of electrodes. It enables a much greater thickness of electrodes and offers many new advantages and construction solutions. This technology greatly improves on the safety of lithium-based batteries and allows for a wide range of completely new technical solutions resulting from the so far unachievable technical and economic parameters found in HE3DA batteries.



www.he3da.com

Up & Coming



www.nanopharma.cz

Nanopharma

Nanopharma is an engineering company focusing on research, development and production of innovative materials using functionalized nanofiber structures. Our vision is to support our partners in creating innovations of the highest order across industries. The division called Technology Solutions by Nanopharma was established to pursue this goal by providing contract research services. The company is able to design customized 2D and 3D structures to order – whether for a specific cell line, active ingredient or industrial product.

NanoMatrix3D is Nanopharma's leading product range for 2D and 3D cell culture. Nanopharma also offers a wide array of materials and services to university and research partners we have been working with closely since starting up in 2008.



www.nanomembrane.cz

Nanomembrane

The Czech company NANOMEMBRANE in cooperation with the company Svitap and the Faculty of Textile Engineering of the Technical University of Liberec has developed a brand new nanofibrous membrane with excellent properties including extremely high vapour permeability, water resistance with a high water column, and 100% wind resistance for outdoor, sports and military purposes.

NANOMEMBRANE is the first enterprise in the world to start industrial production of nanofibrous membrane with the fibre diameter of less than 150 nm. Thanks to a unique nanofibrous structure, on 1 cm² the NANOMEMBRANE nanofibrous membrane has 20 million more pores than microporous membranes. This helps the NANOMEMBRANE achieve unique attributes that no other membranes in the world can match. Moreover, the entire production is based in the Czech Republic to ensure top quality, which is of utmost importance for NANOMEMBRANE. The products of NANOMEMBRANE are protected by a number of patents and utility models.



www.advamat.cz

AdvaMat

AdvaMat Ltd. is a SME company engaged in R&D of advanced materials and thin films. The company was founded as a spin-out from the Czech Technical University in Prague, specifically the Advanced Materials Group at the Faculty of Electrical Engineering. Over 10 years of academic research has been dedicated to the development and testing of superhard and tribological layers and coatings. AdvaMat originated as an interface between science and industry with a vision to up-scale certain laboratory procedures to industry specific solutions and raise awareness of the design of the final product based on the functional layer.

Material solutions by AdvaMat are usually focused on PVD – magnetron sputtered – coatings modified to specific customers' request. The portfolio spans from hard wear-resistant coatings, anticorrosive films, and decorative coatings to solid lubricants achieving almost zero-friction in various sliding environments. AdvaMat's industrial device allows 3D coverage of complex parts or tools.

AtomTrace



www.atomtrace.com

AtomTrace s.r.o. has been founded in 2014 as a start-up from the Central European Institute of Technology (CEITEC) of the Brno University of Technology. It's main goal is commercialisation of promising technologies arising from research and development in the field of material analysis by laser spectroscopy techniques, particularly by Laser-Induced Breakdown Spectroscopy (LIBS).

The LIBS know-how is given by more than 18 years of research activities of the Laboratory of Laser Spectroscopy at the Brno University of Technology and the Laboratory of Analytical Chemistry at the Masaryk University in Brno in the LIBS field.

AtomTrace introduces the Sci-Trace, the modular LIBS instrumentation for laboratory research experiments and the X-Trace, the mobile LIBS instrumentation for in-field remote chemical analysis. Above all AtomTrace also targets research, development and production of the custom-built industry-oriented LIBS devices.

Networks & Infrastructure



www.nanoasociace.cz

Czech Nanotechnology Industries Association

The Czech Nanotechnology Industries Association (CNIA) is a newly formed body that brings together Czech small and medium-sized nanotechnology firms in order to support their operations by creating synergies and new business opportunities, and to popularize and promote the area of nanotechnology in the Czech Republic as well as abroad. To do so, CNIA has created two projects: “Czech is Nano” introducing potential partners from the Czech Republic to foreign entities and “Nano Days” targeting the regions of the Czech Republic to build awareness of this field.

CNIA members are active mainly in the fields of nanofibers and their applications, air and water filtration, nanostructures and electron lithography, nanomedicine, photocatalysis and environmentally friendly technologies, energy storage and special applications of nanoparticles. The mission of CNIA is to spread information about its members’ activities and to establish itself as a reliable partner for any possible nanotechnology collaboration.



www.clutex.cz

CLUTEX

CLUTEX is a civil society with 29 members (university, association, R&D institutions, producers focused on technical textiles) with the following main objectives: common development and innovation, marketing and promotion of members, collecting and sharing information, education and training.

Main fields of R&D of CLUTEX are nanotechnology in textiles, (multi)functional textiles, personal protective textiles, design of customised textile structures and biotechnology and bio-based resources. The cluster is developing a technology to create multilayer textile mesh structures and to provide a basis for defining the technical requirements for building a laboratory line to be used for the investigation of special fibres for textile manufacture.

The cluster also focuses on efforts to develop filtering fabrics resistant to UV radiation, innovate clothing textile products, protective clothes, bed linen and geotextiles; analyse and innovate the technologies of heat permeability measurement; innovate fire-proof technical textiles; develop value-added coated textiles; promote the outcomes of the cluster’s joint activities at trade fairs and shows.

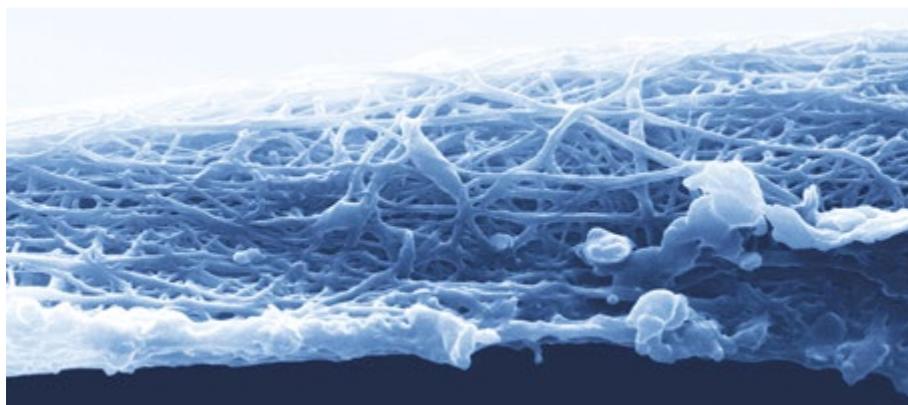


www.nanoprogres.cz

Nanoprogres

Cluster Nanoprogres focuses on R&D of functionalized nanofibers and its application in the industry and bio-medicine. The member base is currently composed of 34 SMEs, R&D institutions and universities and covers the whole nanotechnological value chain starting with production of entry material up to the development and construction of new equipment, production of nanofibrous structures and its application. Cluster activities and services support the internal and external collaboration, internationalization, innovation and competitiveness of its members. Nanoprogres is involved in the European Strategic Cluster Partnership in new emerging industry and belong to the category of European excellent clusters under the European Initiative of Cluster Excellence.

Within the joint research activities Nanoprogres developed sophisticated methodologies for functionalization of nanofibers, built new technological equipment and determined the application potential of the functionalized nanofibrous structures. As principal success case can be considered the development of new methodology for production of core-shell nanofibers and the design and construction of new equipment based on the worldwide unique AC electrospinning technology.



CzechInvest's Services

Headquartered in Prague, CzechInvest is the Investment and Business Development Agency of the Ministry of Industry and Trade. Since its establishment in 1992, the agency has been tasked with attracting foreign investments and developing domestic companies through its services and development programmes.

Our Objectives

- To advise and support existing and new companies to grow and prosper in the Czech Republic
- To facilitate communication between the public and private sectors
- To actively influence the positive development of the business environment
- To support the competitiveness of the Czech economy

CzechInvest is exclusively authorised to file applications for investment incentives at the relevant governing bodies and prepares draft offers to grant investment incentives.

Its task is also to provide potential investors with current data and information on the business climate, investment environment and investment opportunities in the Czech Republic.

Our Services

- Detailed, sector-specific market intelligence and value propositions
- Customised business cases
- Identification of business properties and sites suitable for investment
- Tailored visits to the Czech Republic
- Access to investment incentives and EU funds
- Information and advice on doing business in the Czech Republic, regulations and taxation
- Identification of potential business partners, suppliers and acquisition targets
- Referrals to professional associations (lawyers, bankers, accountants, etc.)
- Aftercare service

Our services are fully funded by the Ministry of Industry and Trade as a part of the business support measures so they are free of charge to businesses.



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