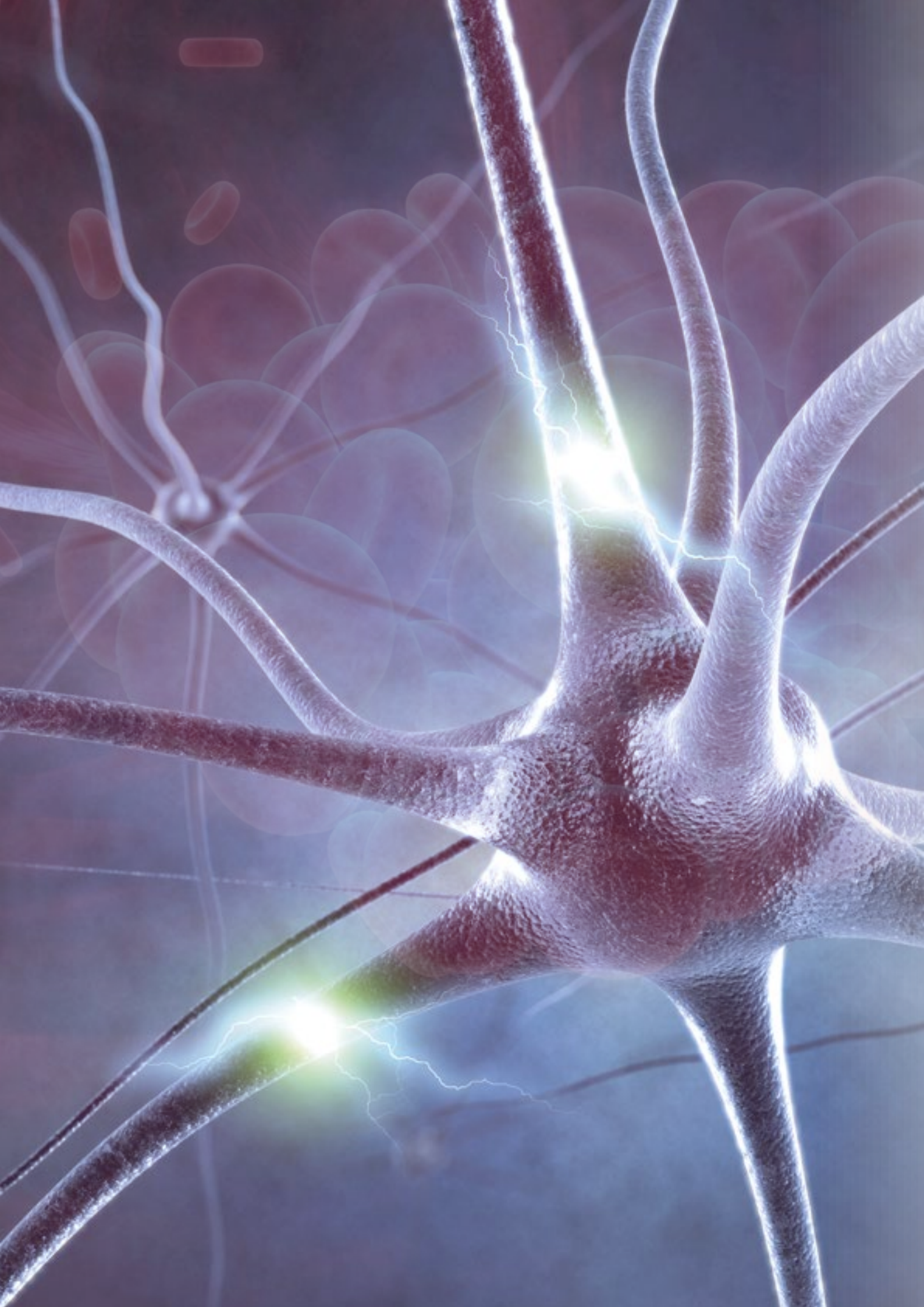




Science
Innovation
Business

Science – Innovation – Business

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Innovation is not new to the Czech Republic. Czech academics and entrepreneurs have been successfully exploiting new ideas for generations. What is new, is that the Czech Republic is now widely recognized as a centre of profitable innovation and technological entrepreneurship. Moreover, innovation throughout the economy is now being stimulated and sustained by both Czech and international companies.

The Czech Republic: Ideas for Science, Science for Life

Increasingly, companies that fail to innovate will not survive, while those that do need to better serve customers from optimal business environments, like the Czech Republic, where the country's pre-eminent resource, intellectual capital, can creatively and productively respond to the needs of knowledge-based and innovation-driven businesses. From the country that introduced the world to the contact lens and successfully developed the compounds on which current anti-AIDS drugs are based, Czech companies have already left a large footprint on groundbreaking technologies with respect to hologram production, nanofibres, speech recognition, hyaluronic acid, cybernetics, stem-cell research and astrophysics, with the highest density of observatories in the world.

Innovation of Past and Future

The commercialisation of those developments, as elaborated within this publication, is increasingly Czech-driven and thus a better balance has been achieved between exploiting innovation indigenously and through international partnerships and cooperation. The increase in local innovative companies has also been matched by unprecedented growth in international companies engaging in technology-intensive and R&D activities.

Smart Support of Smart Projects

Over the past fifteen years, the Czech Republic's spending on R&D has increased from 0.95% of GDP to 2.0%. In 2004 the country became a member of the European Union, which spurred an additional, fundamental increase of support for science and research. The country has gained access to a variety of European funds and programmes, such as EU Structural Funds and EU Cohesion Funds, which have already had a positive impact on the economy. To that end, the funds can be used particularly for development of R&D infrastructure and the innovation activities of enterprises.

Skilled and Educated People

Some of Europe's oldest and largest technical universities are located in the Czech Republic, such as the Czech Technical University in Prague, which dates back to 1707 and currently has more than 20,000 students. In total, more than 91,000 students were studying at Czech technical universities in the 2014/2015 academic year. The strength of Czech technical education lies in secondary schools, whereas approximately 82% of the Czech population had attained at least upper secondary education as of 2012 (OECD, 2014). The ability to draw extensive aid from European Union Structural Funds for the period 2007 to 2013, to foster R&D and enhance the country's R&D infrastructure, especially outside Prague, in parallel with Operational Programmes like Enterprises and Innovation, Human Resources and Employment, and Research and Development for Innovation will help to ensure that the Czech Republic remains in the vanguard of skills provision. Given that skills underpin the ability to innovate and innovation, in turn, drives demand for upgraded skills, the Czech business environment has all the conditions necessary to sustain these mutually supporting activities.

Selected Science and Technology Parks

In science and technology parks, young, innovative firms cross paths with well-established companies with a shared interest in research and development. Within the context of science and technology parks the Czech Republic supports cooperation between the research and business spheres through the operational programmes of EU and other programmes.

More than fifty science and technology parks including incubators and innovation centers etc. have been established in the Czech Republic since 1994. Some of the science and technology parks are for example the Science and Technology Park in Roztoky, the South Moravian Innovation Centre in Brno and the Ostrava Science and Technology Park which have laid the foundations of **success of numerous innovative firms.**



SCIENCE AND TECHNOLOGY PARK USTI NAD LABEM

www.vtp.fvtm.ujep.cz

SCIENCE AND TECHNOLOGY PARK IN ROZTOKY

www.vtp-roztoky.cz

SCIENCE AND TECHNOLOGY PARK PILSEN

www.vtpplzen.cz

BUSINESS INNOVATION CENTRE PLZEN

www.bic.cz



SOUTH BOHEMIAN SCIENCE AND TECHNOLOGY PARK

www.jaip.cz



TECHNOLOGICAL CENTRE OF HRADEC KRALOVEwww.tchk.cz**CTTV – THE CENTER OF TEXTILE TECHNOLOGIES AND EDUCATION**www.inotex.cz**SCIENCE AND TECHNOLOGY PARK OF PALACKY UNIVERSITY, OLOMOUC**www.vtpup.cz**SCIENCE-TECHNOLOGICAL PARK OSTRAVA**www.vtpo.cz**BUSINESS INNOVATION CENTRE OSTRAVA**www.bicova.cz**SOUTH MORAVIAN INNOVATION CENTRE, BRNO**www.jic.cz

Brno has recently been spoken of as the Czech Silicon Valley. Founded by the South Moravian region, the City of Brno and four local universities in 2003, the South Moravian Innovation Centre (JIC) has played an important role in the region's dynamic development over the past ten years. The centre's main activities include support for innovative start-up companies, connecting research and business, and support and infrastructure for mature innovative companies. The centre operates two innovation parks with a total area of 7,000 m² of space (one INTECH innovation park and one INBIT innovation park; in 2014, JIC intends to open another innovation park, INMEC, with focus on advanced materials and technologies) and provides tenant companies with access to financing, facilities, consulting, contacts, promotion and PR services. Set up to encourage the growth of local talent, these incubators currently include 60 firms that have already employed more than 400 high-skilled workers in total. However, the leaders of JIC are not resting on their laurels and are planning further expansion of the centre's activities. The main tasks in this area include development of the knowledge economy in the region through implementation of the Regional Innovation Strategy. In agreement with this aim, JIC contributed to establishment of research centre INTEMAC by the South Moravian Region, which provides professional services and comprehensive solutions for producers and users of machine tools. JIC provides also understanding of the region's environment, support for local companies' projects and international contacts. JIC serves local companies and universities in the area of innovative business through many projects focused on, for example, establishing startup companies (e.g. startup accelerator StarCube), interconnecting the business environment of South Moravia with its scientific and research sphere (e.g. Innovation Vouchers), helping companies with entering both local and international research grants or projects etc. In 2011, JIC won third place in the Best Internationally Connected Incubator category at Incubator Awards.

**HRADEC KRALOVE****OSTRAVA****OLOMOUC****BRNO****ZLIN****TECHNOLOGY PARK BRNO**www.technologypark.cz**THE TECHNOLOGY PARK AT TOMAS BATA UNIVERSITY IN ZLIN**www.utb.cz/uni/organizacni-cleneni/vedeckotechnicky-park-pri-utb-ve-zline-1**TECHNOLOGY PARK OF INFORMATION AND COMMUNICATION TECHNOLOGY**www.utb.cz/firemni-sektor/vedeckotechnicky-park-ict**TECHNOLOGY INNOVATION CENTRE**www.ticzlin.cz

NAFIGATE – Nanofibers Gateway



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 nanofibre community and to inform the members of that community about the latest innovations in research and development, as well as about the applica-tions of nanofibers.



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

NAFIGATE Corporation Inc. Currently Offers

- Business Opportunity
- Investment Opportunity
- New Green Products
- Networking

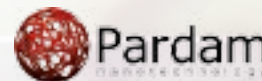
PARDAM

Produces high-quality nanofibrous materials (NnF CERAM® & NnF MBRANE®) manufactured using industrial-production technology located at the company's production and R&D centre in the Czech town of Nové Město na Moravě.

Pardam has been focusing on production and development of nanofibrous materials since 2009 and has extensive experience with electrospinning and forcespinning nanofibre-production technology.

Pardam provides its customers with several services such as:

- Development of new nanofibrous materials (inorganic/polymer)
- Development of new nanofibrous products
- Post treatment of nanofibrous materials in accordance with customers' needs (milling, dispersing, doping with functional nanoparticles, lamination, plasma treatment, etc.)



- Industrial-scale production of nanofibrous materials (NnF CERAM®, NnF MBRANE®)
- Material analyses – XRD, SEM, BET
- Pardam is also a SEM partner for a project within FP7.

Inorganic nanofibres – Thanks to its unique properties (large surface area, high porosity, good breathability, high surface-to-volume ratio, stable structure, etc.), NnF CERAM® can be used in many products such as anode and cathode Li-ion batteries, Li-ion battery/fuel-cell separators, catalysts, catalyst support, photo catalysts, gas sensors, thermal insulators, metal and ceramics nano-composites, dehumidifiers, abrasives, thermal barrier coatings, and filtration.

Polymer nanofibers – Thanks to its unique properties, NnF MBRANE® can be used in products such as nanofibrous polymeric membranes, which can be used as separation membranes for different products or filtration materials for water and air purification with very low-pressure drop and very high filtration efficiency. Nanofibrous membranes can be deposited on a supporting substrate with an air-permeable structure made of virtually any material at the customer's request.

Pardam closely cooperates with Kertak Nanotechnology, its exclusive marketing partner.

Technical University of Liberec

Institute for Nanomaterials, Advanced Technologies and Innovation



EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND
INVESTMENT IN YOUR FUTURE



Technical University of Liberec

Over the past ten years, the Technical University of Liberec has become well known due to its international patent for the industrial production of nanofibres. This was an important impetus for the creation of a regional centre for nanomaterials, advanced technologies and innovation known as CxI. Through the provision of high-tech infrastructure and highly qualified staff, CxI aims to provide the potential for innovative research by our industrial partners, thereby increasing their competitiveness. This cooperation is realised through mutual research projects, contractual research and services in two main areas: new nanomaterials and advanced engineering constructions and technologies.

Competitive Engineering

CxI is heavily involved in competitive engineering, including initial research and the construction of prototypes and functional laboratory models of machinery, as well as laying the foundations for the construction of operational lines and their components. One example is the modification of technology required for the creation of aerial nanofibre formations leading to operational lines for the creation of linear and 3D nanofibre formations. The main goal of competitive engineering is long-term support of 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 to increase the level of industrial production in local regions. Strong emphasis is put on lowering energy intensity and environmental hazards.



Materials Research

The university is now well known within the scientific community due to its association with the patented industrial technology for nanofibre production successfully commercialised by the company Elmarco under the name Nanospider. Research within CxI is presently focused on the physics involved in nanomaterial creation and electrostatic spinning. Within materials research, the application of nanofibre 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 nanofibre materials for implants and tissue engineering.



Nanomaterials in Environmental Applications

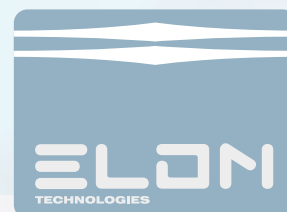
An important focus of CxI's work has been the application of modern nanotechnologies in environmental protection, including water and gas purification and solution filtration technologies. CxI has also been significantly involved in the utilisation of elementary iron nanoparticles (nZVI) in water-treatment processes. CxI cooperates with a wide range of leading European institutes and companies within the 7th EU Framework Programme, NANOREM.

Cooperation with Industry

CxI has successfully developed long-term cooperation between the Technical University of Liberec and industry. Offering state-of-the-art technology in materials research and research in industrial technologies, all devices, machinery and other technologies at the disposal of CxI meet the strictest criteria for current research requirements and, at the same time, support commercial enterprise.

Established in the Czech Republic in 2006, ELON Technologies focuses on research and development of electroluminescent technology.

ELON Technologies



Organic Photovoltaic Textiles

Know-how in the area of flexible OPV surfaces can transform ordinary surfaces into power-generating platforms. ELON Technologies is currently starting a project involving the application of this know-how to tents and other surfaces with the governments of two countries.



Key ELON
Technologies
Products

Electroluminescent Displays

With its ELON Poster™ product, ELON is a worldwide leader in the area of EL displays for advertising.

ELON's know-how is a driving force behind new flexible displays, smart packaging, and innovative advertising solutions.

Healthcare Products

ELON Technologies has created several potentially ground-breaking products for the healthcare sector in the area of OLED phototherapy. ELON is capable of using 3M know-how to develop commercially viable products in the areas of drug delivery and patient compliance.



EL/Organic LED Lighting

ELON developed and successfully carried out pilot testing of its ELON Safety Sign™ product with a leading international mining corporation. The product is ready for commercialisation and is very compatible with the 3M technology portfolio.

Institute of Experimental Medicine

Scientists at the Institute of Experimental Medicine of the Academy of Sciences, under the leadership of director Eva Syková, have introduced a system that monitors the behaviour of stem cells in living organisms. The scientists created new iron-oxide nanoparticles coated with biocompatible polymers for labelling stem cells in order to follow their migration and fate in vivo. This process substantially aids research and the monitoring of stem cells implanted into animals with experimental brain or spinal cord injuries as well as other

disorders. The institute is an internationally recognised centre in the field of neuroscience and regenerative medicine and was selected as an EU Centre of Excellence.

Stem Cells: A Revolution in Medicine?

Stem cells have the ability to develop into any type of cell in the body, support the function of those cells and thus treat a whole range of hitherto untreatable diseases. Professor Syková and her team participate in many international collaborative projects, including projects funded by the EU. The Institute of Experimental Medicine participates in the Biotechnology and Biomedicine Centre of the Academy of Sciences and Charles University (BIOCEV). The institute cooperates with leading Czech nanotechnology companies in the development

In synthesizing long-chain molecules, man imitates natural polymers such as cellulose. Today, nature is being outdone, and polymers are evolving that may be capable enough to serve for heavy industry as well as for medicine.

Institute of Macromolecular Chemistry

“Without natural macromolecules, no life would be created; without synthetic macromolecules, or polymers, our daily life wouldn't be so comfortable”, says František Rypáček, Director of the Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic (IMC).

All IMC scientific priorities are related to macromolecules and their formation and unique properties.

Polymers are giant molecules created by connecting small molecules called monomers into long chains or wide networks.

The Main Research Areas are:

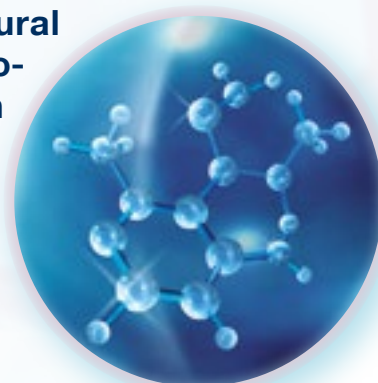
- Biomacromolecular systems
- Dynamics and self-assembly of molecular and supramolecular polymer structures
- Preparation, characterisation and use of new polymeric systems with controlled structure and properties

Studies of bio-macromolecular systems and medicinal polymers are in the spotlight of the institute's current research programme. The IMC is keeping pace with the world's top scientific institutes in research of polymer drug carriers, development of new biomaterials for regenerative medicine and in the study of nanostructured systems based on self-assembling macromolecules.

of tissue-engineering protocols using nanofibre layers seeded with stem cells. In 2009, the institute finished construction of the Innovation Biomedical Centre, equipped with cleanroom technology for human stem-cell production for clinical trials.

Bioinova

Bioinova is an example of an innovative company in the field of cell therapy and tissue engineering. Bioinova is engaged in the manufacture of advanced therapeutics under strict Good Manufacturing Practice requirements, thus ensuring the quality and safety of the produced cells. Human mesenchymal stem cells, which are currently produced at Bioinova, are used in clinical trials in the fields of diabetology, neurology and orthopaedics.



Super-paramagnetic Polymer Particles for Cell Labelling

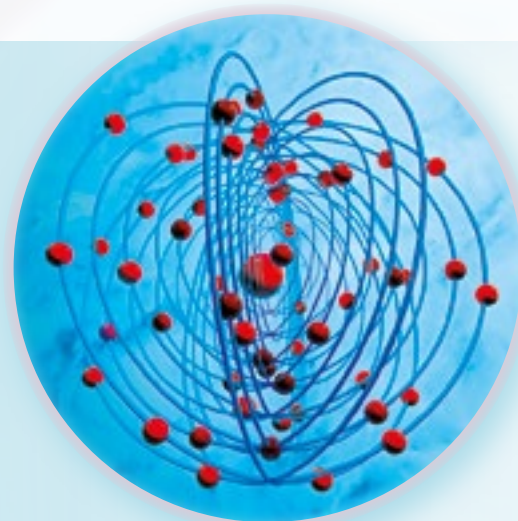
The IMC has patented a procedure for preparation of surface-modified super-paramagnetic iron oxide nanoparticles. Magnetite nanoparticles obtained by conventional methods were exposed to subsequent oxidation, which was followed by their coating with biocompatible polymers – poly (*N,N*-dimethylacrylamide) and poly (L-lysine) using an original procedure.

Study of the relationship between a range of reaction parameters and properties of the particles carried out in cooperation with biologists and radiologists resulted in the design of novel contrast agents for the labelling of living cells.

The labelled cells can be transplanted in malfunctioning tissue of an organism and, at the same time, their direction, migration, proliferation, differentiation and a long-term fate can be noninvasively monitored using magnetic resonance imaging.

“There is no need to point out that monitoring the behaviour of transplanted cells is of key importance especially in regenerative medicine,” says Daniel Horák, head of the Department of Polymer Particles.

In October 2013 Daniel Horák's team was awarded the Prize of Academy of Sciences of the Czech Republic for outstanding research results.

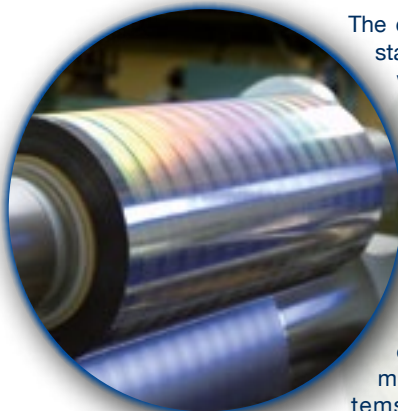


OPTAGLIO

OPTAGLIO®
OPTICAL MICROSTRUCTURE TECHNOLOGIES

Another cutting-edge technology in the Czech Republic is the production of high-end security solutions based on DOVIDs (holograms). Optaglio ranks among the world's top ten most significant companies in the area of security hologram production. The firm's products represent the absolute peak of protection against counterfeiting of official government documents such as passports and ID cards, banknotes and tax stamps, as well as company brands. Optaglio is currently present in sixty countries and delivers its products to thirty governments.

Czech-made Holograms Protect Documents Around the World



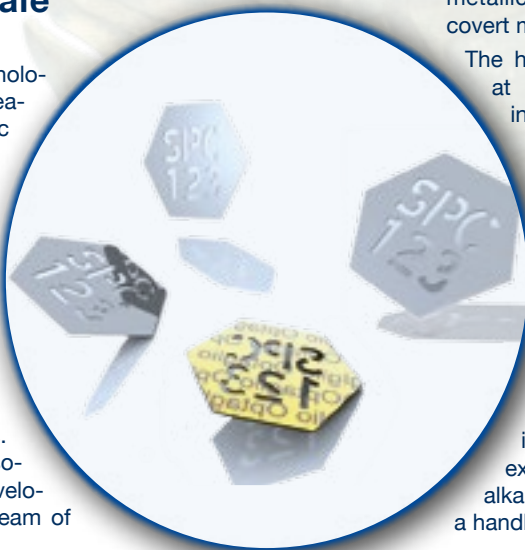
The company's success lies in constant technological innovation as well as in its approach to security and protection. The company's first holograms were produced in the usual way – with a laser – at the beginning of the 1990s. After some time, however, Optaglio began to use a technology called electron beam lithography with presently used resolution of up to 2,500,000 DPI. Following modifications of its control systems, the lithograph enabled far more sophisticated production of holograms.

The device was developed by scientist Armin Delong, whose home laboratory, the Institute of Scientific Instruments in Brno, has long cooperated with Optaglio.

Safer than Safe

The high-end technology used for the creation of holographic images is an important but not the only factor influencing Optaglio's success.

The company places strong emphasis on the development of the means of applying holograms. A wide range of solutions is being developed by Optaglio's team of



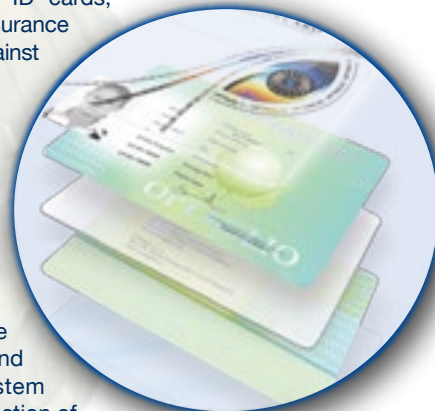
scientists. New features are quickly gaining recognition around the world and have already been recognised in the security printing industry with an IHMA award. Optaglio's list of brand-protection clients includes such renowned global companies as Microsoft, Calvin Klein, Siemens, Toshiba, Nokia, Bosch and Samsung.



Latest Technological Development

The worldwide patented **OVMesh™** is a metallic holographic micro-system for protection of polycarbonate documents (e-passports, ID cards, driving licenses, health-insurance cards, entrance cards) against counterfeiting.

OVMesh™ combines the crucial properties of diffractive/holographic security features, i.e. the transparency of standard lamination films and the excellent optical performance of metallised holographic foil. The material characteristics and the structure of the system create a new level of protection of ID documents against counterfeiting and fraud. The versatility of the system brings a revolutionary approach to the implementation of diffractive/holographic security features into ID-document design.



The worldwide patented **OVDot™** is a proprietary metallic holographic technology for unambiguous covert marking, preventing counterfeiting and fraud.

The holographic dust (micro-holograms) developed at Optaglio presents a revolutionary innovation in anti-counterfeiting protection. OVDot® comprises microscopic nickel particles produced in various shapes and sizes and carrying a high-resolution holographic image created with an electrical beam and verifying the authenticity of OVDot®. These micro-particles are further individualised with a variable alphanumeric code integrated within the structure of OVDot® itself. The range of products features various shapes (hexagon, octagon, square or customised shapes) and sizes (40 µm – 1 mm) with alphanumeric individualisation, high durability, resistance to extreme temperatures, diluted acids and diluted alkalis, and simple authenticity verification (using a handheld microscope).

TESCAN ORSAY HOLDING



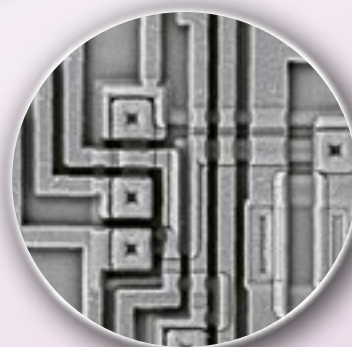
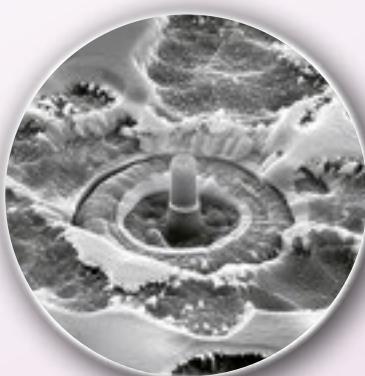
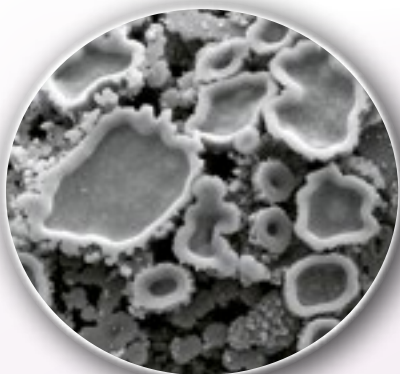
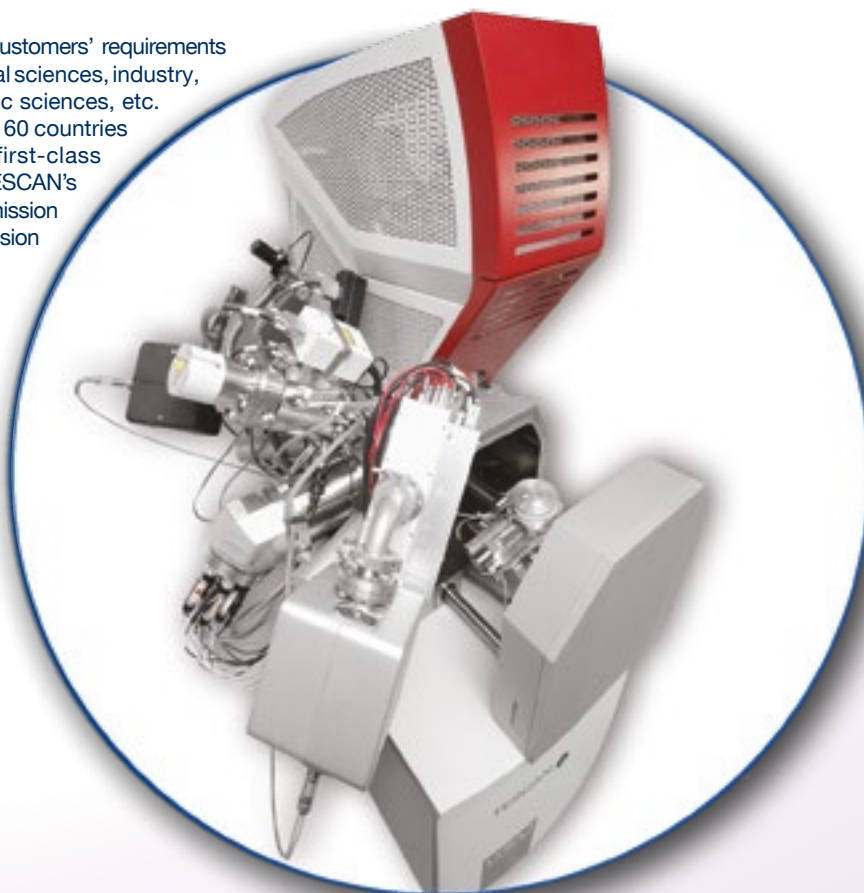
TESCAN ORSAY HOLDING is a multi-national company established by the merger of the Czech company TESCAN, a leading global supplier of SEMs and focused ion beam workstations, and the French company ORSAY PHYSICS, a world leader in customized Focused Ion Beam and Electron Beam technology.

The TESCAN brand has, within 23 years of its existence, 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 of any level in the fields like material sciences, industry, biology and life sciences, forensic sciences, etc. Over 1600 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.

TESCAN's continuous participation in top research projects has resulted in great scientific and technical achievements. LYRA3 - Multi-Functional Analytical FIB Tool for Nanotechnology or FERA3 - the world's first fully integrated Xe plasma source FIB with SEM are proof of these technical achievements.

TESCAN focuses on developing special tools for diverse analytical purposes in wide range of fields, e.g., forensic applications, materials science applications, nanotechnology and semiconductor applications.



Technology Agency of the Czech Republic



The Technology Agency of the Czech Republic (TACR) is a state organisation that supports and finances applied research and experimental development. It was founded in 2009 and its first funds were distributed about two years later.

Support for applied research in the Czech Republic has suffered from fragmentation in the past, so the task of TACR is to concentrate it in one place and facilitate the commercialisation of research results in practice. This may stem from the need to do additional testing, verify certain properties or conduct surveys of potential applications. Introducing the results of research to the market is a complex process, so there is another TACR programme in place to assist in this area. Other programmes are focused on promoting research activities in the field of social sciences and on international collaboration.

All of the supported projects must result in practically usable outputs. These can be patents, utility models or industrial designs, prototypes, functional samples, software, etc. Other results can be used in the formulation of laws or other binding regulations and methodologies. In addition to direct funding of applied research, TACR also

provides advice to the supported institutions, especially legal and financial advice and also in the field of intellectual-property protection. It also collaborates with similar organisations abroad.

By autumn 2013, TACR will have supported approximately 800 projects and distributed over CZK 11 billion from the state budget. As a result, accurate satellite guidance systems for trains, water and air purification using nanoparticles and inoculation of plants so that they can live in nutrient-poor soils are all being developed in the Czech Republic. TACR is the institution that currently invests the most in applied research and development in the Czech Republic. It is significantly contributing to the transformation of the Czech Republic into a country which during its development will increasingly rely on new ideas and will be able to bring them into production.

Czech Science Foundation



The Czech Science Foundation (GAČR) was established in 1993 as the main independent public organisation in the Czech Republic supporting basic research in the Czech Republic and promoting international collaboration of researchers and research teams on the bilateral and multilateral levels. On the basis of calls for proposals, the Czech Science Foundation provides financial support for both experienced and young and early-stage researchers. Moreover, it funds bilateral projects as well as projects carried out within international research programmes. Around 3,000 project proposals are submitted to the GAČR every year, roughly one fifth of which obtain financial support.

The foundation promotes basic research across the whole range of scientific fields. The structure of support is divided into five domains: technical sciences, physical sciences, medical and biological sciences, social sciences and humanities, and agricultural and biological-environmental sciences.

Main Goals

- To provide financial support for projects in the area of basic research with strong potential for achieving world-class results.
- To promote and enhance international scientific cooperation in the area of basic research.
- To help create attractive conditions for the professional development of young and early-stage researchers.
- To ensure that entrusted funds are used as effectively as possible to the benefit of the Czech and international scientific communities.
- To create, within existing laws, the best possible conditions for the administration of project proposals and awarded projects.

Selected Programmes of R&D Funding in the Czech Republic



Programme	Activities supported	Beneficiary	Basic conditions	Amount of contribution/grant
Grant Agency of the Czech Republic www.gacr.cz	Support to and launching of public tenders in R&D to support basic research grant projects	Legal entities and individuals, research organisations	Objectives and methods of addressing the project are determined by those who propose the project and are responsible for it	Subsidies up to 100%
RUNNING PROGRAMME: Technology Agency of the Czech Republic ALFA Programme www.tacr.cz	Support to and pursuance of co-operation between scientific and research institutions and private entities, aimed at a higher quality of applied research	Legal entities and individuals, research organisations	The purpose is to transfer new findings effectively to practice and to transfer the technologies quickly to the application sphere.	Subsidies depending on the type of project
Technology Agency of the Czech Republic GAMA Programme www.tacr.cz	Support of the verification of applied research and experimental development results based on their practical application and the preparation of their subsequent commercialization	Research organizations or enterprises	The supported project must lead to at least one of these results – patent, technically executed results (prototypes, functional samples), pilot plant or verified technology, software, industrial and utility model	Subsidies for research organizations – 90% Subsidies for enterprises vary from 35% to 80% depending on multiple criteria
Technology Agency of the Czech Republic DELTA Programme www.tacr.cz	Support of collaboration in applied research and experimental development projects through joint projects of enterprises and research organizations supported by the Technology Agency of the Czech Republic and major foreign technological and innovation agencies	Research organizations and enterprises	At least one international candidate (only for specific country regarding to the current call) and at least one candidate from the Czech Republic, which is an enterprise. Research organization from the Czech Republic may be an applicant for support 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
RUNNING PROGRAMME: Technology Agency of the Czech Republic Competence Centres Programme www.tacr.cz	The aim of the programme is to support the establishment and operation of centres for research, development and innovation in advanced fields with high application and innovative potential and a perspective for making a substantial contribution to the growth of competitiveness of the Czech Republic	Enterprises or research organizations cooperating with at least 3 enterprises	Fulfilment 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 http://ec.europa.eu/research/horizon2020	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. The programme will be running from 2014 to 2020	All entities actively carrying out as well as supporting and enhancing R&D, innovation related activities and technology transfer within the European Union	The purpose is to implement the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. It combines all research and innovation funding currently provided through the Framework Programmes for Research and Technical Development, the innovation related activities of the Competitiveness and Innovation Framework Programme (CIP) and the European Institute of Innovation and Technology (EIT).	Funding will depend on respective R&D support programme
Operational Programme Entrepreneurship and Innovations for Competitiveness http://www.czechinvest.org/en/operational-programme-entrepreneurship-and-innovations-for-competitiveness	Emphasis on the knowledge-based economy, cooperation between the R&D sphere and innovative firms, and use of new forms of support.	Research organizations and enterprises	The support will be provided in compliance with the individual state aid rules. The state aid rules relevant for the support within OP EIC is comprised of 4 basic regimes: 1) Regional state aid rules 2) General block exemption regulation (GBER) 3) Framework for state aid for research and development and innovation 4) De minimis aid	Subsidies depending on the type of project - from 25% to 100%
Operational Programme Research, Development and Education http://www.msmt.cz/strukturalni-fondy-1/op-vvv	Objective of OP RDE is to contribute to the shift of the Czech Republic towards an economy based on educated, motivated and creative workforce, to produce high-quality research results and use them for enhancing the competitiveness of the Czech Republic.	Research organizations and enterprises	Please see more at http://www.msmt.cz/strukturalni-fondy-1/op-vvv	Subsidies depending on the type of project
Ministry of Industry and Trade of the Czech Republic TRIO Programme http://www.mpo.cz/dokument160144.html	Objective of the programme is at developing the potential of the Czech Republic in the area of Key enabling technologies (Kets) such as photonics, micro- and nanoelectronics, nanotechnology, industrial biotechnology, advanced materials and advanced manufacturing technologies.	Applicants for subsidy must be enterprises (legal and natural persons) 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. The first call will be announced in the second half of 2015.	Subsidies for research organizations is up to 100% with a limit of CZK 20 mil. for one project. Subsidies for enterprises is up to 80% with a limit of CZK 20 mil. for one project.
Technology Agency of the Czech Republic Epsilon Programme www.tacr.cz	EPSILON programme focuses on improving the position of the Czech Republic and in the global context as well as European industry by supporting projects of applied research and experimental development	Research organizations and enterprises	Results have to have a high potential for fast application in new products production processes and services, particularly in the following priority areas: competitive knowledge-based economy, sustainability of energy and material resources, the environment for quality of life.	Subsidies up to 60%.

CEITEC is a centre of scientific excellence in the fields of life sciences and advanced materials and technologies whose aim is to establish itself as a prestigious European centre of science with a state-of-the-art infrastructure and conditions in place to employ the best researchers. The results will contribute to the improvement of the quality of life and human health.



EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND
INVESTING IN YOUR FUTURE



CEITEC – Central European Institute of Technology

Partnering Institutions

CEITEC was approved by the European Commission on 6th June 2011. 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.

The following institutions participate in the setting up of the centre of excellence: **Masaryk University, Brno University of Technology, Mendel University in Brno, University of Veterinary and Pharmaceutical Sciences in Brno, Veterinary Research Institute and Institute of Physics of Materials of the Academy of Sciences of the Czech Republic.**

4. Genomics and Proteomics of Plant Systems
5. Molecular Medicine
6. Brain and Mind Research
7. Molecular Veterinary Medicine

State-of-the-art Infrastructure

New modern laboratories of an area of 25,000 m² will grow in the University Campus of Masaryk University in Brno - Bohunice and in the Brno University of Technology Campus "Pod Palackého vrchem" in 2014.

Almost 700 special instruments and unique facilities will be selected and acquired based on the specific needs of scientific teams. The high-tech 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 specialized research, higher expertise, higher-quality facilities for advanced education and mainly close cooperation, also multidisciplinary.

Thanks to the combination of the knowledge and resources of the six participating institutions it is possible to reach high quality results faster and with a higher involvement of the application sphere.

Multi-field Centre

Multi-field CEITEC is in fact the first type of a scientific centre in the Czech Republic to integrate research and development in the fields of life sciences, advanced materials and technologies in such a large range. The research is divided into **61 groups** and **7 programmes**:

1. Advanced Nanotechnologies and Microtechnologies
2. Advanced Materials
3. Structural Biology



Investment into the Future for the Whole Region

The state-of-the-art instruments and facilities will be also utilized by scientists and companies from the whole of the Czech Republic and abroad. CEITEC will bring new jobs in perspective fields and a creation of research laboratories for nearly 600 scientists and over 1200 students. The aim of CEITEC is to help existing basic and applied research located in the South Moravian Region reach a top level. Its justification is not only to involve the activities carried out in this region in the European research area but to open it to the world by means of creating conditions favourable for the cooperation with the private sector.

It is the utilization of results of research in science for the needs of commercial companies that will bring a long term increase in the competitiveness of the whole region. CEITEC is an investment for the future.

International Management

The system of management and internal setting of CEITEC has been inspired and set according to most significant scientific institutions; top management is covered by foreign experts in science; the internal language is English. Existing research teams and key managerial positions are being gradually filled with top experts with international experience and there is an aim for the return of successful Czech scientists.

It is based on a regular evaluation of the quality of scientific results carried out by an independent team of top world experts in the given fields. An independent evaluation according to strict international standards is ensured by the Coordination Board and the International Scientific Advisory Board, whose members are significant people in foreign and Czech science.

Financing

The total budget: €208 mil.

Source of funding: The European Regional Development Fund to be financed through the Operational Programme Research and Development for Innovations, priority axis 1 – European Centres of Excellence, which is managed by the Ministry of Education, Youth and Sports of the Czech Republic.

The Institute of Molecular and Translational Medicine, Faculty of Medicine and Dentistry, Palacký University in Olomouc – A modern, state-of-the-art institution for drug and biomarker discovery, research and development in the Czech Republic.

Institute of Molecular and Translational Medicine



**INSTITUTE OF MOLECULAR AND
TRANSLATIONAL MEDICINE**

The recently established Institute of Molecular and Translational Medicine (IMTM) of the Faculty of Medicine and Dentistry at Palacký University in Olomouc is one of the most influential research projects carried out in the Czech Republic. The IMTM's mission consists in basic and translational biomedical research with the goal of understanding the underlying causes of cancer and infectious diseases and development of future human medicines and diagnostics. The initiator of the institute's establishment was Palacký University in Olomouc in close partnership with the University Hospital in Olomouc, the Institute of Chemical Technology in Prague and the Institute of Organic Chemistry and Biochemistry of the Academy of Sciences of the Czech Republic. The IMTM is funded via the Biomedicine for Regional Development and Human Resources (BIOMEDREG) infrastructural project financed by the European Regional Development Fund and the national budget of the Czech Republic through the Operational Programme Research and Development for Innovation. The IMTM's work is divided into four main programmes, which are described below.

Molecular Basis of Diseases and Molecular Targets

This programme aims to identify, describe and understand the metabolic and signalling pathways and the genetic and epigenetic causes of human disease with special focus on cancer and inflammatory and infectious diseases. The outcome of this programme is the identification of target molecules for which drugs or biomarkers can be designed to influence the given disease's outcome.

Medicinal Chemistry

This programme concentrates on synthesis, isolation and/or optimisation of novel organic compounds with potential biological activity with focus on specific classes of new compounds, their derivatisation and structure modification in response to biological activity. In-

solution and solid-phase synthesis combinatorial chemistry plays a crucial role in establishment of scaffolds modification collections. The outcomes of this programme are new hits and new optimised lead compounds.

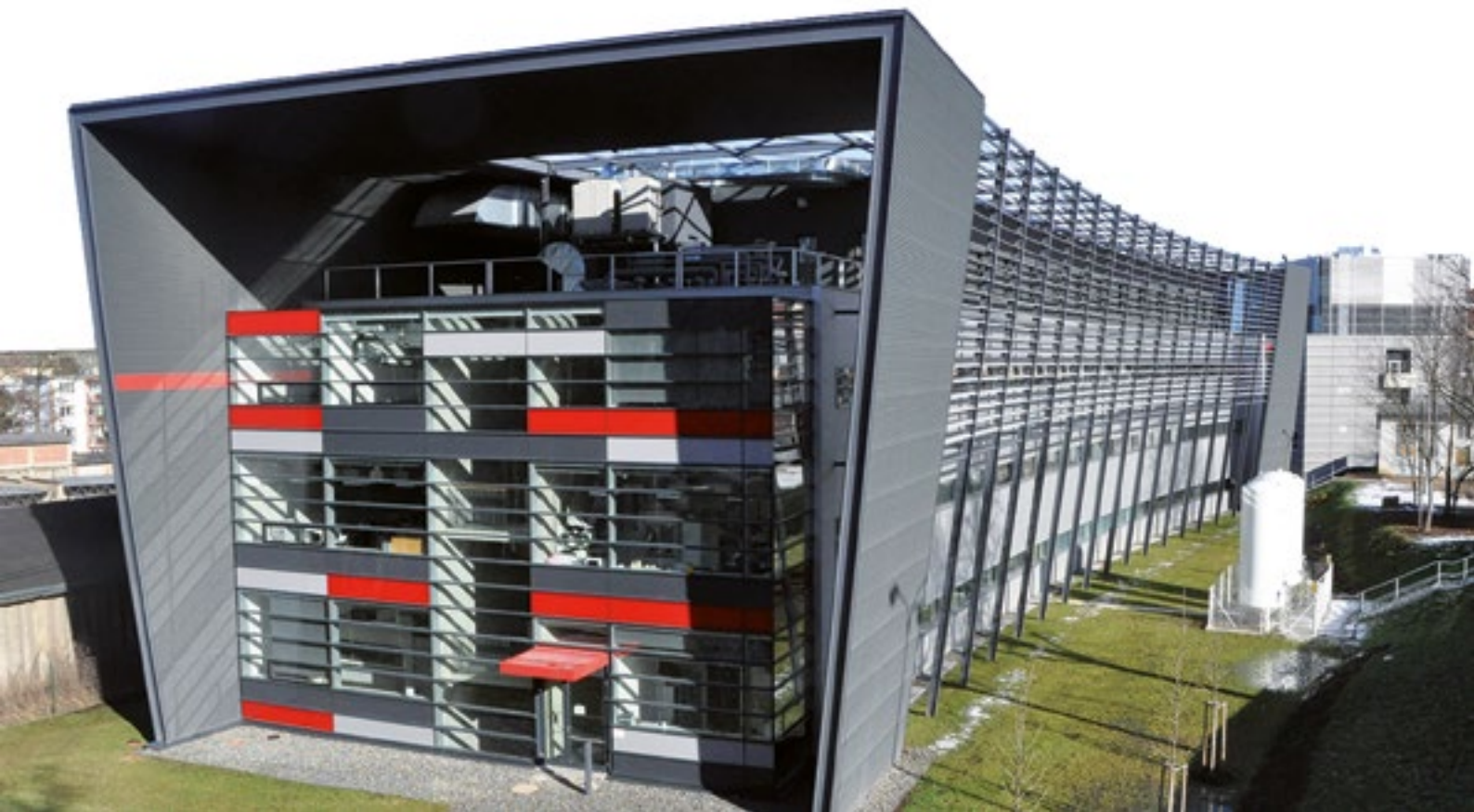
Chemical Biology and Experimental Therapeutics

This programme provides high throughput screening (HTS) on a broad variety of assays and detection platforms. The programme is responsible for, and provides feedback information on, all the stages in the lead generation pipeline. Our HTS platform is industry strong, modular and flexible, and allows testing in the BSL3 and BSL2+ environments, screening in combination with ionizing radiation, mass spectrometry, high-content analysis and more. The outcomes of this programme are preclinical and clinical candidate molecules for further proof-of-concept clinical trials.

Biomarkers – Identification and Validation

The main focus of the Biomarkers – Identification and Validation research programme is identification, validation and implementation of new biomarkers for diagnostic, prognostic and predictive purposes. Unique tissue-bank collections in combination with complex genomic, metabolomic and proteomic analyses and complex analysis of biomolecules





modulating signal and regulation pathways in normal and diseased cells form the basis of our biomarker discovery engine. The outcomes of this programme are new validated biomarkers and certified diagnostics.

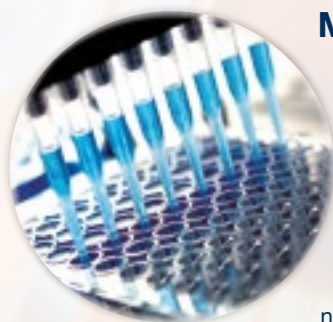
Pharmacology and Toxicology

The main goal of this programme is to elucidate toxicity and the modes of absorption and transformation of active substances by experimental organisms and in clinical trials. The outcomes of this programme are optimised administration routes, basic preclinical ADME/Tox data and pharmacokinetics in clinical trials.

Translational Medicine

The Translational Medicine programme removes barriers to multi-disciplinary collaboration by pointing out clinically relevant problems on one hand and, on the other, validating discoveries from molecular targets, biomarker and drug discovery pipelines in proof-of-concept clinical trials. In addition to facilitating the exchange of information, the programme collects and comparatively analyses clinical information and provides support for phase I-III clinical trials. The outcomes of this programme are drugs and biomarkers validated in proof-of-concept clinical trials. The research programmes are supported by nine core facilities that provide their expertise and technical support in their respective fields to all the

research programmes. These core facilities are Bioinformatics and Biostatistics, Animal Models and Imaging, Genomics, Proteomics, Meta-bolomics, Cell Biology, Combinatorial Chemistry, Radiochemistry and the uHTS/HCA screening platform.



An international team of researchers and physicians is building a unique centre for multidisciplinary medical research focusing on some of the most serious health problems and diseases.

The International Clinical Research Centre of St. Anne's University Hospital in Brno



ST. ANNE'S UNIVERSITY HOSPITAL BRNO
INTERNATIONAL CLINICAL RESEARCH CENTER



Creating the Future of Medicine: Medical R&D for the 21st Century

The International Clinical Research Centre (ICRC) of St. Anne's University Hospital in Brno, Czech Republic, is a new-generation science and research centre combined with a public healthcare facility. It focuses on advances in cardiovascular medicine and neuroscience. Its mission is to find new methods, technologies and pharmaceuticals for early diagnostics, effective prevention and advanced treatment of problems and diseases such as stroke, heart failure, cardiac arrest, Alzheimer's disease and sleep apnoea.

The centre is based on cooperation with numerous prestigious foreign and domestic institutions. At present, the number of employees is more than 300, including approximately 260 specialists working in 17 international research teams.

Research as a Key for Effective Diagnosis and Treatment

Research activities are focused primarily on two areas – cardiovascular and neurological diseases, and include, for instance, the development of novel stem-cell technologies for improving myocardial regeneration, development of new coronary stents and artificial vessels and biological valves. At the same time the centre's experts work on the development of advanced electrophysiology technologies for the treatment of central nervous system disorders and the development of new methods of stroke evaluation and management.

The international teams led by top specialists are supported by new infrastructure and advanced technologies such as a high-tech operating theatre, HiSeM laboratories, a magnetic stereotactic navigation system and resonance scanner, PSG laboratories, a SPECT scanner, biplane X-ray system and mini-cyclotron.

The centre also benefits from the long history and well-established infrastructure of St. Anne's Hospital, which has nearly 1,000 beds and, in 2013, served approximately 28,000 hospitalised patients and carried out roughly 1.4 million out-patient treatments.

Moreover, 6 multidisciplinary platforms have been created to provide high-quality facilities in the areas of animal research (pre-clinical models), development of new bio-molecules and new technologies in cell engineering, development of new types of stem cells and bio-medical engineering.





The close connection between medical research and clinical care enables the centre to put the results of the latest research programmes into clinical practice as soon as possible.

International Platform Open for Collaboration

The ICRC is based on collaboration with numerous prestigious Czech and foreign academic and medical research and life sciences institutions, such as institutes of the Academy of Sciences of the Czech Republic, Czech Technical University in Prague and Masaryk University in the Czech Republic, Mayo Clinic and the University of Minnesota in the United States, and University College London in the United Kingdom.

The centre also cooperates with private companies (currently around 30), particularly manufacturers of medical technologies, producers of pharmaceuticals and biotech companies, to ensure rapid transfer of knowledge and technologies into practical use. In its relationship to the industrial sphere, the ICRC offers expert services especially in the development of diagnostic and therapeutic approaches and strategies, medical technologies, drugs and medical devices.

The ICRC is open to all kinds of partnerships: joint research, contract research, clinical trials and joint grant applications, as well as study visits and internships.

Strategic Project of the Czech Republic and the EU

The ICRC has been declared a strategic project of the Czech government in the area of R&D and building of the knowledge society. New ICRC premises were opened in October 2012.

The centre, with a total budget of roughly USD 220 million for the period 2011-2015, is co-funded by European Union Structural Funds through the Operational Programme Research and Development for Innovation.

The Department of Cybernetics at the Czech Technical University in Prague is a research and teaching institution in the fields of informatics, cybernetics and robotics. Its mission is to deliver excellent and globally competitive research results, provide quality teaching and collaborate with industrial companies. It has generated several spin-off and start-up companies. It has a total of 100 staff members and an annual budget of USD 8 million. The head of the department is Jan Kybic.

Czech Technical University in Prague, Faculty of Electrical Engineering, Department of Cybernetics



Research teams of the Department of Cybernetics at the Czech Technical University

Center for Machine Perception (CMP):

Teams and Projects:

- Computer vision
 - 3D models from still images or video sequences
 - Vision for unmanned aerial and ground vehicles
 - Image-based inspections for industry
- Pattern recognition
 - Detection and recognition of human faces
 - Image-based retrieval in ultra-large collections
 - Video analysis, video-based human tracking
- Geometry of vision and robotics
 - Omni-directional vision
 - Perception for outdoor terrain robots
- Biomedical image analysis
 - Registration, segmentation, classification, reconstruction and detection for medical and biological data

Gerstner Laboratory for Intelligent Decision Making:

- Biomedical data processing and nature inspired technology
- Intelligent systems and intelligent and mobile robotics
- Knowledge-based and software systems





Industrial Partners

Texas Instruments, Boeing, Rockwell Automation, Honeywell, Google and Microsoft (USA); Robert Bosch GmbH, Volkswagen AG (Germany); Hitachi, Toyota Motor Company (Japan); Samsung (South Korea),

Current Projects Financed by EU Structural Funds

MASH (STREP), DARWIN (STREP), MASELTOV (STREP), NIFTi (Integrated Project), CloPeMa (STREP) and De-Montes (SP4-Capacities – Research for SMEs).

Partners and Start-up Companies

The department's researchers cooperate with industrial companies in many research projects. The department has helped found four spin-off companies: CertiCon, ProTyS, Eyedea Recognition, Neovision and Cognitive Security. Their vision is to give former MS and doctoral students new opportunities to convert the results of their research into business solutions. For example, CertiCon cooperates with leading companies on the development of software and expert systems for pa-

cemakers. Eyedea Recognition is excellent at image/video-based object detection and recognition of human faces and number plates. Neovision specialises in camera-based measurements and quality control in industry. Cognitive Security, active in network security, was recently acquired by Cisco.

Research

The researchers are active in the fields of computer vision, artificial intelligence, pattern recognition and machine learning, image and signal processing, planning, scheduling, optimization, mathematical modelling of uncertainty and related fields. Apart from academic research funded by research agencies, our strength lies in cooperation with industry resulting. We deliver top solutions within the entire R&D chain, from basic and applied research to development of real-world software prototypes and demonstrators.

We carry out recognised, top-quality fundamental and applied research and, by participating in graduate and postgraduate education, to help young research and engineering teams to play an active role in local and international advanced technology research and development.

Czech Institute of Informatics, Robotics, and Cybernetics

The Czech Technical University in Prague (CTU) founded the new Czech Institute of Informatics, Robotics, and Cybernetics (CIIRC) in July 2013. With its modern character, principles for invention, scientific results and transfer thereof into practice, as well as the educational style of the new generation of top professionals, the new institute will become a unique, modern, centre of excellence in the Czech Republic contributing to the long-term competitiveness of CTU internationally.

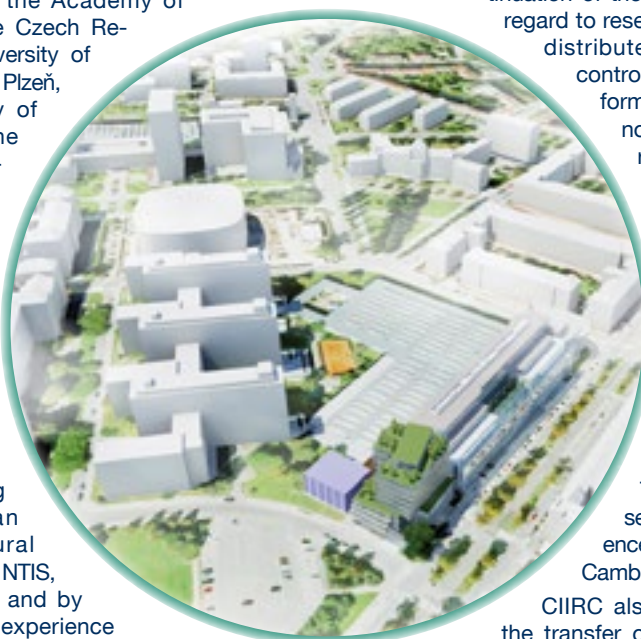
Located in the centre of the main campus, this research institute will connect up to 300 researchers (FTE) in the near future and it will open the door for cooperation between many facilities, teams and companies in the Czech Republic and abroad.

The aim is to reasonably integrate research in computer science, robotics and cybernetics withing CTU, while also raising the existing cooperation between CTU, the Academy of Sciences of the Czech Republic, the University of West Bohemia in Plzeň, Brno University of Technology, the Technical University of Ostrava and the Technical University of Liberec to new, higher levels, especially through links with the infrastructure constructed with financing from European Union Structural Funds (CEITEC, NTIS, IT4Innovations) and by using positive experience gained from the operation of the Centre for Applied Cybernetics over the last 12 years.

The purpose-built CIIRC will continue in activities and in the internationally recognised research results of several CTU departments, especially the Department of Cybernetics and the Department of Control Engineering. With enhanced capacities and capabilities, CIIRC will be a natural continuation of those activities and results, especially with regard to research in the fields of robotics, intelligent, distributed and complex systems, automatic control, computer-aided manufacturing, bioinformatics, biomedicine and assistive technologies. We shall focus on the excellent research carried out with the knowledge of the true needs of the industrial sector in all of these areas.

CIIRC intends to integrate and internationalise research with postgraduate students' education. CIIRC is already attracting interest from top experts and professors from abroad. It is expected to gradually build joint laboratories with leading universities, which already cooperate with CTU in Europe (RWTH Aachen, Vienna University of Technology), as well as with major research centres in the field of computer science, such as NII Tokyo, Microsoft Research Cambridge (UK) and Google Research Zürich.

CIIRC also has appropriate physical space for the transfer of knowledge into practice (incubators, centres for transfer of know-how), created by linking research activities with the transfer of knowledge ideally within a single building.



Parking



Speed limit



Navigation



robot



The aim is to create a motivating environment for the support of business and innovation activities of students and researchers by employing the latest knowledge and experience of technology transfer in the world's top incubators (Silicon Valley, Cambridge, Oxford, Israel, Singapore), all in cooperation with CzechInvest.

CIIRC will also offer suitable facilities for the presence of large companies. It creates the conditions for long-term co-funding of research conducted by major international companies, many of which have already expressed interest in being present in CIIRC (Samsung, Rockwell Automation, Eaton and others).

Construction of the CIIRC building is expected to be supported by EU Structural Funds, namely the Research and Development for Innovations Operational Programme.

The Agent Technology Centre (ATG) at the Department of Computer Science and Engineering, Czech Technical University in Prague, is a research centre performing basic and applied research in the areas of computer science, artificial intelligence, multi-agent systems, agent-based modelling and simulation, machine learning and game theory, autonomous systems and UAV robotics, modelling and control of air traffic and public transport, and cyber security and critical systems protection.



▲
A Unicorn Procerus
UAV flying in an urban
area performing the pa-
trol mission of a ground
transport vehicle
▼

Agent Technology Center: Agent-based Computing for Safety and Efficiency of Critical Infrastructures

The Agent Technology Centre employs 40 researchers (faculty members, post-doctoral researchers and graduate students) working on many technical issues underpinning our increasingly interconnected and automated world. Working in small, dynamic teams, the researchers at the centre bring together methods and expertise from diverse areas of artificial intelligence and distributed computing.

The centre has earned a world-class reputation for synergistically interlinking the ability to perform fundamental scientific research with strong engineering skills, which enables the researchers to test their scientific results as part of larger, application-oriented system prototypes.

Members of the centre produce cited publications in impact journals and archival conferences, deliver keynote talks and participate in the international research community.

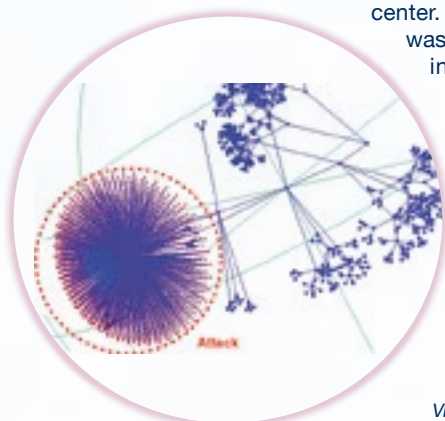
The centre is also involved in applied research in collaboration with industrial companies and commercial businesses. The centre is funded by the Czech National Science Foundation (GACR) and Technology Agency of the Czech Republic (TACR), government projects and the European FP7 and ARTEMIS projects, and also receives funding from the US Air Force, Office for Naval Research, US Army, and the European Office for Aerospace Research and Development. The centre has successfully collaborated with the Federal Aviation Administration (US), National Aeronautics and Space Administration (US), Czech Navigation Services (CZ), BAE Systems (UK), FOXCONN (CZ), GOOGLE (CH), IBM (CZ), DENSO Automotive (D), CADENCE Design Systems (D), The Transport Research Centre (CZ) and SKODA AUTO (CZ).

The centre transfers created know-how and developed technology by means of direct or third-party funded collaboration with industry and via academic start-up companies that licensed the technology from the university.

In 2010, the start-up company AgentFly Technologies, s.r.o. was established by members of the center. Another start-up firm initiated by members of the center, Cognitive Security s.r.o., was acquired by Cisco Systems Inc in 2013. Among other things, the transaction resulted in an important research collaboration agreement between the Czech Technical University and Cisco.

Research and Application Areas

- Autonomous systems: unmanned aerial assets, collective flights, collision avoidance, multi-agent modelling of free-flight operation, planning of tactical missions, mixed-reality flight simulation with PROCERUS, Microcopter and LinkQuad platforms, collision avoidance deployment on ultra-light planes
- Intelligent traffic systems: intelligent transportation systems – agent-based transportation modelling and simulation, integrated multimodal journey planning, self-

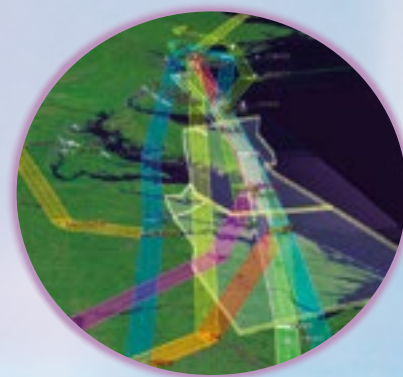
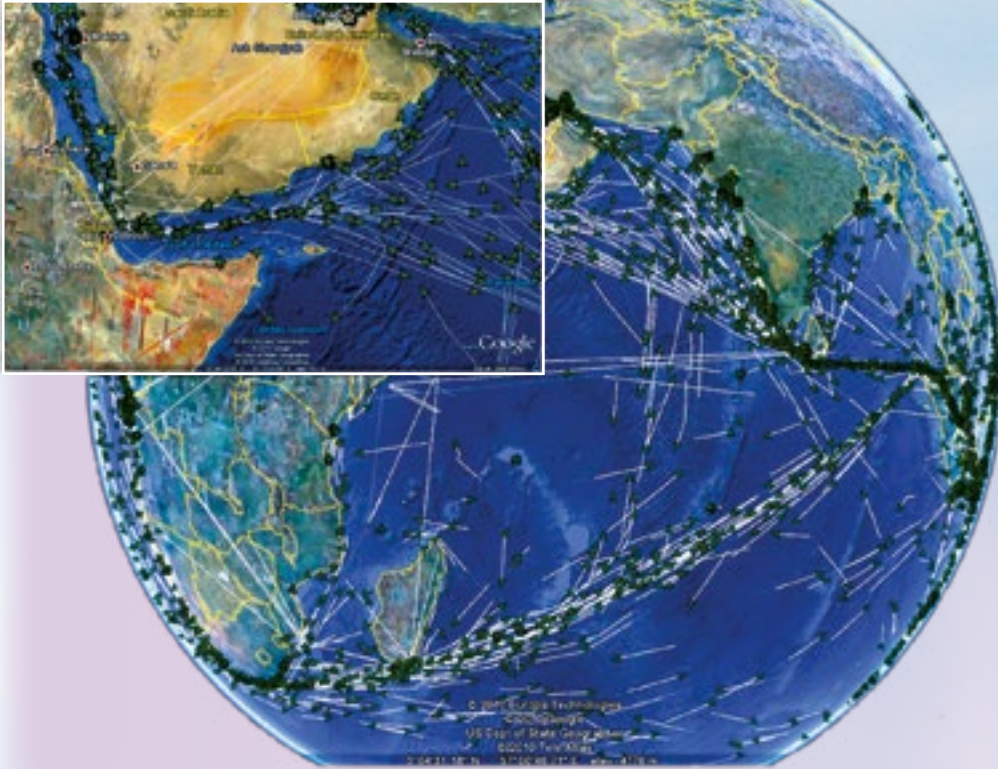


▲
Visualisation
of a detection agent's
trust model
▼



Agent-based
simulation of Gulf
of Aden transit

Simulation
of civilian air traffic
within the US national
airspace (NAS)



organizing sustainable mobility systems, transportation network analysis and optimisation, connected vehicles technologies; protection of critical infrastructures – game-theory modelling and optimisation of maritime counter-piracy operations, public-transport fare-inspection modelling and planning, adversarial planning of surveillance and tracking operations

- Security and privacy in computer networks: network-behaviour analysis, anomaly detection, protection against advanced persistence threat, polymorphic and zero-day malware detection, web security, steganography and steganalysis, social-network data-privacy consulting
- Industrial planning and decision-making systems: intelligent planning and scheduling for manufacturing, supply-chain and virtual organisation management, chip-design process modelling, decentralised diagnostics for automotive electronic systems

Success Stories and Deployments

- AgentFly: Multi-agent system for air-traffic modelling and simulation, R&D funded by the US Air Force, license provided to BAE systems, used and further developed by the FAA, Czech Air Navigation Services and the US Army. System validated by TASC and protected by a US patent. Commercialisation implemented by AgentFly Technologies.
- CAMNEP: Network behaviour-analysis intrusion-detection system, R&D funded by the US Army, CERDEC and the US Air Force. Commercialisation implemented by Cognitive Security. System used by financial institutions, telecommunications providers, airline companies and others.
- AGENT C: Multi-agent system for modelling global maritime transportation systems and evaluating and optimising maritime-piracy countermeasures, including the design of transit corridor systems and planning of patrol activities. Deployed at the Naval Research Laboratory in Monterey and used in regional information sharing centres

in Kenya, Tanzania and Yemen. R&D funded by the Office for Naval Research. Follow-up activity in fare-inspection optimisation in the Los Angeles Metro System.

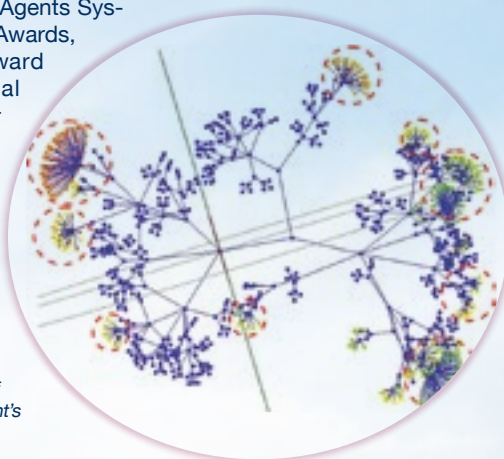
ATG has Collaborated with the Following Universities and Institutes

Carnegie Mellon University, University of Southern California, University of Texas El Paso, Binghamton University, Drexel University, Imperial College London, King's College London, Masaryk University, Technion – Israeli Institute of Technology, Universitat Politècnica de Catalunya, University of Calgary, University of Edinburgh, Institute for Human and Machine Cognition, Linköping University, TU Delft, University of Oxford

Selected Awards

2010 Czech Mind for Innovation Award, 2009 Google Research Award, 2007 Engineering Academy of the Czech Republic Grand Prize, 2006 and 2004 Cooperative Information Agents System Innovation Awards, 2006 DARPA Award for Best Industrial and Applied Paper at AAMAS, 2005 IEEE/WIC/Intelligent Agent Technology Best Demo Award

Visualisation of
a detection agent's
trust
model



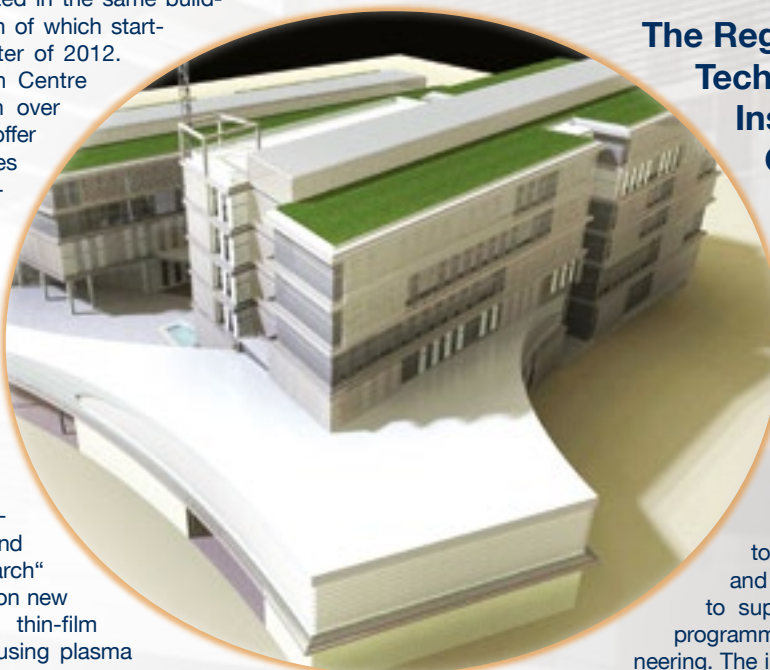
The University of West Bohemia (UWB) is currently fully engaged in the construction of state-of-the-art research and development centres. The centres are being built as part of the Operational Programme Research and Development for Innovation, with financial support from EU Structural Funds and the state budget of the Czech Republic.

The University of West Bohemia New Centres of Research and Development

European Centre of Excellence

Two extraordinary projects are currently being implemented at the Faculty of Applied Sciences of University of West Bohemia: NTIS (New Technologies for the Information Society) and CTPVV (Centre for Technical and Natural Science Education and Research). Both centres will be located in the same building, the construction of which started in the first quarter of 2012. The NTIS European Centre of Excellence worth over one billion CZK will offer room and top facilities for about 180 researchers, who will conduct their research activities in two priority directions. The first one, called „Information society“, aims at the areas of computer science, cybernetics, intelligent decisionmaking systems or biomechanics. The second one „Material research“ is primarily focused on new heterogeneous and thin-film materials prepared using plasma processing. An important role is played by mathematics applied to modelling the systems and processes, as well as actual development of relevant mathematical structures. Close cooperation with prestigious research institutes in the Czech

Republic and abroad is anticipated. The associated Centre for Technical and Natural Science Education and Research will take care of the necessary development of human resources for the research and development base of NTIS and of the Faculty of Applied Sciences students.



The Regional Technological Institute is Growing Now

The Faculty of Mechanical Engineering of the University of West Bohemia started construction of its modern mechanical engineering centre – RTI (Regional Technological Institute) – in February 2011. The project worth over CZK 520 million aims to provide new laboratory and testing-room facilities to support modern research programmes in mechanical engineering. The institute should become a reliable bridge between the research conducted at the faculty and industry. In its ten specialised laboratories and testing rooms, the institute will provide facilities for innovative and motivated research teams focusing on, for example, modern



vehicle design, including drive systems, manufacturing and machining, virtual prototyping of processing machines, etc. The content of

the research programmes will be customised to address, in particular, the needs of mechanical engineering and technology companies in the regions of West and South Bohemia. Cooperation with other partners on the national as well as international level is also being prepared.

Implementation Team Working at Full Speed

The Electrical Engineering Faculty of the University of West Bohemia is engaged in a project worth more than CZK 700 million and known as RICE (the Regional Innovation Centre for Electrical Engineering). The combined scientific capacities of the centre work on the „Intelligent Industrial Systems“ research programme covering the complete range of technology-oriented activities, from theoretical research and modelling to product prototype manufacturing and testing. The programme includes sectors such as new drives and auxiliary equipment for traction vehicles, new drives for mining machines and high-voltage electronic equipment and systems, and organic (molecular) electronic components and systems. RICE developed REMCS (RICE Embedded Modular Control System), which is designed to manage real-time applications in the fields of energy and transport technology. RICE is expecting gradual growth and major investments in its infrastructure in the near future. The hall laboratory should be fully operational as the key experimental facility by the third quarter of 2015.



Performance Under Control

Employees of the New Technology Research Centre at UWB actively work on investigating (New Technology and Materials Centre) project. This project is not focused on construction works, as it uses facilities in the Plzeň Science and Technology Park. The majority of funds in the amount of almost CZK 250 million is allocated for the purchase of high-tech instrumentation in order to develop new technologies for the needs of industry and research bodies within and beyond the region. This concerns primarily advanced technologies based on polymer and composite materials, materials for photovoltaics, optoelectronics, laser technologies and systems for energy storage. Research is focused on the production and transfer of outcomes which are directly useful for commercial entities.

This remarkable construction boom related to research and development, as well as the use of revolutionary technology, promises students and staff at the University of West Bohemia a state-of-the-art environment with above-standard facilities for studying and achieving cutting-edge results in the field of science. All of this will positively affect the image of the university city of Plzeň and the Plzeň region.



To develop compounds that are effective against HIV is the dream of many laboratories around the world. Professor Antonín Holý († 2012) of the Czech Institute of Organic Chemistry and Biochemistry (IOCB) has succeeded in realizing this dream with the assistance of a team of scientists from the University in Louvain, Belgium.

Czech Chemist Successful in Fight against HIV

The exceptional antiviral effects of Professor Holý's compounds were recognised 24 years ago by American researchers who under the trade name Gilead Sciences set out on the risky path of development of anti-AIDS drugs based on these compounds. And what is the result of their endeavours? Gilead Sciences now has over 1,900 employees in nine centres around the world, has several times been recognised as the world's most dynamic pharma-ceuticals firm and **covers 90% of the world market with its anti-AIDS drugs. Five of Gilead Sciences nine approved products are derived from professor Holý's compounds.**

Uncompromising Antivirals

This is the reason that **Gilead decided in 2006 to establish and finance its only R&D centre outside the United States with professor Holý in Prague.** "We have done so because Dr. A. Holý and his team have shown such productivity and such impressive scientific leadership over the years," emphasizes John F. Milligan, Executive vice president of Gilead. An advantage of the centre is that the scientists from the IOCHB are not working only on things intended for commercialisation, which gives them the necessary freedom to conduct their research. And the world has already seen the first result, a virtually non-toxic antiviral compound, which is 500 times more effective against HIV and retroviruses than the best currently available compounds.

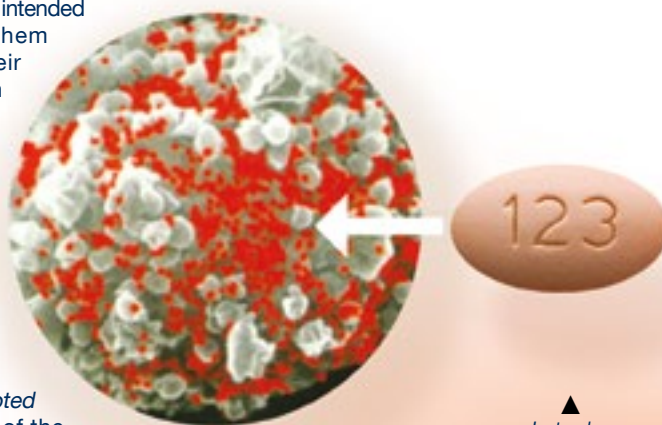
New Generation of Cancer Drugs

"The institute's current successes are rooted in its celebrated history," says director of the institute. This is confirmed by the findings of Professor Peter Jones of the University of Southern California, who discovered that compounds synthesized by the institute 40 years ago have the ability to heal cells damaged by cancer, which is absolutely unique in today's

world of science. In the United States, an approved drug containing these compounds is now freely available. The institute is, of course, still in the game, having recently patented another compound which surpasses the original compounds in terms of stability.

Molecular Electronics

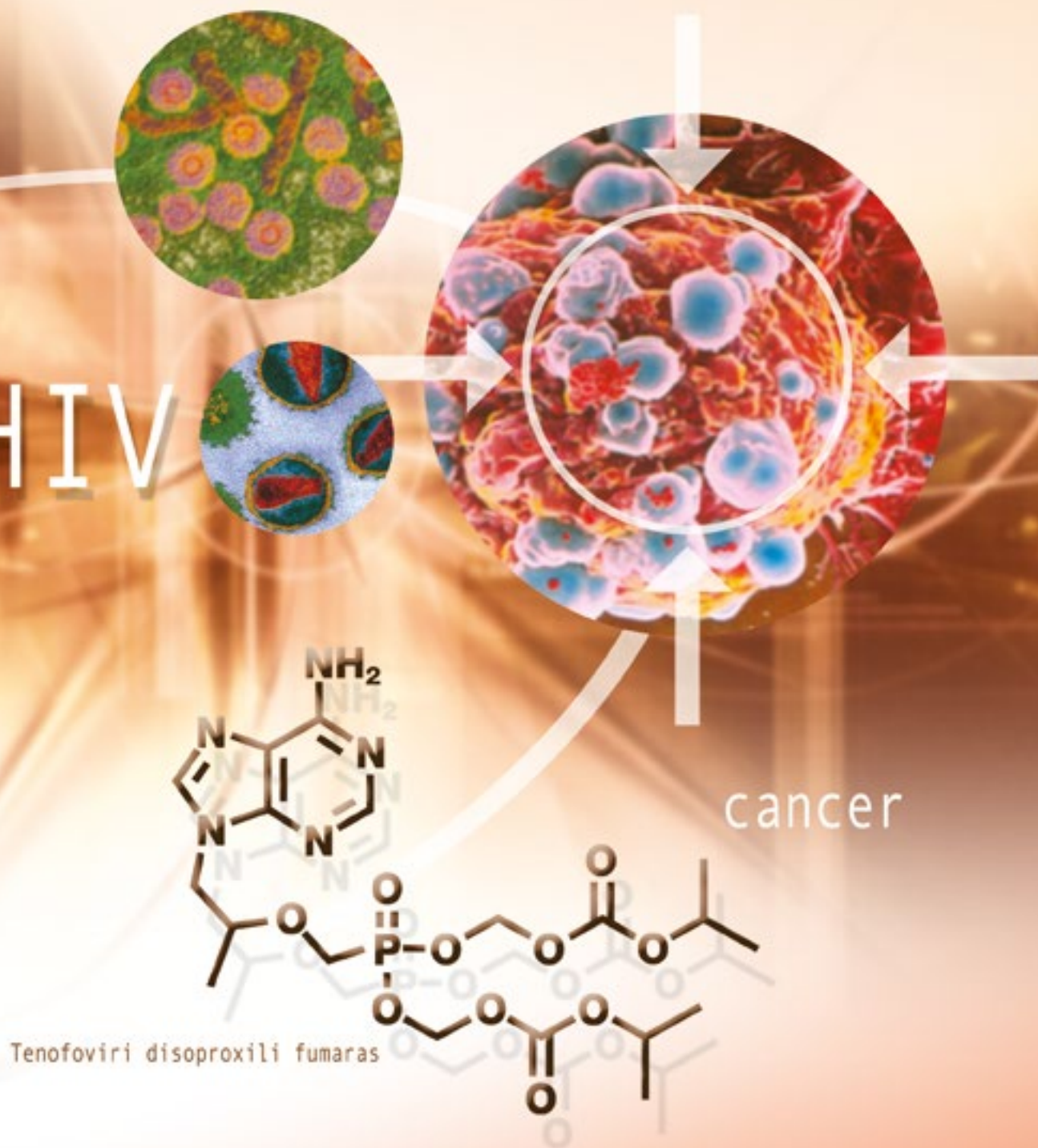
Another important scientific personality at the institute is Professor Josef Michl. This American of Czech descent, who has been awarded several Czech doctorates and nominated for a Nobel prize, is working on the American DARPA project – molecular electronics for the third millennium with the aim of creating computer components on the molecular scale. This is an important project for the future which holds promise of an essential, qualitative advance of science.



▲
Instead
of the original
13 tablets taken daily,
only one Atripla pill
is needed each
morning.

HEPATITIS B

HIV



GILEAD SCIENCES' PRODUCTS DERIVED FROM PROFESSOR HOLÝ'S COMPOUNDS:

HEPSERA - based on adefovir, serves for the treatment of CHRONIC HEPATITIS B

VISTIDE - effective against SHINGLES and SMALLPOX, for example

VIREAD AND TRUVADA - approved for the treatment of AIDS

ATRIPLA - a drug which substantially changes the frequency of use of ANTI-AIDS drugs

The Czech Republic is the cornerstone of Honeywell's global engineering strategy in Europe. The company's Prague laboratory opened in 1993, followed by its Brno design centre ten years later.

Honeywell in the Czech Republic

In 2006, the Brno design centre was integrated into Honeywell Technology Solutions' international network of research, development and engineering centres located in the United States, China, India and the Czech Republic. This centre provides support to different business divisions – Aerospace, Automation and Control Solutions and Transportation Systems – on a global level. Honeywell also has two manufacturing facilities in the Czech Republic: Aerospace in Olomouc and Environmental and Combustion Controls in Brno. More than 4,000 professionals work for Honeywell in the Czech Republic.

Honeywell Technology Solutions in Brno is involved in providing research, product design, development and engineering in order to deliver the best value to Honeywell customers. With its world-class engineering talent and state-of-the-art infrastructure, the centre in Brno works on current and next-generation products for Honeywell's Aerospace, Automation Control Solutions and Transportation Systems divisions.

Areas of Focus

Aerospace Engineering and Technology

- Flight control systems
- FADEC (Full Authority Digital Engineering)
- Engineering test services
- Sensing, guidance and Navigation
- Electronic HW
- Cabin products
- Electronic and power controllers

Automation and Control Solutions Engineering and Technology

- Combustion controls and valves
- Heating and cooling systems
- Global field devices
- Home comfort controls
- Fluid control products
- Access and security systems
- Enabling technologies
- Life and safety solutions

Transportation Systems Engineering and Technology

- Innovation, variable geometry turbochargers, aerodynamic and vibro-acoustics analysis, and bearing systems for:
 - Commercial vehicles
 - Passenger vehicles, light trucks



GE Aviation is successfully developing and manufacturing aero engines in the Czech Republic since acquiring certain assets of Walter Company in 2008. The Czech operation, named GE Aviation Business & General Aviation Turboprops, helps complete GE's engine product portfolio.

GE Aviation



Since the acquisition, GE Aviation has made significant investments in the Czech business. GE Aviation Business & General Aviation Turboprops moved to a new 135,000 square-foot facility in Prague that boasts new engine test cells equipped with the latest diagnostic and software tools.

The engineering team of GE Aviation Czech has already doubled its size over the last three years and is still expected to grow as new development projects are coming through the pipeline. This brings exciting opportunities not only for senior and experienced engineers searching for new challenges but also for fresh university graduates as well as for the students seeking internships. Scope of work of Engineering team in Prague is rich: Starting with material engineering, strength department and continuing with reliability engineering, system integration and development. Additional enrichment comes from a close cooperation with global engineering centers of GE Aviation located in Europe and U.S. helping with best practice sharing and implementation of GE Aviation design practices.

The Prague facility has also a unique position within GE Aviation – it is the only facility owning the DOA, POA, MOA and MTOA certificates under one legal entity. It means that the site is fully certified to develop and certify new aircraft engines, but also produce new engines and then maintain them in the field and provide a complete after-market support.

GE Aviation also brought the latest technologies from its commercial

engines programs and shared them with the Czech design and development

team. This collaboration between GE Aviation's Czech engineers and engineering teams in the United States led to a new turboprop engine family, called the H80. Just within 3 years from the acquisition, H80 received an EASA type certificate in December 2011. And in less than 12 months, GEAC certified additional two new engines H75 and H85. The new H80 engine family incorporates advanced technologies that will provide customers with significant improvements in performance, fuel burn and weight. GE has also expanded the service and support offerings for business and general aviation turboprop operators to provide customer service in more regions around the world.

Today, H80 serves its duty on multiple aircrafts. For example famous commuter L410 produced by Aircraft Industries in Czech Republic, brand new agriculture aircraft Thrush 510G manufactured by US-based Thrush or on KingAir 90. The H80 engine has also been selected to power Technavia's newly designed Rysachok aircraft, a twin-engine general aviation aircraft and H85 engine has been selected by Chinese company Caiga for its corporate aircraft called PRIMUM 150. Investments into R&D and new product do really pay off. H80-series engine enabled GEAC to accelerate the production of new engines which more than doubled compared to the situation prior acquisition. New product with best in class performance helped enter new markets such as China, Uruguay, Paraguay, Canada and many others and secured faster growth in previously served markets such as Russia and North America.



Crytur is one of the world's leading companies engaged in crystal manufacturing and processing with a strong focus on material research and the development of crystal-based applications. Crytur follows the tradition of crystal growing and processing reaching back to 1935. During the past decades Crytur has gained worldwide recognition as the provider of integrated crystal-based solutions for science and industry.

Crytur



Materials processed in the modern 4000 sqm facility at the edge of the Bohemian Paradise do not have much in common with the crystals you can find in nature. While natural stones are usually full of impurities, synthetic crystals grown in Crytur originate in a strictly controlled environment and have to be precisely tuned to gain the desired physical characteristics. Processes implemented in Crytur run in controlled atmosphere under temperatures close to 2000°C. Common production covers garnets, perovskites, silicates doped with rare earth elements and profiled sapphire.

Exceptional physical characteristics make these materials unique. Scintillation is one of the most valued properties.

Scintillating crystals convert invisible radiation to light visible to the human eye and as a result of this effect, these crystals glow when exposed to ionizing radiation such as UV, X-rays or gamma rays. Scintillation crystals are the "eyes" of a wide variety of radiation detectors. Other types of crystals serve as media for solid-state lasers and generate laser radiation when pumped with an external energy source.

Profiled sapphire, on the other hand, withstands extreme conditions such as high temperatures, high pressure or aggressive chemical environments and is widely used as a protective element for highly demanding extreme temperature probes.

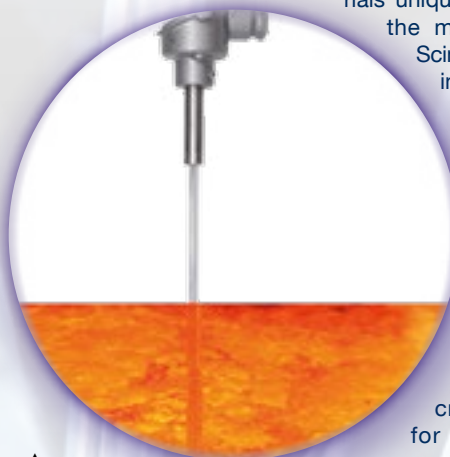
The key to Crytur's long term success lies in coherent material application and proprietary development resulting in a variety of crystal-based detectors and devices. This approach has made Crytur become the world's leading supplier of detectors for electron microscopy. Another example of an integrated solution is a high resolution x-ray camera, which enables the capture of visible object details in units of micro-



◀ Furnaces for crystal growth by Czochralski process

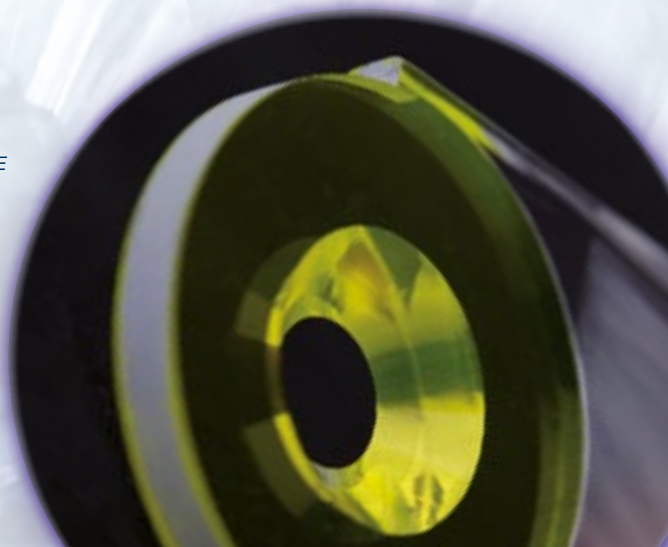
meters. This would not be possible without the ability to machine a crystal imaging screen to the thickness of the human hair.

Crystal luminophore in LED light sources presents yet another significant innovation by Crytur. Small single crystal slabs or half-domes placed over the LED increase the overall lighting efficiency of the diodes. Crystals could be the future of high-power light sources in automotive, aerospace and industrial lighting.



▲ Sapphire protected thermocouple in glass melt

▶ Detail of the BSE detector crystal



TECHNOLOGY TIMELINE OF THE CZECH REPUBLIC

- 1348 Charles University established in Prague
- 1600 First public dissection of a human body performed in Prague
- 1707 Czech Technical University (CTU) established
- 1754 Prokop Diviš invents lightning rod
- 1773 Czech Royal Society of Science established
- 1796 Discovery of lithography by Alois Senefeld
- 1815 Josef Božek exhibits his steam-driven carriage
- 1827 Josef Ressel demonstrates ship's propeller
- 1837 J. E. Purkyně formulates the cell theory
- 1842 Pilsner-type beer brewed in Plzeň (Pilsen in German) for the first time
- 1866 Johan Gregor Mendel discovers laws of heredity
- 1881 František Křižík introduces new type of fluxional arc lamp
- 1897 First car in Central Europe, the President, manufactured in Kopřivnice
- 1905 Škoda Auto manufactures its first car
- 1905 Karel Schinzel receives patent for three-layer colour photography
- 1907 Jan Janský discovers the four blood types
- 1912 Viktor Kaplan invents the Kaplan turbine (patented in 1920)
- 1922 Jaroslav Heyrovský invents the polarographic method
- 1952 Czechoslovak academy of Sciences established
- 1957 Jaroslav Kurzweil co-formulates the Henstock-Kurzweil integral
- 1959 Jaroslav Heyrovský receives the Nobel Prize for Chemistry
- 1961 Otto Wichterle invents method of manufacturing soft contact lenses
- 1966 Invention of the Semtex explosive in Pardubice
- 1978 Vladimír Remek becomes the first non-Soviet and non-American astronaut in space
- 1987 The Czechoslovak army develops the TaMaRa passive radar
- 1992 Czechoslovakia joins CERN, the European Organization for Nuclear Research
- 1998 Jiří Čížek nominated for a Nobel Prize for his method of calculating correlation energy
- 2002 The FDA approves the B-hepatitis drug Hepsera based on a compound discovered by Antonín Holý
- 2004 Elmarco introduces Nanospider – the world's first industrial nanofibre production machine
- 2006 The FDA approves atipla – a once-daily pill for treating HIV, based on A. Holý's compound
- 2008 Institute of Macromolecular Chemistry has developed Hemagel – the revolutionary preparation designed to heal very extensive injuries and damaged skin
- 2011 The siting of the European GNSS Supervisory Authority headquarters in Prague.
- 2012 IKEM performed the world's first heart surgery where the patient's heart was replaced by two heart support devices.
- 2013 Scientists from the Masaryk University in Brno have discovered an enzyme that determines the future function of stem cells in the early stage of human development.
- 2015 Even though the hereditary information of wheat is six times the size of human genome, Czech scientist have come up with a unique method which substantially facilitates the analysis of complex plant genomes.



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MINISTRY OF
INDUSTRY AND TRADE

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