

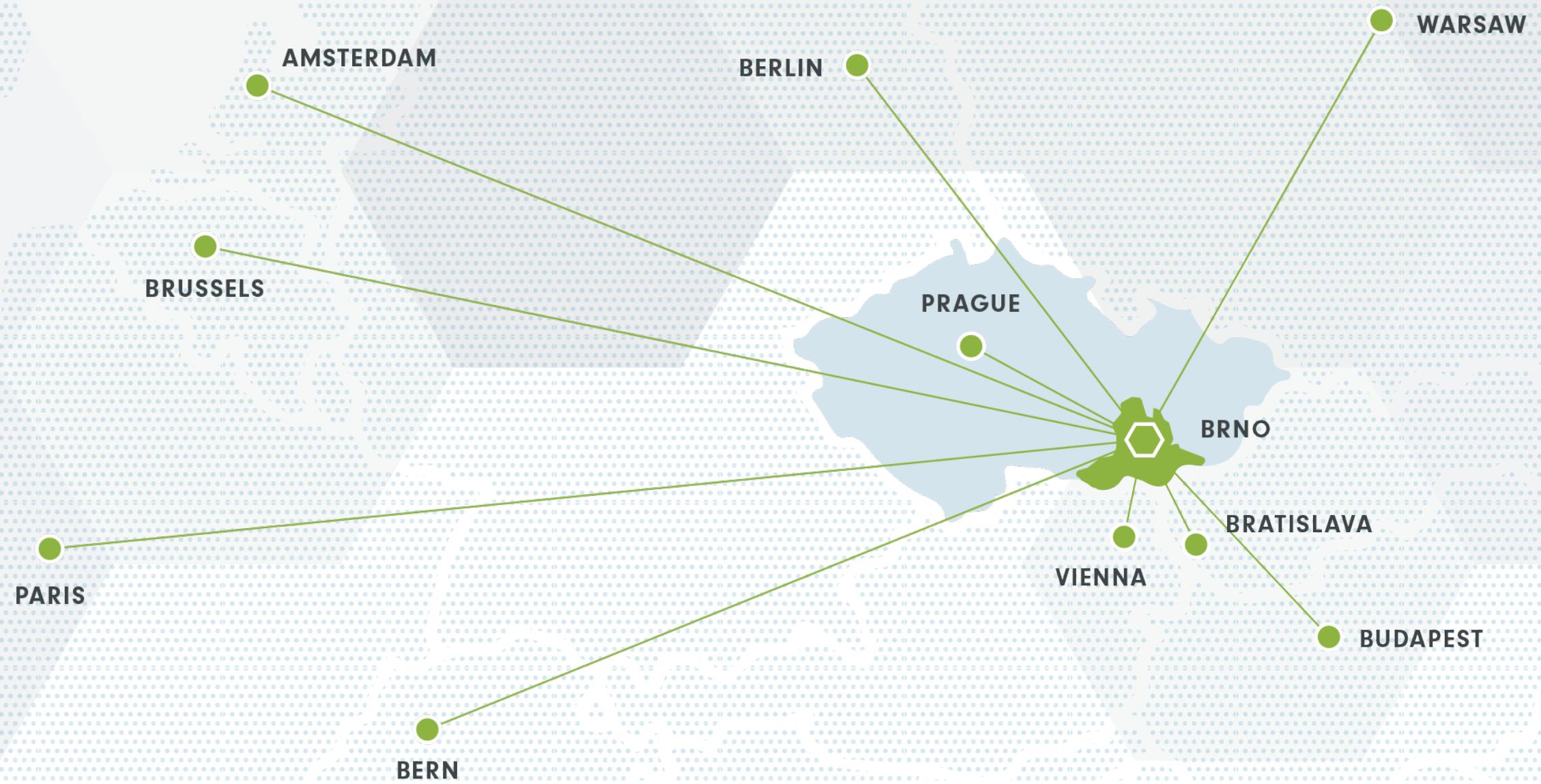


Central European Institute of Technology  
BRNO | CZECH REPUBLIC

Radimír Vrba

# CEITEC – Central European Institute of Technology





# Basic Overview



BRNO  
UNIVERSITY  
OF TECHNOLOGY  
[www.vutbr.cz](http://www.vutbr.cz)



INSTITUTE OF  
PHYSICS OF  
MATERIALS AS CR  
[www.ipm.cz](http://www.ipm.cz)



VETERINARY  
RESEARCH INSTITUTE  
[www.vri.cz](http://www.vri.cz)



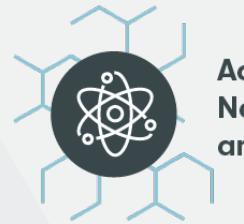
MASARYK  
UNIVERSITY  
[www.muni.cz](http://www.muni.cz)



MENDEL UNIVERSITY  
IN BRNO  
[www.mendelu.cz](http://www.mendelu.cz)



UNIVERSITY OF  
VETERINARY AND  
PHARMACEUTICAL  
SCIENCES BRNO  
[www.vfu.cz](http://www.vfu.cz)



Advanced  
Nanotechnologies  
and Microtechnologies



Advanced  
Materials



Structural  
Biology



Molecular  
Medicine



Brain and Mind  
Research



Molecular  
Veterinary  
Medicine



INDUSTRIAL CYBERNETICS,  
INSTRUMENTATION AND  
SYSTEMS INTEGRATION

GENOMICS  
AND PROTEOMICS  
OF PLANT SYSTEMS



# Management excellence



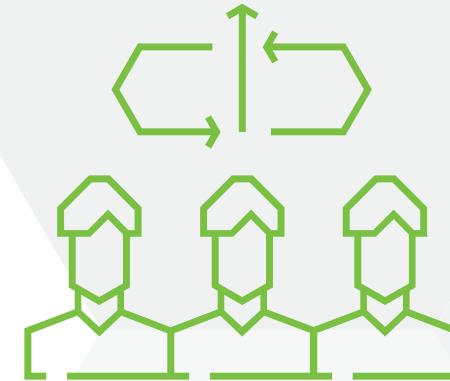
## COORDINATION BOARD

Composed of statutory representatives of partner institutions and external representatives from prominent Czech companies active in R&D and the best international research institutes



## INTERNATIONAL SCIENTIFIC ADVISORY BOARD

Members of ISAB are exclusively representatives of important international research institutes



## EVALUATION

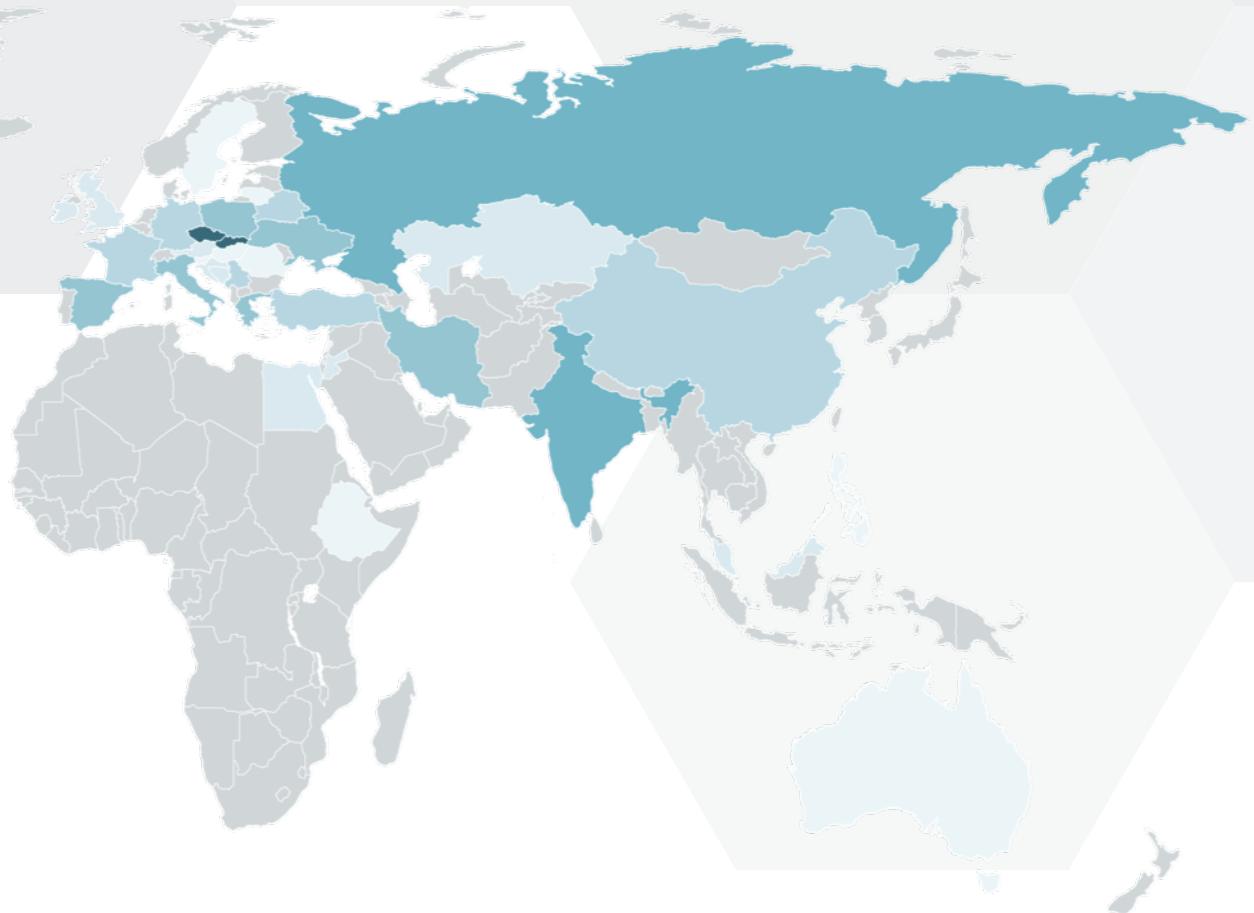
Evaluations of the quality of research results are conducted by independent teams of prominent global experts in their respective fields

# Our People

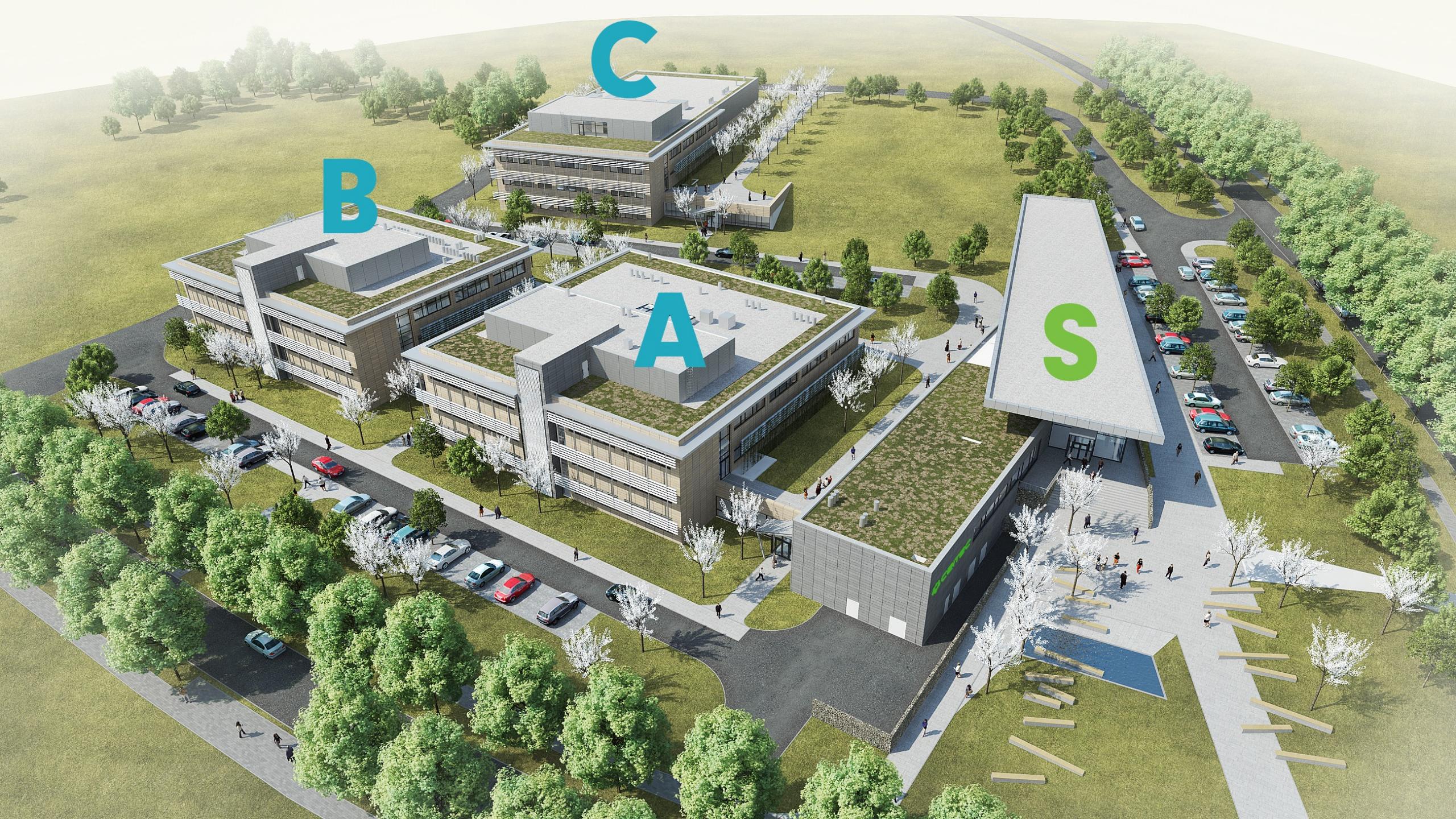


# Our people

in 2020







B

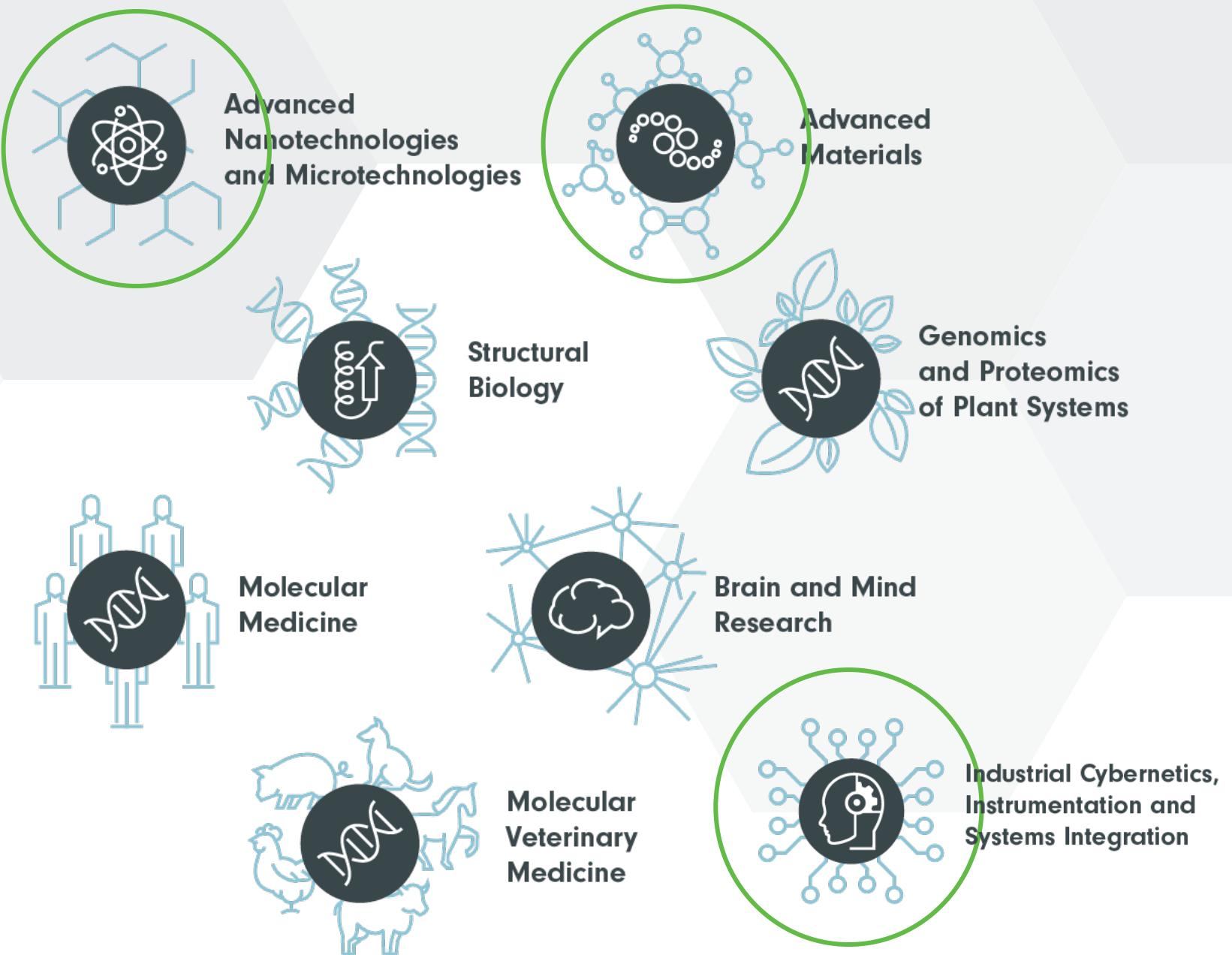
C

A

S



# Research Areas

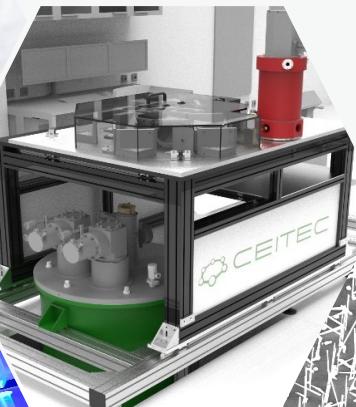


# Advanced Nanotechnologies and Microtechnologies

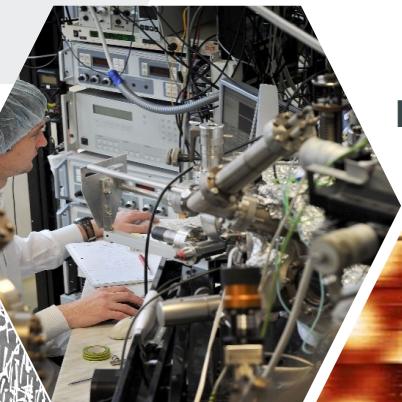
Experimental  
Biophotonics



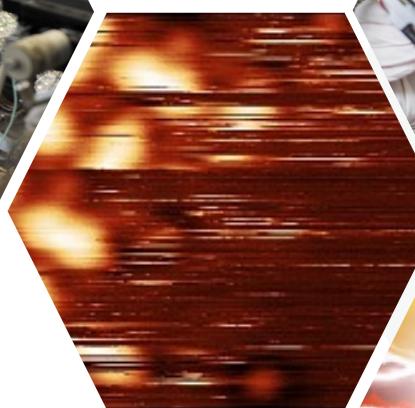
Magneto-Optical  
and THz  
Spectroscopy



Fabrication and  
Characterisation  
of Nanostructures



Molecular  
Nanostructures  
at Surfaces

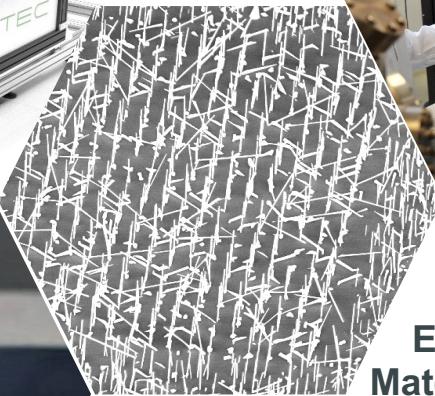


9  
**RESEARCH  
GROUPS**

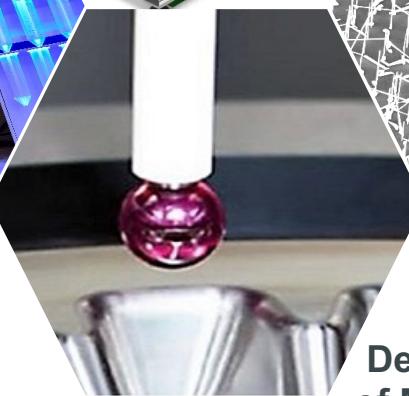
Smart  
Nanodevices



Development  
of Methods for  
Analysis and  
Measuring



Epitaxial  
Materials and  
Nanostructures



Nanomagnetism  
and Spintronics



Future  
Energy and  
Innovation

## **Area Coordinator:** Tomáš Šikola

**102 Smart Nanodevices**  
RG Leader: Vojtěch Adam

**103 Experimental Biophotonics**  
RG Leader: Radim Chmelík

**104 Fabrication and Characterisation of Nanostructures**  
RG Leader: Tomáš Šikola

**105 Development of Methods for Analysis and Measuring**  
RG Leader: Petr Klapetek

**112 Magneto-Optical and THz Spectroscopy**  
RG Leader: Petr Neugebauer

**113 Molecular Nanostructures at Surfaces**  
RG Leader: Jan Čechal

**114 Nanomagnetism and Spintronics**  
RG Leader: Vojtěch Uhliř

**115 Epitaxial Materials and Nanostructures**  
RG Leader: Hermann Detz

**118 Future Energy and Innovation**  
RG Leader: Martin Pumera



# Advanced Materials

5

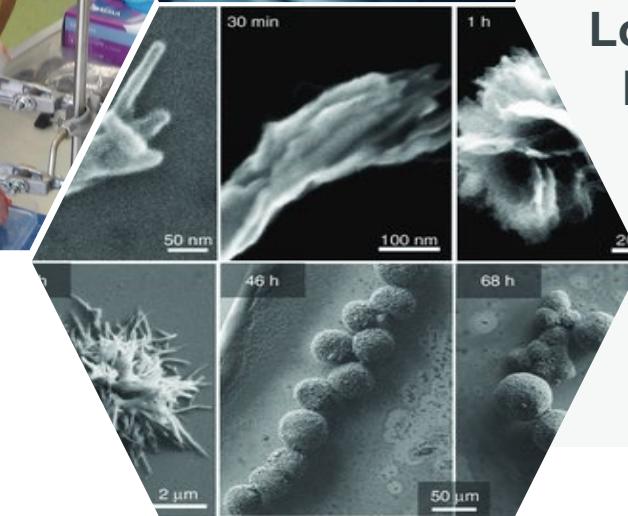
RESEARCH  
GROUPS

Advanced Ceramic  
Materials

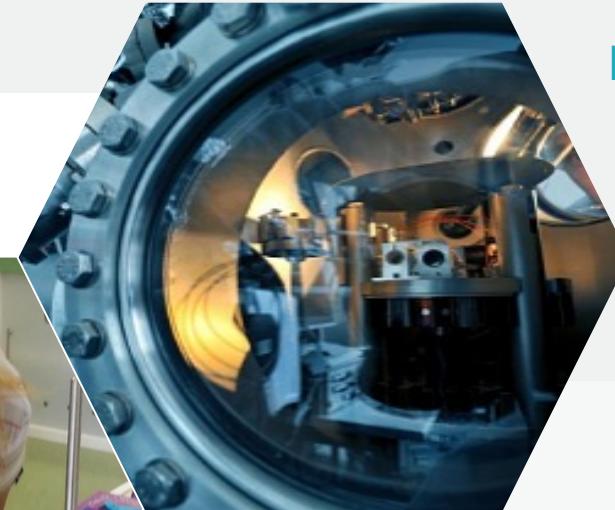


Advanced  
Polymers and  
Composites

Advanced  
Biomaterials



Advanced  
Low-Dimensional  
Nanomaterials



**Area Coordinator:** Jan Macák

**201 Advanced Ceramic Materials**

**RG Leader:** Martin Trunec

**203 Advanced Polymer Materials**

**RG Leader:** Josef Jančář

**206 Advanced Low Dimensional Nanomaterials**

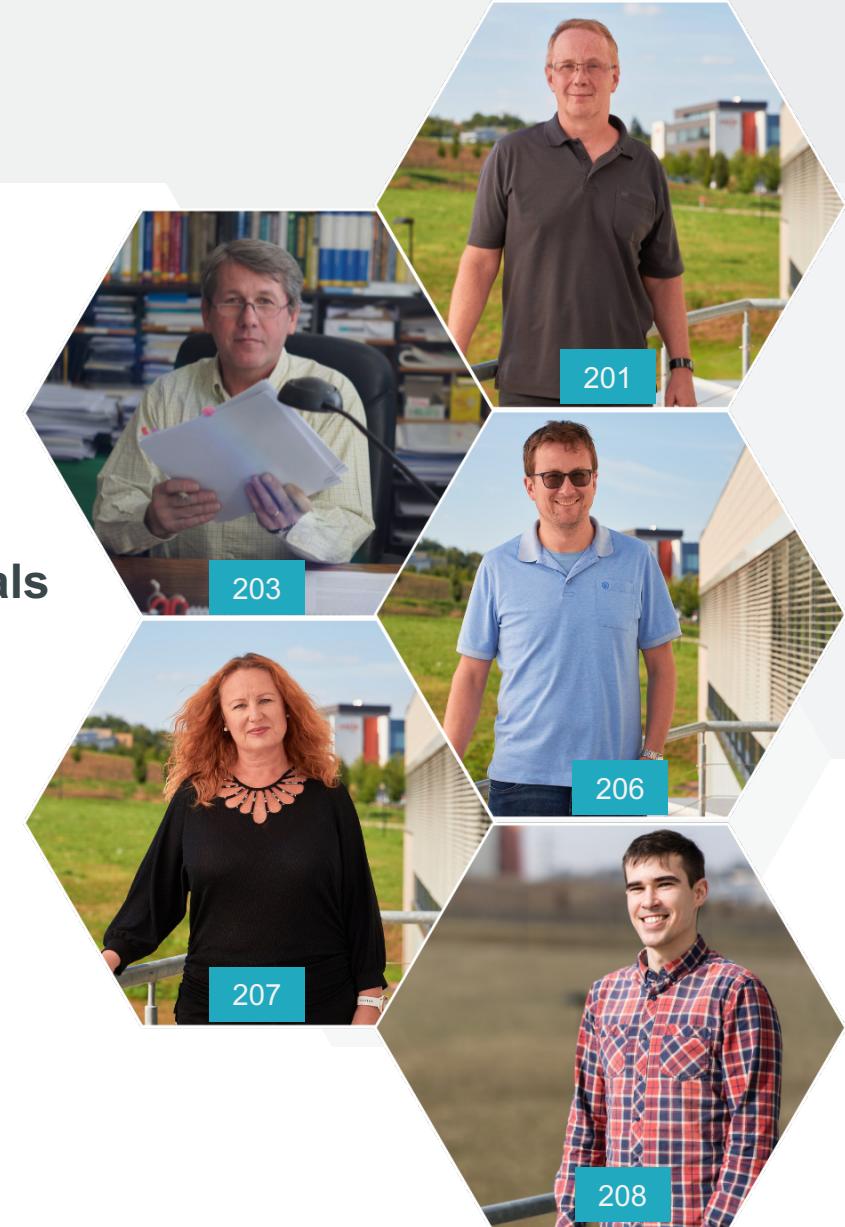
**RG Leader:** Jan Macák

**207 Advanced Biomaterials**

**RG Leader:** Lucy Vojtová

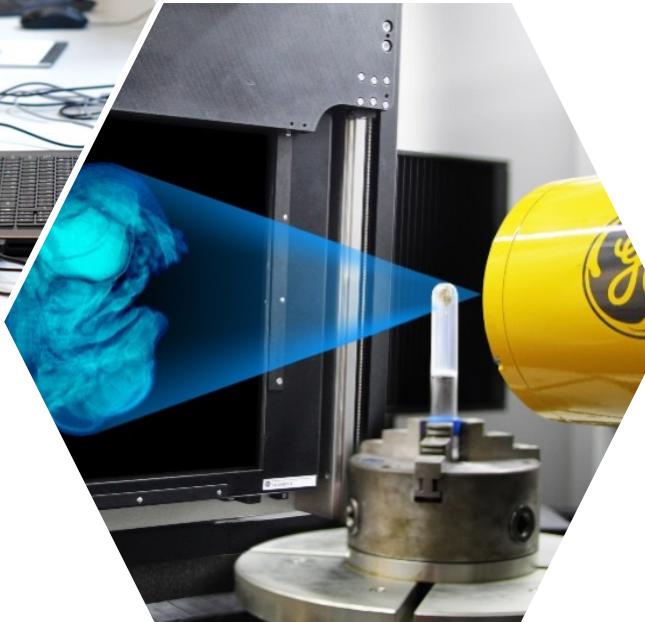
**208 Bioelectronic Materials and Devices**

**RG Leader:** Eric D. Glowacki



# Industrial Cybernetics, Instrumentation and Systems Integration

Cybernetics and  
Robotics



2

RESEARCH  
GROUPS

Advanced  
Instrumentation  
and Methods for  
Materials  
Characterization

\*Established in 2021

**Area Coordinator:** Pavel Václavek

### **302 Cybernetics and Robotics**

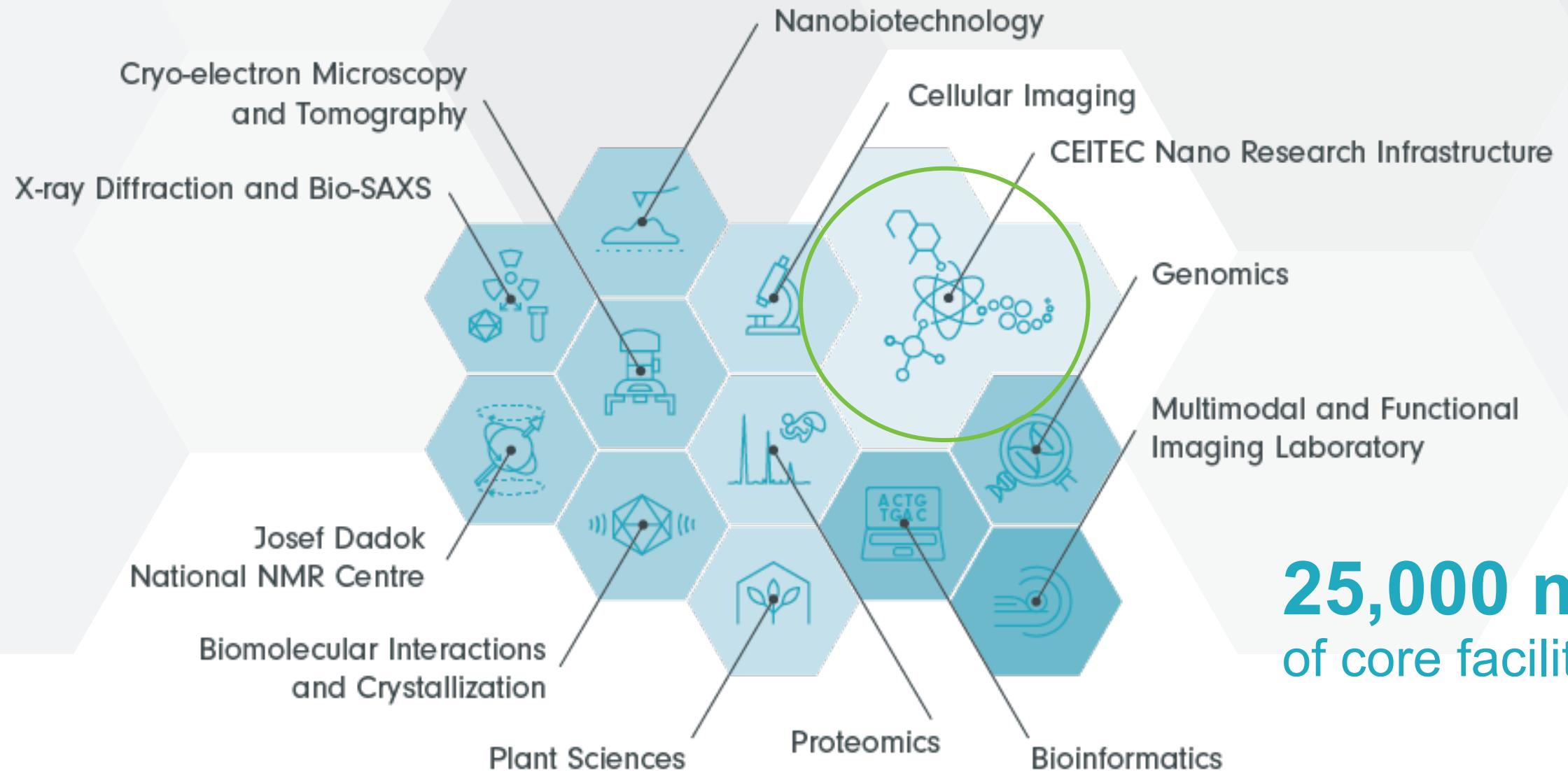
**RG Leader:** Pavel Václavek

### **106 Advanced Instrumentation and Methods for Materials Characterization**

**RG Leader:** Josef Kaiser



# Research facilities



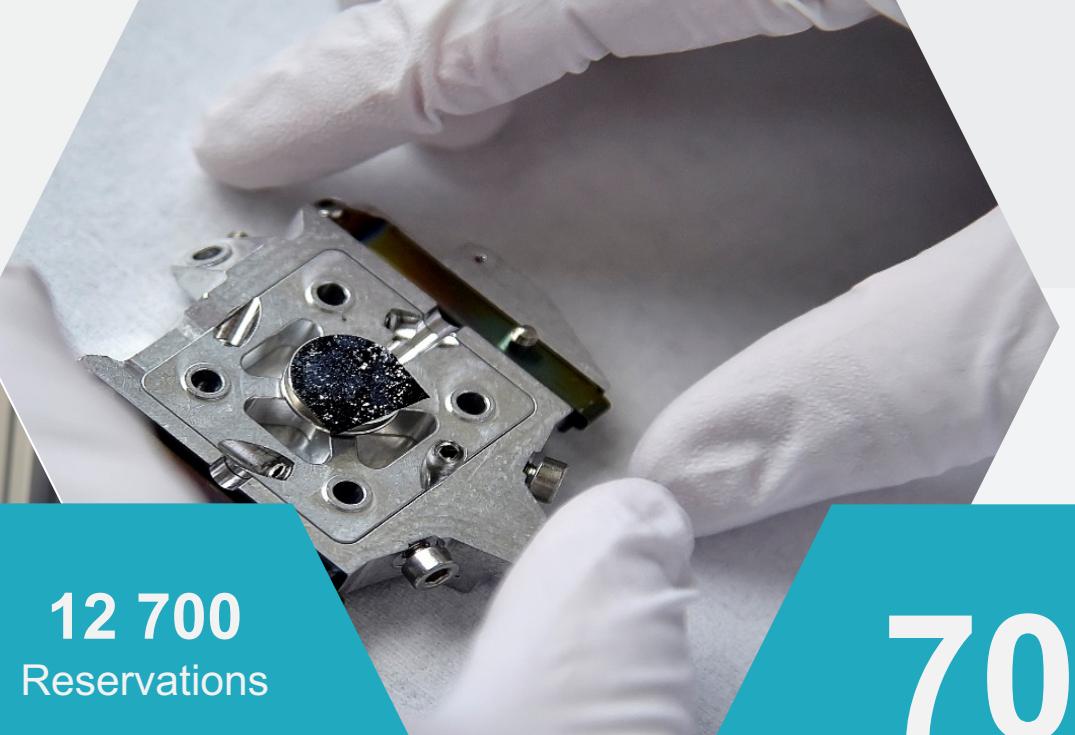
**25,000 m<sup>2</sup>**  
of core facilities



2 000 m<sup>2</sup>  
of cleanrooms



<http://nano.ceitec.cz>



12 700  
Reservations

69 000  
Booked hours

82 Instruments

in 2020

323  
Users

70  
Full Service  
Users

25+  
Nationalities



## CEITEC BUT in numbers 2020

# Impressive scientific results



**VOJTEČH ADAM**  
TOWARDS THE  
UNDERSTANDING  
A METAL-TUMOUR-  
METABOLISM

**European Research Council**

Established by the European Commission



**PETR  
NEUGEBAUER**  
THZ-FRASCAN-ESR:  
THZ FREQUENCY  
RAPID SCAN –  
ELECTRON SPIN  
RESONANCE  
SPECTROSCOPY  
FOR SPIN DYNAMICS  
INVESTIGATIONS OF  
BULK AND SURFACE  
MATERIALS



**European Research Council**

Established by the European Commission

**ERIC D. GLOWACKI**  
OPTEL-MED  
OPTOELECTRONIC  
MEDICINE – NERVE CELL  
REGULATION WITH LIGHT

# Our selected projects



Research and Innovation Centre  
on Advanced Industrial Production  
**H2020\_Teaming**  
3 938 000 EUR



2D Nanomaterials Electrochemistry  
**GAČR Expro**  
49 586 000 CZK



Plasmon enhanced terahertz  
electron paramagnetic  
resonance  
**H2020\_FET OPEN**  
399 500 EUR



Strengthening Nanoscience and  
Nanotechnology Research at  
CEITEC  
**H2020\_Twinning**  
546 150 EUR

**151**

Projects  
in realization

**22**

H2020  
Projects

**22**

GAČR  
Projects

**33**

TAČR  
Projects

**13**

MPO

**14**

OPVV

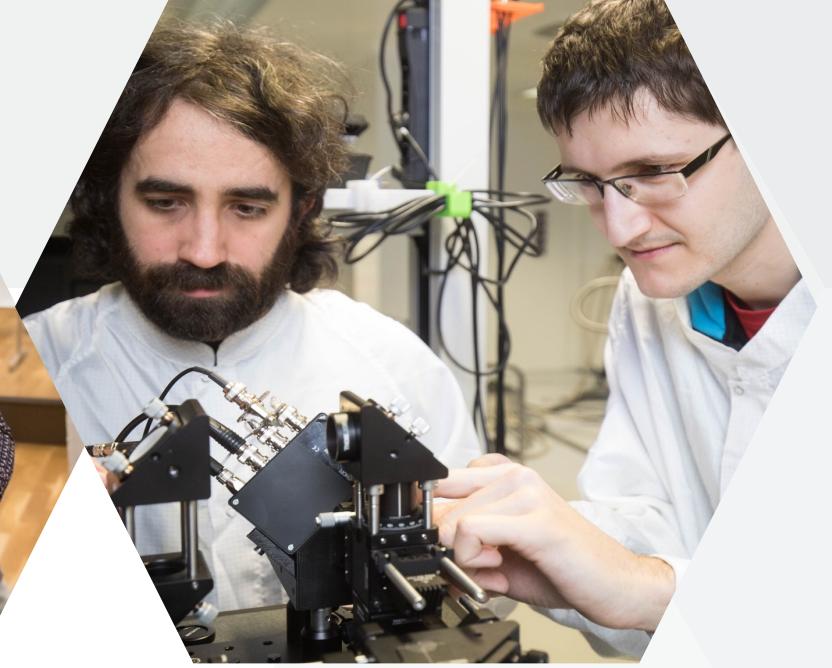
# CEITEC BUT first Spin-off Company



Scanning Probe Microscope designed for easy integration into the Scanning Electron Microscopes.



# Our PhD School



- 4 year PhD program
- Courseworks in your chosen field
- International and Interdisciplinary Environment
- A wide range of topics
- PhD Events

# Advanced Materials and Nanosciences PhD program

- Advanced Nanotechnologies and Microtechnologies
- Advanced Materials

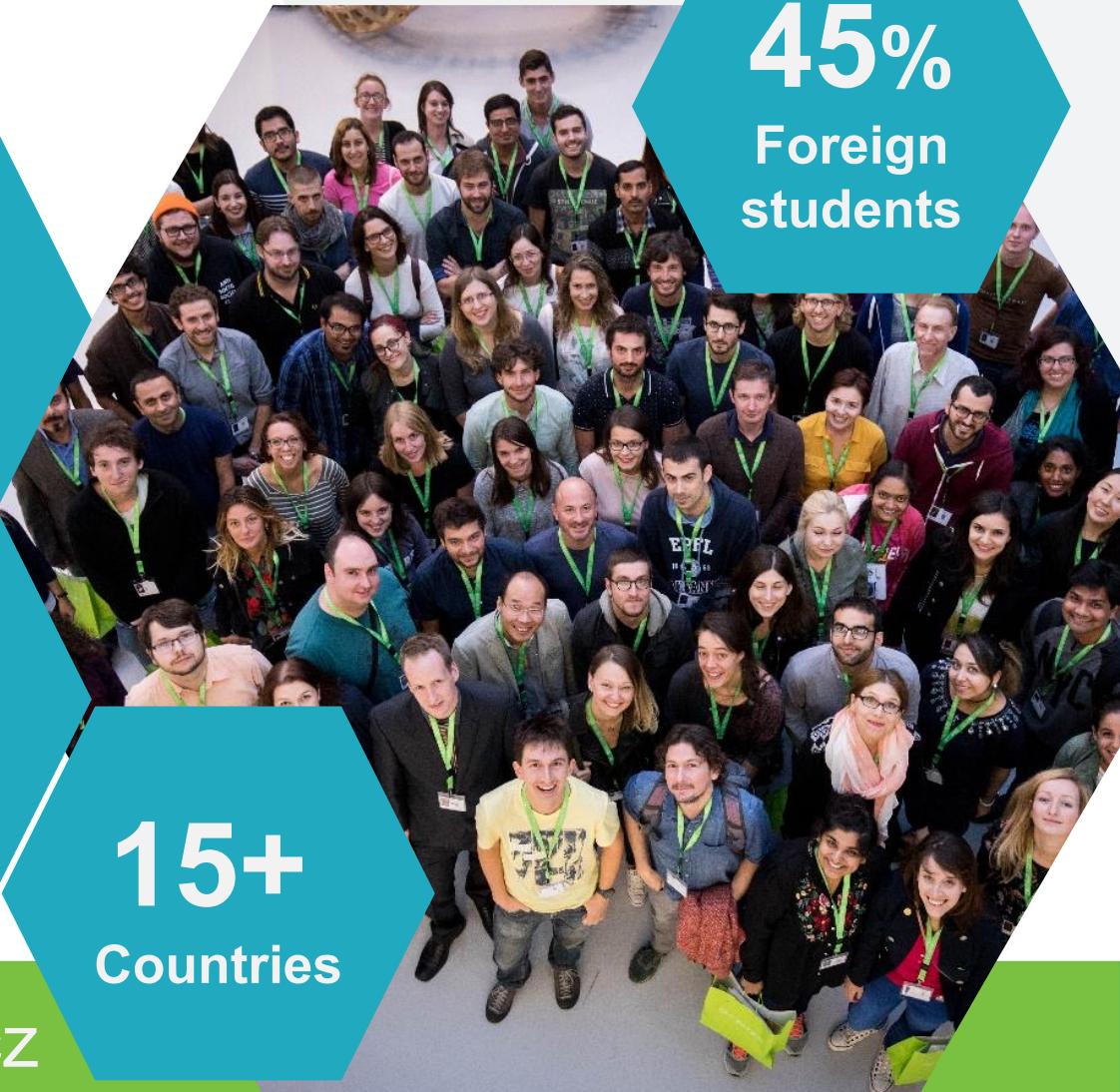
40%  
women

123  
Students

Full  
English  
Curriculum

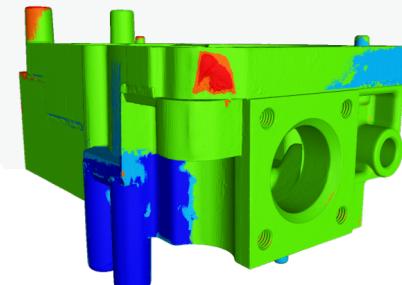
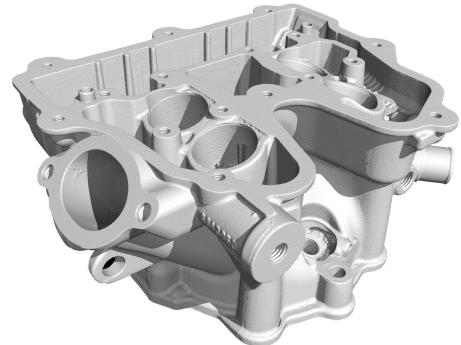
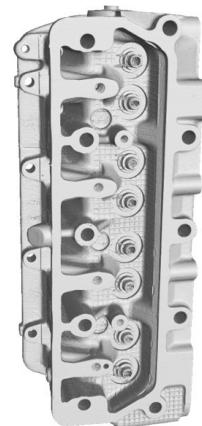
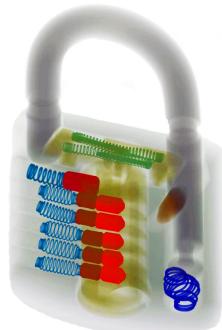
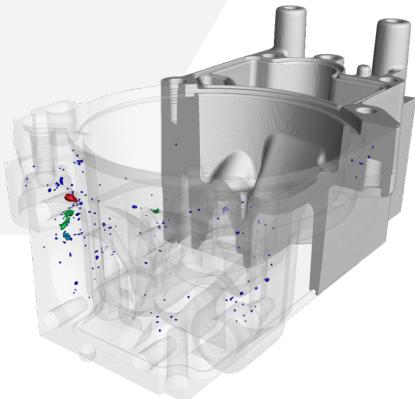
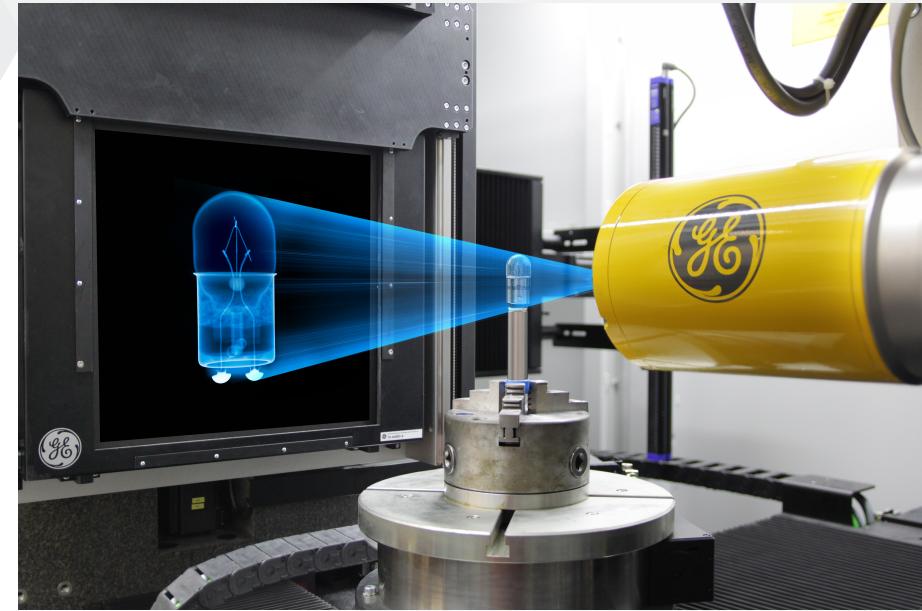
15+  
Countries

45%  
Foreign  
students



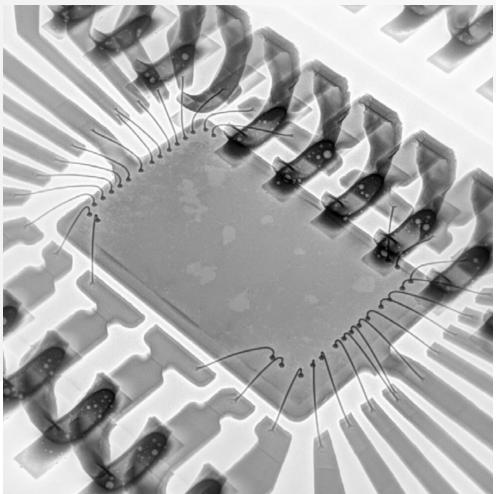
# Laboratory of X-ray micro and nano computed tomography

- Lead by: **Prof. Ing. Jozef Kaiser, Ph.D.**
- **4 complementary CT systems**
- **Accreditation (CSN EN ISO/IEC 17025)**
- **Cooperation with industry**
  - grants
  - contractual research
- **Cooperation with CT producers**

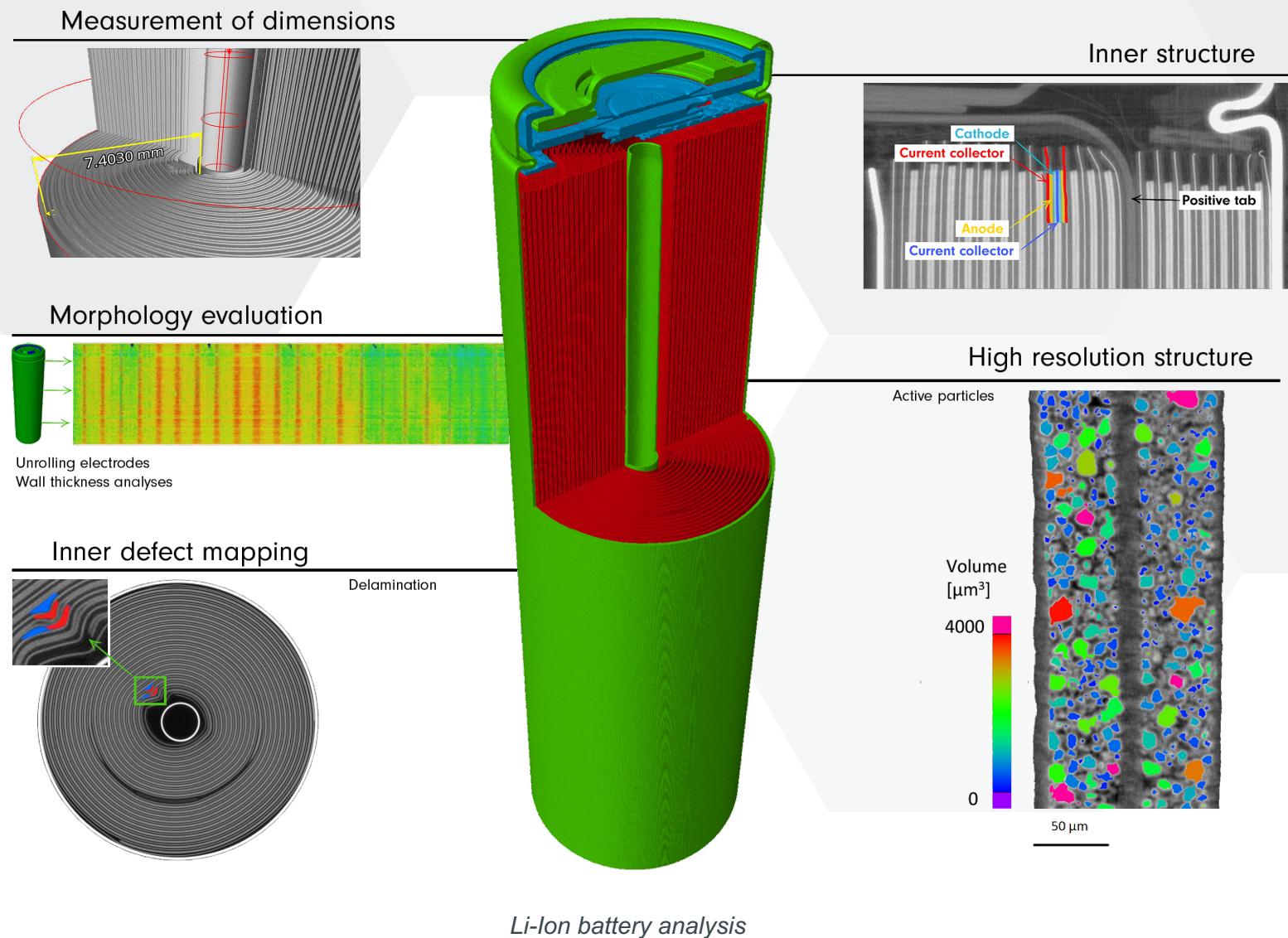


# Applied R&D

- Porosity/Inclusion Analysis
- Coordinate measurement
- Wall Thickness Analysis
- Nominal/Actual Comparison
- Fiber Composite Material Analysis
- Analysis of the soldered joints
- Mold correction



Analysis of soldered joints



# Research line of Advanced Coatings

## ○ Head of the Research Line – Assoc. Prof. Ladislav Čelko

- 15 Researchers / 1 Technician / 7 Ph.D. students
- Expertise in the fields of materials science, physics, chemistry, civil engineering, construction design, electronics, systems programming & computational science

## ○ Research areas

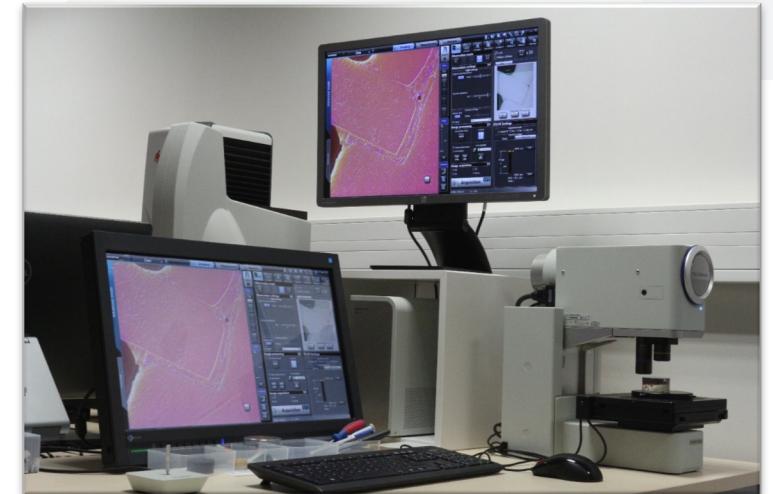
- Transport
- Energy & Vacuum
- Environment
- Medicine
- Engineering

## ○ Laboratories

- Powder Synthesis & Advanced Coatings Laboratory
- Additive Manufacturing & Biofabrication Laboratory
- Construction & Systems Processing Laboratory
- Laboratory of Materials Analysis
- Laboratory of Analytical Chemical Analysis

# Laboratory of Materials Analysis

- Cutting units, hot press, grinding & polishing unit (STRUERS)
- Hardness – Rockwell, Brinell & Vickers (STRUERS)
- Microhardness – Vickers (STRUERS)
- Opto-digital microscope DSX 500 (OLYMPUS)



# Lab Tour

## Testbed Průmyslu 4.0

Prof. Pavel Václavek, RG Kybernetika a robotika, ricaip.eu

## Velká výzkumná infrastruktura CEITEC Nano

Dr. Michal Urbánek, nano.ceitec.cz

## Laboratoř rentgenové počítačové mikro- a nanotomografie

Prof. Jozef Kaiser, RG Pokročilé instrumentace a metody pro charakterizace materiálů, ctlab.ceitec.cz

## Laboratoř magneto-optické a THz spektroskopie

Doc. Petr Neugebauer, RG Magneto-optická a THz spektroskopie, spectroscopy.ceitec.cz

## Laboratoř 3D tisku pro moderní zdroje energie

Prof. Martin Pumera, RG Energie budoucnosti a inovace, energy.ceitec.cz

Zde pouze anglický výklad, registrace nutná, max. 10

**Spolupráce a TT:** Ing. Vojtech Helikar, [vojtech.helikar@ceitec.vutbr.cz](mailto:vojtech.helikar@ceitec.vutbr.cz)



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vrbar@vutbr.cz