



**NAME: CZECH SOCIETY FOR NEW MATERIALS AND
TECHNOLOGIES (CSNMT), PRAHA**

COUNTRY: CZECH REPUBLIC

Profile :

The Czech Society for New Materials and Technologies (CSNMT), founded in 1993, is a voluntary association of individual and collective members residing in the Czech Republic. CSNMT was established to provide all possible support for research in the area of new materials and technologies (including education in the field of materials science and engineering, advisory and consultancy activities, etc.). Within the collective membership, CSNMT associates the most important part of materials research units in universities, institutes of the Academy of Science and organisations closely linked to the production sector, thus covering the area of both fundamental and applied research.

Activities :

- Research and development in the field of materials science and engineering (joint research projects), information support for research and study programmes and projects of institutes and universities (creating and making accessible databases about research and developments units, programmes and projects under solution, available instruments, facilities and places for study - or work-oriented stays in research establishments, etc.)
- Service provided to industry (counselling and consultancy activities, offering research infrastructure, scientific service, technology transfer, dissemination of information concerning new advanced materials and technologies, etc.)
- Other activities (joint organisation of national and international conferences, support and promotion of tuition in materials science and engineering at universities, including doctoral studies, etc.)

Expertise on following materials:

Thanks to the structure of CSNMT, the expertise covers nearly all engineering materials.

Actual research domains concerning materials technology / Competences :

(Actual research domains of some collective members of CSNMT are given below)

Faculty of Mechanical Engineering, Brno University of Technology , www.fme.vutbr.cz

- Development of research techniques (micro- and nanotomography, holographic and confocal microscopy, optical diffraction and optical image processing, contactless measurement of the surface quality, etc.).
- Nanomaterials and nanotechnologies (e.g. transparent nanoceramics, bioceramics, hollow ceramic fibres, ZrO₂ ceramics for biomedicine applications, etc.).
- Etching and modification of solid surfaces and thin films by broad ion beams. Design and application of UHV apparatus for direct deposition of ultrathin films by focused

ion beam.

- In-situ analysis of surfaces and deposited films. Building-up of research techniques or design of apparatuses: TOF LEIS, SIMS, XPS, STM/AFM in UHV conditions, LEED.
- Mechanical properties and structure of materials.
- Ab initio approaches to determination of elastic and magnetic properties of crystals.
- Multiaxial fatigue of metallic materials.
- Quantitative fractography by means of stereogrammetrical methods.
- Cracks/microcracks behaviour in selected composites with brittle matrix.
- Thermal barrier coating.
- Electrospun nanofibres for bio-inspired composite materials.
- Plasma spark sintering.
- The modelling and experimental study of structural stability of modern heat resistant steels and their weldments, electron beam welding.

COMTES FHT, Inc., Plzeň, www.comtesfht.cz

The main competences of COMTES FHT are:

- Development of forming and heat treatment processes with the aid of computer and physical modelling. Numerical simulation of forming processes.
- Development of special metal processing techniques, such as SPD processes, etc.
- Basic and applied research into ferrous and non-ferrous materials.
- Comprehensive services in the fields of materials analysis, mechanical testing and thermophysical measurement.

Institute of Plasma Physics, Academy of Sciences of Czech Republic, Praha, www.ipp.cas.cz

- Spark plasma sintering of powder materials.
- Plasma spraying of coatings and free standing bodies.
- Properties of plasma-sprayed materials.
- Characterisation of plasma-sprayed materials.
- Materials for fusion applications.
- Nanocrystalline and amorphous coatings.

SVÚM a.s , Research and Testing Centre, www.svum.cz

- Static and fatigue testing, fracture toughness, crack propagation, contact fatigue.
- Fractographic and X-ray analyses and microanalysis.
- Damage mechanism, creep strength tests up to 1200°C, creep crack growth, long term structural stability, high temperature corrosion, corrosion resistant coatings.
- PTFE and Teflon products, self lubricated bearing foil Metaloplast.
- High performance permanent magnets.



- Failure analyses of constructional components and investment plants.

Faculty of Metallurgy and Materials Engineering, VSB-TU Ostrava, www.vsb.cz

- Continuous casting.
- Super Alloys (Ni base).
- Sulphide stress cracking.
- Corrosion resistance of high-alloy materials.
- Fracture toughness of ceramic cutting tools.

Institute of Thermomechanics, Academy of Sciences of Czech Republic, www.it.cas.cz

- Non-destructive material characterisation and diagnostics (acoustic emission, ultrasound, guided waves, crystal acoustics, acoustic microscopy, ultrasonic spectroscopy and nonlinear acoustics).
- Development of novel acoustic, ultrasonic, and optical methods.
- In-situ techniques.
- Physical properties of phase transforming materials.
- Shape memory alloys.
- Smart structures and composites.
- Functional materials and actuators.

Faculty of Mechanical Engineering, Technical University Liberec, www.fs.tul.cz

(see also The Institute for Nanomaterials, Advanced Technology and Innovation, <http://cxi.tul.cz/en/>)

- Characterisation of metals and non-metallic materials (composites, intermetallics).
- Surface Engineering – coatings, nanolayers, RF PVD deposition, diamond-like carbon (DLC), nanocrystalline diamond (NCD), TiO₂ layers.
- Testing of properties of thin layers (biocompatibility (endo-prosthesis), barrier coatings – thermal and wear resistant, tribological properties).
- Nanostructured coatings for solar energy applications.
- Toxicity of nanomaterials.
- Nano-fibred materials for implants and tissue engineering.
- etc.

Institute of Physics, Academy of Sciences of Czech Republic, www.fzu.cz

- Fundamental processes of crystal growth, phase transformations and plastic deformation.
- The properties of intergranular and interphase boundaries, grain boundary.
- Migration and segregation, interfaces in shape memory materials, the impact of interfaces on deformation processes and transformation reactions.
- Preparation of oriented single crystals and bicrystals with fully characterised

boundaries.

- Characterisation of thin layers, quantitative phase analysis.
- In situ deformation in TEM.
- Multi-scale modelling of material properties for the interpretation of experimental findings spanning from the models based on the anisotropic continuum to the atomistic simulations.

Faculty of Mechanical Engineering, Czech Technical University Praha,
www.fs.cvut.cz/en

- Structure and mechanical properties of wrought and cast HSLA steels.
- Development of new testing methods for diagnostics of metallic materials.
- Processing and properties of advanced magnesium alloys.
- Optimisation of constitution and heat treatment of tool steels made by powder metallurgy.
- Carbon – carbon composites for bioengineering.
- Research on polymeric and composite materials for automotive applications.
- Development of materials for custom-fit products.
- Development of polymer composite materials for high performance machining systems.
- Damage and durability of thermoplastic polymer nanocomposites.
- Recycling processes for engineering plastics.

Faculty of Nuclear Science and Physical Engineering, Czech Technical University Praha , www.fjfi.cvut.cz/en

- Fractography, fractographic reconstruction of fatigue crack history.
- Failure Analysis.
- Damage processes of thermally sprayed coatings.
- Numerical Modelling of Stress and Strain Fields in Failure Processes.
- Advanced materials – Intermetallics, Ceramics, Composites, etc.

Institute of Physics of Materials AS CR, Brno, www.ipm.cz/en

- Creep, high-cycle and low-cycle fatigue, creep-fatigue interaction and other types of mechanical loading.
- Brittle fracture and fracture mechanics.
- Processing, microstructure and mechanical properties of ultrafine-grained metals and alloys.
- Dislocation substructure, recovery and recrystallisation of metallic materials.
- Thermodynamic, diffusion and magnetic properties.
- Microstructure of phases.
- Particle and fibre-reinforced metal-base composites and nanocomposites.



Department of Physics of Metals, Faculty of Mathematics and Physics, Charles University, Praha, www.mff.cuni.cz/to.en

- Mechanical properties of metals and alloys.
- Properties of magnesium and aluminium alloys.
- Properties of intermetallics.
- Acoustic emission.
- Electron microscopy.
- Thermophysical properties of materials.

ŠKODA RESEARCH, Ltd. Plzeň, www.vzuplzen.cz/en

- Investigation of Material Behaviours.
- Metallurgical research.
- Standard Tests of Vehicles.
- Fatigue Life Assessment.
- Noise and Vibration Measurement.
- Electrotechnical Testing.
- Computer Simulation.
- Computational Fluid Dynamic.
- Application of thermal spray technology.

Available research infrastructure :

An overview of the research infrastructure available at each collective member laboratories can be found through the above mentioned websites.

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CZ 116 68 Praha 1
Czech Republic

URL: <http://www.csnmt.cz/en>

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