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# Department of Physics of Materials

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*„Our primary objective is a complex investigation of structural and functional materials and development of perspective materials for advanced applications.“*

## Offer

- Expertise in understanding of material properties
- Complex support in analysis of material performance and failure analysis
- Knowledge-based consultancy for improved material design, processing and performance
- State-of-the-art experimental equipment and experienced research staff for cutting-edge basic and applied research

## Expertise

- Characterization of the microstructure of materials by means of transmission electron microscopy (TEM), scanning electron microscopy (SEM) and atomic force microscopy (AFM)
- Mechanical properties analysis under room and elevated temperatures; investigations by acoustic emission
- Phase transformation and microstructure evolution analysis during heat treatment by means of differential scanning calorimetry, dilatometry and electrical resistivity measurement
- Modelling of microstructure evolution, phase transformations and plastic deformation of metallic materials

## Research Areas & Excellence

The Department primary objective is a complex investigation of structural and functional materials and development of perspective materials for advanced applications.

To approach the research topics, the team combines experience, knowledge and advanced analytical techniques to suggest solutions to current problems in applications of structural and functional materials.

## Key Research Equipment

- Microscopy (Transmission electron microscopy, Scanning electron microscopy, Atomic force microscopy)
- Thermal analysis equipment (Dilatometry, Differential scanning calorimetry, Electrical resistivity)
- Mechanical properties (Deformation testing, Microhardness measurement, Acoustic emission, Internal friction)

## Partnerships and Collaborations

### Academic and Research Partners

- Czech Academy of Sciences
- Czech Technical University – Department of Solid State Engineering, Czech Republic
- University of Chemistry and Technology – Department of Metallic materials and Corrosion Engineering, Czech Republic
- Max-Planck-Institut für Eisenforschung, Germany
- Helmholtz-Zentrum Geesthacht, Germany
- TU Clausthal, Germany
- BTU Feiberg, Germany
- Pohang State Technical University, South Korea
- Clemson University, USA
- Paul Scherrer Institut Villigen, Switzerland
- Institute National Polytechnical Grenoble, France
- Universität Wien, Austria
- Ruhr- Universität Bochum, Germany
- Ufa Aviation Technical University, Russia
- Eotvos Lorand University, Hungary
- University of Zilina, Slovakia

### Public and Private Sector

- Airbus, Germany
- Beznoska, Czech Republic
- Al Invest, Czech Republic
- Valeo, Czech Republic

## Main Research Projects

- EU FP6 project „**MagForming**“ - The project was focused on the development of new technologies for the deployment of magnesium alloys in aerospace industry. The partners in the project consortium were e.g. Airbus (EADS) or Liebherr
- Czech Scientific Foundation project “**AdMat Research Center of Excellence**” - Research cluster of six well-established institutions based in the Prague region. The cluster is focused on fundamental research of advanced materials (coordinating partner)
- „**NanoCent – Nanomaterials Centre for Advanced Application**“ financed by ERDF. The main objective of the research centre is the investigation of nanomaterials for applications in microelectronics, spintronics, energetics and biomedicine, in particular the development and design of heavily perturbed C (Li-Ion batteries), nanocrystalline and epitaxial thin layers (LEDs), nanocrystalline metal oxides and ultrafine-grained magnesium and titanium alloys (stents, body implants)

## Achievements

- Collaboration on Czech patent No. 304445: Process of joint implant production (patent holder Beznoska s.r.o.);
- Publications in respected international journals with high impact factors e.g.: Acta Materialia, International Journal of Plasticity, Materials Science and Engineering-A, Journal of the Mechanical Behavior of Biomedical Materials, Journal of the European Ceramic Society etc.

## Are you interested in this expertise?

**Please contact CPPT UK**

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## Experts and their Department

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