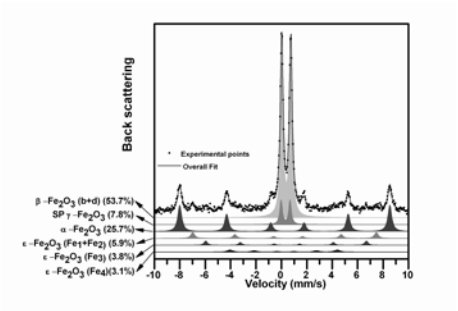
Research division: Nanocrystallite metal oxides

Conversion electron Mössbauer spectroscopy and conversion X-ray radiation

Conversion electron Mössbauer spectroscopy (CEMS – *Conversion Electron Mössbauer Spectroscopy*) and conversion X-ray Mössbauer spectroscopy (CXMS – *Conversion X-ray Mössbauer Spectroscopy*) are a pair of methods, which help to investigate mössbauer radiation in backscattering geometry (BMS – *Backscattering Mössbauer Spectroscopy*). Considering the energy losses during non-elastic collissions in the examined material is the scope of conversion electrons, or conversion X-ray radiation very short (300 nm, resp. 1–10 μm). Therefore, this technique is suitable for studying thin films and surface phase composition of the materials.



CEMS and CXMS act as supporting methods in material physics, nanotechnologies, metallurgy, chemistry, archaeometry, geology and mineralogy. Spectra can offer valuable information about corrosion processes and their inhibition (steel phosphatizing, study of oxide layers), catalysis, magnetic structures, changes in properties of wrought material surfaces etc.

Our laboratory is equipped by CEMS/CXMS spectrometer CEMS2010. We offer contract measuring of qualitative and quantitative phase composition of thin layers containing iron.

- **Operation parametres of the spectrometer:**
  - Detection technique: Integral Mössbauer spectroscopy of conversion electrons, or conversion X-ray radiation.
  - Detector type: Proportional flow detector for measuring in room temperature.
  - Counting mixture: He (Ar) / 0–25% CH_4.
  - Detected radiation: 7,3 keV K conversion electrons, or 6,3 keV K_α characteristic X-ray radiation.
  - Registration: 1024 channels.
- **Requirements on specimens:**
  - Sample containing compact iron in solid phase (maximum dimensions 15 mm in diameter and 7 mm high) with as smooth surface as possible, or powder material (e.g.. *core-shell* particles).
  - It is possible to measure electrically conductive materials as well as insulators.
- **Examples of performed studies of phase composition:**
  - Catalytic layers deposited by methods APCVD, USP, *spin coating*, *magnetron sputtering* a *solid-state deposition*.
  - Wüstit semiconductive senzors.
  - Surface crystallization of the alloys Fe-Co-Ni-Cu-B.

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