

Laboratory of identification and characterization of geomaterials

Institute of Geonics of the CAS



Contact

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Competences

The laboratory has long been engaged in a comprehensive material research on rocks and minerals, energy raw materials, modified geomaterials and selected building materials. The basic research area is characterization of geomaterials in terms of their structure, mineralogical composition and chemico-physical properties using spectroscopic and microscopic methods (infrared and Raman spectroscopy; optical, confocal and infrared microscopy), and methods of thermal analysis and physical sorption of gases. Clay minerals and their use in the preparation of advanced composites and nanocomposites with specific properties represent another important field of research.



SETSYS TG-DTA/DSC 24 thermal analyser with mass spectrometer (Setaram Instrumentation)

Key devices

Instruments for infrared and Raman spectroscopy

- NICOLET 6700 FT-IR spectrometer with NICOLET NXR FT-Raman module (Thermo Fisher Scientific)

- NICOLET iN10 FT-IR microscope (Thermo Fisher Scientific)

Instruments and software for microscopy and image analysis

- NIKON Eclipse 80i optical polarization and fluorescence microscope

with MÄRZHÄUSER Scan-24-410 motorized scanning stage

- NIKON Eclipse LVDIA-N optical polarization microscope
- OLYMPUS BX 50 optical polarization and fluorescence microscope
- OLYMPUS LEXT OLS 3100 laser confocal microscope
- NIKON SMZ25 and NIKON SMZ2T stereomicroscopes
- Image processing and analysis systems: NIS Elements (Nikon), LUCIA Vitrinite, LUCIA Concrete (Laboratory Imaging, Ltd.) and Matlab Image Processing Toolbox

Instruments for thermal analysis

- SETSYS TG-DTA/DSC 24 thermal analyser with mass spectrometer (Setaram Instrumentation)
- SETSYS 12 thermal analyser (Setaram Instrumentation)
- Izomet 2104 – device for measuring thermal conductivity and specific heat capacity of geomaterials

Instrument for measuring specific surface area and pore size distribution in geomaterials by gas physisorption methods

- ASAP 2026 surface area and porosity analyser (Micromeritics)

Equipment for preparation of analytical samples

- FRITCH „Pulverisette 5“ laboratory planet mill - agate, ZrO₂
- FRITCH „Pulverisette 1“ jaw crusher + „Pulverisette 13“ disc mill
- DISCOPLAN-TS device for automatic cutting and grinding of mineralogical samples (Struers)
- BUEHLER SimpliMet XPS1 mounting press for preparation of microscopic polished sections



Microscopic preparation (rock thin section) in transmitted light of NIKON Eclipse 80i optical microscope

Our services

- Analysis of composition, structure, thermal stability, corrosion states and physico-chemical changes in geomaterials and building materials (optical and IR microscopy, image processing and analysis, IR and Raman spectroscopy, TG-DTA/DSC thermal analysis)
- Technical mineralogy and petrography
- Coal petrography (maceral analysis, vitrinite reflectance)
- Measurement of thermal properties of geomaterials (specific heat capacity and thermal conductivity, TMA)
- Measurement of specific surface area and pore size distribution in materials by gas physisorption methods
- Analysis of tendency of metallurgical by-products towards volume changes
- Analysis of condition and probable origin of historical building materials

- Professional consultation and expertise

Target groups

Target groups for cooperation are industrial as well as academic institutions, whose activities are related to the use of Earth's crust, especially in the field of engineering geology, geotechnics, and building materials. We also offer cooperation to partners from the field of extraction and processing of raw materials, metallurgy and materials engineering, underground engineering, civil engineering, highway and railway construction, or to monument care institutions.