



# LABORATORIES & TECHNICAL EQUIPMENT

## Faculty of Earth Sciences and Spatial Management UMCS

- TL and OSL Laboratory
- Palynological Laboratory
- Micromorphological Laboratory
- Micropaleontological Laboratory
- Meteorological Monitoring
- Hydrochemistry and Hydrometry Laboratory
- Atomic Spectrometry Absorption Laboratory
- ICP OES Laboratory
- Gas chromatography Laboratory



# Mastersizer 2000 Malvern

**Mastersizer 2000 - the most flexible and user friendly particle sizing instruments available**

**Method : laser diffraction**

**Offers:**

- Broad particle size range suitable for many different applications**
- Wide range of sample dispersion options for emulsions, suspensions and dry powders**
- Full validation documentation available**



# Analyser of CNS

**CN-concentration ratio - important for statements regarding fertility of soil,**

**sulfur content - one of the parameters determining the soil pH**

**For the analysis of very low S contents IR detector can be used**

- time for analysis of a single sample – 4 minutes
- automatic sample supply



## Epsilon5 energy dispersive X-ray fluorescence spectrometer (ED XRF)



- **Method: Energy Dispersive X-ray Diffraction Spectrometry**
- **rapid, qualitative and quantitative multi-element analysis**
- **sodium (Na) - uranium (U)**
- **to be employed in environmental monitoring in a range of industries (environmental, mining and minerals, pharmaceuticals, building and materials)**
- **Range of the method sub-ppm to %**
- **- in solids, liquids, powder, material on filters, thin films**

# Electron scanning microscope Hitachi SU6600



- for dry samples and liquids
- docummentation can be made in magnification up to 800 000 times
- big size of samples is acceptable - up to 4,5 cm thick and up to 14 cm long
- photograph of the surface and chemical composition can be made
- chemical analysis at a point can be performed
- morphology of analysed particles can be mapped

# Morphologi G3

## Analyser of shape and size of particles



- **measures the size and shape of particles using the technique of static image analysis**
- **fully automated and with integrated dry sample preparation makes it the ideal replacement for costly and time-consuming manual microscopy measurements**
- **object of analysis: size, shape, transparency, count, location**
- **range of samples 0.5-1000  $\mu\text{m}$**
- **for dry and wet samples**

# Mercurium content analysis

## Atomic absorption spectrometer AMA 254



- determines mercurium (Hg) content in all forms of its existence
  - in all types of samples
  - solids, liquids, gases
- 
- to be used in environmental research
- 
- range: ppm
  - detection limit: **0,003 ng Hg**

# Hydrochemistry laboratory

## Ionic chromatography

### analyses simultaneously

- anions (F, Cl, NO<sub>2</sub>, NO<sub>3</sub>, Br, HPO<sub>4</sub>, SO<sub>4</sub>, organic acids)
- cations ( Li, Na, NH<sub>4</sub>, K, Mn, Cs, Ca, Mg, Sr, Br)





# ICP-MS- LC quadrupol mass spectrometer with liquid chromatography



Analysis of trace metals in water and solid samples

# Equipment for analysis of isotopes of water and water vapour $H_2^{16}O$ , $H_2^{18}O$ , $HD^{16}O$



# Equipment for analysis of carbon isotopes (TC, TOC, IC) in liquids and solid samples



# Faculty of Earth Sciences and Spatial Management UMCS offers

precise measurements by the method of laser scanning 3D (TLS) of objects in different spatial scales from big factories to small objects (for example sculptures)



## Laser Scanning 3 D in practice

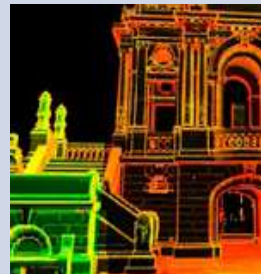
### Industry

- ✓ Location of equipment
- ✓ Inventory of industrial installations
- ✓ Industrial designing



### Building constructions

- ✓ Architecture
- ✓ Modelling in building industry (BIM)
- ✓ Documentation of cultural heritage



### Engineering

- ✓ Roads Infrastrucutre
- ✓ Engineering
- ✓ Building construction



### Criminal sciences

- ✓ Scanning places of accidents (CSI)
- ✓ Accidents documentation
- ✓ safety



## **Faculty of Earth Sciences and Spatial Management UMCS offers:**

- analysis of soil, water, air, gases, rocks and minerals, biological material etc.**
- analysis of wastes**
- classification of soils (in it recultivation after industrial impact),**
- estimation of the impact on natural environment , environmental protection in exploitation of natural resources,**
- estimation of the potential of biomass production**
- estimation of environmental hazards (for example trace metals)**