

Sample Preparation

Discovery Micro-Ultracentrifuge M120 SE

Parameters:

- Maximum speed:
120,000 rpm (648,840 x g).

Application:

- separation of liquids and suspensions of different density, weight and particle size distribution
- cooling of samples during centrifugation (up to 0 °C)



Responsible person: Ing. Martina Koneracká, CSc.

Analog Cell Disruptor® BRANSON - Model 450

Parameters:

- Output Power: 400 Watt
- Frequency : 20kHz
- Volume Sample : 1 - 20 ml

Application:

- Preparation of emulsions, dispersions, homogenization
- Shortening of magnetosome chains
- Preparation and modification of the magnetic particles.

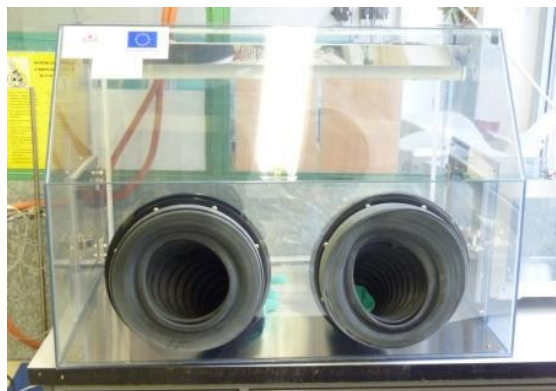


Responsible person: Matúš Molčan, PhD.

Sample characterization

Glove Box

for sample preparation and handling in a sterile and inert atmosphere



Responsible: Ing. Matúš Molčan, PhD.

PCR Box

for sample preparation and handling in a sterile environment



Hydraulic press

CrushIR – for making pellets for FTIR analysis



Freeze dryer IISHINEurope TFD5503

for sample freeze-drying under vacuum and temperatures $< -55^{\circ}\text{C}$

Ultraprecise scales



Autoclave for sample preparation under high pressure and temperature



Responsible: Ing. Vlasta Závishová, PhD.

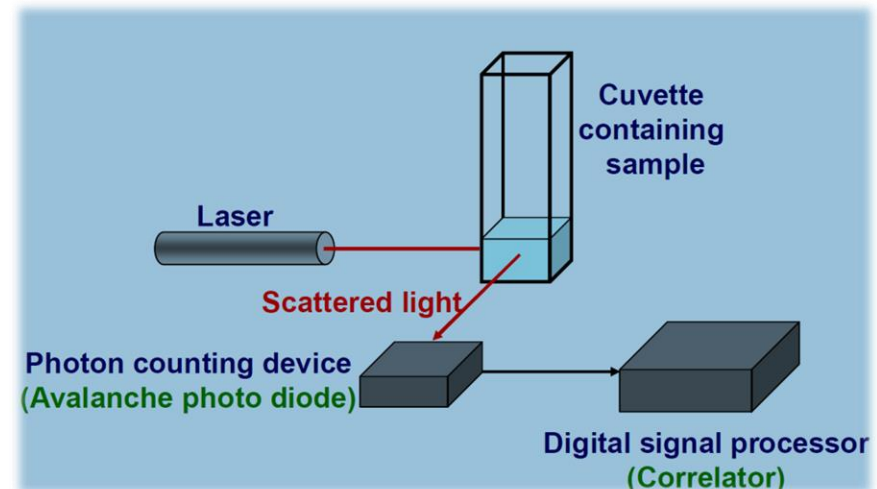
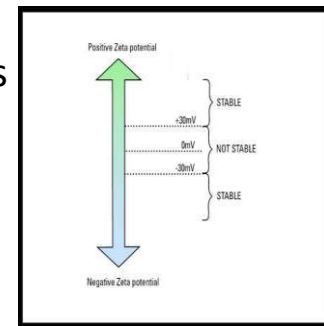
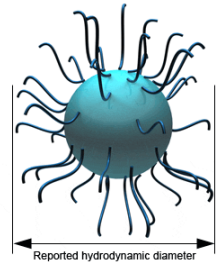


Sample characterization

Zetasizer Nano ZS

Used for:

- **particle size measurements** in range from 1 nm up to 3 μm using Dynamic Light Scattering method (the Brownian motion velocity of nanoparticles in the sample is measured and converted to hydrodynamic diameter)
- **zeta potential measurement:** $<-60; +60>\text{mV}$ using Laser Doppler electrophoresis
- **molecular weight** (342 Da to 2×10^7 Da)
- **autotitration** (pH/ionic strength vs. Zeta potential)
- thermal stability measurements (melting point of proteins or polymers can be determined)

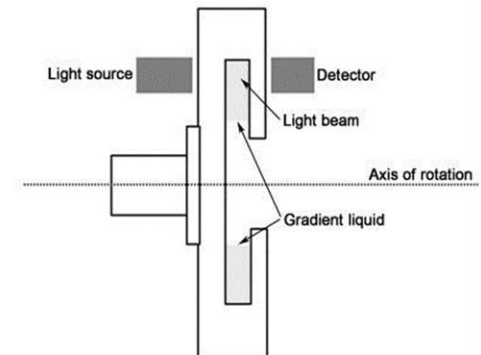
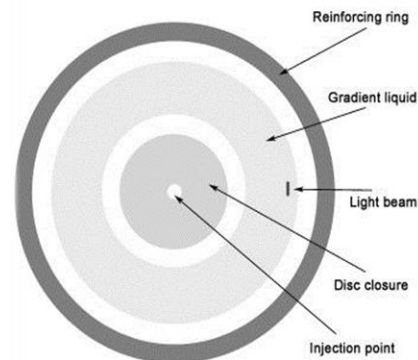
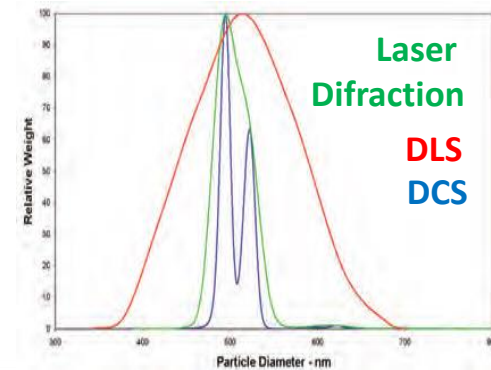


Sample characterization

CPS Disc centrifuge DC 24000 UHR

Utilization:

- particle size analysis in the range 5 nm – 40 μm
- rotating disc velocity 600 - 24 000 RPM
- The time for particles to reach the detector beam versus beam intensity is converted to a size distribution - differential sedimentation method



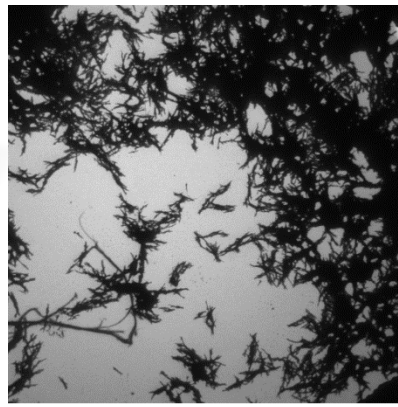
Responsible: Ing. Martina Koneracká, PhD.

Sample characterization

Low Voltage Electron Microscope LVEM5

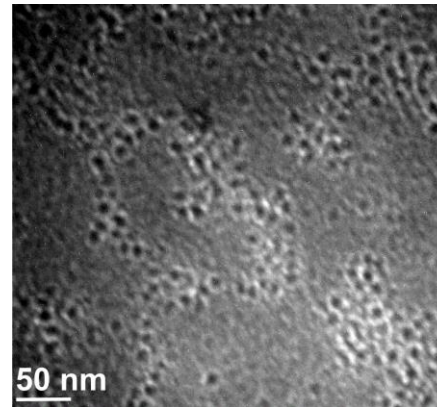
Compact transmission electron microscope.

- LVEM5 combines transmission (TEM, STEM) and surface scanning (SEM) observation modes including electron diffraction (Saed)
- high contrast on light elements comes from the low accelerating voltage (5 kV)
- resolving power - 2 nm
- allows to provide high contrast results with no addition of contrast-enhancing staining procedures in life science

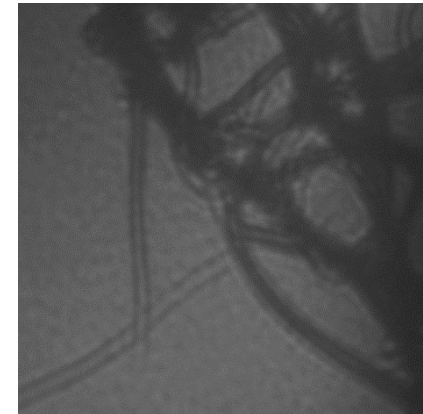


FOV 25700 nm

Lysozyme fibrils



Magnetic nanoparticles



FOV 772 nm

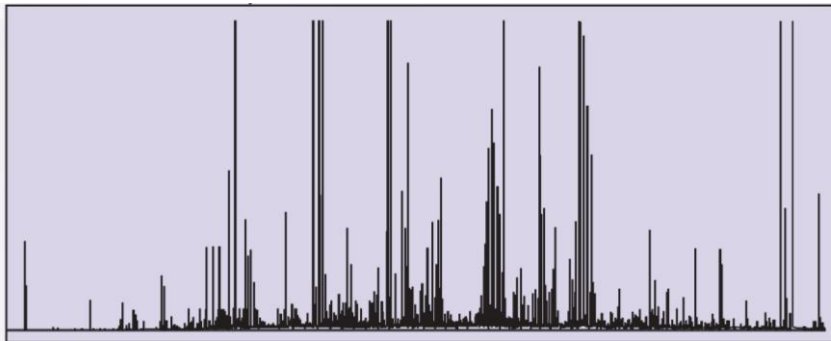
Carbon nanotubes

Sample characterization

ICP –AES spectrometer

Inductively coupled plasma atomic emission spectroscopy

- plasma emission spectrometer for qualitative and quantitative analysis of the sample (over 70 elements)
- samples are introduced in the spectrometer in a liquid form
- an atom subjected to a plasma emits characteristic photons, this property makes it possible to perform a **qualitative analysis**
- the number of photons emitted is proportional to the number of atoms of the considered element, this is the basis of the **quantitative analysis**
- extended spectral range from 120 to 800 nm
- detection limit 0,01 µg/ml



Full spectrum acquisition (120–800 nm)



Responsible: Ing. Zuzana Mitróová, PhD.