



Joint Institute for Nuclear Research



Frank Laboratory of Neutron Physics



Department of Neutron Investigations
of Condensed Matter



LABORATORY EQUIPMENT



ALL THAT YOU NEED
FOR BRILLIANT RESULTS!



2018



Biochemical Laboratory Equipment

You are welcome
for sample
preparation and
investigation of the
soft matter objects



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Density meter DMA 5000

Features

The Anton Paar DMA 5000 density meter is designed to measure the density of liquids and gases in wide temperature range.



Specifications

Measuring range:	Density 0 g/cm ³ to 3 g/cm ³
Sound velocity	1000 m/s to 2000 m/s
Temperature	0 °C to 70 °C (32 °F to 158 °F)
Pressure	0 bar to 3 bar (0 psi to 44 psi)
Repeatability s.d.	
Density	0.000001 g/cm ³
Temperature	0.001 °C (0.002 °F)

Future information and theory

<https://www.anton-paar.com/corp-en/products/details/dmatm-5000-m-density-meter/>

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pH- and Ion- meter

Features

pH-meters is designed to measure the pH and the temperature of the sample. The glass electrode, which measures the hydrogen-ion activity of a sample, consists of an internal sealed tube containing a standard solution and silver – silver chloride half-cell. A pH-sensitive glass bulb forms the immersion end of this tube. The measurement is accomplished by determining the electrical potential that is developed across the glass membrane between the sample and the standard solution within the glass electrode.



Future information and theory

https://www.mt.com/de/en/home/products/Laboratory_Analytics_Browse/pH/benchtopen_meter/SevenCompact/S220_pH-Ion.html

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Stereo microscope

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Features

The TOP-CLASS STEREO ZOOM RESEARCH MICROSCOPE is equipped with polarizing attachment, photo equipment, different stages, mounting adapters for system integration, different stands, illumination ring for inspection of electrical parts.



Eppendorf termomixer

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Features

EPENDORF TERMOMIXER COMPACT

The Termomixer compact is designed for incubating and mixing aqueous solutions in sealed micro test tubes. Temperature between 4°C above room temperature and 99°C can be maintained exactly and constantly. Mixing frequencies can be set between 300 rpm and 1400 revolutions per minute (rpm).



Eppendorf centrifuge

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Features

The Centrifuge 5415 C is designed for centrifugation of 12 Eppendorf Micro Test Tubes simultaneously in a 45 degree fixed-angle rotor at 14,000 rpm



NanoPhotometer

Features

Implen GmbH has developed the NanoPhotometer P360 to analyze ultra low sample volumes of 0.3µl while maintaining high accuracy, reproducibility and speed.

Small volume and cuvette capability always standard; Standalone mobile design with large LCD display and available thermal printer for convenient direct printing; Electronic data can be automatically generated in a variety of file formats when connected to a PC. 3.5 seconds per reading.



Future information

<https://www.intas-shop.com/de/implen-nanophotometer-p-class-360.html>

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Centrifuges

Features



Thermo Scientific SL 16 Centrifuge

temperature: -10-40°C
max speed: 15200 rpm
Run Time: 9 hr. 99 min. plus HOLD
various number of rotors



Heraeus Biofuge 15R

temperature: 4-45°C
max speed: 15000 rpm
run time: 1-99 min

Future information

<https://assets.thermofisher.com/TFS-Assets/LED/manuals/D21713~.pdf>

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Spin Coater

Features

Spin coating is a widely used and versatile technique for depositing materials onto substrates with accurate and controllable film thicknesses.



Specifications

User Profiles	10
Programs	10 programs on each user profile, with up to 50 steps each
Speed stability	<2% error
Speed	120 to 6000 RPM
Spin time	1 - 1000 sec
Power supply	DC 24V 2A, via 100-240v 50/60Hz power adapter
Safety Switch	Magnetic safety switch on the door
Dimensions	225 x 170 x 132 mm
Materials	Polypropylene bowl, steel casing, tempered glass lid

Future information

<https://www.ossila.com/products/spin-coater>

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UV-Ozone Cleaner

Features

The PSD and PSDP remove organic contaminants
 UV lamp generates UV light at both 185nm and 254nm
 Produces O3 and provides molecular excitation
 Operates at atmospheric pressure with ambient air or oxygen
 Multiple gas ports for the introduction of gases
 Sample Stage with Adjustable sample to lamp distance
 Safety switched to prevent user exposure to UV light



Future information

http://www.novascan.com/products/psd_uv_details.php

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OTHER EQUIPMENT

Distilled water system MiliQ



Refrigerators

2 standard refrigerators with temperature -20°C and $+4^{\circ}\text{C}$

Refrigerator with temperature -40°C

Incubators

2 incubators with temperature range from 5°C to 60°C



Termobox



Branson ultrasonic bath

Balances

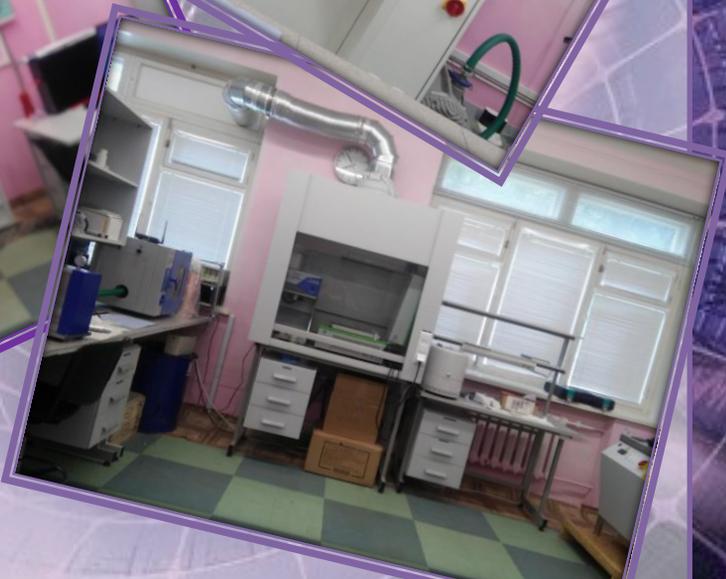


Bioblock Scientific Vacuum ovens



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Electrochemical Laboratory Equipment



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X-ray Diffractometer EMPYREAN (PANalytical)



Features

- Analysis of phase composition and type of crystal structure and microstructural parameters of polycrystalline materials (films, nanomaterials and solid objects).
- Analysis of structural phase transition in a wide temperature range from 15 to 1200 K.
- Fast measurements and high reproducibility of results.
- Simple procedure of sample preparation, small sample volume.

Specifications

Working parameters	power supply ~ 40 kV, current ~ 40 mA
Feature	It has a vertical goniometer with 240 mm radius
Step size	~ 0.0001°
Scattering angle	1° < 2θ < 168°
Signal processing	Auto- and cross-correlation operation modes. Linear and logarithmic scale.
Detector	PIXcel3D
Wave length	Co radiation (~ 1.789 Å) ³
Sample environment	Low temperature cryostat "Phenix" (15 – 300 K) High temperature chamber Anton-Paar RT-1300K (Air, Inert gas, Vacuum)



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Future information and theory

<https://www.malvernpanalytical.com>

OTHER EQUIPMENT

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- H₂O-free argon glove box (<1-2 ppm O₂ and H₂O).
- Battery testers 10μA-6A, up to 6V, 8 channels.
- Coin cell press machine (assembling, disassembling).
- Coating machine for electrodes.
- Rolling machine for cylindrical cells.
- High temperature rolling press machine (up to 200°C).
- Vacuum oven (up to 250°C).
- Exhaust box.
- Vacuum mixer (50 -200 ml).
- Planetary mill (up to 850 rpm; agate, ZrO₂, PTFE jars).
- Presses up to 10 ton.
- Laboratory scales.
- Elins P-20X, P-50X potentiostats (10nA – 10A, up to 15V) .

COMING SOON!

NEW

**Laboratory
Equipment**

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AFM NTEGRA

Features

NTEGRA Prima is a multifunctional device for performing the most typical tasks in the field of Scanning Probe Microscopy.



Applications

Biology and Biotechnology

Proteins, DNA, viruses, bacteriums, tissues

Materials Science

Surface morphology

Polymers and Thin Organic Films

Spherulites and dendrites, polymer monocrystals, polymer nanoparticles, LB-films, thin organic films

Nanomaterials

Nanopowders, nanocomposites, nanoporous materials

Nanostructures

Fullerenes, nanotubes, nanofilaments, nanocapsules

Nanoelectronics

Quantum dots, nanowires, quantum structures

Specifications

Sample size	Up to 40 mm in diameter, up to 15 mm in height	
Sample weight	Up to 100 g	
XY sample positioning range, resolution	5x5 mm, 5 μ m	
Positioning sensitivity	2 μ m	
Scan range	100x100x10 μ m	
Non linearity, XY (with closed loop sensors)	$\leq 0.1\%$	
Noise level, Z (RMS in bandwidth 1000 Hz)	0.04 nm	
Noise level, XY (RMS in bandwidth 200 Hz)	With sensors	0.2 nm (typically), ≤ 0.3 nm (XY 90 μ m)
	Without sensors	0.02 nm (XY 100 μ m), 0.001 nm (XY 1 μ m)
Linear dimension estimation error (with sensors)	$\pm 0.5\% \pm 1.2\%$	
Optical viewing system	Optical resolution	3 μ m
	Field of view	4.5-0.4 mm
	Continuous zoom	available
Vibration isolation	Active	0.7-1000 Hz
	Passive	above 1 kHz

Future information and theory

<https://www.ntmdt-si.com/products/modular-afm/ntegra-ii>

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Particle size and zeta potential analyzer



Features

Photocor Compact-Z model are suitable for particle size and zeta potential measurements. Particle size measurements in opaque dispersions are available in back-scattering mode.

Fast measurements and high reproducibility of results.

Simple procedure of sample preparation, small sample volume. Using various square and cylindrical optical cells including flow-through cuvettes. High-sensitive APD photon counting system.

Different options are available that allows selecting the best instrument for your applications and budge.

Specifications

Measurement range	Particle size: 0.5 nm to 10 μm ¹ (diameter) Diffusion coefficient: 10 ⁻⁵ ... 10 ⁻¹⁰ cm ² /s
Accuracy	±1%
Sample volume	Particle size measurements: 50 μL to 4 mL (Zeta potential measurements: 1 mL to 3 mL)
Scattering angle	20°, 90°
Signal processing	Auto- and cross-correlation operation modes. Linear and logarithmic (multiple-tau) time scale. True real-time operation up to the fastest sample-time of 10 ns
Laser	TEC stabilized diode laser 638 nm, 25 mW ³
Thermostat	Temperature range: 5°C - 90°C, accuracy 0.1°C (thermoelectric module)
Zeta potential	Analysis methods: Electrophoretic light scattering (ELS), Phase analysis light scattering (PALS)

Future information and theory

<https://www.photocor.com>

Laboratory equipment

for synthesis and investigation of
new materials



Investigation of electronic,
thermal and dynamical
properties of new
materials



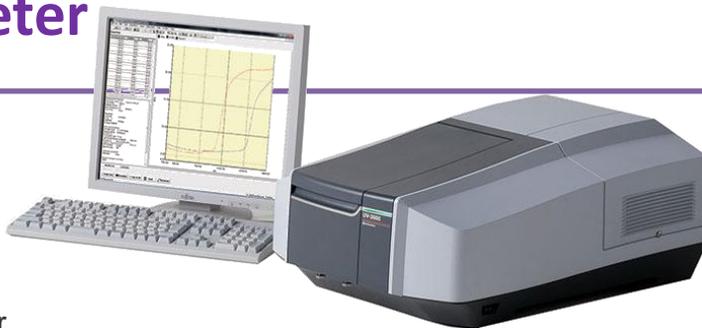
Synthesis of organic and
metallo-organic materials



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Shimadzu UV-Visible Spectrophotometer



Features

The compact Shimadzu UV-Visible Spectrophotometer UV-2600 is a universal, research – grade spectrophotometer that can be used in a wide range of fields, and easily expanded to suit the measurement objective. Validation software is provided as standard for instrument.

Specifications

Spectral range	185-900 nm
Resolution	0.1 nm
Wavelength accuracy	± 0.3 nm
Photometric range	-5 to +5 Abs
Photometric accuracy	± 0.002 Abs (at 0.5 Abs); ± 0.003 Abs (at 1 Abs); ± 0.006 Abs (at 2 Abs); ± 0.3% T
Light source	50 W Halogen Lamp
Optical System	Double Beam, Single Monochromator
Spectral Bandwidth	0.1, 0.2, 0.5, 1.0, 2.0 or 5.0 nm

Future information and theory

<http://www.shimadzu.com>

<https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/spectrpy/uv-vis/spectrum.htm>

http://www.rsc.org/learn-chemistry/content/filerepository/CMP/00/001/304/UV-Vis_Student%20resource%20pack_ENGLISH.pdf

Differential Scanning Calorimeter DSC 204 F1 Phoenix



Features

Tau-sensor offers a high level of calorimetric sensitivity along with extremely short signal time constants of only 0.6 seconds, which guarantees good separation of overlapping thermal effects.

Proteus software on Windows includes everything you need to carry out a measurement and evaluate the resulting data. Determination of onset, peak, inflection and end temperatures.

Automatic peak search.

Transformation enthalpies: analysis of peak areas (enthalpies) with selectable baseline and partial peak area analysis.

Evaluation of crystallization.

Comprehensive glass transition analysis.

Specifications

Temperature range	-180°C to 700°C
Heating rates	0.001 K/min to 200 K/min
Compressed air cooling	RT to 700°C
Cooling rates	max. 200 K/min
Automatically controlled LN2 cooling	-180°C to 700°C
Gas control	for 2 sample gases and 1 protective gas through integrated mass flow controller and software
Gases	Nitrogen, argon, helium

Future information and theory

<https://www.netzsch-thermal-analysis.com/en/products-solutions/differential-scanning-calorimetry/dsc-204-f1-phoenix/>

Thermogravimetry TG 209 F1 Libra



Features

Fast and accurate thermogravimetric analysis over a wide temperature range
Proteus software on Windows includes everything you need to carry out a measurement and evaluate the resulting data.

Mass changes in % or mg

Determination of the residual mass

Peak temperatures of the 1st and 2nd derivative of the mass changing curve

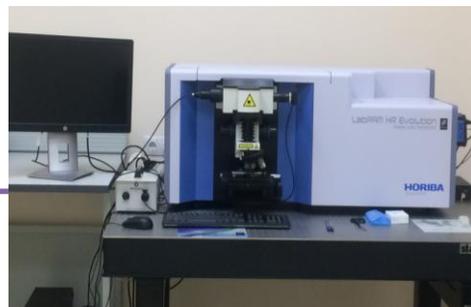
Specifications

Temperature range	RT to 1100°C at the sample
Heating and cooling rates	0.001 K/min to 200 K/min
Cooling time	12 min (1100°C to RT)
Wide measuring range	2000 mg
Resolution	0.1 µg
Sample crucible volume	up to 350 µl
Atmospheres	inert, oxidizing, static, dynamic
Vacuum-tight assembly	up to 10 ⁻² mbar (1 Pa)
Gases	Nitrogen, argon, helium

Future information and theory

<https://www.netzsch-thermal-analysis.com/en/products-solutions/thermogravimetric-analysis/tg-209-f1-libra/>

LabRAM HR Evolution Raman Microscope



Features

Fully automated Raman microscope allows fast non-destructive chemical micro-analysis and automated high definition Raman chemical imaging. Raman microscope can be used in many varied applications, including characterization of graphene/CNT materials, pharmaceuticals, geology, materials and life science

Specifications

Laser source	He-Ne 633 nm (red line) 9 mW
Resolution	1.5 cm ⁻¹
Spectral range	50 – 4000 cm ⁻¹
Temperature range	10 K - RT
Pressure range	0 - 30 GPa
Objectives	10x, 20x, 50x, 100x
Accessories	Motorized XY mapping stage
Samples	crystal, powder, liquid

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Future information and theory

<http://www.horiba.com/scientific/products/raman-spectroscopy/raman-spectrometers/raman-microscopes/hr-evolution/labram-hr-evolution-17309/>

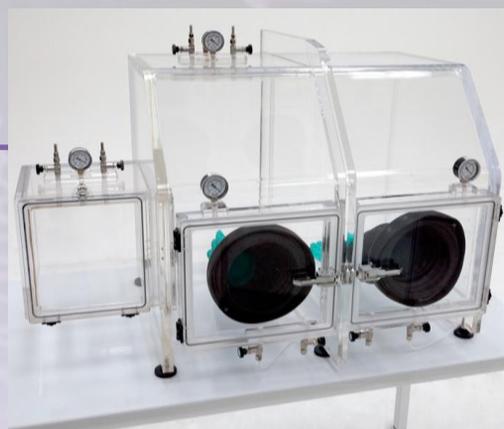
OTHER EQUIPMENT



Drying ovens



Melting point
apparatus



Dry box



Magnetic stirrers



Rotary
evaporator

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