

Annex - MRFs and Techniques

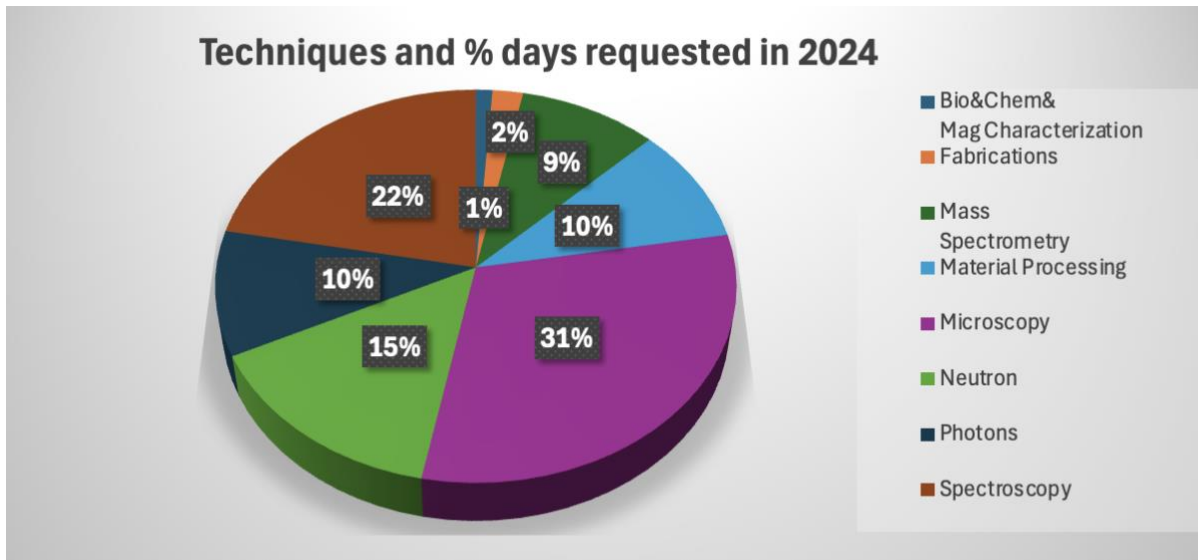


Table 1. List of MRFs open for User Call Direct Access in the year 2024 (DA 24-1 & DA 24-2)

<i>List of the MRFs suite</i>	<i>Technical details</i>
AFM	The Nanowizard II – JPK-Bruker
AFM BIO	AFM/SPM for topological images of biological samples
AFM Raman with Optical Profiler	Raman Spectrometer XploRA Plus
Confocal Microscope 1	Laser Scanning Confocal Microscope Leica TCS SP2
Confocal Microscope 2	Laser Scanning Confocal Microscope Leica TCS SP8
Confocal Microscope 3	Laser lines at 454, 488, 514, 635 nm
Cryogenic Electron Microscopy	CEM in Transmission, Thermo Scientific™ Glacios™
DNA Sequencing NGS	NextSeq 550
Dynamic Mechanical Analyzer	DMA Star Systems – Mettler Toledo
ESCALB QXi	X-ray photoelectron spectrometer XPS, UPS, REELS
FIB-SEM GAIA 3	FIB-SEM with simultaneous milling and EBSD
FT-IR Nexus	Nicolet Nexus 870
FT-IR Nicolet	Endowed with LightDrive Optical Engine components
Fluorescence Microscopy	BX51 microscope
Gas Chromatography - Ion Mobility Spectrometer	To separate & detect the components in sample mixtures
Mass Spectrometer 1	Rapiflex™ MALDI Tissue typer™
Mass Spectrometer 2	Orbitrap Fusion Tribrid mass spectrometer

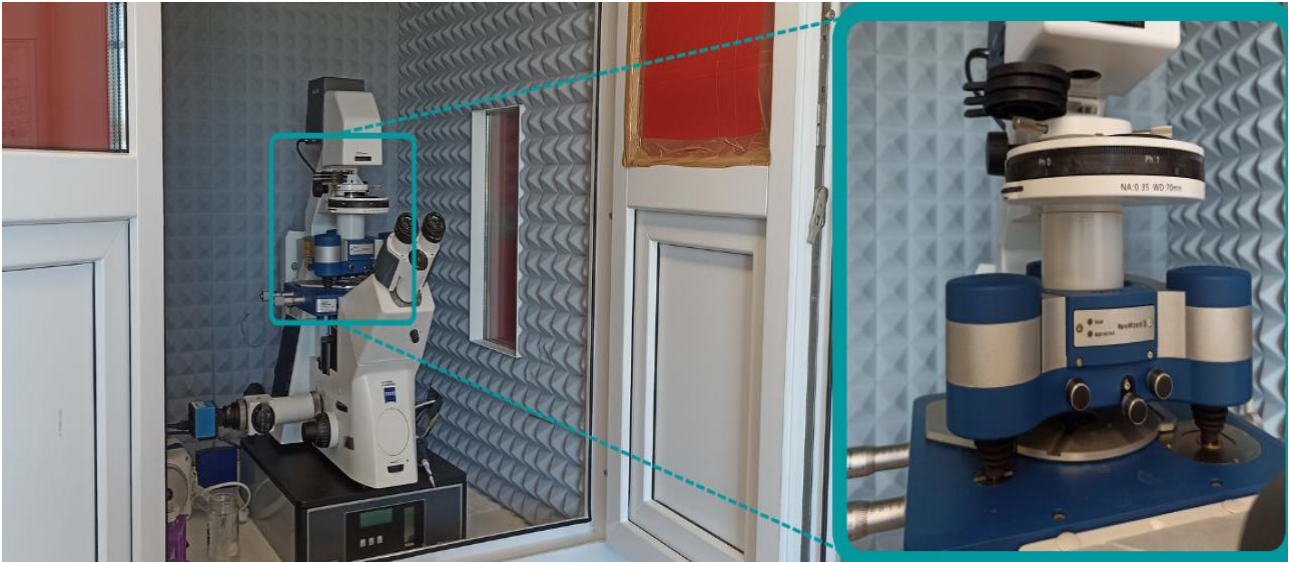
MONeutron	Prototype ground-level-neutron monitoring network
Multipurpose X-Ray diffractometer	With WAXS and SAXS
NMR 600 MHz	Bruker Avance III 600 MHz NMR
RETINA	2D/3D X-ray imaging techniques
Raman Confocal Microscope	Microscope inVia™ Qontor™ model
SAXS GISAXS	Xenocs XEUSS 3.0
SAXS WAXD	Small and Wide Angle X-ray Diffractometer, Electron Microscope
SEM FEI	SEM FEI QUANTA 200
SEM LEO SUPRA	SUPRA 35 Field Emission SEM
SEM ZEISS GEMINI	FEG-SEM with a nominal resolution of 1.2 nm
SEM ZEISS SIGMA	Scanning electron microscope - field-emission source
SEM&&C-AFM with Optical Profiler	SEM system with EDS-SPM
SOURIRE	A neutron source - Deuterium-Tritium (D-T) type
Spectrofluorimeter	Varian Eclipse Spectrofluorimeter
TEM FEI	LaB6 source (120 kV) and BF detector and FEI Eagle
TEM High Resolution	ThermoFisher Talos F200X
TEM JEOL	JEOL JEM 2100 Plus with a LaB6 emitter
TLM platform	Microscopy&time-lapse&lab-on-chip and organ-on-chip
UTEM & LUMINAD	The first national Ultrafast TEM
X-Ray diffractometer	Rigaku SmartLab SE
XRD TOMOGRAPHY	RIGAKU Nano3DX

AFM

UNIT: [University of Milano Bicocca](#)

Category: Microscopy

Key instrumentation: AFM Nanowizard II - JPK-Bruker



General information

The Nanowizard II - JPK-Bruker is designed for biological samples. It is equipped with a Zeiss fluorescence microscope, and it is used for high resolution imaging and nanomechanical characterization.

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Technical description

The AFM Nanowizard II - JPK-Bruker is optimal for soft material (live cells, cell membranes, biomaterials) investigations as well as force spectroscopy studies (ligand binding, protein unfolding and cell adhesion). It allows high-resolution images and force measurements both in air and fluid environment. The NanoWizard II is coupled with a Zeiss inverted microscope with Colibri lamp source for wide spectral fluorescence excitation (365 nm, 470 nm, 590 nm). and it can allow for DirectOverlay™ of AFM and optics images. It has a large scan field (100x100 μm^2) and a 15 μm Z scan range with highest closed loop performance through capacitive sensors. It allows for Patented DirectOverlay™ software feature for combining AFM and optical images distortion free.

Research areas and applications

Characterization of morphology of single filament of DNA and single cells, nanomechanics of single cells and biological materials, single molecule protein unfolding.

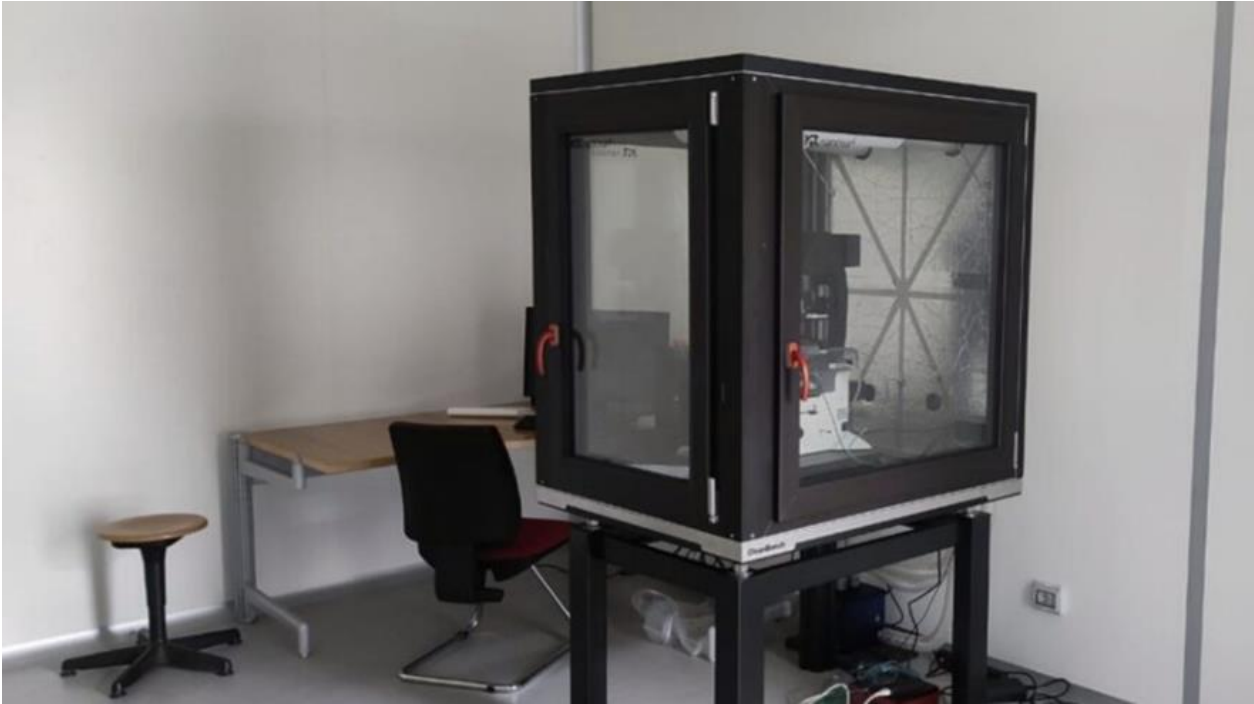
AFM Bio

General information

UNIT: [NAST Centre - University of Rome Tor Vergata](#)

Category: Microscopy

Key instrumentation: AFM/SPM



The instrument allows topological images of biological samples, e.g. tissues and cells. It can be used as a nano-manipulation instrument, allowing modifications of the morphology of a substrate. For biological systems, it also allows the nano-stimulation of the sample.

Technical description

The instrument allows to characterise of a maximum lateral dimension of $100\ \mu\text{m} \times 100\ \mu\text{m}$, a maximum height of $10\ \mu\text{m}$, and it is equipped with a cantilever holder for conductometry measurements. The optical microscope features magnification factors of 5x, 10x, 20x, 40x and maximum movements in the XY stage of $10\ \text{mm} \times 10\ \text{mm}$. Operational modes include non-contact mode, solid/liquid contact mode, solid/liquid tapping mode, solid/liquid with force spectroscopy; (Solid/Liquid) Nanolithography; Nano-Kelvin probe; and conductive-enhanced AFM.

Research areas and applications

Topographical analysis of solid substrates and biological samples in liquid, nanolithography of rigid substrates, nanostimulation of cells.

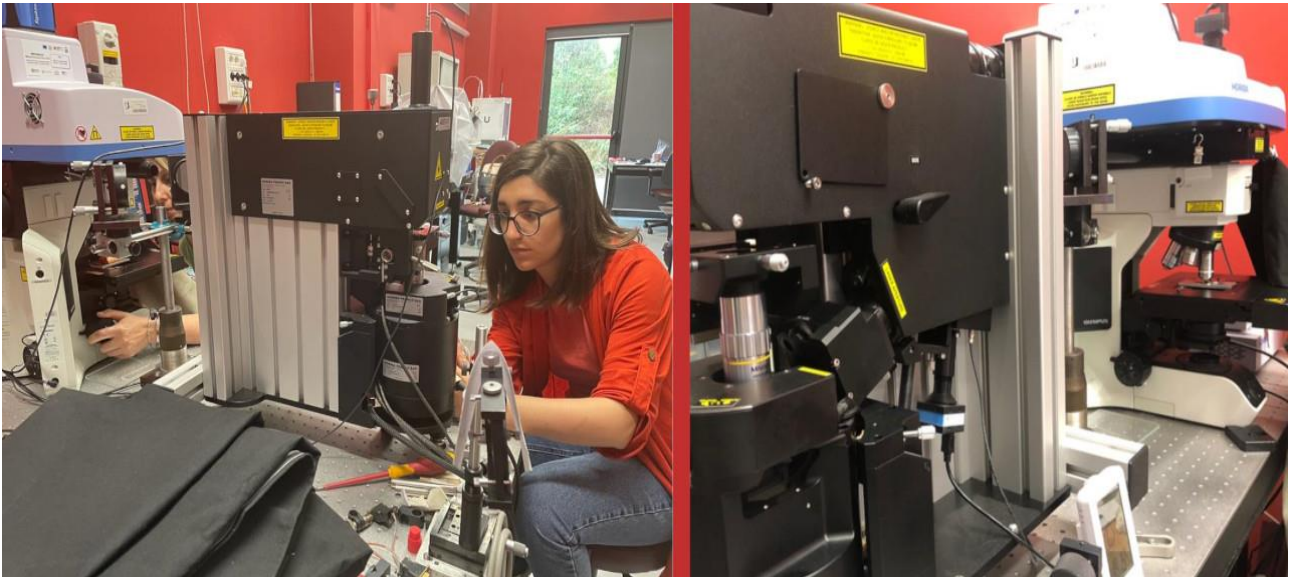
AFM Raman with Optical Profiler

General information

UNIT: [NAST Centre - University of Rome Tor Vergata](#)

Category: Microscopy

Key instrumentation: Tip-Enhanced Raman & PL spectroscopy Horiba - TERS/TEPL



The Raman Spectrometer XploRA Plus is a compact and fully automated micro-spectrometer using the vibrational Raman spectroscopy and an AFM for combined Raman-AFM and TERS. The operation modes combine confocal Raman, fluorescence and photoluminescence imaging and spectroscopy, through external manipulators and probes.

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Technical description

The RAMAN Microscope includes 3 internal lasers (532, 638 and 785 nm) combined with 12 density filters levels and 4 gratings (600, 1200, 1800 and 2400 g/mm) to cover all the UV-Vis range with maximum resolution. The wavelength range covers from 75 up to 4000 cm^{-1} .

Research areas and applications

Nanostructured materials characterization; spatial characterizations; 3D Raman imaging; polymers; pharmaceuticals; gem investigation and mineral phases.

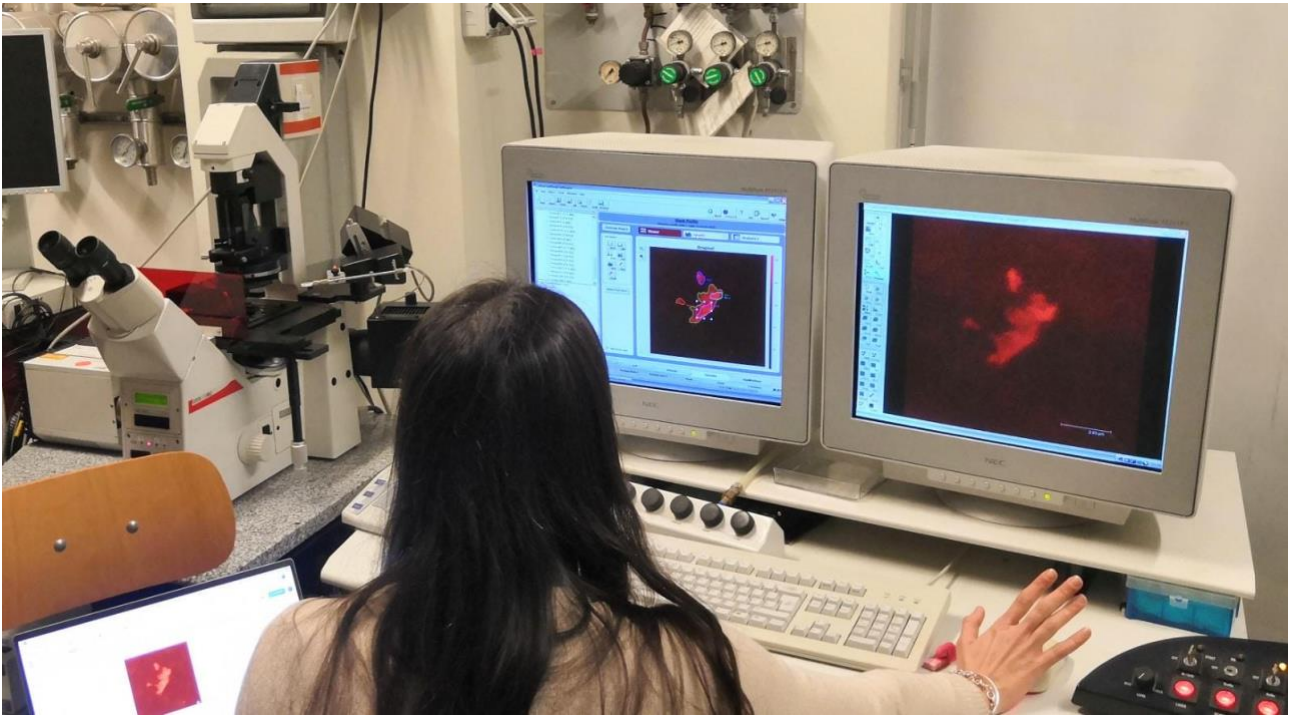
Confocal Microscope 1

General information

UNIT: [CSGI - University of Florence](#)

Category: Microscopy | Spectroscopy

Key instrumentation: Laser Scanning Confocal Microscope



Laser Scanning Confocal Microscope Leica TCS SP2 equipped with 3 fluorescence PMT detectors.

Technical description

The instrument allows users to perform 3D imaging, spatially-resolved emission, spatially resolved FRET and FRAP, and a transmission PMT. The lasers available allow 8 excitation lines, and the microscope table allows motorized motion in 3D for imaging of larger samples. Compared to the Leica TCS SP8 microscope, this instrument represent a “entry level” version.

Research areas and applications

The instrument allows 3D chemical mapping of complex systems and interfaces; Electronics & Semiconductor, Automotive & Transportation; Metals & Machine Engineering; Medical Device QA/QC; Technical Cleanliness, Metallography, Material Analysis, Sample Preparation for Materials Science; live Cell Imaging, 3D Cell Culture.

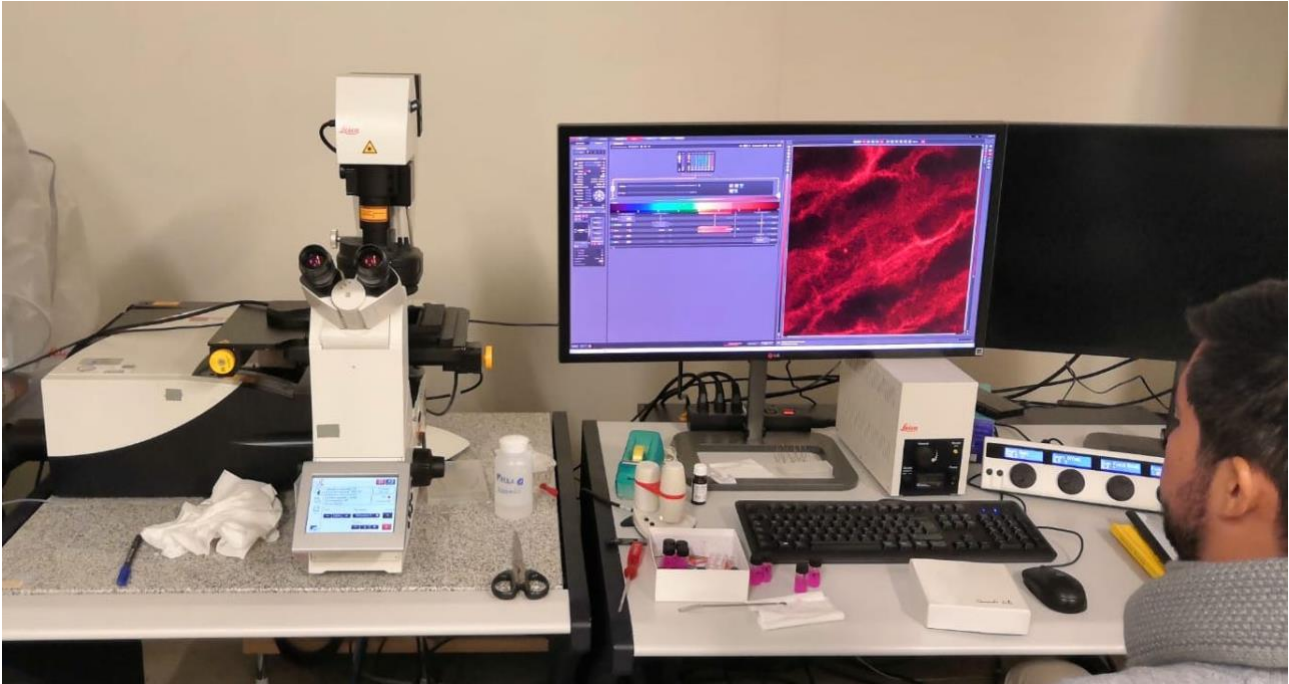
Confocal Microscope 2

General information

UNIT: [CSGI - University of Florence](#)

Category: Microscopy | Spectroscopy

Key instrumentation: Laser Scanning Confocal Microscope



Laser Scanning Confocal Microscope Leica TCS SP8 equipped with DMI8 microscope, FCS Picoquant module and with PMT detector for transmission imaging and 5 internal detectors.

Technical description

The Laser Scanning Confocal Microscope is a Leica TCS SP8, equipped with DMI8 microscope, FCS Picoquant module and with PMT detector for transmission imaging and 5 internal detectors. The latter are two PMT, one hybrid detector and two cooled hybrid detectors, suitable for Single Molecule Detection, 3D imaging, spatially resolved imaging, and spatially resolved FRET, FRAP, FCS and FCCS. The lasers available allow 8 excitation lines, and the microscope table allows motorized motion in 3D for imaging of larger samples. Compared to the Leica TCS SP2, this instrument is recommended when FCS and FCCS analysis are required.

Research areas and applications

The instrument allows users to perform 3D chemical mapping of complex systems and interfaces; Electronics & Semiconductor, Automotive & Transportation; Metals & Machine Engineering; Medical Device QA/QC; Technical Cleanliness, Metallography, Material Analysis, Sample Preparation for Materials Science; live Cell Imaging, 3D Cell Culture. In particular, the FCS and FCCS options are relevant samples of biological interest, where dynamics and diffusion processes are investigated.

CONFOCAL MICROSCOPE 3

General information

UNIT: [University of Milano Bicocca](#)

Category: Microscopy

Key instrumentation: Leica TCS SP5 II Fluorescence



This is a state of the arte confocal microscope with excitation given by laser lines at 454, 488, 514, 635 nm and equipped with Hybrid PMT detectors. The system has spectral resolution on the images. In addition the microscope is equipped with a STED superresolution module.

TECHNICAL DESCRIPTION

This is a state of the arte confocal microscope with excitation given by laser lines at 454, 488, 514, 635 nm and equipped with Hybrid PMT detectors. The system has spectral resolution on the images. In addition the microscope is equipped with a STED superresolution module.

RESEARCH AREAS AND APPLICATIONS

Biomedical and cellular biology research.

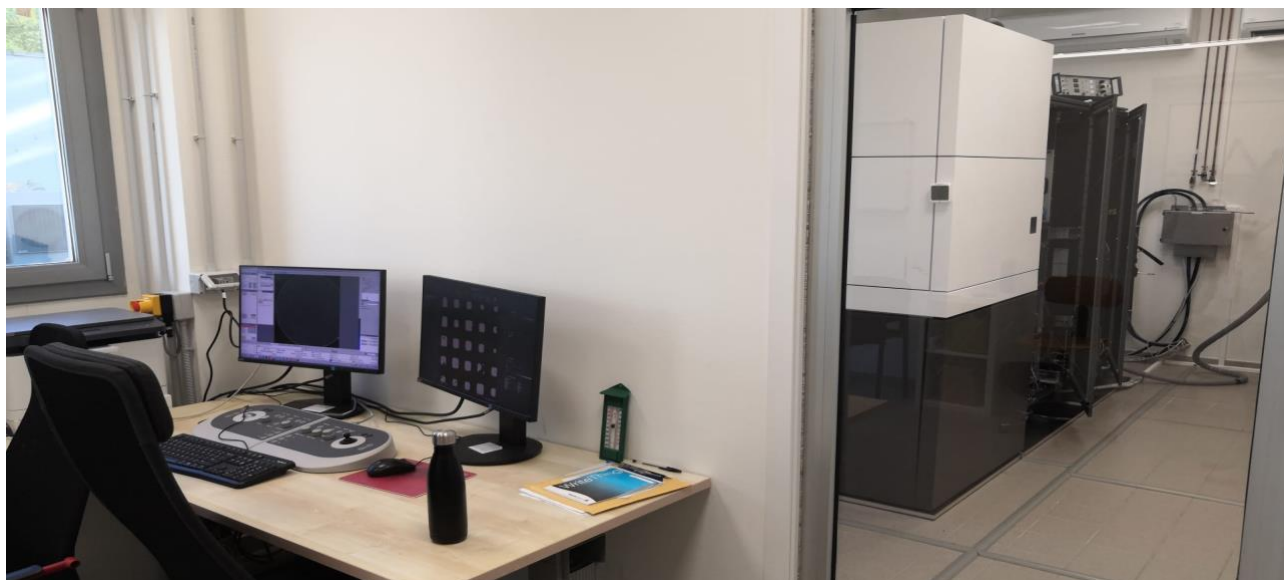
Cryogenic Electron Microscopy

General information

UNIT: [CSGI - University of Florence](#)

Category: Microscopy

Key instrumentation: Cryogenic Transmission Electron Microscopy



Cryogenic Electron Microscopy in Transmission, model Thermo Scientific™ Glacios™. The instrument is equipped with XFEG optics at 200 keV, cryogenic system of the sample preparation and handling, and software and support tools for the analysis of collected images. The Cryo-TEM is equipped with XFEG optics at 200 keV.

TECHNICAL DESCRIPTION

The instrument is equipped with XFEG optics at 200 keV, cryogenic system of the sample preparation and handling, and software and support tools for the analysis of collected images.

RESEARCH AREAS AND APPLICATIONS

Biomacromolecules and polymers solution structure at medium/high resolution; weakly bonded and reactive materials, interfaces and phases; 3D chemical mapping of complex systems and interfaces; nanostructure and chemistry of solid-electrolyte interphases, cathode-electrolyte interphase, and electrode materials in batteries; hybrid perovskite solar cells, and metal-organic-frameworks

DYNAMIC MECHANICAL ANALYZER

General information

UNIT: [NAST Centre - University of Rome Tor Vergata](#)

Category: Materials Processing

Key instrumentation: Next Generation Sequencing



NextSeq 550 is a NGS system capable of: Exome Sequencing; Targeted Gene Sequencing and whole genome; total RNA-Seq, mRNA-Seq, gene expression profiling; Cytogenomic Arrays.

Technical description

The NextSeq 550 System is an integrated platform that uses massively parallel sequencing technology for genetic analysis and functional genomics. Prepared libraries are loaded directly onto the system. Integrated cluster generation provides automated clonal amplification of single molecules randomly distributed on a glass surface. The DNA clusters thus obtained are sequenced on the NextSeq 550 using the Illumina sequencing-mediated synthesis (SBS) method with patented chemistry based on reversible terminators. In addition, the NextSeq 550 System combines microarray scanning with the sequencing system. The system offers:

- Scalable from 20Gb to 120Gb on a single run to support a wide range of application and studio sizes
- Runs, including clustering on the instrument, in 12-30 hours
- Fully automated on-instrument cluster generation to prepare libraries and upload them directly to the instrument
- The highest accuracy of any high-output benchtop sequencing system
- Demonstrated SBS chemistry with single base extension makes accurate sequencing of homopolymers possible
- Fully automated paired-end sequencing

Research areas and applications

Sequencing of prokaryotic and eukaryotic genomes, analysis of exomes, transcriptomes and non-coding RNA, gene expression, detection of pathogens and methylation analyses, epigenomic.

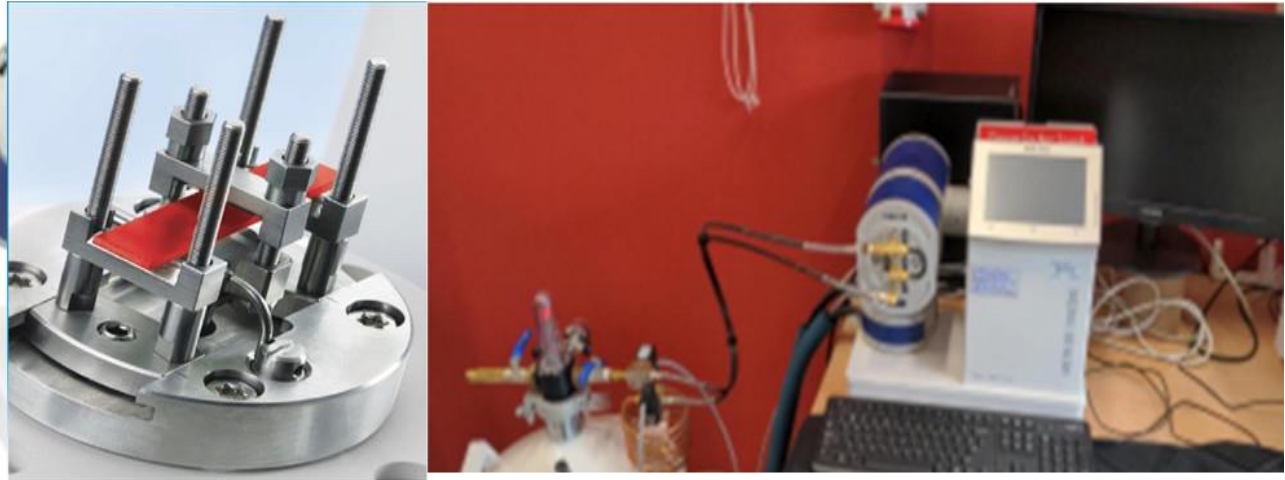
DYNAMIC MECHANICAL ANALYZER

General information

UNIT: [NAST Centre - University of Rome Tor Vergata](#)

Category: Bio&Chem&Mag Characterization

Key instrumentation: Bio-Chemical-Magnetic Characterization



DMA 1 Star Systems – Mettler Toledo – allows Dynamic mechanical analysis to measure the mechanical and viscoelastic properties of materials as a function of temperature, time and frequency. Measurements can be carried out in all standard deformation modes, even in liquids or at defined relative humidity levels. It is coupled to a liquid nitrogen generator for a free-standing production of liquid nitrogen and low-temperature operations. DMA Star Systems – Mettler Toledo – allows Dynamic mechanical analysis to measure the mechanical and viscoelastic properties of materials as a function of temperature, time and frequency.

Technical description

Features and benefits of the METTLER TOLEDO DMA 1 include: Flexible positioning of the Measuring Head – measurements in all deformation modes, even in liquids or at different relative humidity levels; Easy operation – allowing fast change of deformation modes; TMA measurements – for measuring expansion coefficients, effects due to creep, and relaxation times; Humidity option – for sorption and desorption measurements; Ergonomic design with large touchscreen – for convenient sample loading and monitoring of the measurement process; Wide temperature range – from -190 to 600 °C; Extremely efficient and economical cooling – saves valuable measurement time and reduces liquid nitrogen consumption. A unique aspect of the DMA 1 is its rotatable Measuring Head. Measurements can be carried out in all standard deformation modes, even in liquids or at defined relative humidity levels.

Research areas and applications

Thermoplastics, Thermosets, Elastomers, Ceramics, Thermal Energy Storage materials.

ESCALB QXi

General information

UNIT: [CNR-ICMATE](#)

Category: Spectroscopy

Key instrumentation: ESCALB QXi - XPS/UPS/REELS/ISS



The ESCALAB QXi X-ray photoelectron spectrometer is a multi-technique platform for XPS, UPS, REELS and ISS spectroscopies, also equipped with a dual mode (monoatomic and cluster) ion gun. Moreover it has a charge compensation system to perform XPS on insulating samples. It is equipped with two detector systems: one optimised for spectroscopy, consisting of an array of six-channel electron multipliers, and one for parallel imaging, consisting of a pair of channel plates and a continuous position sensitive detector.

TECHNICAL DESCRIPTION

ESCALAB QXi X-ray photoelectron spectrometer is a multitechnique-platform for XPS, UPS, REELS and ISS spectroscopies equipped also with a dual mode ion gun for depth profile analysis. XPS (X-ray photoelectron spectroscopy) provides the composition of the outer few nanometers of a material detailing and quantifying both the elements present and their chemical states. The main XPS features are: -monochromatic Al/Ag source for large and small area XPS (mm² - μm²) -Al/Mg twin source non monochromatic -magnetic lens -flood gun for charge compensation -ARXPS (angle resolved XPS) -XPS parallel imaging (resolution 2-3 μm) UPS (ultraviolet photoelectron spectroscopy) uses UV photons (21.2 eV and at 40.8 eV) rather than X-ray.

RESEARCH AREAS AND APPLICATIONS

The main areas of application include (but are not limited to) catalysis, nanoscience, coatings, corrosion science, semiconductors, solar cells, biomaterials.

FIB-SEM GAIA 3

General information

UNIT: [CNR ICCOM](#)

Category: Fabrications | Microscopy

Key instrumentation: Electron Microscope / Scanning Probe Microscope



FIB-SEM with simultaneous milling and EBSD. The instrument allows preparation of high-quality ultra-thin TEM lamellae, delayering processes in technology nodes, precise nanopatterning and high-resolution 3D reconstructions. It has a unique 3-lens electron optical design capable of dedicated modes for extreme high-resolution imaging, enhanced depth of focus, undistorted ultra-low magnification imaging, and live 3D stereo imaging. FIB-SEM with simultaneous milling and EBSD. The instrument allows preparation of high-quality ultra-thin TEM lamellae, delayering processes in technology nodes, precise nanopatterning and high-resolution 3D reconstructions.

TECHNICAL DESCRIPTION

It allows preparation of high-quality ultra-thin TEM lamellae, delayering processes in technology nodes, precise nanopatterning and high-resolution 3D reconstructions. It has a unique 3-lens electron optical design capable of dedicated modes for extreme high-resolution imaging, enhanced depth of focus, undistorted ultra-low magnification imaging, and live 3D stereo imaging. The smart chamber design of the instrument allows for the simultaneous milling and collection of EBSD patterns without the need to move the sample. This flexibility is unique to Tescan and will provide best-in-class accuracy and throughput for EBSD and 3D-EDS.

RESEARCH AREAS AND APPLICATIONS

material science, structural analysis

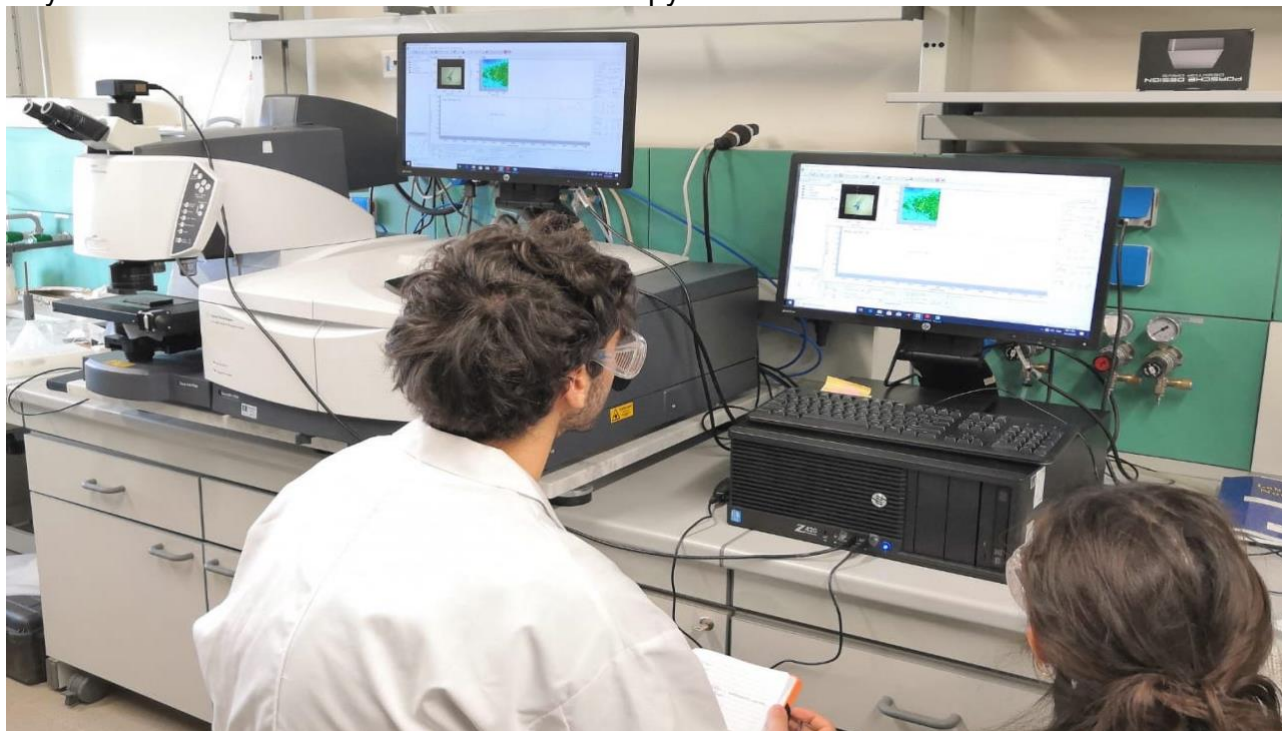
FT-IR NEXUS

General information

UNIT: [CSGI - University of Florence](#)

Category: Microscopy | Spectroscopy

Key instrumentation: FT-IR and FT-IR Microscopy



Nicolet Nexus 870. Instrument for FT-IR spectroscopy and microscopy, model Nicolet Nexus 870, equipped with external optical table, two external detectors (MCT e TRS), GeATR, one Hind photoelastic modulator, and one IR Continuum microscope.

TECHNICAL DESCRIPTION

Nicolet Nexus 870. Instrument for FT-IR spectroscopy and microscopy, model Nicolet Nexus 870, equipped with external optical table, two external detectors (MCT e TRS), GeATR, one Hind photoelastic modulator, and one IR Continuum microscope. The instrument allows for the contemporaneous imaging and FT-IR analysis of micrometric particles/domains, allowing for the chemical mapping of flat samples as well as powders.

RESEARCH AREAS AND APPLICATIONS

FTIR (Fourier transform infrared spectroscopy) is a fast, easy and reliable technique for material identification and quantification of constituents in a sample. The combination with optical microscopy allows for the chemical mapping of complex systems and interfaces, such as mixtures, surface coatings, films, pharmaceuticals, etc.

FT-IR NICOLET

General information

UNIT: [NAST Centre - University of Rome Tor Vergata](#)

Category: Spectroscopy

Key instrumentation: Nicolet iS20 Attenuated Total Reflection Infra Red



The Thermo Scientific™ Nicolet™ iS10 is a FTIR (Fourier-transform infrared spectroscopy) Spectrometer that allows the determination of unidentified contaminants, conduct failure analysis, allowing precisely analyze mixtures, thanks to the spectral power of the Thermo Scientific™ LightDrive™ Optical Engine integrated. The FTIR is able to discern multi-component samples: the advanced LightDrive optical engine technology delivers higher spectral resolution (better than 0.25 cm⁻¹) and single-to-noise ratios (50 000:1) to help identify possible contaminants or characterize defects present in small quantities. Its performance can be validated through an integrated validation wheel with Shott NG-11 glass and NIST traceable, serialized polystyrene film.

TECHNICAL DESCRIPTION

The FTIR (dimensions 570 x 550 x 250 mm) is endowed with LightDrive Optical Engine components (source, laser, interferometer and detector) and a solid-state, temperature-controlled diode laser that with its enhanced long-lifetime and temperature-stabilized design guarantees accurate and precise data acquisitions.

RESEARCH AREAS AND APPLICATIONS

Polymers and Plastics; Analytical Services; Quality Control QA/QC; Pharmaceuticals; Education; Forensics; Gemstone Analysis.

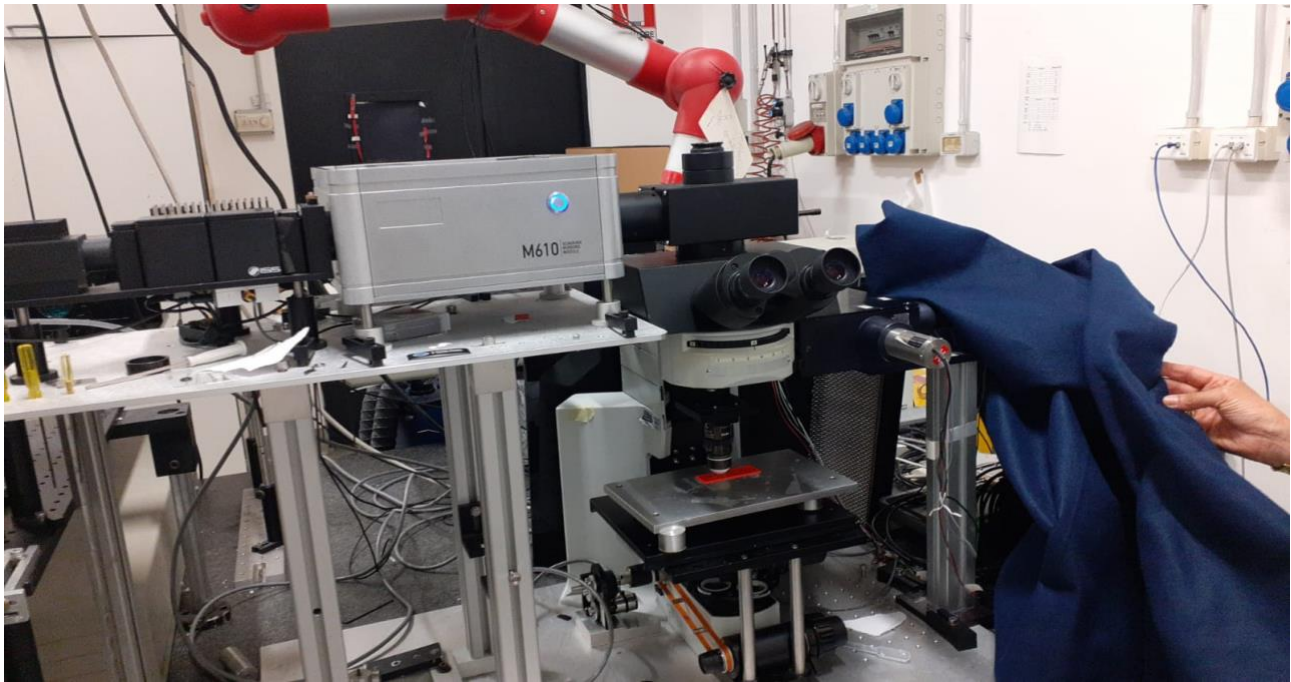
FLUORESCENCE MICROSCOPY

General information

UNIT: [University of Milano Bicocca](#)

Category: Microscopy

Key instrumentation: Nonlinear excitation fluorescence microscope based on pulsed infrared laser MaiTai and Olympus Bx51 scanning microscope



Development of new methods for optical non-linear microscopy to be applied to biophysics and medical physics in-vivo. In this field the Biophotonics group is developing two-photon excitation fluorescence imaging microscopy and second harmonic generation microscopy. One of the main application aims to the study of the motion of lymphocytes in lymph nodes in order to model the immune response of mice. This work is being carried out in collaboration with the Biotechnology group of our University.

TECHNICAL DESCRIPTION

The instrumentation is based on a BX51 microscope coupled to a scanning head for raster scanning biological samples. The excitation is given by a femtosecond laser tunable in the range 680 nm - 1040 nm with peak power of 3.5 W, 80MHz of repetition rate. The laser source allows to induce non-linear absorption in biological samples and recover images in fluorescence (two-photon excitation) or second harmonic generation signals.

RESEARCH AREAS AND APPLICATIONS

Biomedical Research, Imaging of tissue and cells, Nanoscopy for biotechnology and Medicine (Collini, Chirico), Stochastic Simulations for Biophysics (Chirico), GFP mutants for biotechnology (Collini), Nanoparticles for Biomedical Applications (Chirico, D'Alfonso), In-vivo non-linear microscopy for biotechnology and Medicine (Sironi)

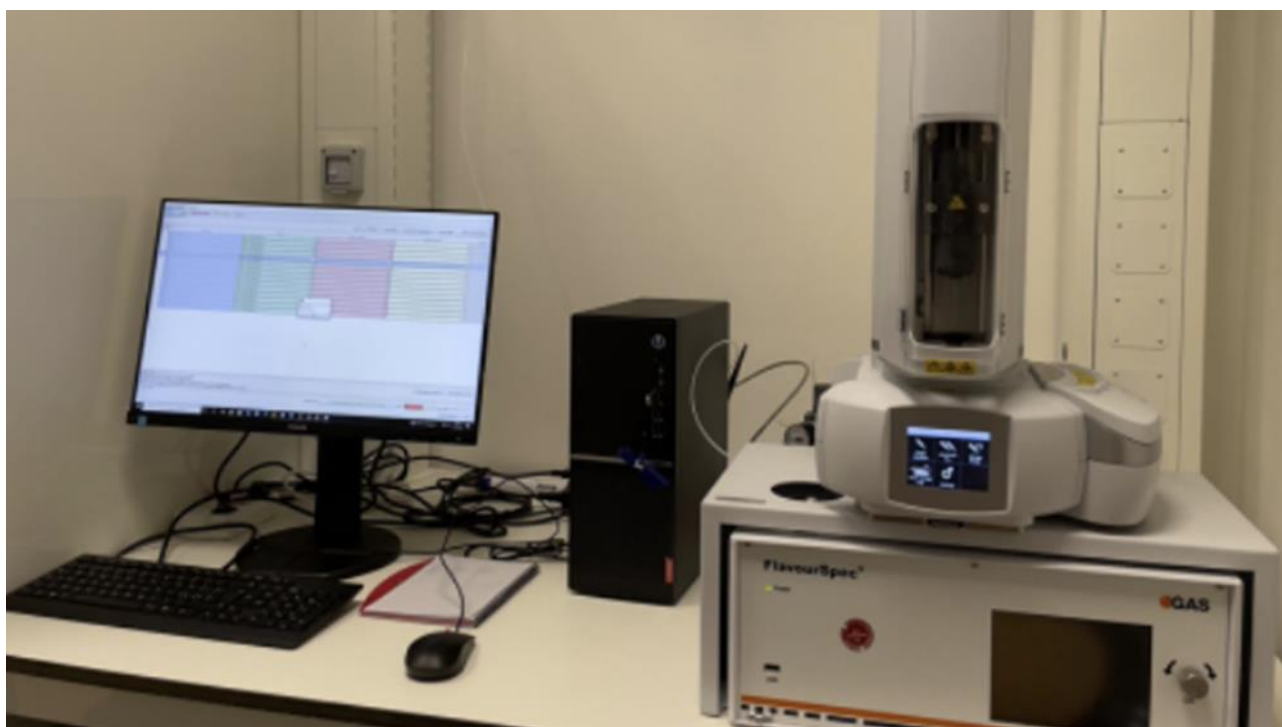
GAS CHROMATOGRAPHY – ION MOBILITY SPECTROMETER

General information

UNIT: [NAST Centre - University of Rome Tor Vergata](#)

Category: Bio&Chem&Mag Characterization

Key instrumentation: Gas-chromatography



Gas chromatograph coupled with mass spectroscope for identifying and quantifying chemicals in mixtures. The instrument is complemented by an autosampler enabling the automatic analysis. The Shimadzu GCMS-QP2020NX model is suitable for general untargeted analysis, as well as for the detection of specific chemical families. The instrument features an autosampler that can accommodate up to 40 samples and equipped with a temperature control.

TECHNICAL DESCRIPTION

Gas chromatography (GC) is an analytical technique used to separate and detect the components in a sample mixture. The GC is coupled to a Mass spectrometry (MS) where the neutral molecules eluted from the GC are ionized to produce molecular ions which degrade into fragment ions. Charged fragments are then separated in the mass analyzer by their mass to charge (m/z) ratio and are detected. The GC-MS is a GCMS-QP2020NX model (from Shimadzu, Kyoto, Japan) it is equipped by a capillary column SH-I-5 ms (30 m × 0.25 mm × 0.25 μ m, Shimadzu, Kyoto, Japan). This is general purpose column suitable for untargeted analysis, the column can be changed in order to emphasise the detection of specific chemical families. The thermal cycle of the GC is totally customizable.

RESEARCH AREAS AND APPLICATIONS

The instrument is suitable for the detection of thermally stable molecules with a molecular weight below 1250 Da. Main applications include Food analysis, environmental analysis, medical diagnosis.

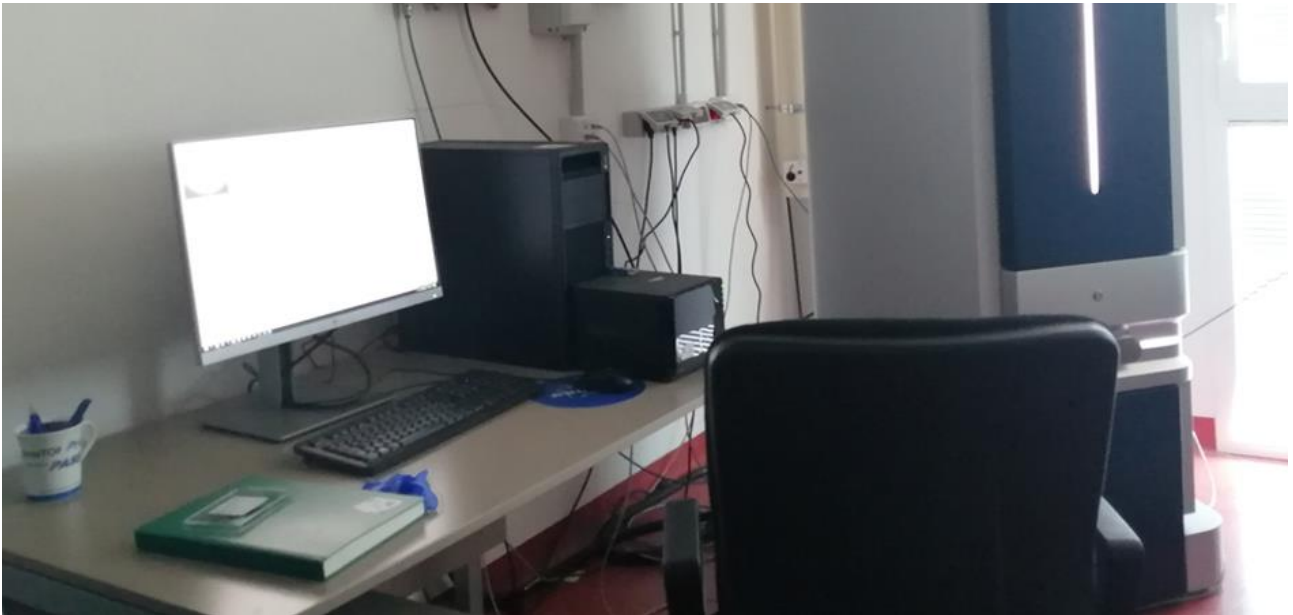
MASS SPECTROMETER 1

General information

UNIT: [University of Milano Bicocca](#)

Category: Mass Spectrometry

Key instrumentation: Rapiflex TissueTyper MALDI-TOF/TOF MS System



Rapiflex TissueTyper MALDI-TOF/TOF MS System mass spectrometers are of high accuracy and sensitivity. They have a resolution of over 40,000 RP and a mass accuracy of better than 2-5ppm. The rapiflex™ MALDI TissueTyper™ is specifically designed for MS imaging with a spatial resolution of 10-20 μm , so as to obtain information at the single cell level, and with a speed 10 times better than other commercial MS-Imaging tools.

TECHNICAL DESCRIPTION

The rapiflex™ MALDI TissueTyper™ is specifically designed for MS imaging with a spatial resolution of 10-20 μm , so as to obtain information at the single cell level, and with a speed 10 times better than other commercial MS-Imaging tools.

RESEARCH AREAS AND APPLICATIONS

Clinical research.

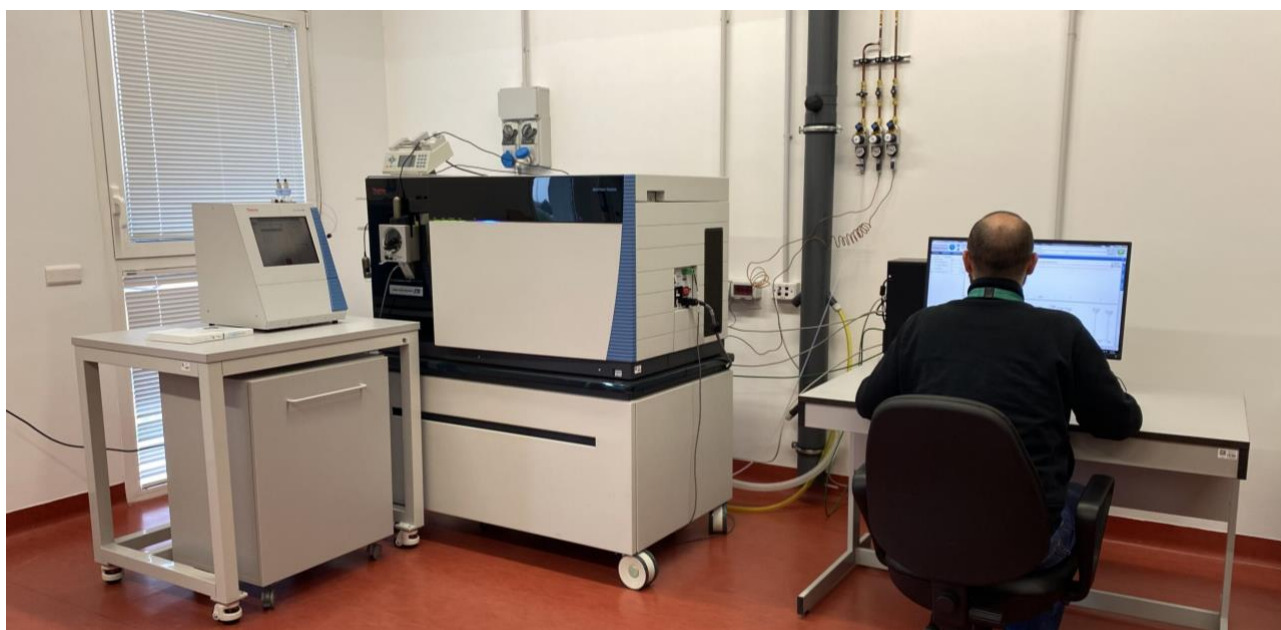
MASS SPECTROMETER 2

General information

UNIT: [University of Milano Bicocca](#)

Category: Mass Spectrometry

Key instrumentation: Orbitrap Fusion Tribrid mass spectrometer



Orbitrap Fusion Tribrid mass spectrometer for the analysis of molecules and supramolecular complexes with ultra-high resolution for proteomics, structural proteomics and other omics sciences. The instrument supports multiple fragmentation modes (CID, HCD, ETD) and their combinations and is coupled with a nano-flow UHPLC EASY-nLC 1000, enabling automated, high-performance LC/MS for the analysis of complex biological matrices.

TECHNICAL DESCRIPTION

The Orbitrap Fusion mass spectrometer enables the analysis of molecules and supramolecular complexes in the 50-6,000 m/z range, with high resolution (up to $R=450,000$), scan rate (MS_n up to 20 Hz), mass accuracy (5,000) and sensitivity (100 fg total amount of the reserpine standard). The instrument is characterized by a great flexibility of scan protocols based on multiple fragmentation modes, i.e. collision-induced dissociation (CID), higher-energy collisional dissociation (HCD), electron-transfer dissociation (ETD) and their combinations, that can be performed in two different collision cells (quadrupole or linear ion trap) and analyzed by two different analyzers (linear ion trap or Orbitrap). These features support bottom-up, top-down and middle-down proteomics studies and enable high-throughput and high-depth analysis of small molecules, peptides, proteins, post-translational modifications, protein-ligand interactions, and other polymers. The instrument is equipped with a regular and a nano electrospray ionization (ESI) sample source and can be coupled to a nano-flow UHPLC EASY-nLC 1000, enabling automated, high-performance LC/MS analyses of complex biological matrices.

RESEARCH AREAS AND APPLICATIONS

Clinics, Integrated Biology

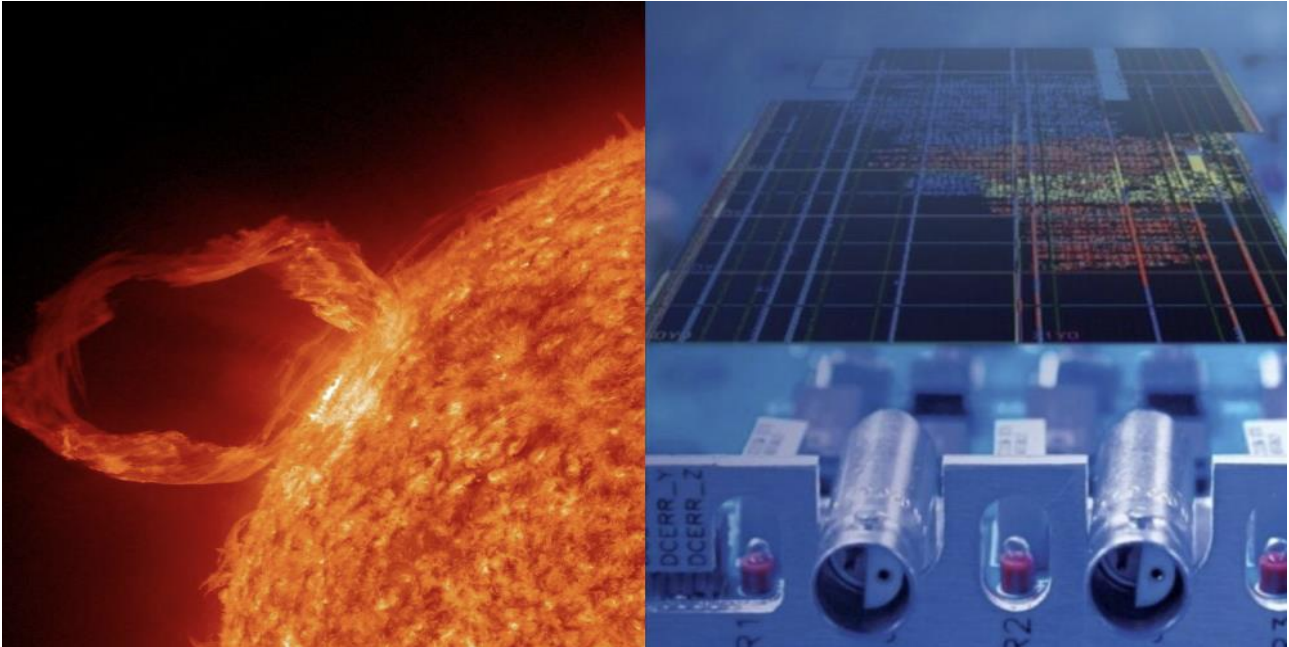
MONeutron

General information

UNIT: [NAST Centre - University of Rome Tor Vergata](#)

Category: Neutron

Next Generation Neutron Monitor



MONeutron is a ground-level neutron monitor design for studying cosmic rays and fluxes of solar energetic particles at the Earth's surface related to solar activity and cosmic rays reaching the atmosphere. It is a compact instrument measuring the flux of primary and secondary neutrons at the ground level on the site of IM@IT' Unit University of Rome Tor Vergata, collecting data that can be used by the Neutron Space Weather (NSW) and airborne radiation modeling. Extreme space weather due to the sun and its impact on the aging human body, and biological and electronic systems. MONeutron registers a constant feed of neutron data in real-time produced by the extreme NSW due to the potentially hazardous solar activity, collected view from Earth and space, in mixed radiation environments, as well as current and future human explorers, unshielded by Earth's magnetic field and vulnerable.

TECHNICAL DESCRIPTION

The neutron compact monitor at Unit UTOV is part of a network of the same class of monitors operating at different altitudes and latitudes, and in space. • 6 x 3He detector (2m long, 1" diameter, 4 atm, helium-3 tubes) • 2 x High-Density Polyethylene (HDPE) moderator material, modular in design, to part establish 1 off 6-way 3He detector assembly • 1 x Two-input junction box/amplifier • 1 x Mirion signal aggregator and de-randomiser assembly • 1 x CAEN R7780 data acquisition module (Shift Register Multiplicity and Time Recorder) • 1 x Lead Shield frame

RESEARCH AREAS AND APPLICATIONS

Challenges (Health, Digital, Security (improving and protecting health and well-being; health technologies and tools; technologies and digital solutions for health and care; Health Space, materials, coatings and electronic components qualification; Development and verification of a new class of neutron detectors).

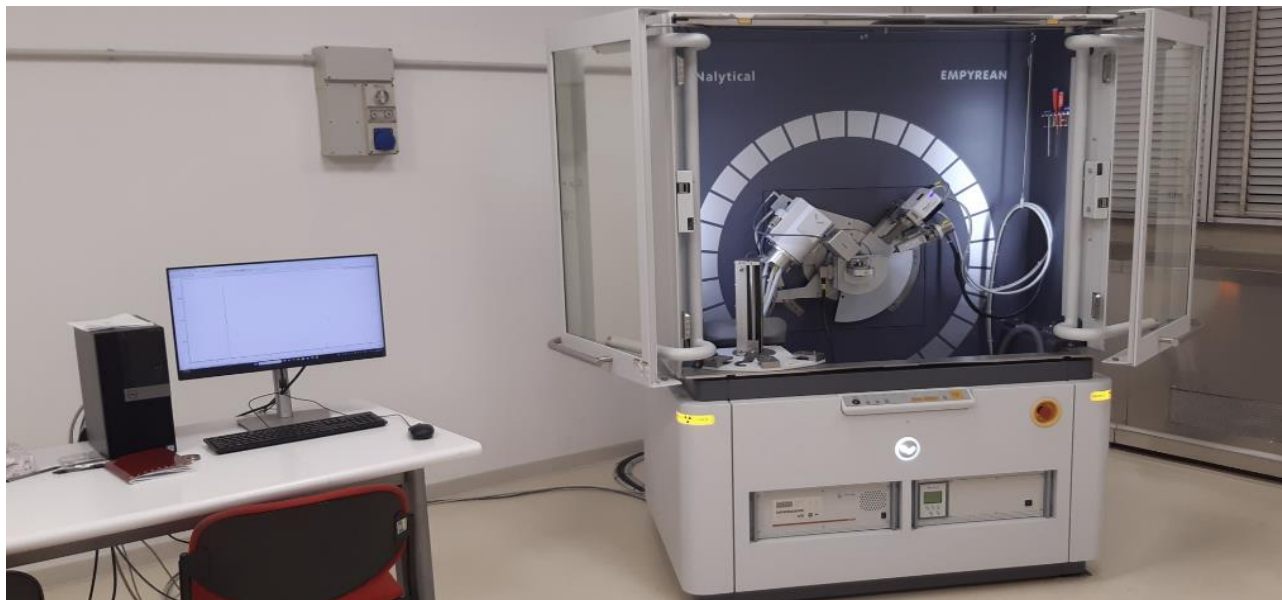
MULTIPURPOSE X-RAY DIFFRACTOMETER

General information

UNIT: [CNR-ICMATE](#)

Category: Photons

Key instrumentation: XRD



Multipurpose diffractometer for the collection of wide-angle (WAXS) and small-angle diffraction (SAXS) data on bulk materials, powders, thin films, epitaxial layers, in reflection, grazing incidence and transmission geometry, on flat samples or capillaries. The data collected can provide information on crystal structure, microstructure of materials, and thickness of thin layers. A Eulerian Cradle is also available, allowing the investigation of preferred orientation and residual stress on bulk and thin film samples.

TECHNICAL DESCRIPTION

The probe for liquid samples is a QCI (1H, 13C, 15N, 31P) cryo-probe, suitable for the analysis of low-concentration samples, for structural studies on biological macromolecules, rapid analysis of unstable samples (i.e. unstable proteins or prone to change their folding or aggregation state over time). Multipurpose diffractometer equipped with a 240 mm radius theta-theta goniometer and a Cu X-ray tube. The diffractometer allows the collection of wide-angle (WAXS) and small-angle (SAXS) diffraction data on bulk materials, powders, thin films, epitaxial layers, in reflection and transmission (for transparent samples). The incident radius optics include a monochromator mirror allowing to completely remove the Cu Kbeta radiation, programmable divergence slits and masks for the analysis of flat samples, and a parabolic mirror for diffraction experiments on rotating capillaries. A Eulerian Cradle is also available, allowing to investigate preferred orientation and residual stress on bulk and thin film samples.

RESEARCH AREAS AND APPLICATIONS

Structural and microstructural characterization of materials. The obtainable information includes crystal structure, cell parameters, crystalline domain size, microstrain, residual stress, texture.

NMR 600 MHz

General information

UNIT: [University of Milano Bicocca](#)

Category: Spectroscopy

Key instrumentation: Bruker Avance III 600 MHz NMR spectrometer



The NMR spectrometer is Bruker Avance III 600 MHz NMR, equipped with three probes suitable for the analysis of liquid, solid and heterogeneous samples.

TECHNICAL DESCRIPTION

The probe for liquid samples is a QCI (1H, 13C, 15N, 31P) cryo-probe, suitable for the analysis of low-concentration samples, for structural studies on biological macromolecules, rapid analysis of unstable samples (i.e. unstable proteins or prone to change their folding or aggregation state over time).

RESEARCH AREAS AND APPLICATIONS

Chemical areas, pharma areas (including nutraceuticals and cosmetics) – materials area (including crystalline materials and polymers)

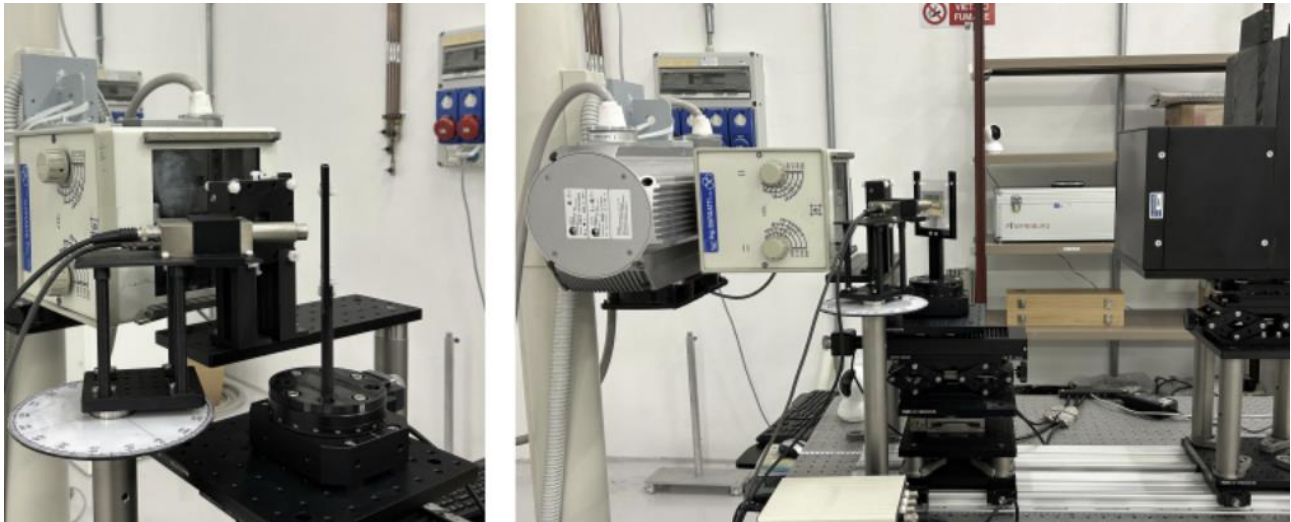
RETINA

General information

UNIT: [POLIMI - National Medium Range Facilities](#)

Category: Spectroscopy

Key instrumentation: XRF



RETINA provides non-destructive material analysis of various medium-sized samples via X-ray Fluorescence (XRF) spectroscopy, and 2D/3D X-ray imaging techniques.

TECHNICAL DESCRIPTION

The radiation source is a high-power X-ray tube (RTC1000HS by IAE), emitting X-rays with a maximum energy from 40 keV to 150 keV. The anodic current can reach up to 5 mA in continuous mode, and 200 mA in pulsed mode, resulting in an integral fluence at 1m in the order of $1E8$ and $1E10$ photons/cm²/s, respectively. A high-precision sample positioning system from THORLABS is installed in the facility. The system can move the sample along 3 translation axis and can rotate it along the vertical axis. This, combined with an adjustable collimator, enables elemental mapping of planar samples with millimeter resolution. All the stages are installed on an optical table, allowing for room to mount user instrumentation near the sample. Characteristic X-ray spectra are measured via a Peltier-cooled CdZnTe detector (XR-100T-CZT by Amptek). X-rays from about 3 keV up to 90 keV can be measured; energy resolution is about 0.4 keV FWHM at the energy of the Fe K-alpha.. For X-ray imaging purposes, RETINA has 3 X-ray cameras

RESEARCH AREAS AND APPLICATIONS

Non-Destructive Testing, XRF, Tomography, Fuel Cells, Battery, Thin Films

RAMAN CONFOCAL MICROSCOPE

General information

UNIT: [CSGI - University of Florence](#)

Category: Microscopy | Spectroscopy

Key instrumentation: Raman Confocal Microscope



Microscope inVia™ Qontor™ model, with excitations at 532 and 785 nm, with motorized XYZ stage, flexible arm and Raman imaging techniques

TECHNICAL DESCRIPTION

inVia™ Qontor™. Raman Confocal Microscopy, inVia™ Qontor™ model, with excitations at 532 and 785 nm, with motorized XYZ stage, flexible arm and Raman imaging techniques. The microscope is equipped with the LiveTrack™ technology allowing the real-time sample focusing during the measurement and the Raman map acquisition. This allows the study of samples with coarse or uneven surfaces.

RESEARCH AREAS AND APPLICATIONS

3D chemical mapping of complex systems and interfaces

SAXS GISAXS

General information

UNIT: [CSGI - University of Florence](#)

Category: Photons

Key instrumentation: SAXS, USAXS and GISAXS



Xenocs XEUSS 3.0 system operates in SAXS (Small Angle X-ray Scattering), USAXS (Ultra SAXS) and GISAXS (Grazing Incidence SAXS) modes. It is equipped with sample holders for measurements on powders, pastes, gels, liquids and films, temperature control and robot for automation of sample preparation.

TECHNICAL DESCRIPTION

Xenocs XEUSS 3.0 system operating in SAXS (Small Angle X-ray Scattering), USAXS (Ultra SAXS) and GISAXS (Grazing Incidence SAXS) modes, equipped with sample containers for powders pastes, gel, liquids and thin films, temperature control and automated sample preparation for liquid sample via a Universal Robot. The scattering wavevector range for U/S/WAXS is between 0.0002 and 3.1 Å⁻¹.

RESEARCH AREAS AND APPLICATIONS

The system allows for studying (fr instance):

- Particle size distribution ranging from few nanometers to more than 350 nm in diameter
- Crystallization rates and lamellar structure of semicrystalline polymers
- Size and shape analysis of surfactants or proteins in solutions
- Organization and orientation of nanomaterials at atomic or nanoscale, in bulk phases or at surfaces
- Phase segregation studies of alloys
- *In situ* studies of nanostructure transitions

SAXS WAXD

General information

UNIT: [CNR-IPCB](#)

Category: Photons

Key instrumentation: Electron Microscope / Scanning Probe Microscope / X-Ray microanalysis



Saxspace Anton-Paar. Small and Wide Angle X-ray Diffractometer. X-ray scattering in the angular range of $0 - 10^\circ$ detected by CCD or imaging plate, and up to 60° detected by using an imaging plate for the systems coupling SAXS and Wide Angle X-Ray Scattering, WAXS. Small and Wide Angle X-ray Diffractometer. Samples can be measured at different temperature, humidity, high pressure and under mechanical stress/strain conditions. Special features: – TrueFocus: self-alignment with X-ray beam; – TrueSWAXS: simultaneous SWAXS studies up to $60^\circ 2\theta$.

TECHNICAL DESCRIPTION

The investigated sample is irradiated with a monochromatic radiation, and scattered X-rays are typically collected in an angular range of $0 - 10^\circ$ by a suitable (ie. CCD or imaging plate) and up to 60° (by using an imaging plate for the systems coupling SAXS and Wide Angle X-Ray Scattering, WAXS). Samples can be measured under various conditions, like at different temperature, humidity, high pressure and under mechanical stress/strain conditions. Special features: - TrueFocus: self-alignment with X-ray beam; - TrueSWAXS: simultaneous SWAXS studies up to $60^\circ 2\theta$; - StageMaster: YZ stage with auto-recognition of sample stages. Accessible q range 0.03 nm^{-1} to 40.7 nm^{-1} , $200 \text{ nm} > d > 0.15 \text{ nm}$. System resolution q_{min} : 0.03 nm^{-1} .

RESEARCH AREAS AND APPLICATIONS

material science, structural analysis

SEM FEI

General information

UNIT: [CNR IPCB](#)

Category: Microscopy

Key instrumentation: Scanning Probe Microscopes



Field Emission Scanning electron microscopy QUANTA 200 with Energy Dispersive X-ray analysis. Scanning Electron Microscope with field emission source, equipped with SE, BSE and Environmental (GSED) detectors, EDS system (Oxford Inca Energy System 250), heating stage (FEI) and tensile/compression test module (Gatan MST200).

TECHNICAL DESCRIPTION

Scanning Electron Microscope FEI QUANTA 200 with field emission source, equipped with SE, BSE and Environmental (GSED) detectors, EDS system (Oxford Inca Energy System 250), heating stage (FEI) and tensile/compression test module (Gatan MST200).

RESEARCH AREAS AND APPLICATIONS

material science, composites, nanocomposites, biomaterials, morphological analysis, elemental analysis, element mapping

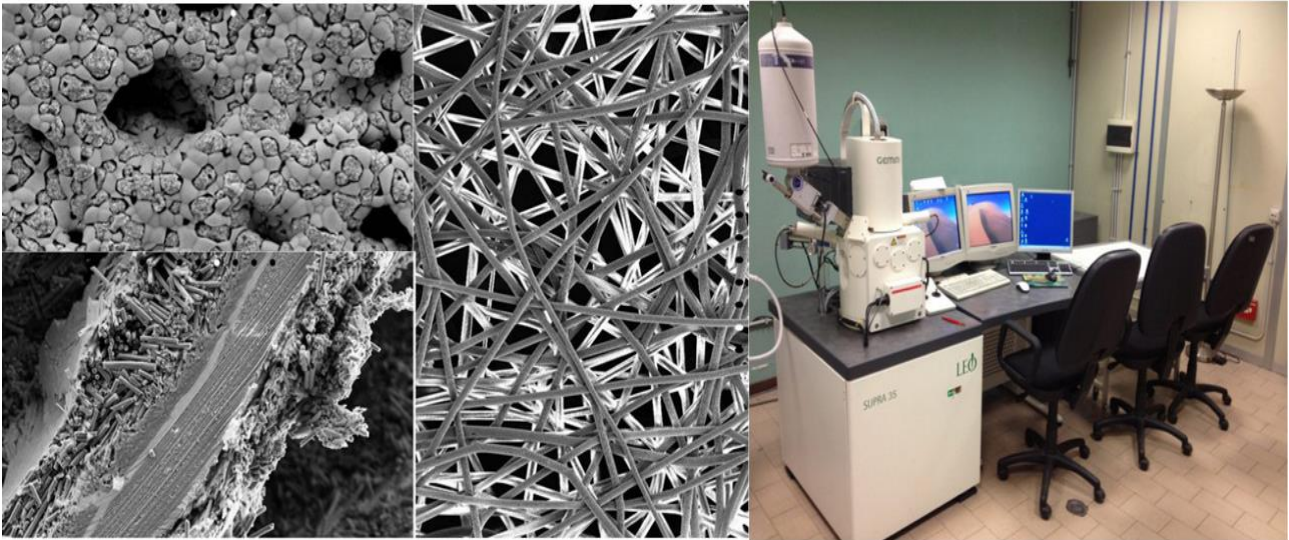
SEM LEO SUPRA

General information

UNIT: [NAST Centre - University of Rome Tor Vergata](#)

Category: Microscopy

Key instrumentation: SUPRA 35, Field Emission Scanning Electron Microscope- ZEISS



The SUPRA 35 Field Emission SEM provides improved image resolution and a high productivity and versatility. The SUPRA 35 Field Emission SEM provides improved image resolution and a high productivity and versatility.

TECHNICAL DESCRIPTION

The FE-SEM electron gun is a Schottky Field Emission Gun and it is endowed with several detectors: Back Scattering Detector, Everhart Thornley and In-lens Secondary Electron Detector and an Energy Dispersive Spectrometer (EDS) from Oxford Instruments INCA 200. The ability to detect BSE leads to the obtaining of sub-surface information and nano-scale composition.

RESEARCH AREAS AND APPLICATIONS

Materials characterization: solid-state or biological specimens, conductive and non-conductive.

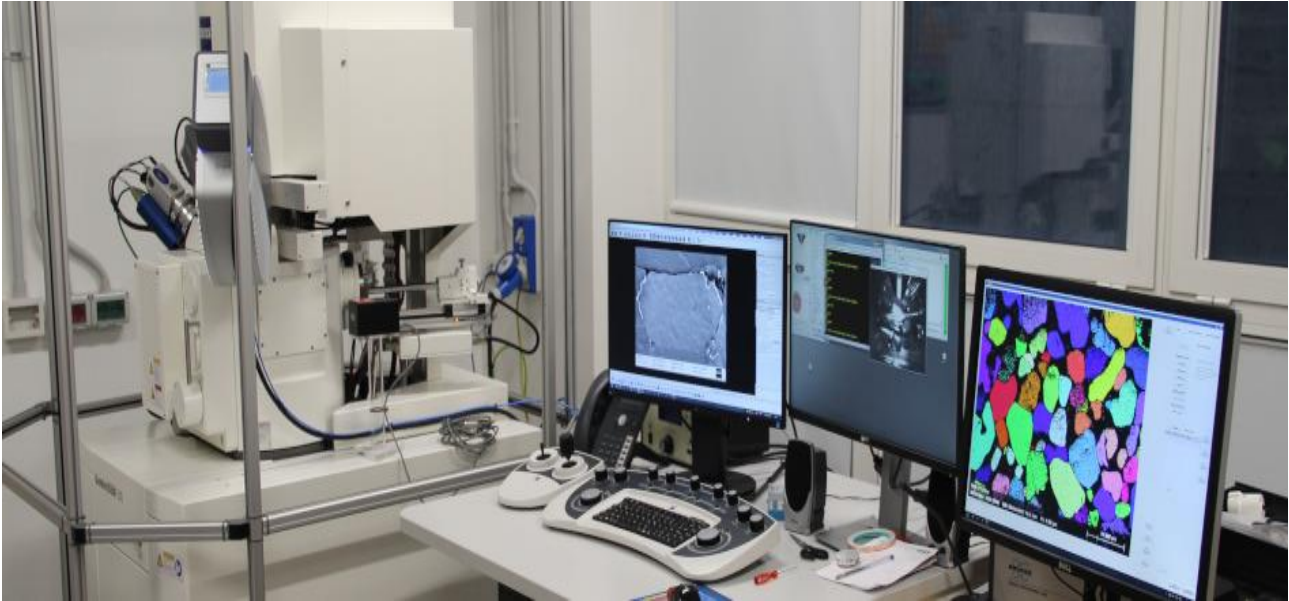
SEM ZEISS GEMINI

General information

UNIT: [University of Milano Bicocca](#)

Category: Microscopy

Key instrumentation: Field Emission Scanning Electron Microscope, Zeiss Gemini 500



FEG-SEM with a nominal resolution of 1.2 nm, equipped with an integrated EDS/WDS micro-analytical system and with an EBSD detector for the crystallographic analysis of the sample surface.

TECHNICAL DESCRIPTION

Scanning Electron Microscope (SEM) Zeiss Gemini 500 with a Field Emission Gun (FEG). The microscope can operate with an accelerating voltage between 1 kV to 30 kV and has a nominal resolution of 1.2 nm. In addition to the common “in-camera” BSE (Backscattered) and SE (Secondary Electron) detectors, the instrument is equipped with “in-lens” detectors (BSE/SE) for high-resolution imaging and with a STEM detector for the observation of thin specimens or biological samples in transmission mode. The FEG-SEM is also equipped with a Bruker integrated EDS/WDS (Energy Dispersive/Wave Dispersive) micro-analytical system, specially designed for light elements. Finally, the FEG-SEM is equipped with an EBSD (Electron Backscattered Diffraction) detector (Bruker) for the crystallographic analysis of the sample surface. The EBSD comes with the Argus FSE (Forward Scattered Electrons) and BSE detector for the acquisition of orientational contrast images. The wide gamma of detectors makes this instrument a very powerful characterization tool for the investigation at a sub-micrometre scale of solid samples and biological tissues.

RESEARCH AREAS AND APPLICATIONS

General mineralogy, advanced organic-inorganic hybrid functional nanomaterials, mineral forms for nuclear waste, dangerous airborne mineral dusts and fibers, REE and critical metals

SEM ZEISS SIGMA

General information

UNIT: [CSGI - University of Florence](#)

Category: Microscopy | Spectroscopy

Key instrumentation: Scanning electron microscope with field-emission source



Scanning electron microscope with field-emission source, equipped with detectors for EDS, backscattered and secondary electrons.

TECHNICAL DESCRIPTION

Zeiss Sigma scanning electron microscope with field-emission source, equipped with a GEMINI column and In-Lens detector, allowing the acquisition of high-resolution images on both conducting and non-conducting samples. The microscope is equipped with X-ray detectors (EDS), backscattering (BSE) and secondary electrons (SE). The X-ray detection system is from Oxford Instruments and, in addition to conventional X-ray analysis capabilities, produces high-resolution maps of the electron emission. This instrument is especially well-suited for samples with poor electronic contrast and that cannot be chemically modified or coated, as it allows the use of very low accelerating voltages (as low as 100 V).

RESEARCH AREAS AND APPLICATIONS

Thanks to its flexibility, the Zeiss Sigma microscope finds many applications in the investigation of morphology and chemical composition of solids, also without metal coatings or chemical treatments. Materials Science (polymers, fibers, semiconductors, metals, alloys,...), life sciences (micro- and nanostructure of microorganisms, bones, prosthesis,...), geosciences and natural resources (rocks, minerals,...) and, more generally, industrial applications (such as in the case of powders) are some examples.

SEM&C - AFM WITH OPTICAL PROFILER

General information

UNIT: [NAST Centre - University of Rome Tor Vergata](#)

Category: Microscopy | Spectroscopy

Key instrumentation: Electron & Scanning Probe Microscopes, AFM & X-Ray microanalysis



TECHNICAL DESCRIPTION

The TESCAN VEGA SEM is equipped with various types of detectors: X-ray for EDS microanalysis (Oxford Instruments INCA 200), back-scattering (BSE), Everhart-Thornley and In-lens Secondary Electron (SE) detectors, plus a water vapour detector for low vacuum. EDS microanalysis allow identification of elemental distribution of sub-micrometre areas of the specimens. The large vacuum vessel (340 x 315 x 320 mm³) allows the insertion of large samples. The electron gun consists of a Schottky Field Emission Gun. SEM parameters: a high tension range from 3 keV to 30 keV, a beam current from 10 pA to 100 nA and a wide magnification range going from 500X to 10 000X. The focussing of lens allows high-resolution images on conducting samples; for non-conducting samples the microscope operation is available either in high or low vacuum (with a partial pressure from 7 up to 500 Pa in nitrogen and water vapour). Unique feature of this instrument is the presence of a SPM, particularly an AFM Microscope, useful for colocalized scanning-electron and nano-probe microscopy characterization. The AFSEM system enables to combine the possibilities of a SEM with the capabilities of an atomic force microscopy (AFM). The AFM system can be inserted inside the SEM chamber for AFM surface measurements during SEM operation.

RESEARCH AREAS AND APPLICATIONS

Fundamental Materials Research, Quality control and failure analysis, Technical Cleanliness, Forensics, Catalysis Research, Materials Testing (energy storage, automotive, etc). Characterization of composite materials and interfaces in medicine, cultural heritage, prosthetics, robotics and microelectronics. Topography and spectroscopic characterization of surfaces and interfaces of polymers, semiconductors, composite materials, with application also in cultural heritage.

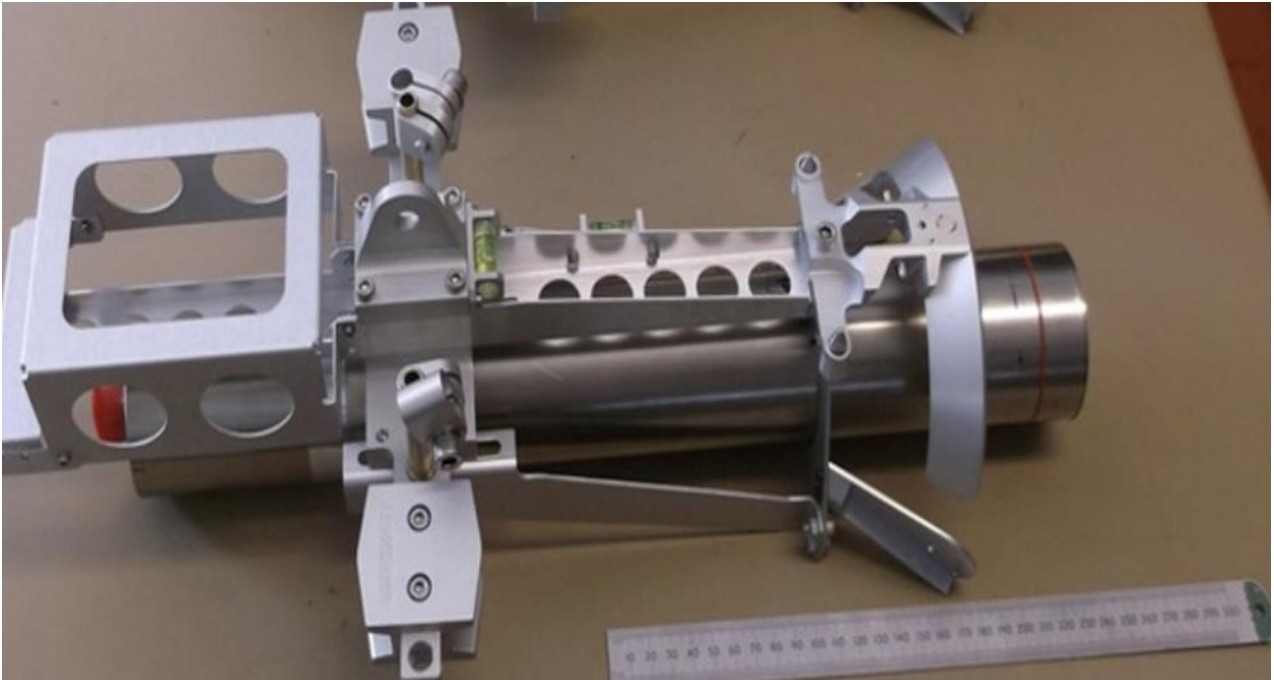
SOURIRE

General information

UNIT: [University of Milano Bicocca](#)

Category: Neutron

Key instrumentation: Neutron source DT (14 MeV), Broad Energy High Purity Germanium



The SOURIRE Lab is a fast (14 MeV) neutron irradiation plant for material testing, neutron activation analysis and calibration of new detectors. The neutron source is a Deuterium-Tritium (D-T) type, and the total flux is 10^{10} neutron per second over the entire solid angle. The facility is open to scientist and companies, who wants to irradiate their sample. At SOURIRE Neutron Source, radiation hardness tests of materials can be performed. Moreover, fast neutron detectors can be characterised and calibrated with 14 MeV neutrons that can be used in different physics field, such as nuclear fusion, where fast neutrons are emitted. The building that will host the neutron source is under construction and the expected start date of activities is June 2026; meanwhile, the IS and the staff can conduct you to other facilities to perform your experiment.

TECHNICAL DESCRIPTION

SOURIRE is a compact fast neutron source with an average intensity of up to 10^{10} n/s over the entire solid angle. The generator operates by accelerating deuterium ions and directing them to collide with a tritium target. These nuclear fusion reactions generate fast neutrons of 14 MeV. In addition to a concrete bunker that houses the source, the facility includes a radiochemistry laboratory, an irradiation system "RABBIT" consisting of a pneumatic channel used for neutron activation analysis (NAA) and a detector for gamma spectroscopy: a 50% Relative Efficiency Broad Energy High Purity Germanium.

RESEARCH AREAS AND APPLICATIONS

Calibration of new detectors; Material testing; Neutron activation analysis; Radiation hardness tests; Fast neutron detectors characterization; Nuclear fusion; Irradiation measurements; Gamma spectrometry; Training activity in gamma spectrometry.

SPECTROFLUORIMETER

General information

UNIT: [University of Milano Bicocca](#)

Category: Spectroscopy

Key instrumentation: Varian Cary Eclipse spectrofluorimeter



The spectrometer Eclipse, Varian, is a fluorimeter for the measurement of excitation and emission spectra of fluorophores in solutions.

TECHNICAL DESCRIPTION

The excitation lamp is a Xenon flash lamp (80 Hz) with excitation and emission range = 200-900 nm. The system is equipped with a temperature control that allows to perform programmable temperature ramps. Phosphorescence times can also be measured.

RESEARCH AREAS AND APPLICATIONS

Fluorescence spectrum measurements of organic molecules and biomolecules

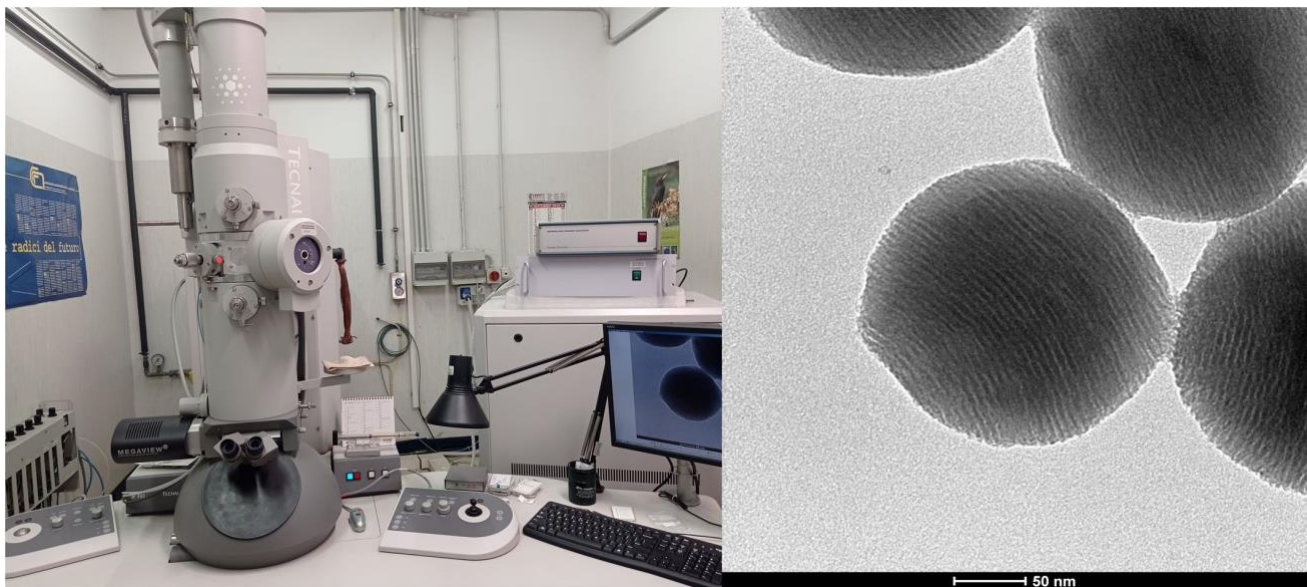
TEM FEI

General information

UNIT: [CNR IPCB](#)

Category: Microscopy

Key instrumentation: Transmission Electron Microscope



Transmission Electron Microscope with LaB6 source (120 kV) and BF detector and FEI Eagle 4k CCD camera (bottom mounted).

TECHNICAL DESCRIPTION

Transmission Electron Microscope with LaB6 source (120 kV) and BF detector and FEI Eagle 4k CCD camera (bottom mounted). Operating modes: Bright field imaging; Electron Diffraction.

RESEARCH AREAS AND APPLICATIONS

material science, biomaterials, morphological/structural analysis

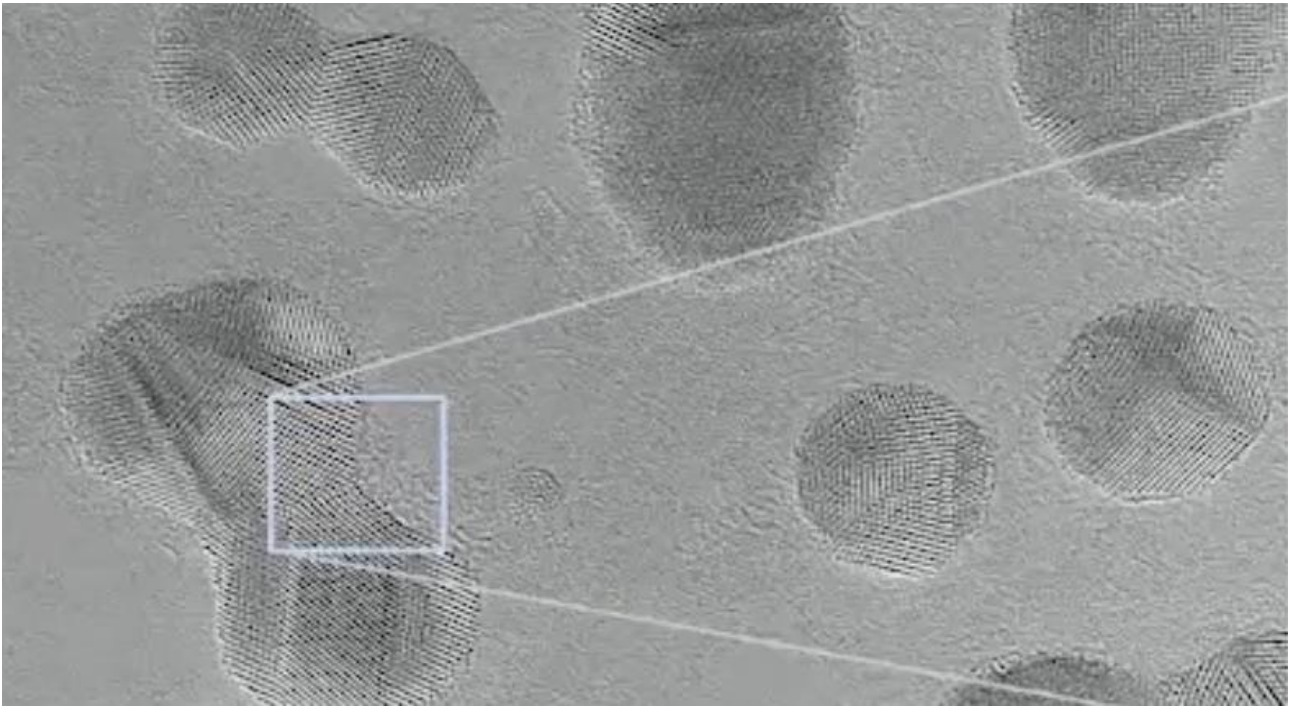
TEM HIGH RESOLUTION

General information

UNIT: [CNR ICCOM](#)

Category: Microscopy

Key instrumentation: High-resolution TEM



The TEM instrument – ThermoFisher Talos F200X – combines outstanding high-resolution S/TEM and TEM imaging with high performance energy dispersive x-ray spectroscopy (EDS) signal detection and 3D chemical characterization with compositional mapping.

TECHNICAL DESCRIPTION

The instrument allows for one of the best HRTEM imaging, and one of the fastest and most precise EDS analysis in all dimensions (1D-4D) at the state of the art. The applications are wide from energy materials, process control, and material science. A ULTRAMICROTOME RMC PowerTome PC with CR-X Cryosectioning system for the preparation of ultra thin sections for electron microscopy. The study of biologic samples, polymer, rubber or metals is also available

RESEARCH AREAS AND APPLICATIONS

3D chemical mapping of complex systems and interfaces; material science; microscopy; morphology; elemental analysis; nanostructure

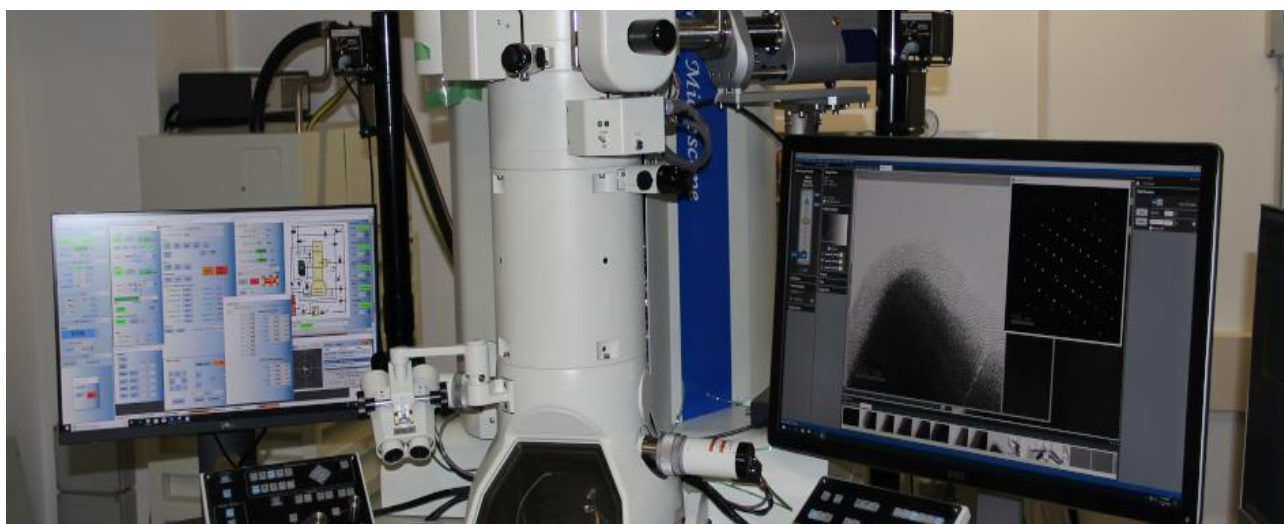
TEM JEOL

General information

UNIT: [University of Milano Bicocca](#)

Category: Microscopy

Key instrumentation: Transmission Electron Microscope - JEM 2100Plus with EDS



Transmission Electron Microscope (TEM) with LaB6 emitter, 80-200 kV accelerating voltage, point-to-point resolution of 0.24 nm, EDS micro-analysis, 9 Mpx CMOS camera.

TECHNICAL DESCRIPTION

Transmission Electron Microscope (TEM) JEOL JEM 2100 Plus with a LaB6 emitter. The accelerating voltage can be set between 80 and 200 kV. The high-resolution objective pole piece allows a point-to-point resolution of 0.24 nm in TEM mode. The instrument can operate in STEM (scanning) mode and can acquire BF (Bright Field) and HAADF (High Angle Annular Dark Field) images with a nominal 1 nm resolution. The microscope is equipped with an 80 mm² Oxford Energy Dispersive System (EDS) for spot analysis and chemical mapping and with a 9 Mpixel Gatan CMOS camera for image acquisition. A special in-gap aperture allows to reduce the damage on beam sensitive materials, as biological samples. The wide tilt range ($\pm 45^\circ$ with a standard double-tilt holder) along with the wide range of detectors and the high-resolution capability, makes this instrument a very versatile one.

RESEARCH AREAS AND APPLICATIONS

nanoparticles, semiconductors, hazardous mineral particles and fibres, proteins, cytotoxicity studies, cell ultrastructure, nanoplastics

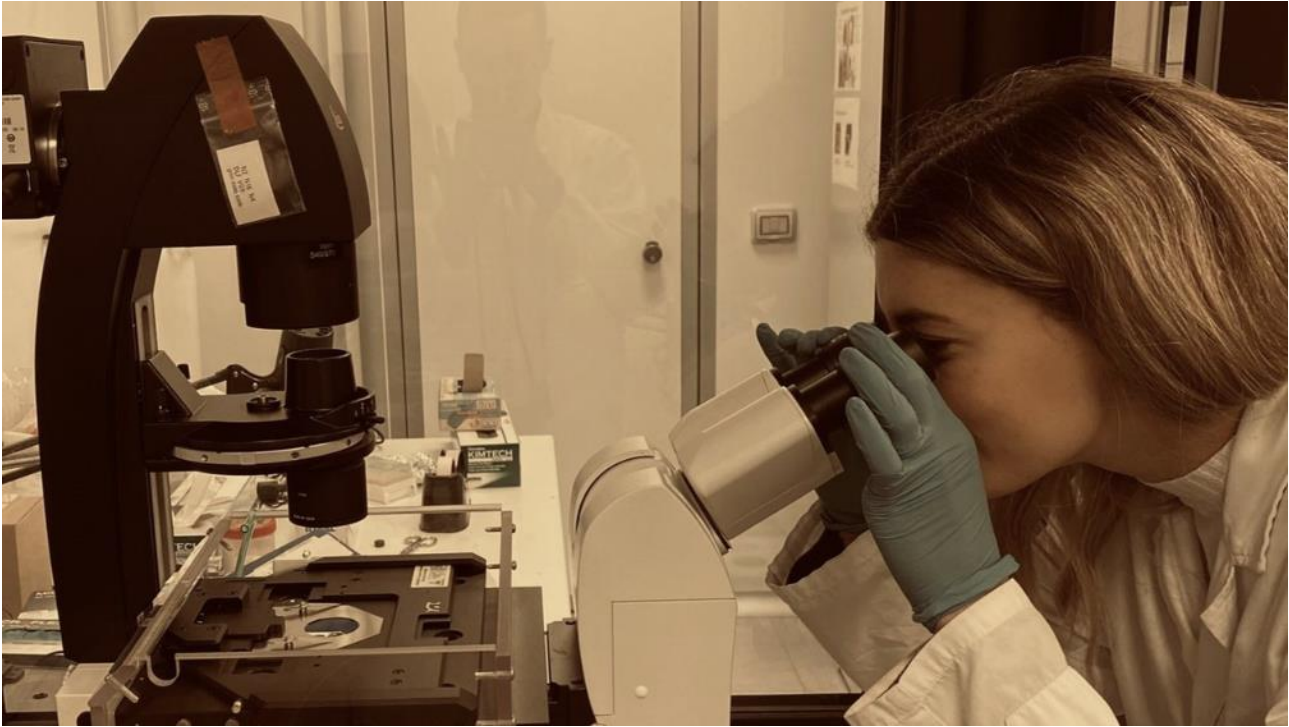
TLM PLATFORM

General information

UNIT: [NAST Centre - University of Rome Tor Vergata](#)

Category: Microscopy

Key instrumentation: Time Lapse Microscopy for Organ on chip applications



The LEICA DMI8 inverted optical (brightfield) microscopy is utilized to capture time-lapse measurements of cells and tissues in lab-on-chip and organ-on-chip devices, employing an integrated incubator. Thanks to the optimal resolution, accuracy, and repeatability of the XYZ motorized stage, an unlimited number of regions inside the devices can be acquired to monitor, over time, more than one experimental condition. The top-stage incubator maintains the cell's physiological conditions throughout the experiment.

TECHNICAL DESCRIPTION

Utilizing inverted microscopy enables the acquisition of time-lapse measurements for dynamic studies involving cells and tissues within the innovative domains of lab-on-chip and organ-on-chip devices exploiting an integrated incubator. This advanced imaging technique facilitates meticulous observation and enhances the precision and depth of analysis, allowing for a comprehensive exploration of cellular and tissue behaviour in a controlled microenvironment. The inverted LEICA DMI8 microscope is characterized by an XYZ motorized stage with dimensions of (L x W x H) 375 mm x 330 mm x 27 mm, positioning range of 127 mm x 83 mm, resolution of 0,7 μm , accuracy < 20 μm , and repeatability < 3 μm . It includes magnifications between 5x and 40x and is equipped with a CMOS camera (18MP, MU1803 Amscope).

RESEARCH AREAS AND APPLICATIONS

Biomedical research, drug testing, disease modelling

UTEM & LUMINAD

General information

UNIT: [University of Milano Bicocca](#)

Category: Microscopy

Key instrumentation: TEM



This is the first Ultrafast-TEM in Italy, where a femtosecond laser is coupled to a Transmission Electron Microscope to provide simultaneous high temporal (fs) and high spatial ($< \text{nm}$'s) resolutions. Because of the versatility of our cross-scale approach, which combines real-space (imaging) and reciprocal-space (diffraction) with high temporal resolution, the UTEM at LUMiNaD provides the unique capability of observing many fundamental phenomena

TECHNICAL DESCRIPTION

The Ultrafast Transmission Electron Microscope (UTEM) built and operated in the LUMiNaD laboratory of the University of Milano-Bicocca is obtained by interfacing together a Transmission Electron Microscope (JEOL JEM-2100 TEM) with an Amplified Femtosecond Laser (PHAROS, Light Conversion) via a coupling module with three optical accesses. The TEM is also equipped with state-of-the-art sample holders and electron detection tools.

RESEARCH AREAS AND APPLICATIONS

1) ultrafast phenomena in nanoscale quantum materials; 2) light-induced coherent modulation of a free-electron wavefunction; 3) dynamic behavior of nano-chemical and biophysical systems; 4) dynamic control of magnetic systems; 5) electron-structural correlations in non-equilibrium condition.

X-RAY DIFFRACTOMETER

General information

UNIT: [University of Milano Bicocca](#)

Category: Photons

Key instrumentation: Rigaku SmartLab SE



Rigaku SmartLab SE is an X-ray powder diffractometer for thin film diffraction, SAXS, pole figure, residual stress and non-ambient experiments, and with automatic alignment.

TECHNICAL DESCRIPTION

Rigaku SmartLab SE features SmartLab Studio II software based on a new architecturally integrated modular platform; Cross-beam optics module switches between Bragg-Brentano and parallel beam without the need to change optics; HyPix-400 2D detector enabling seamless switch between 0D, 1D and 2D detection mode depending on application type; D/teX Ultra 250 1D detector accelerates powder diffraction by a factor of 250 in speed and provides adjustable energy resolution of approximately 20% or 4% depending on sample type; Integrated intelligent Guidance software enables fully automated measurement including optics and sample alignment; and Self-aligned optics maximize instrument uptime and minimize cost of ownership.

RESEARCH AREAS AND APPLICATIONS

Thin Films, Materials Science, Engineering

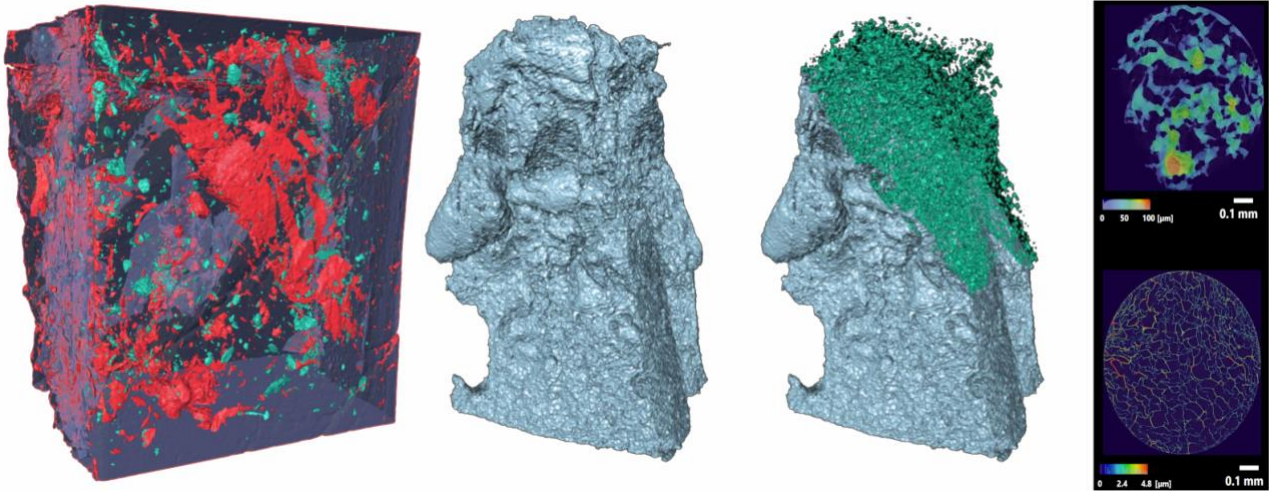
XRD TOMOGRAPHY

General information

UNIT: [CNR-IPCB](#)

Category: Microscopy

Key instrumentation: The RIGAKU Nano3DX is a X-ray microscope to measure large samples at high resolution.



The RIGAKU Nano3DX is a X-ray microscope to measure large samples at high resolution. This is achieved with a high-power rotating anode X-ray source and a high-resolution CMOS-type detector. The instrument allows CT reconstruction, image processing, 3D visualization and segmentation, quantitative analysis.

TECHNICAL DESCRIPTION

"Specifications: - 1 kW continuous rotating anode X-ray generator, complete with integral X-ray protection hood, with: - Dual anode: Cr/Mo or any other combination that provides high versatility of analysis - Max. source spot diameter 80 microns to minimize source drift - Detector type: high resolution sCMOS (0.325 to 7micron/pixel resolution), with 2048x2048 pixels, pixel size 6.5x6.5 microns, 16-bit A/D converter and standard 0.325 to 2.6 μm lens, 0.66 mm \times 0.66 mm FOV - Changing pixel size from 325nm to 5200nm by replacing the lens - Two interchangeable lenses: 1. Max. FOV 10.64 mm \times 10.64 mm - Minimum pixel size 5200nm 2. Max. FOV 2.66 mm \times 2.66 mm - Minimum pixel size 1300 nm - Maximum spatial resolution achievable on a 2D graph below 500 nm - Near-parallel beam geometry instead of conical beam geometry enlargement for projection reduction - Maximum sample size: 20mm diameter \times 40mm height - Automatic sample holder (Automatic sample holder) - Temperature control system and mechanical compression of sample during acquisition (temperature range RT-200°C, pressure range 1-200N maximum sample size \varnothing 10mm \times 2mm"

RESEARCH AREAS AND APPLICATIONS

Advanced materials, Nanotechnologies, characterization of porous materials, evaluation of micrometric filler distribution in composites, hierarchical structure of materials