

Material Characterization Services

The Instituto de Ciencia Molecular is a leading research center dedicated to the study of molecular science, nanoscience, and advanced materials. Equipped with state-of-the-art scientific instrumentation, the Institute provides cutting-edge experimental capabilities to support fundamental research and technological development. This catalogue presents a selection of the main characterization and analysis techniques available at the Institute, designed to address complex scientific challenges across chemistry, physics, materials science, and nanotechnology, fostering excellence in research, innovation, and collaboration.

Bruker

Icon AFM (Atomic Force Microscope)



Technology Overview

Atomic Force Microscopy (AFM) is an advanced surface characterization technique that provides three-dimensional imaging and quantitative measurements at the nanometer scale. It operates by scanning a high-precision sharp tip across the sample surface, detecting interaction forces between the tip and the material. These interactions are converted into detailed information on surface topography and material properties. Bruker AFM systems are recognized for their high resolution, stability, and operational versatility.

Applications

- Nanoscale surface topography characterization
- Surface roughness and quality analysis
- Measurement of mechanical and functional material properties
- Study of nanomaterials, polymers, and thin coatings
- Research in biology, biomedicine, and life sciences
- Inspection and analysis of electronic and semiconductor materials

Contact

transferencia@icmol.es
+34 963 54 3367

Pricing & Access Conditions

transferencia@icmol.es



Bruker

Multimode AFM (Atomic Force Microscope)



Technology Overview

The MultiMode 8-HR Atomic Force Microscope (AFM) is a high-resolution scanning probe instrument designed for advanced surface imaging and nanomechanical analysis. Built on Bruker's proven MultiMode platform, it delivers exceptional imaging speed and resolution with support for innovative modes such as PeakForce Tapping® and enhanced nanomechanical mapping. Powered by the NanoScope 6 controller, the system offers flexibility, precision, and the ability to tailor experiments with a wide range of accessory modules and custom analysis tools.

Applications

- High-resolution topographic imaging of surfaces at the nanoscale
- Quantitative mapping of mechanical properties (e.g., stiffness, adhesion)
- Analysis in air, fluid, and controlled environments
- Nanomechanics and materials characterization
- Research in polymers, biomaterials, semiconductors, and coatings

Contact

transferencia@icmol.es
+34 963 54 3367

Pricing & Access Conditions

transferencia@icmol.es



Bruker

Powder X-Ray Diffraction (XRD)



Technology Overview

Powder X-ray Diffraction (XRD) is a core analytical technique used for the identification and structural characterization of crystalline materials. It is based on the interaction of an X-ray beam with a polycrystalline sample, where diffraction from atomic planes generates characteristic patterns according to Bragg's law.

Bruker powder XRD systems provide high accuracy, stability, and fast data acquisition, enabling reliable phase identification and structural analysis.

Applications

- Phase identification and quantification
- Structural analysis of crystalline materials
- Quality control in industrial materials
- Characterization of powders, ceramics, minerals, and inorganic materials
- Research in chemistry, materials science, and geology
- Pharmaceutical development and functional materials characterization

Contact

transferencia@icmol.es
+34 963 54 3367

Pricing & Access Conditions

transferencia@icmol.es



Malvern Panalytical

Empyrean X-Ray Diffraction System



Technology Overview

The Empyrean range represents a next-generation multi-purpose X-ray diffraction (XRD) platform designed to handle a very wide variety of sample types — from powders and thin films to nanomaterials and solid objects — on a single instrument. Its advanced MultiCore Optics and flexible modular design allow users to perform a broad spectrum of diffraction, scattering and imaging experiments without manual intervention, making it a future-proof solution for evolving research needs.

The HTS robotic system enables rapid results, processing up to 98 samples in 24 hours, making it an efficient solution for high-throughput industrial applications. With a 2Theta range from 2 to 59 degrees

Applications

- Structural characterization and phase identification of crystalline materials
- Analysis of powders, coatings, thin films and bulk samples
- Small- and wide-angle X-ray scattering (SAXS/WAXS) studies
- In situ and in operando diffraction experiments
- Materials science, chemistry, nanotechnology and quality control investigations

Contact

transferencia@icmol.es
+34 963 54 3367

Pricing & Access Conditions

transferencia@icmol.es



Rigaku

Single crystal X-Ray Diffraction (XRD)



Technology Overview

The XtaLAB Synergy-S is a high-performance single-crystal X-ray diffractometer designed for rapid and precise three-dimensional structure analysis of crystalline materials. It combines advanced PhotonJet-S microfocus X-ray sources, a kappa goniometer and hybrid photon counting detectors (HyPix) to deliver fast, accurate diffraction data across a wide range of samples. The system's modular design and intelligent control software support flexible experimental workflows and high-quality results.

Applications

- Detailed 3D structural determination of small molecules and crystalline compounds
- Crystallography studies in chemistry, materials science and life sciences
- Chemical and protein crystallography for research and development
- Investigation of polymorphs and molecular geometry
- Structure analysis across varied temperatures and conditions

Contact

transferencia@icmol.es
+34 963 54 3367

Pricing & Access Conditions

transferencia@icmol.es



Mettler-Toledo

Thermogravimetric Analysis (TGA)



Technology Overview

Thermogravimetric Analysis (TGA) is a thermal analysis technique used to measure changes in a material's mass as a function of temperature or time under a controlled atmosphere. The technique provides precise information on thermal stability, composition, and decomposition processes.

Mettler-Toledo TGA systems are known for their high balance sensitivity, excellent temperature control, and flexible gas handling, enabling accurate and reproducible measurements across a wide range of applications.

Applications

- Evaluation of thermal stability and decomposition behavior
- Determination of material composition and filler content
- Analysis of moisture, solvents, and volatile components
- Characterization of polymers, pharmaceuticals, and inorganic materials
- Quality control and material consistency testing
- Research and development in materials science and chemical engineering

Contact

transferencia@icmol.es
+34 963 54 3367

Pricing & Access Conditions

transferencia@icmol.es



Quantum Design

Physical Property Measurement System (PPMS)



Technology Overview

The Physical Property Measurement System (PPMS) is a versatile, fully integrated platform designed for the characterization of physical properties of materials under precisely controlled conditions of temperature, magnetic field, and environment. The system combines cryogenic technology, high-field magnets, and modular measurement options in a single, automated instrument.

Quantum Design PPMS systems are widely recognized for their flexibility, reliability, and precision, enabling a broad range of measurements from cryogenic temperatures up to room temperature and under high magnetic fields.

Applications

- Measurement of magnetic, electrical, and thermal properties
- Studies of materials at low temperatures and high magnetic fields
- Characterization of superconductors and magnetic materials
- Transport measurements (resistivity, Hall effect)
- Heat capacity and thermal analysis
- Research in condensed matter physics and advanced materials

Contact

transferencia@icmol.es
+34 963 54 3367

Pricing & Access Conditions

transferencia@icmol.es



Quantum Design

SQUID Magnetometer (MPMS)



Technology Overview

The SQUID (Superconducting Quantum Interference Device) magnetometer is an ultra-sensitive instrument designed for precise magnetic measurements of materials. It operates by detecting extremely small changes in magnetic flux using superconducting loops and Josephson junctions, enabling measurements with unparalleled sensitivity.

Quantum Design SQUID systems (MPMS) are considered the gold standard in magnetometry, offering exceptional accuracy, stability, and automated operation over a wide range of temperatures and magnetic fields.

Applications

- High-sensitivity magnetic characterization of materials
- Study of superconductors and magnetic phase transitions
- Measurement of weak magnetic signals in solids, thin films, and nanoparticles
- Temperature- and field-dependent magnetization studies
- Research in condensed matter physics and materials science
- Investigation of magnetic properties in advanced and functional materials

Contact

transferencia@icmol.es
+34 963 54 3367

Pricing & Access Conditions

transferencia@icmol.es



Thermo VG Scientific X-ray Photoelectron Spectroscopy (XPS)



Technology Overview

X-ray Photoelectron Spectroscopy (XPS) is a powerful surface analysis technique used to determine the elemental composition, chemical state, and electronic environment of materials. The technique is based on the photoelectric effect: an X-ray beam irradiates the sample surface, causing the emission of photoelectrons whose kinetic energy is analyzed to identify elements and their chemical bonding states.

Thermo VG Scientific XPS systems are renowned for their high surface sensitivity, quantitative accuracy, and reliability, enabling detailed chemical characterization of the top few nanometers of a material.

Applications

- Surface elemental and chemical state analysis
- Thin film and coating characterization
- Study of oxidation states and chemical bonding
- Analysis of polymers, catalysts, and functional materials
- Failure analysis and contamination studies
- Research in materials science, chemistry, and nanotechnology

Contact

transferencia@icmol.es
+34 963 54 3367

Pricing & Access Conditions

transferencia@icmol.es

