ICMAB
INSTITUT DE CIÈNCIA DE MATERIALS DE BARCELONA
EXCELENCIA SEVERO OCHOA
CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

ICMAB TECHNICAL SCIENTIFIC SERVICES

ICMAB TECHNICAL SCIENTIFIC SERVICES MEETING

Dr. Carles Frontera: Scientific Equipment Platforms Director

11 different SEP ("Servicios Cientifico-Tecnicos")

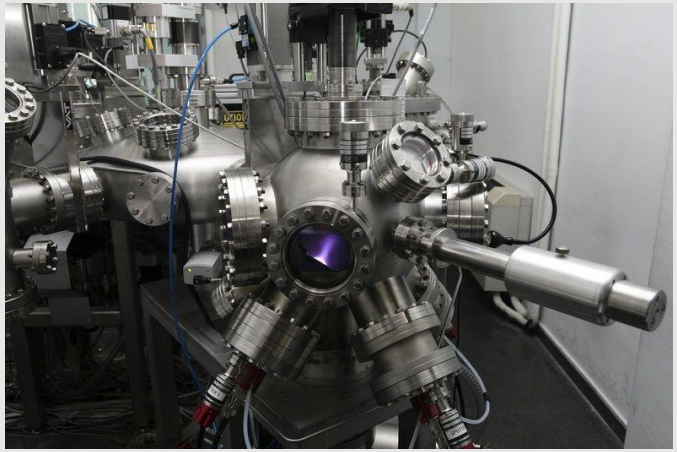
Thin film PLD growth	**Preparation of materials**
MBE	
Low Temperature and Magnetometry	**Characterization of materials**
SPM/AFM	
X-ray diffraction	
Electron Microscopy (TEM, SEM)	
Thermal Analysis (ATG, DSC, BET)	
Spectroscopy (IR, UV, EPR)	
Nanoquim: Clean room facility	**Preparation & characterization**
Soft materials	
Bioservice	

Part of red de Servicios del CSIC http://www.csic.es/web/guest/buscador-de-servicios
https://icmab.es/research/scientific-and-technical-services

Preparation

Molecular Beam Epitaxy

- Scientist in charge: Isabel Alonso, Miquel Garriga
- Scientific equipment:
  - ✓ Ultra-high vacuum (UHV) chamber to deposit type IV (Si,Ge) semiconductors by evaporation.



Thin Films

- Scientist in charge: Florencio Sánchez
- Technician: Raul Solanas, Victor Andrés Castro
- Scientific equipment:
  - ✓ UHV cluster for pulsed Laser deposition (PLD) + sputtering.

Preparation & Characterization

Advanced Optical Lithography Lab

Characterization Nanoscale Lab

Physico-Chemical Lab

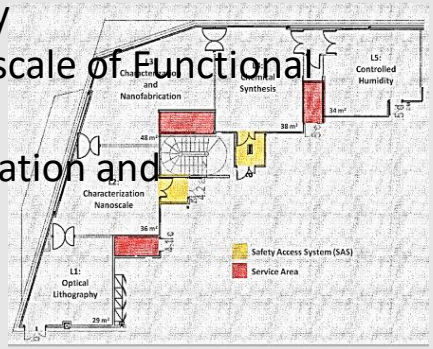
Chemical Synthesis Lab

Highly Controlled Humidity Lab

Nanoquim Platform

- Scientist in charge: Teresa Puig
- Technicians:
  Marta Gerbolés, Luigi Morrone, Adrià Pacheco
- **10,000 class cleanroom (ISO7)** 200 m^2
- **5 labs** with independent regulation of humidity, temperature and over-pressure
- Scientific equipment: over 30 instruments

✓ Advanced Optical Lithography
✓ Characterization at the Nanoscale of Functional Materials
✓ Physico-Chemical Characterization and Nanofabrication
✓ Chemical Synthesis
✓ Highly Control Humidity



Preparation & Characterization

Soft Materials

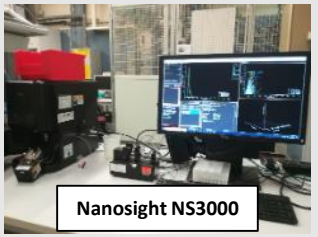
- Scientist in charge: Mariana Köber
- Technicians: Amable Bernabé, David Piña, Xavi Rodriguez.
- Scientific equipment:



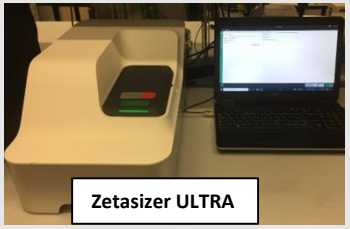
Processing :

- ❑ Lab-scale high pressure equipments for materials processing with compressed fluids (plant scale 6 ml, 25 ml, 50 ml, 300 ml)
- ❑ High-pressure phase analyzer (Volum variable cell) (SITEC)
- ❑ Freeze Dryer (lyomicron 85)
- ❑ Tangential flow filtration system (KR2i-Repligen)
- ❑ Pulse-free microfluidic system (Elvesys)
- ❑ MODDE (Software for Design of Experiments)


High pressure phase analyzer


Nanosight NS3000


300 mL high-pressure plant


Zetasizer ULTRA


Surface Plasmon Resonance


TFF System

Characterization:

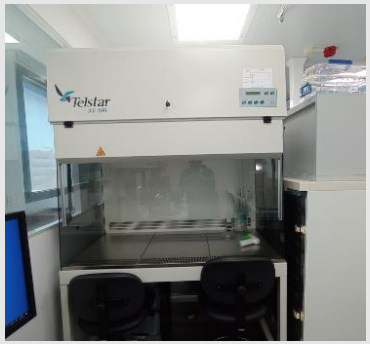
- ❑ Zetasizer NanoZS (Particle size & Z-Potential)
- ❑ Zetasizer ULTRA (Particle size & Z-Potential)
- ❑ Nanosight NS300 (Particle size & Concentration)
- ❑ Mastersizer 2000 (Particle size)
- ❑ Turbiscan Lab (Stability studies)
- ❑ Isothermal Titration Calorimetry
- ❑ Surface Plasmon Resonance
- ❑ Helium Pycnometer (Density studies)

Linked to U6. Biomaterial Processing and Nanostructuring Unit

The SOFT materials service is accredited with an ISO 9001 certification in its characterization unit.

Preparation & Characterization

Vertical laminar flow cabinets



Incubator

Autoclave

Bioservice

- Scientist in charge: Anna Laromaine
- Technicians: Marc Martínez
- Scientific equipment:

Activitites:

- ✓ Cell propagation and stock maintenance.
- ✓ Cryopreservation of viable cells.
- ✓ Personnel training on basic techniques of cell cultures.
- ✓ Maintenance of facilities and equipment.
- ✓ Performance of bioassays upon request.

Equipment:

- ✓ Vertical laminar flow cabinets.
- ✓ CO_2 incubators set up for several animal cells.
- ✓ Refrigerators and freezers.
- ✓ Autoclave.
- ✓ Inverted microscope equipped with a digital camera.
- ✓ Water baths.
- ✓ Tabletop refrigerated centrifuge.
- ✓ Vortex.
- ✓ Liquid nitrogen tank for cell storage.

Characterization

Quantum Design MPMS-3

Quantum Design PPMS System

Low Temperatures and Magnetometry

- Scientist in charge: Benjamín Martínez
- Technician: Bernat Bozzo, Ferran Vallés
- Scientific equipment:

✓ **2 MPMS-XL (Squid)** *:* Magnetic Property Measurement Systems. H_{max}=70kOe, T: 2K-400K.

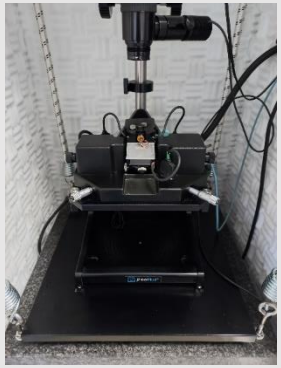
Quantum Design MPMS-XL
Quantum Design MPMS-3

✓ **Quantum Design PPMS System:**
Resistivity, magnetoresistance, Hall effect, AC susceptibility, VSM magnetometry, VSM+Oven magnetometry. H_{max}=90kOe, temperature range: 2K-400K (up to 1000K with VSM Oven)

✓ 16 T Cryostat System

Characterization

Park Systems NX10



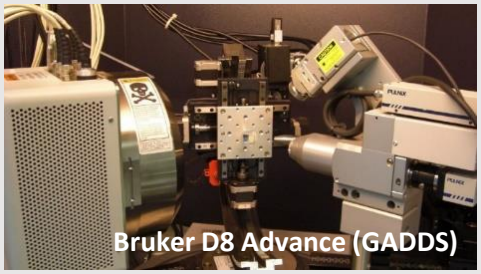
Keysight 5500

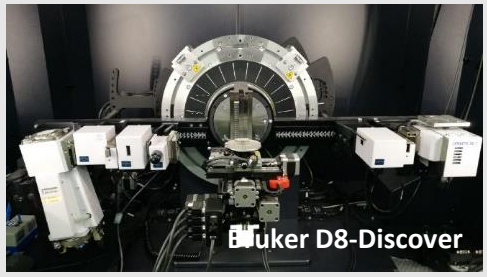
Scanning Probe Microscopy

- Scientist in charge: Arántzazu González
- Technicians: Marcos Paradinas
- Scientific equipment:
  - ✓ Park Systems NX10
  - ✓ Keysight 5500 LS
- Advanced atomic force microscopy techniques :
  - Atomic Force Microscopy (AFM)
  - Friction Force Mode (FFM)
  - Conductive AFM (CAFM)
  - Kelvin Probe Force Microscopy (KPFM)
  - Piezoresponse Force Microscopy (PFM)
  - Magnetic Force Microscopy (MFM)

Characterization


Bruker D8 Advance

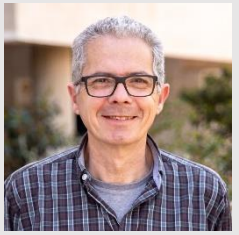

Bruker D8 Advance (GADDS)


Bruker D8-Discover


Bruker D8 Advance A25

X-Ray Diffraction

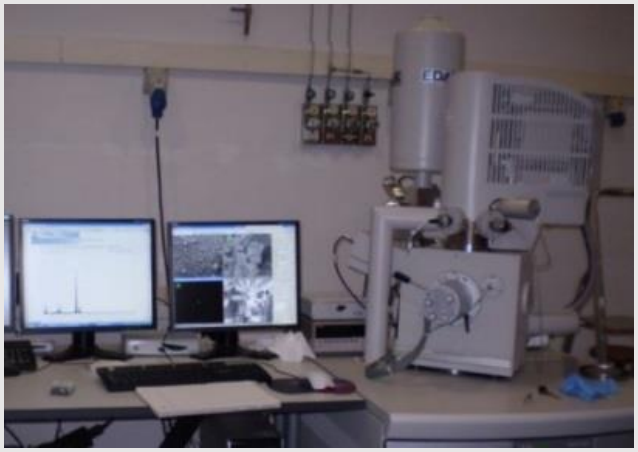




- Scientist in charge: Jordi Rius
- Technicians:
  F. Xavier Campos, Anna Crespi, Joan Esquius
- Scientific equipment:
  - ✓ D8 Advance: for the analysis of powder samples
  - ✓ Bruker D8 Advance (GADDS): Used for texture measurements.
  - ✓ Bruker D8-Discover: Specially used for thin film analysis.
  - ✓ Bruker D8 Advance A25: Bragg-Brentano geometry with electrochemical cell (Cu radiation) and Debye-Scherrer geometry (Mo radiation) for capillary measurements.

Characterization

QUANTA FEI 200 FEG-ESEM (SEM)



JEM1210, JEOL

OLYMPUS BX51

Electron Microscopy

- Scientist in charge: Lluís Balcells
- Technicians: Anna E. Carrillo, Judith Oró
- Scientific equipment:

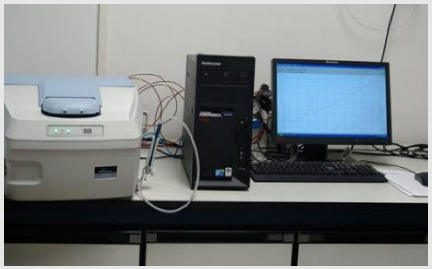
  ✓ JEM1210, JEOL 120 kV (TEM):
  -Holder: Analytical specimen holder, doble tilt (Tilt X=± 60º, Tilt Y=± 30º) GATAN 646.
  -Camera: ORIUS 831 SC 600, GATAN.

  ✓ QUANTA FEI 200 FEG-ESEM (SEM)
  -Energy Dispersive X-ray (EDX) system for chemical analysis
  -Lithography and nano-lithography by a RAITH e-beam

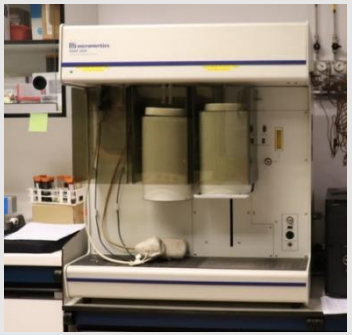
  ✓ Optical microscope: Olympus BX51

Characterization

STA NETZSCH -STA 449 F1 Jupiter con QMS 403 Aëolos® Quadro.



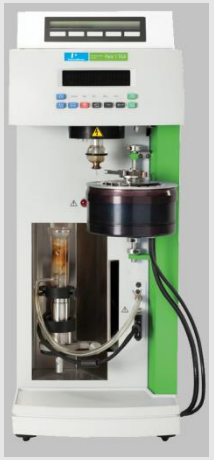
Perkin Elmer DSC8500



Micromeritics ASAP 2020

Thermal Analysis

- Scientist in charge: Amparo Fuertes, Nora Ventosa
- Technicians: Alejandro Borrás, Roberta Ceravola
- Scientific equipment:
  - ✓ STA NETZSCH -STA 449 F1 Jupiter (TGA/DSC) with QMS 403 Aëolos® Quadro coupled mass spectrometer.
  - ✓ Perkin Elmer Pyris 1 TGA Thermogravimetric Analyzer
  - ✓ Perkin Elmer DSC8500 (DSC)
  - ✓ Micromeritics ASAP 2000 (N_2)
  - ✓ Micromeritics ASAP 2020 (N_2, Ar & CO_2)



Perkin Elmer Pyris

Characterization

UV-Vis JASCO v-780

FT-IR JASCO 4700LE

Bruker ELEXYS 500

Spectroscopy

- Scientist in charge: José Vidal
- Technician: Vega Lloveras
- Scientific equipment:
- UV-Vis-NIR spectrophotometers:
  JASCO V-780 (190-1600 nm) and JASCO V-770 (190-3200 nm). Equipped with different sample holders, a diffuse reflectance integrating sphere and a temperature controller peltier (0-100 ºC).
- Infrared spectrophotometer: FT-IR JASCO 4700LE
  Equipped with an Attenuated Total Reflectance accessory (ATR) for powder samples, films, polymers, substrates, liquids, etc. as well as with a Transmittance accessory.
- EPR: X-Band (9.7 GHz) Bruker ELEXSYS E-500 spectrometer
  Equipped with a ST8911 microwave cavity, a Bruker variable temperature unit (120-400K), a field frequency lock system (Bruker ER 033 M), along with a NMR Gaussmeter (Bruker ER 035 M).

WEB: http://icmab.es/research/scientific-technical-services

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