

## Other skills

- Bibliographic and patent research
- Definition of normative and specifications
- Material/chemical consults

## Structures and instruments

- Chemical synthesis laboratories
  - ▶ Miniemulsions
  - ▶ Hydrothermal synthesis
  - ▶ Inert atmosphere synthesis
  - ▶ Standard and tubular ovens
  - ▶ Calcination oven
  - ▶ Ball milling
  - ▶ Dip coating, spray coating and spin coating
  - ▶ Polymerizations
- Advanced instruments
  - ▶ XRD, Bruker D8 Advance diffractometer
  - ▶ XPS, Perkin-Elmer PHI 5600ci (XE-AES) Spectrometer
  - ▶ UV-Vis, Cary 5E Spectrophotometer with diffuse reflectance accessory
  - ▶ FT-IR, Nicolet Nexus with ATR accessory
  - ▶ Dynamic contact angle
  - ▶ Micro-Raman ThermoFisher (laser 780, 532 nm)
  - ▶ SEM (Zeiss Supra) equipped with EDX
- Bibliographic resources
  - ▶ Reaxys, Google Scholar
  - ▶ Web of Science
  - ▶ Patent databases

### Contacts

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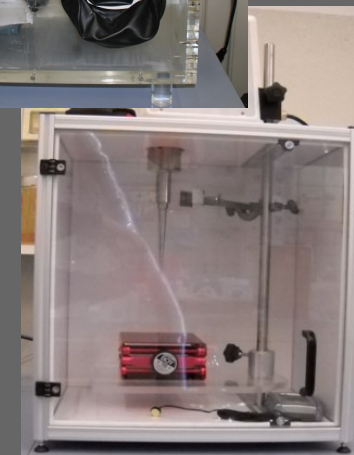
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# Materials synthesis and study



## Analytic and synthetic skills

### Chemical and quantitative analysis of materials

#### Bulk phase and suspensions

- Composition, structure and morphology
- Photochemical and chemical stability
- Infrared, Raman, UV spectroscopy (FT-IR)
- Raman Mapping
- Aging tests on materials
- Theoretical simulations

#### Surface

- Composition, structure and morphology
- Hardness and scratch resistance
- Wettability, hydrophobicity and hydrophilicity (contact angle)
- Adhesion
- Photochemical and chemical stability
- Aging tests
- Optical and scanning microscopy (SEM, AFM)
- Adsorption simulations and surface studies
- DFT calculations

### Synthetic skills

Development of protective coatings

- ▶ Inorganic
- ▶ Polymeric
- ▶ Organic-inorganic hybrid materials

Optimization of polymeric formulations

Nanocomposite materials with improved properties

- ▶ Flame-retardant
- ▶ Mechanical
- ▶ Thermal
- ▶ Photochemical and chemical stability

Colloidal systems

Hydrothermal synthesis

Miniemulsions

Sol-gel processes

Low-temperature synthesis of inorganic materials  
and nanoparticles

Mechanosynthesis (ball milling)

Inert atmosphere synthesis

- ▶ Schlenk line synthesis
- ▶ Glove box

### Work Group

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