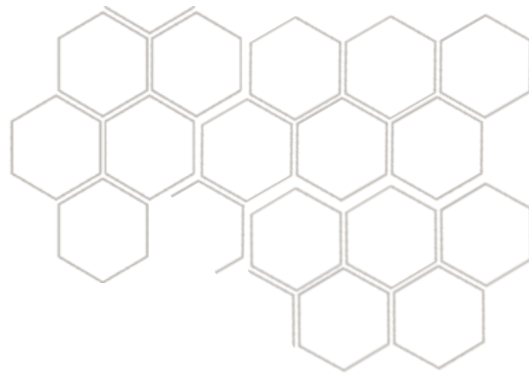




Services

MATERIALS CHARACTERIZATION

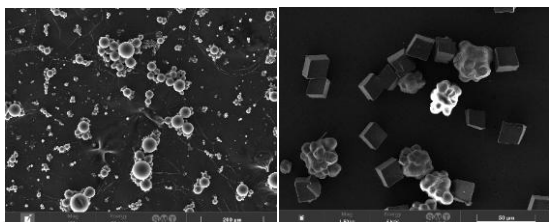


MATERIALS CHARACTERIZATION



The Smallmatek (SMT), offers a wide range of characterization services, based on equipment that ensures personalized, accurate and reliable characterization of your materials. More than simply providing results, the SMT makes its accumulated know-how and experience across various fields available to support informed decision-making and enhance the success of your projects.

SEM/EDS



Scanning Electron Microscopy (SEM) with integrated X-ray microanalysis system

- **High-Resolution Imaging:** Detailed observation of surface topography and texture (morphology).
- **Element Identification:** Qualitative detection of the chemical elements present in the sample.
- **Quantitative Analysis:** Measurement of the quantity of each chemical element.
- **Elemental Mapping:** Creation of color-coded maps showing the spatial distribution of elements in the image.

Model: *TESCAN VEGA LMU*, Scanning Electron Microscope (SEM) with tungsten filament. EDS by *Bruker*.

MATERIALS CHARACTERIZATION



DRX

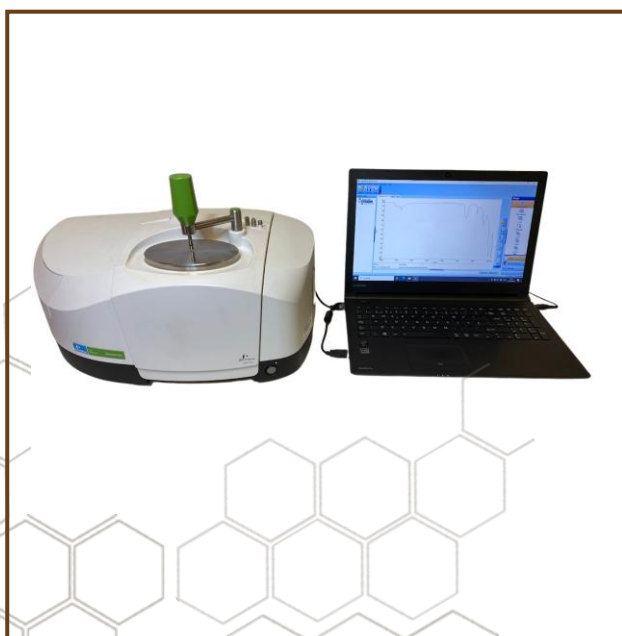


X-ray Diffraction

- **Phase identification:** Identifies specific compounds and minerals.
- **Crystal structure:** Reveals the organisation of atoms in the material.
- **Degree of crystallinity:** Distinguishes ordered materials from amorphous ones (e.g. plastics vs metals).
- **Crystallite size:** Estimates the size of microcrystals.
- **Purity:** Allows the detection of possible solid contaminants.

Model: *Rigaku Miniflex600*

FTIR



Fourier Transform Infrared Spectroscopy

- **Chemical family identification:** Identifies functional groups (e.g. alcohols, ketones, acids).
- **Molecular "fingerprint":** Compares the spectrum against databases to identify polymers, oils or pharmaceuticals.
- **Purity analysis:** Detects organic contaminants in raw materials.

Model: *PerkinElmer UATR Two*

MATERIALS CHARACTERIZATION



UV-Visible Spectroscopy



UV-Visible Spectroscopy

- **Concentration measurement:** Determines the amount of a substance in solution (Beer-Lambert law).
- **Purity analysis:** Checks whether a sample is contaminated.
- **Compound identification:** Identifies substances through their characteristic absorption band.
- **Chemical kinetics:** Monitors reactions in real time by observing changes in colour/absorbance.
- **Impurity detection:** Identifies traces of contaminants that absorb light at specific wavelengths.

Model: VWR® M9 UV/Vis Spectrophotometer

Optical Microscopy

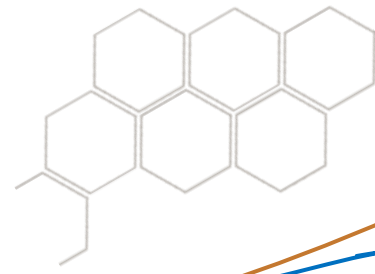


Optical Microscopy

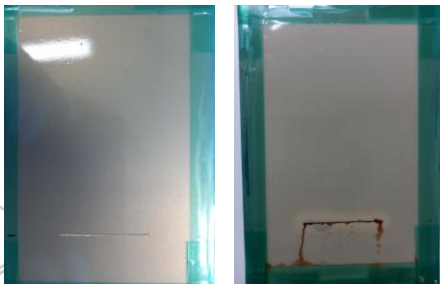
- It analyses the morphology and microstructure of opaque and translucent samples using reflected and transmitted light systems.

Model: Leica DM2700 M

MATERIALS CHARACTERIZATION



Accelerated corrosion tests

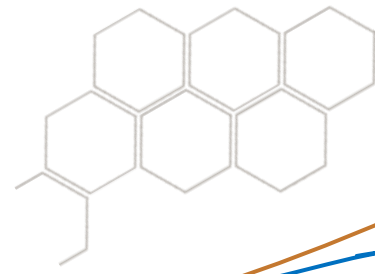


Salt Spray Chamber

- **Accelerated corrosion tests:** Simulate, in a few hours or days, the corrosion that would occur over years under natural conditions, using a salt solution (sodium chloride) at controlled temperatures.
- **Coating evaluation:** Checks the effectiveness of paints, galvanising, chromium plating, and other surface treatments in protecting the base metal against corrosion.
- **Standards compliance:** Performs standardised international tests (such as ISO 9227) for quality control in the automotive, naval, construction and electronics components industries.
- **Cyclic tests:** Carries out cyclic corrosion tests, with alternating salt spray, drying and controlled humidity, to simulate more complex real-world climatic conditions.

Model: Ascott CC450iP

MATERIALS CHARACTERIZATION



Electrochemical tests



Potentiostat

- **Corrosion characterisation:** Precise measurement of corrosion rate and determination of corrosion potential using techniques such as potentiodynamic polarisation and linear polarisation resistance (LPR).
- **Electrochemical impedance spectroscopy (EIS):** Detailed analysis of degradation mechanisms and the protective capacity of passive coatings, allowing complex interfacial processes to be distinguished.
- **Localised corrosion tests:** Identification of susceptibility to pitting and crevice corrosion, determining critical potentials for passive film breakdown and protection loss in aggressive environments.
- **Galvanic and cathodic protection studies:** Assessment of compatibility between different metals and monitoring of the efficiency of anodic or cathodic protection systems under real operating conditions.

Model: *Gamry Instruments, reference*

