Structure, Morphology and Topography

The Structure, Morphology and Topography Facility covers all areas related to structure, morphology and topography. In this respect, the facility has a number of state of the art instruments to support the growing research activities relative to **inorganic and composite materials, polymers and powders.**

For the identification of structures as well as the study of structural quality, the main technique used in this facility is **X-ray diffraction.** This technique not only helps with the identification of phases but can also give an in-depth view with respect to preferred orientation or residual stress inside the material. As phase transformations can be studied with respect to temperature as well as humidity, the compatibility of a material to be used in specific environments can be tested based on the stability of its consisting phases.

The facility's high vacuum and environmental SEMs provide **high-resolution images and topographic and chemical information of the sample's surface.** Together with the use of complementary tools such as 3D surface profilometry, the **thickness of coatings** and **surface roughness** can be determined. The facility's tools are also used to study **material wear** as well as **material failure** and can be used for the study of **material adhesion.**

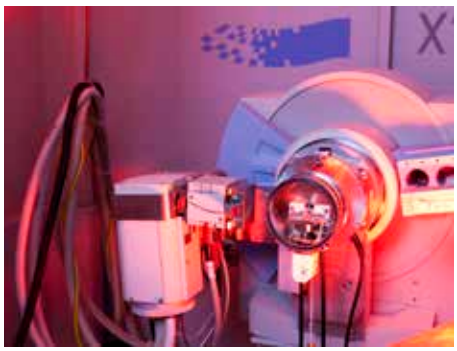
Our analytical capabilities and skills have already been helpful for the **glass, steel, packaging, building, and polymer industries, as well as the pharmaceutical and cosmetic industries.**

Equipment

- Bruker D8 Discovery (series II) comprising a Cu Kα and Mo Kα anodes
- PANalytical X'Pert Pro comprising a Cu Kα anode
- Agilent AFM 5100 (availability of liquid cell)
- KLA-Tencor profilometer
- FEI Environmental SEM combined with EDX system
- Hitatchi SU-70 SEM combined with EDX/WDS system

FEI Environmental SEM combined with EDX system

KLA-Tencor profilometer



X-ray diffraction instrument

Agilent 5100 surface probe micropscope

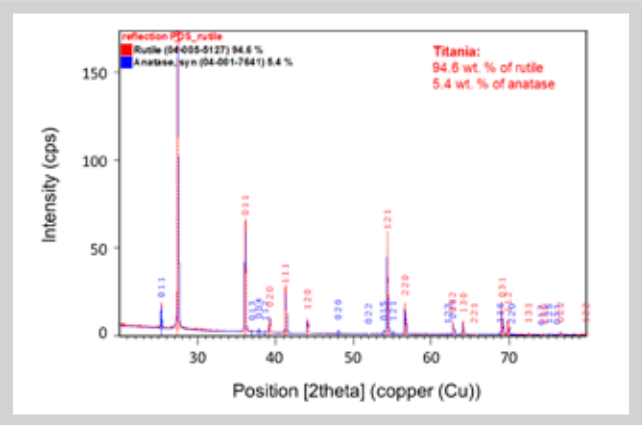
Hitatchi SU-70 SEM

Expertise and possible applications

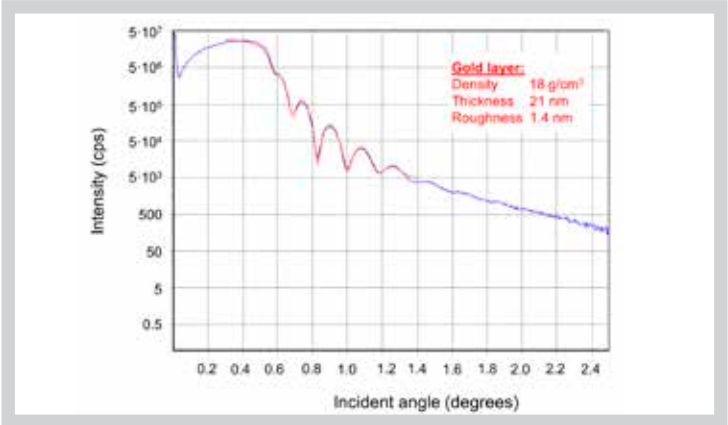
- Failure analysis, detection of defects, wear analysis
- Quantitative phase analysis
- Phase identification
- Texture analysis
- Residual stress analysis
- Phase transformation analysis (with respect to temperature, humidity)
- Stress analysis
- Roughness analysis
- Characterization of nanoparticle's size and strain

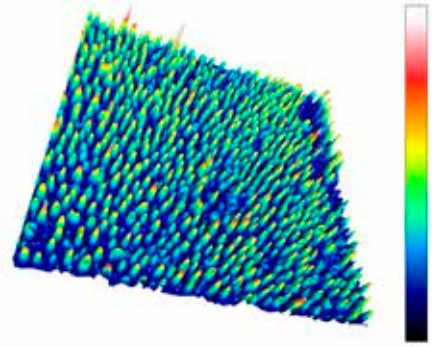
Examples of analyses

Quantitative phase analysis using XRD - Investigation of titania structure by classical reflection

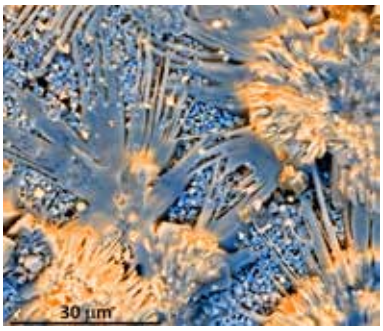


Properties of gold layer deposited on a silicon substrate evaluated by X-Ray Reflectivity

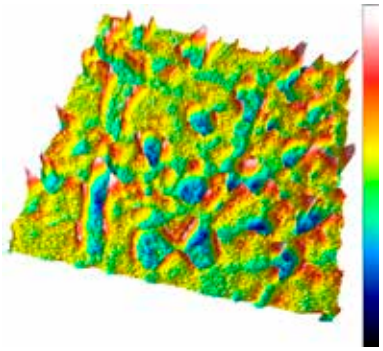




Surface of an annealed polymer blend
(field of view: 20x20µm²)



Crystalline structure viewed by SEM
(field of view: 75x65µm²)



Topography of PVC polymer surface
(field of view: 15x15µm²)

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