

Elemental and Isotopic Analysis

The Elemental and Isotopic Analysis Facility aims to carry out the **relevant characterization of the surface and bulk of materials** developed at LIST, other research centres or within industries. The use of complementary techniques, namely Dynamic-Secondary Ion Mass Spectrometry (D-SIMS) and electron spectroscopies (XPS, AES, UPS) allows us to determine the elemental composition (from H to U), provide chemical state information on the detected elements and trace isotopes with excellent sensitivity (from < ppm up to 100%).

By combining multiple capabilities for sample analysis (large areas or micro-analysis, mapping, depth profiling, angular analysis), a complete characterization and description of a wide range of materials compatible with ultra-high vacuum can be achieved. The facility addresses problematic areas such as **adhesion, surface**

and interface chemistry, failure analysis, element and isotope tracking, corrosion, segregation or diffusion, among others.

Our analytical capabilities and skills have already been implemented in the **automotive, packaging, building, microelectronic and polymer industries, as well as in the pharmaceutical industry and cosmetic research and development.**

Our facility is the **only public lab worldwide equipped in SIMS** with both a **CAMECA NanoSIMS** and a **CAMECA SC-Ultra**, instruments dedicated to imaging with an optimized lateral resolution (down to 50 nm) and to depth profiling with an optimized depth resolution (down to 1 nm), respectively.

Equipment

- ▶ SIMS (Secondary Ion Mass Spectrometry): CAMECA NanoSIMS 50, CAMECA IMS-6F modified, CAMECA SC-Ultra
- ▶ XPS - UPS (X-Ray Photoelectron Spectroscopy, Ultra-violet Photoelectron Spectroscopy): Kratos Axis-Ultra DLD
- ▶ AES (Auger Electron Spectroscopy): ThermoVG microlab 350
- ▶ EDX (Energy Dispersive X-ray)

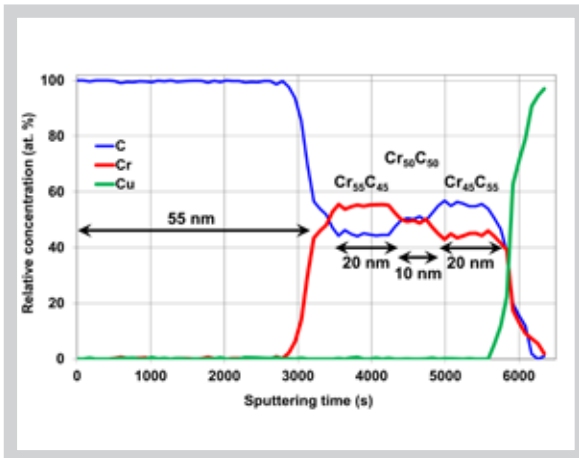


NanoSIMS 50

Expertise and possible applications

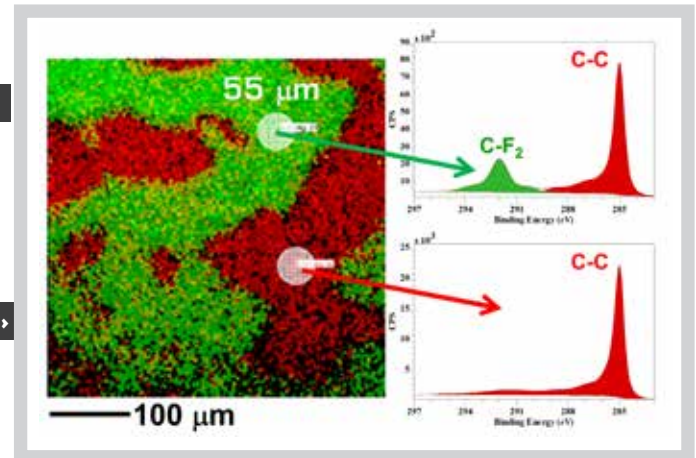
- ▶ Analyses of bulk materials, coatings, films and multilayers
- ▶ Determination of the elemental composition of materials
- ▶ Quantification of contaminants in solids
- ▶ Diffusion in materials, grain boundaries, surfaces and interfaces
- ▶ Detection of trace elements
- ▶ Quantification of dopants
- ▶ Isotopic tracing
- ▶ Imaging and depth profiling

Examples of analyses

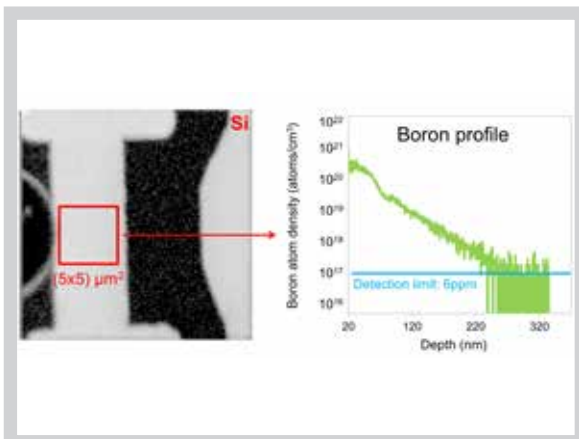


◀ Inorganic materials

Polymers ▶

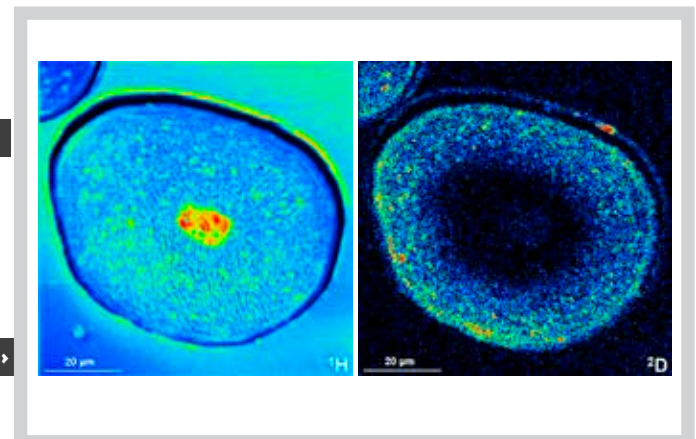


Surface functionalization of polystyrene with fluorine



◀ Semi-conductors

Biological samples ▶



Incorporation of an isotopically (D) labeled active molecule in human hair

3D elemental analysis of Si and BSi

Contact



Dr Marc ANGOTTI



Ulrich PECHSTEIN

mrt-platform@list.lu | Phone: (+352) 275 888 - 1

Headquarters

Luxembourg Institute of Science and Technology (LIST)
5, avenue des Hauts-Fourneaux
L-4362 Esch/Alzette
Phone: (+352) 275 888 - 1 | Fax: (+352) 275 885

info@list.lu

LIST.lu

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