Time Of Flight Secondary Ion Mass Spectroscopy (ToF-SIMS)

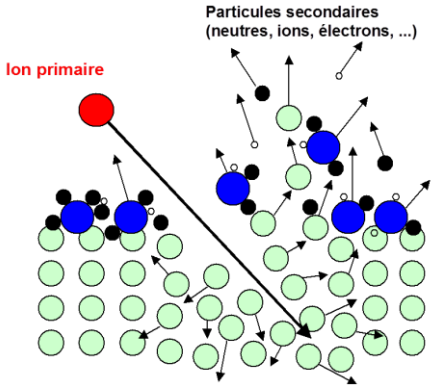
SCIENCE ET SURFACE
Filiale de SERMA TECHNOLOGIES

SPECIFICATIONS

- **Chemical and molecular information**: qualitative information on the nature of the surface molecules and/or molecular specie, elemental analysis: all elements can be detected (H included)
- Analysis depth: < 5 Å
- **Micro-analysis**, with an analysis area from a few µm² to a few hundreds of µm²
- **Mapping**: elemental and molecular imaging with a high spatial resolution (< 0.2 µm)
- **Depth profiling**: ultrashallow depth profiles are possible.

PRINCIPLE

The surface of the sample is bombarded by a few keV ion beam (pulsed source), called primary ions. Under bombardment many secondary particles are emitted from the surface (electrons, photons, atoms and neutral molecules, excited atoms and molecules, ions).



The atomic and molecular secondary ions produced by the pulverization are analyzed by mass spectrometry (parallel acquisition with a Time-of-Flight analyser).

The use of a very weak primary ion current (static SIMS) enables to limit the depth analysed (2 or 3 first atomic layers): it is thus an extreme surface analysis. That is why precautions must be taken during sample handling to prevent contamination which would hide the surface of interest.

The weak current of the probe limits the fragmentations (high mass fragments*) leading thus to qualitative information about chemical structure of the sample surface, i.e. about bonds and surface species. Thus this method is particularly used to study contamination, adsorption, adhesion, corrosion and biocompatibility of materials like polymers, semiconductors, catalysts and biological materials.
* in dynamic SIMS (classical), the current densities are generally higher, as a consequence, fragmentations are more important (less high mass fragments), which explains the impossibility to get information about chemical bondings.