

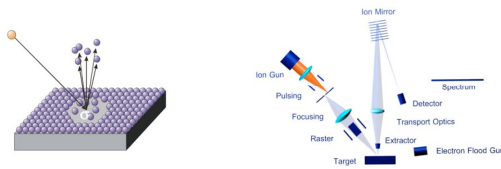


## analytical services

# SIMS— Secondary ion mass spectrometry

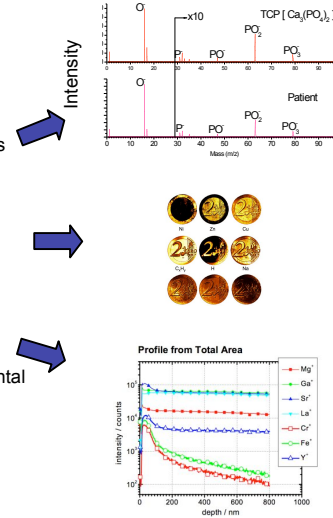
### What is SIMS?

Secondary Ion Mass Spectrometry, SIMS, is mass spectrometry of sputtered ionized particles. These particles are emitted from solid surfaces under the bombardment of energetic primary ions. The emitted or "secondary" particles are electrons, neutral atoms or molecules and atomic and cluster ions. Although the majority of secondary particles are neutrals, it is the secondary ions which are detected and analyzed by a mass spectrometer.



### Modes of operation

- 1. Static SIMS**  
Application of very low primary ion dose densities quasi non-destructive surface analysis.
- 2. Imaging**  
Rastering of a finely focused ion beam over the surface. Mass resolved secondary ion images (chemical maps).
- 3. Depth Profiling (dynamic SIMS)**  
Application of high primary ion dose densities; successive removal of top surface layers; elemental in-depth distribution.



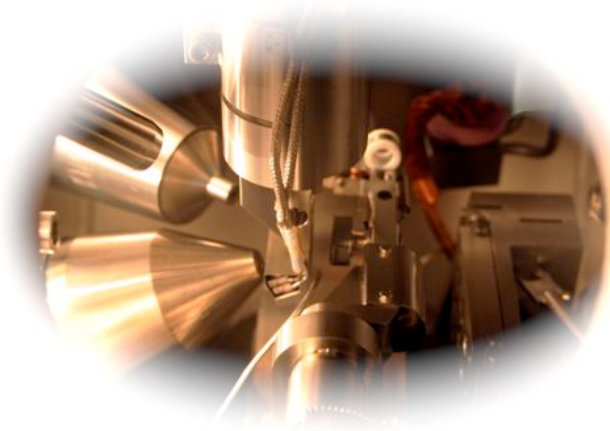
### Advantages of SIMS

- ↪ detection of all elements
- ↪ isotope sensitivity
- ↪ chemical information (molecules, clusters)
- ↪ small information depth
- ↪ high depth resolution
- ↪ high lateral resolution
- ↪ low detection limit (ppm - ppb)
- ↪ quantification if reference samples are provided

### Time-of-Flight SIMS

ToF-SIMS is combination of the analytical technique SIMS with a special type of mass analyzer and pulsed ion source. Our ToF-SIMS instrument is based on a Poschenreider mass analyzer. The advantage over other SIMS techniques are as follows:

- ↪ Parallel detection of all ions with excellent resolution i.e. no mass scan required.
- ↪ High transmission i.e. number of ions transmitted to the detector divided by the number of ions entered the analyzer.
- ↪ No upper mass limit- extends SIMS to bio-materials, insulators, polymers, etc.
- ↪ High sensitivity (<1ppm of monolayer for elements) consequently low sample degradation.



### Applications

Materials	Tasks	Applications
Semiconductors	Failure Analysis	Contamination
Polymers	Quality Control	Adhesion
Paint + Coatings	Development	Friction
Biomaterials	Reverse Engineering	Wettability
Pharmaceuticals	Research	Corrosion
Glass		Diffusion
Paper		Segregation
Metals		Cell Chemistry
Ceramics		Biocompatibility