

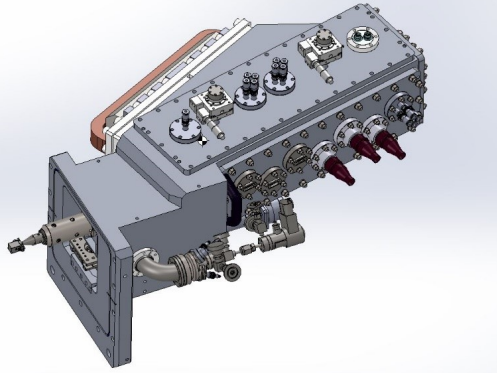
Instrumentation for nano-analytics

Development of high-performance SIMS add-on systems

We develop compact SIMS add-on systems, which can be mounted on various instruments, including helium ion microscopes (HIM), FIB (focused ion beam instruments) and dual beam instruments, transmission electron microscopes (TEM), ion implanters, etc.:

- Our SIMS systems comprise all ion optical components allowing them to be easily mounted as add-on systems on existing instruments.
- Our extraction and transfer optics maximize secondary ion extraction efficiency (>60%) without negatively impacting the focusing property of the primary ion beam.
- Our mass spectrometers are based upon a compact magnetic sector double-focusing mass spectrometer, offering highest transmission (100 %), high mass resolution ($M/\Delta M > 1000$), full elemental mass range (H-U) and parallel detection of several or even all masses using a multiple-collector system or a full-size in-house developed focal plane detector (FPD), respectively.

In this context, we are collaborating with zeroK (<https://www.zerok.com/>) to develop SIMS:Zero. SIMS:Zero is coupling LIST's SIMS technology with zeroK's super high brightness laser-cooled low temperature Cs+ ion source, allowing (i) ultimate SIMS spatial resolution (< 8 nm) at (ii) highest sensitivity thanks to the ionisation enhancement provided by reactive Cs.

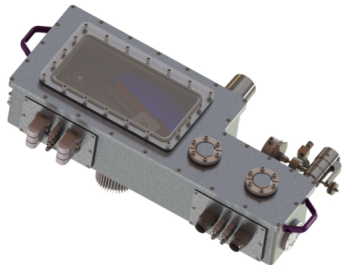


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Development of high-performance mass spectrometers for space applications and field portable applications

We develop field portable mass spectrometers providing high transmission, high mass resolution and parallel detection. The mass spectrometers can be as light as 4 kg, allowing for an integration into portable and/or mobile systems. The size of the spectrometers is depending on applications and can be as small as 20 x 10 x 10 cm³. The mass resolution ($M/\Delta M$) can be ranging from a few hundreds to a few thousands. The two main fields of application are:

- Space exploration and resource prospecting including analyses of
 - water and volatiles
 - isotopic ratios of H, C, O, N
 - minerals
 - etc.
- Terrestrial field portable applications including in-line isotopic ratio measurement in
 - hydrology
 - chemical analysis in oil and gas industry
 - environmental monitoring
 - homeland security
 - etc.



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Development of ion sources

Nano-scale techniques based on finely focused ion beams fall primarily into three groups: FIB machining, imaging (no chemical information) and analysis (chemical information). Such techniques all have in common that high-brightness ion sources are desired to produce very finely focused ion probes, and thus extremely high lateral resolution, while keeping a sufficiently high current compatible with a reasonable erosion rate or large yield of secondary electrons. In addition, the species used for the ion beam is of great importance in all three areas mentioned above. Our ion source developments include a novel high brightness Cs+ ion source, negative surface ionization sources and versatile high-brightness electron impact ion sources.

Apart from high-brightness ion source development, we also develop compact electron impact ion sources for space and field portable mass spectrometry applications.



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Linked Technologies

- [Instruments for correlative microscopy](#)
- [Correlative methodologies and workflows in materials science and life sciences](#)
- [Data treatment and visualization for correlative microscopy](#)
- [Particle-matter interactions for ion microscopy](#)

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