

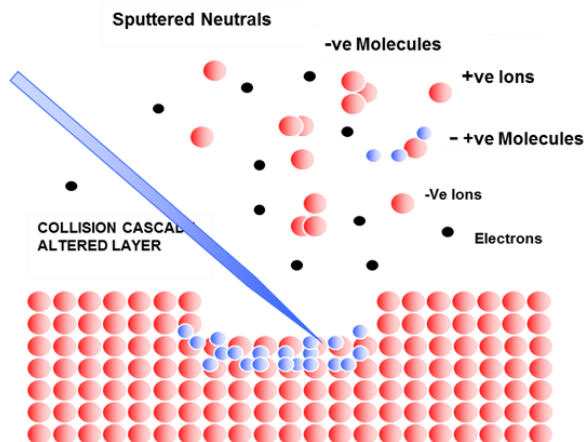
Hidden Compact SIMS

Mass Spectrometry in solid material

Compact SIMS Overview

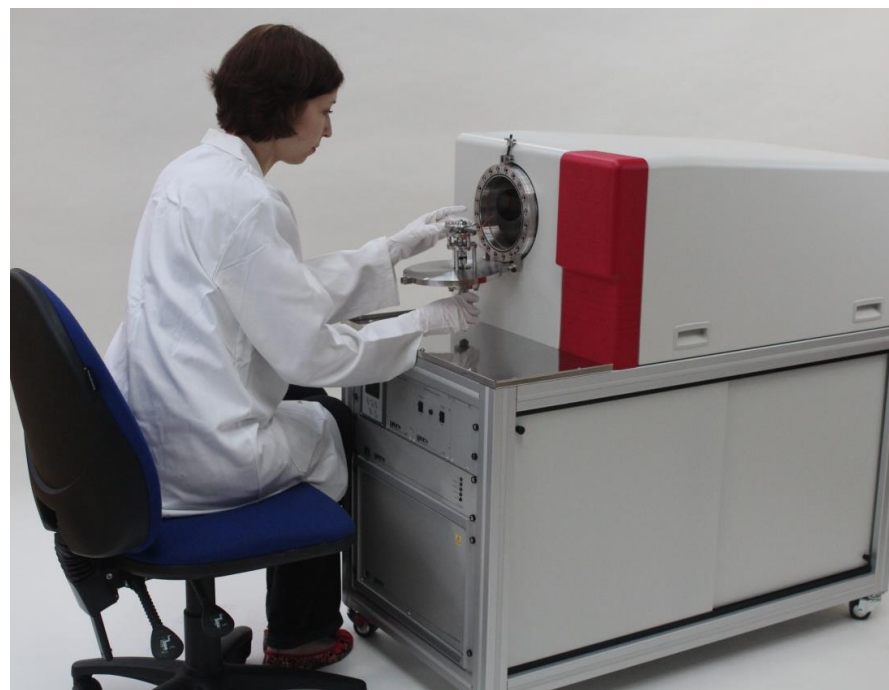
The Hiden Compact SIMS tool is designed for fast and easy characterisation of layer structures, surface contamination and impurities with sensitive detection of positive ions being assisted by the oxygen primary ion beam and provides isotopic sensitivity across the entire periodic table.

The ion gun geometry is set to provide for ideal nanometre depth resolution and near surface analysis.



Features

- Small footprint
- Easy “user friendly” layout
- Requires only single phase electrical power (under 10A 220Vac)
- Wheeled trolley design
- Positive SIMS and SNMS
- Depth Profiling
- 3D characterisation and imaging
- Mass spectra
- Isotopic analysis



Applications

- Thin films
- Surface coatings
- Semiconductors
- Catalysis
- Magnetic media
- Pharmaceuticals
- Corrosion studies
- Nanotechnology



Specifications

Primary ions

Energy/current: 1 to 5 keV / up to 400nA

Gases: Oxygen for high sensitivity

Spot size: under 50µm (imaging)
80 µm depth profiling

Sensitivity

Boron in Silicon (SIMS): 2ppm (10^{17} atoms cm^{-3})

Vacuum

Pump down to operation 10 minutes
with inert gas vent

Ultimate ----- $<5 \times 10^{-8}$ mbar

Weight --- 215kg

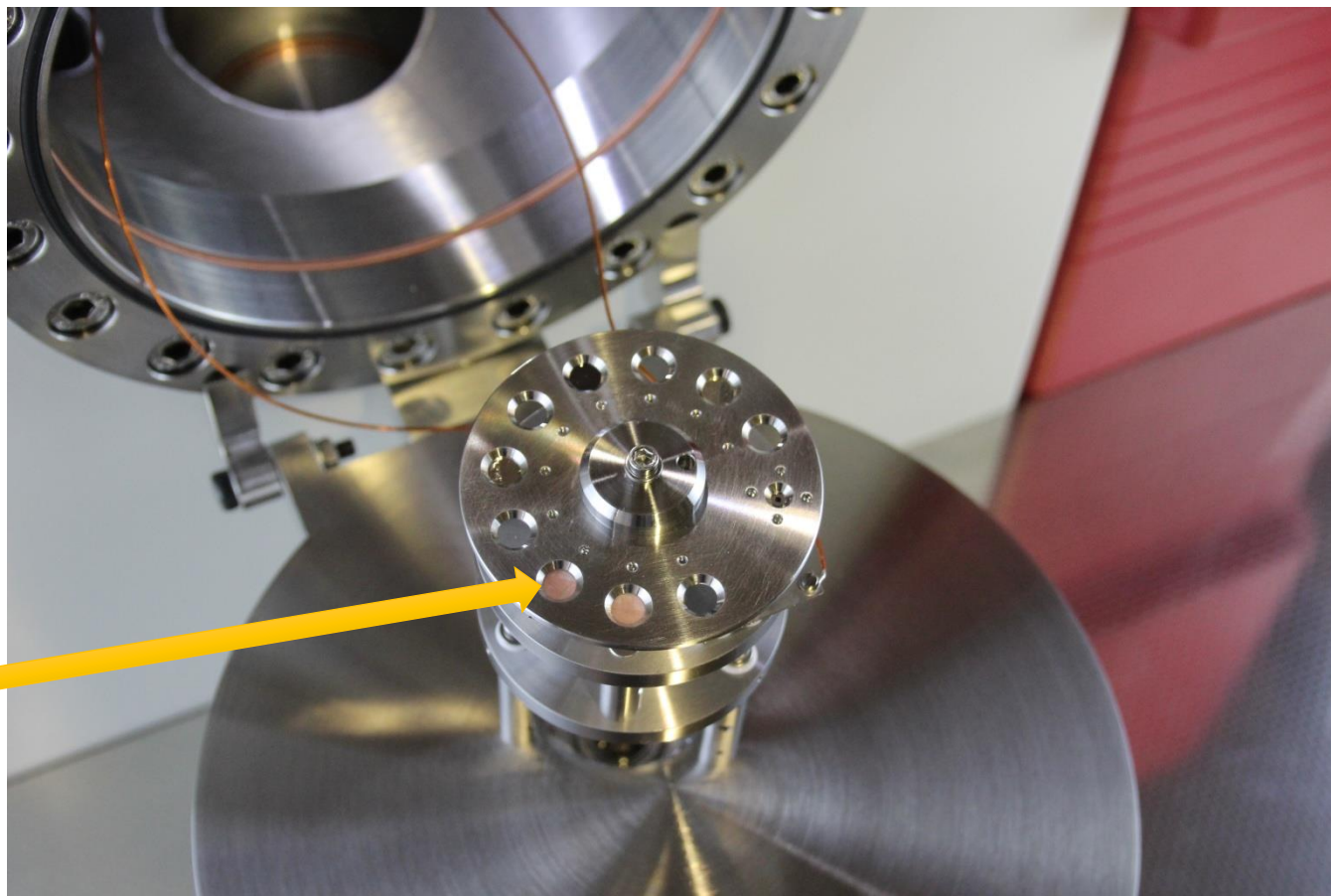


Sample loading

A rotary carousel enables 10 samples to be simultaneously loaded for measurement into the dry-pumped vacuum chamber.

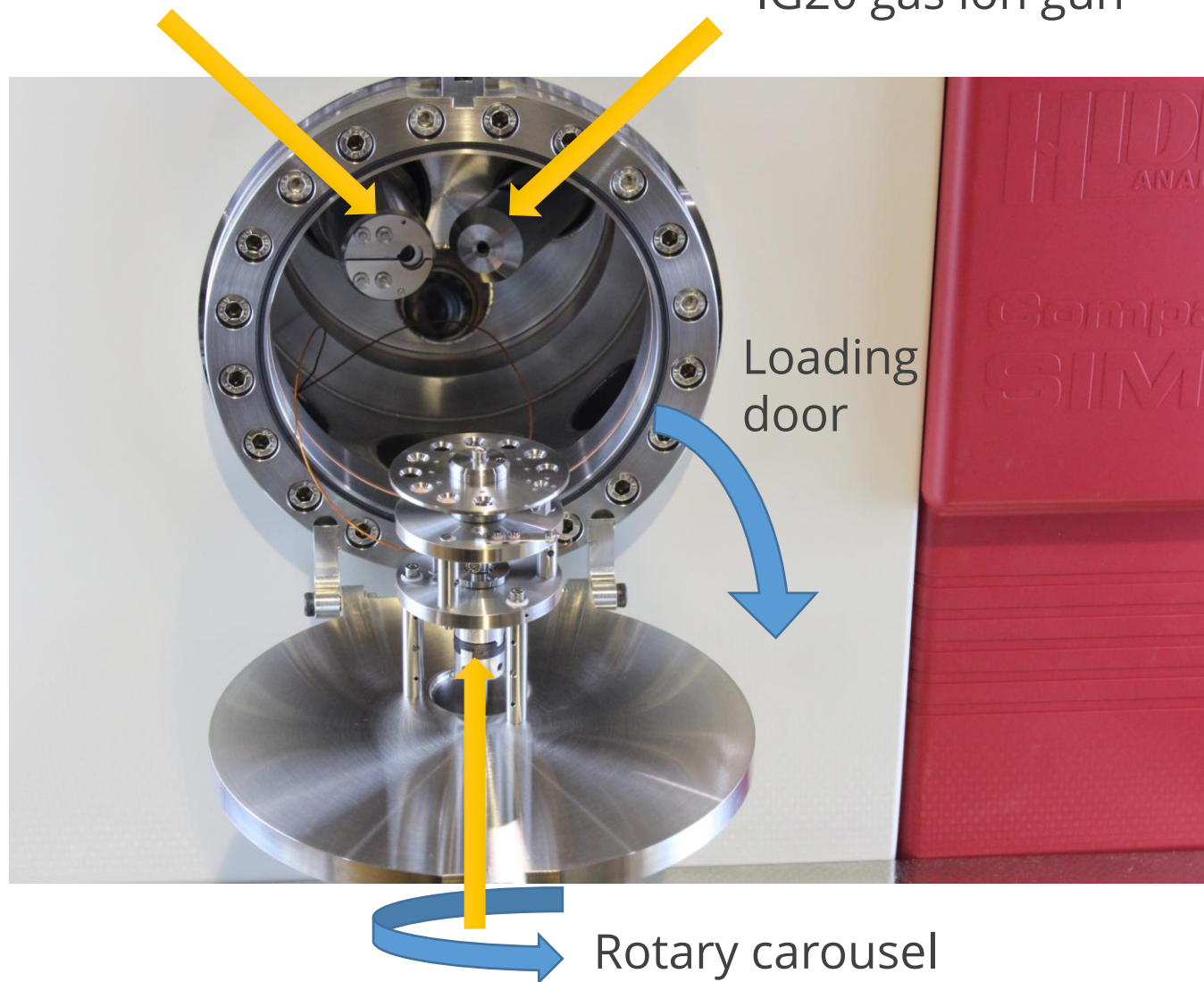
Custom carousels are easily changed and custom carousels can be manufactured for specific sample applications.

8mm diameter



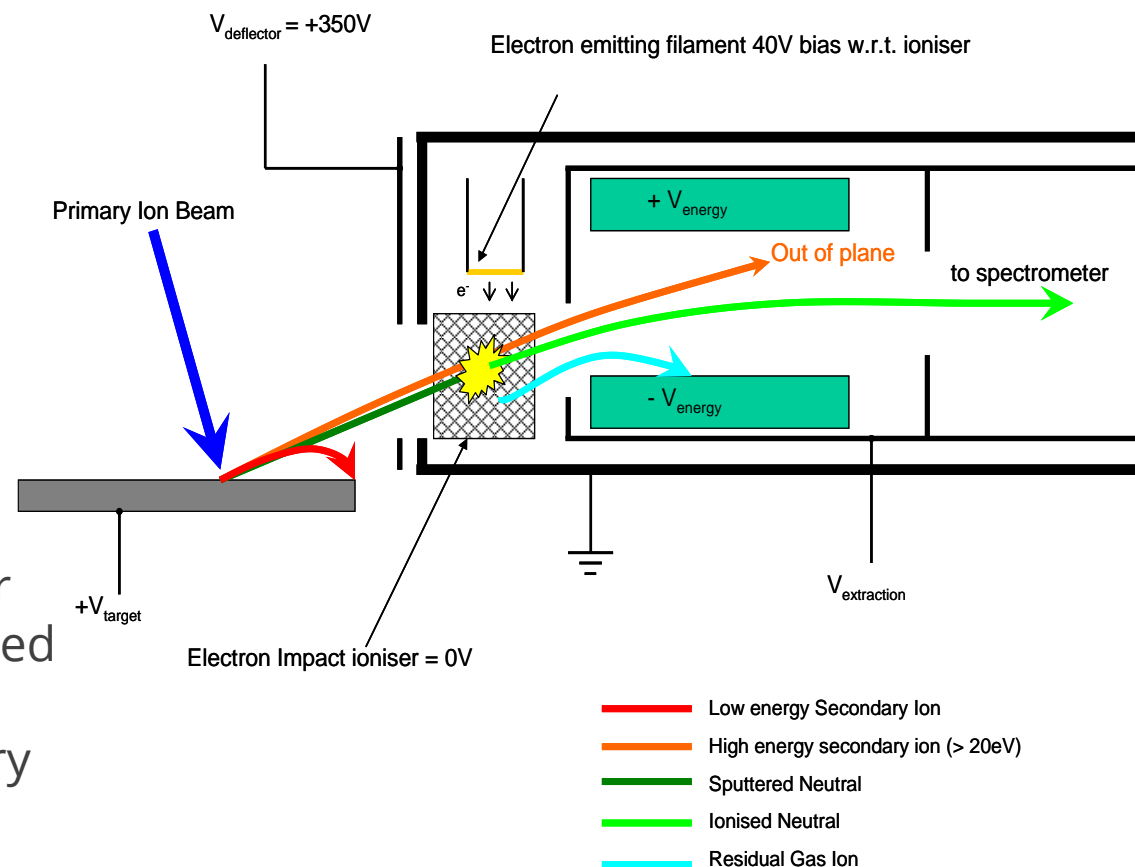
MAXIM-600P SIMS detector

IG20 gas ion gun



SNMS facility that is useful for quantification of high concentration elements, such as alloys.

The MAXIM SIMS/SNMS spectrometer has an electron impact ion source fitted close to its entrance. An external deflector plate removes the secondary ions (which generally constitute less than 1% of the sputtered flux) and allows the neutrals to enter the ioniser. Once ionised, the neutrals follow the same path that SIMS ions would have taken.

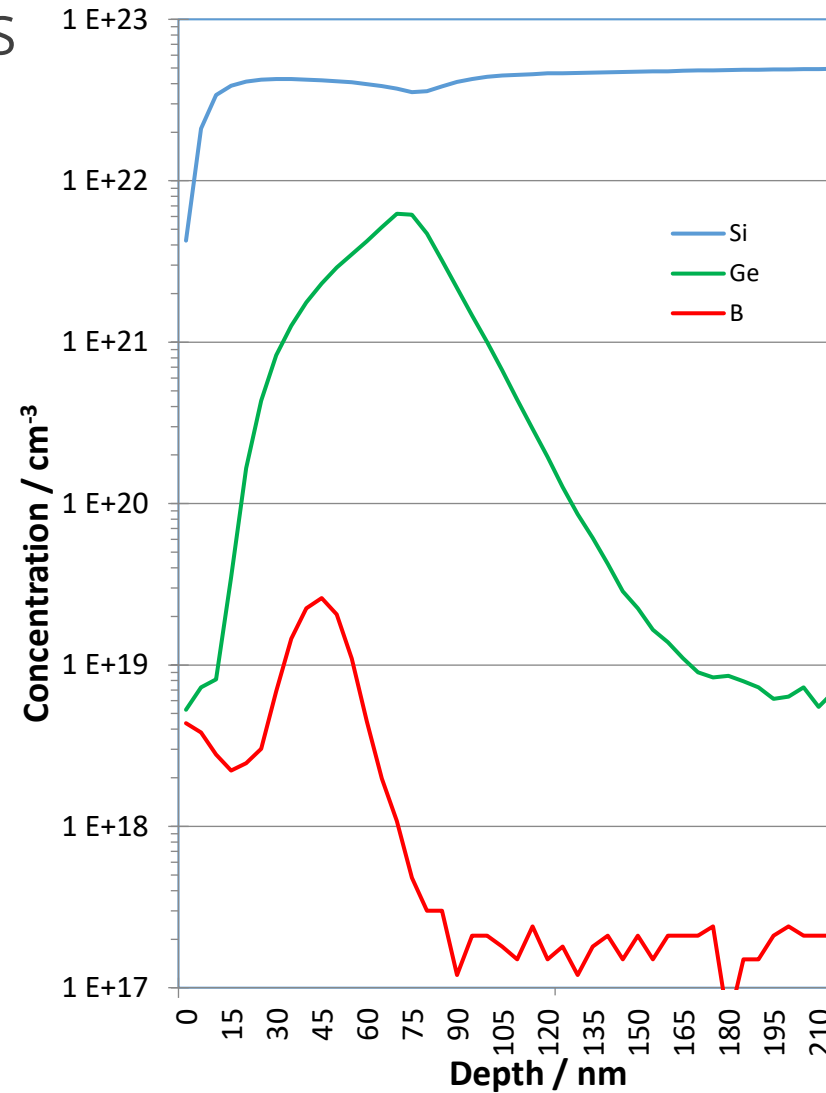


Depth Profile from Compact SIMS

SiGe with Boron Doping

Primary ions 5keV O₂⁺

Positive secondary ions



Ion Gun Control

PC controlled

Settings can be saved and recalled

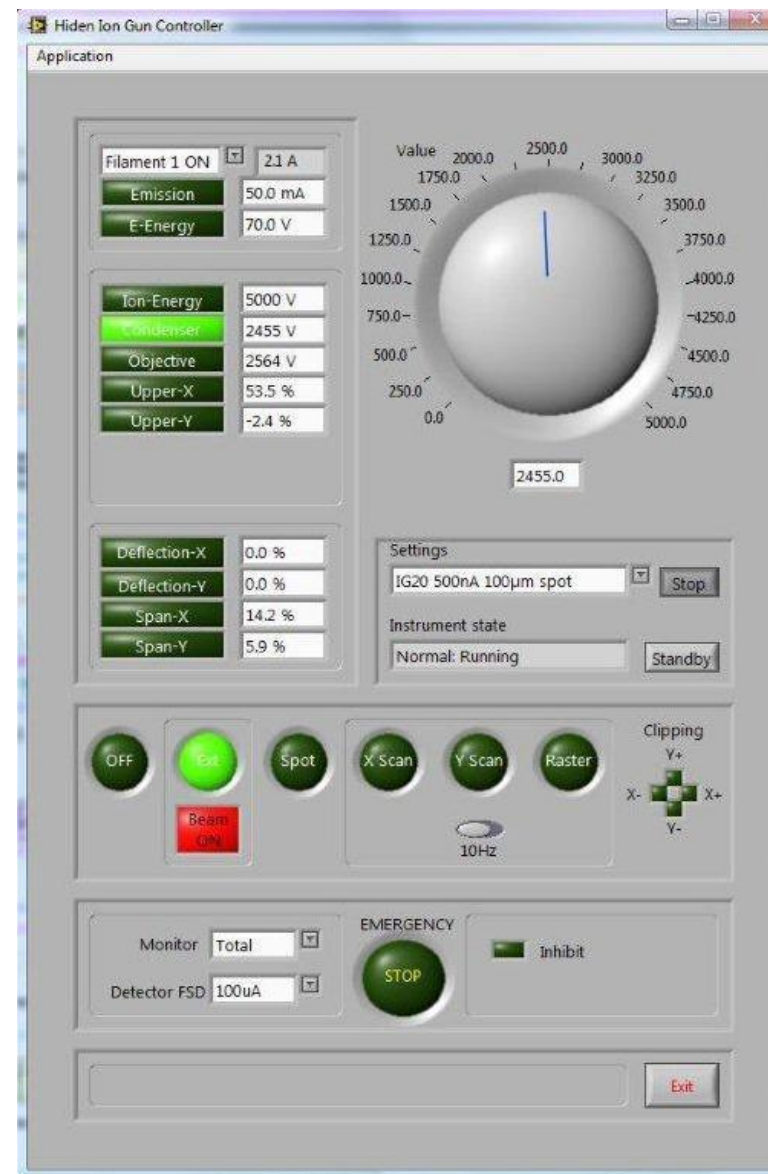
Automatic ion source warm up / cool down

EHT ramp rate control

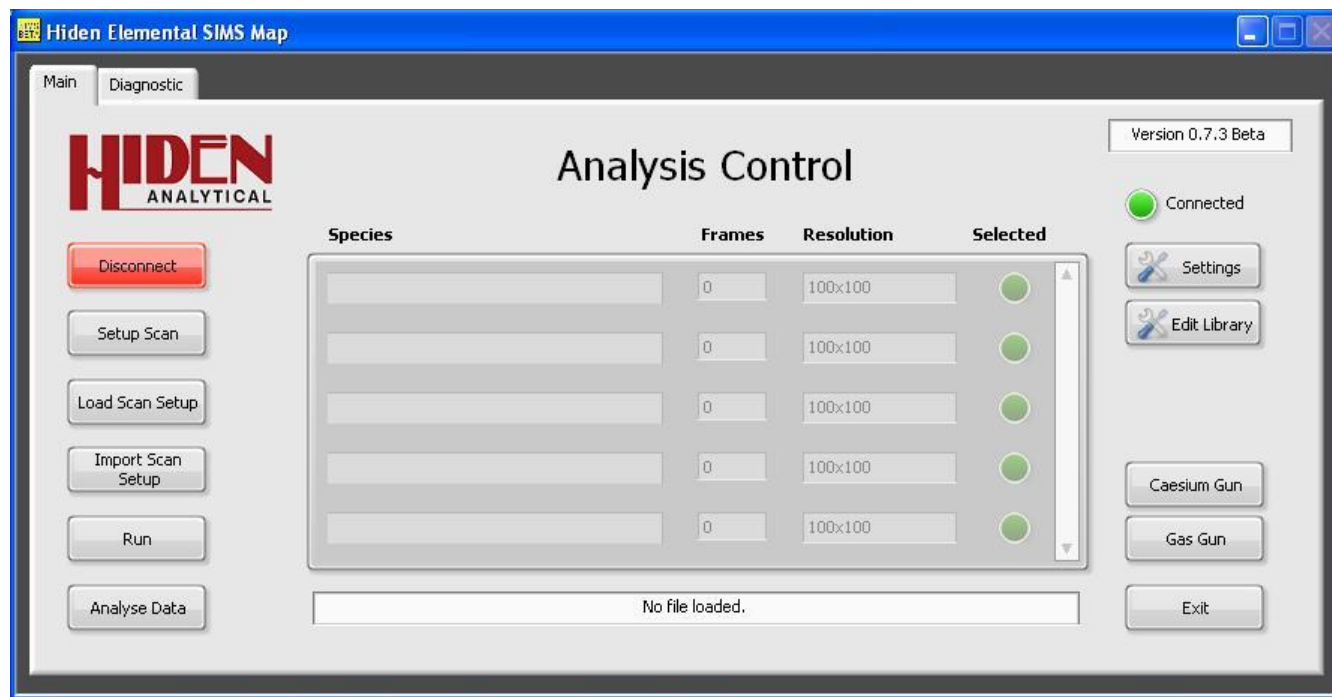
Gun diagnostics

Connect via TCP/IP, USB or serial

Upgradeable software and firmware



Hidden SIMS Mapper Software



Control of the overall experiment and connection to the mass spectrometer

Periodic Table Species Selection

Periodic Table Species Selection

Available Isotopes	Exact Mass	Abundance
28Si	27.98	92.23
29Si	28.98	4.67
30Si	29.97	3.10

Atomic Mass: 30 Chosen Species: Si Exact Mass: 29.97 Abundance (%): 3.10

Interference Calculator Save to Custom List Custom List Editor

Cancel Done

Set Charge z = 1 M/Z

Mass for analysis is chosen from a periodic table and can include molecules and multiply charged species. Experienced users can also input data directly.

Interference Calculator

The interference calculator generates a mathematically produced list from up to 5 elements to assist the user in species selection.

The appearance of a species in the list does not suggest that it will be actually observed.

- Unique, Single Charged Species
- Unique, Double Charged Species
- Interfered Single Charged Species
- Interfered, Double Charged Species

H He Li Be B C N O F Ne
 Na Mg Al Si P S Cl Ar
 K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr
 Rb Sr Y Zr Nb Mo Ru Rh Pd Ag Cd In Sn Sb Te I Xe
 Cs Ba Hf Ta W Re Os Ir Pt Au Hg Tl Pb Bi
 La Ce Pr Nd Sm Eu Gd Tb Dy Ho Er Tm Yb Lu
 Th U

Set Charge z = M/Z

Isotope	Exact Mass	Abundance
470Si	46.98	0.01
480Si	47.97	0.01
51000	50.99	0.00
575Si	56.96	4.31
585Si	57.95	2.86
595Si	58.95	0.14
6200Si	61.97	0.18
6300Si	62.98	0.00
730SiSi	72.95	4.30
740SiSi	73.96	0.00
75As	74.92	100.00
750SiSi	74.94	0.14
750SiSi	74.96	0.01
760SiSi	75.95	0.00
770SiSi	76.95	0.00
79000Si	78.97	0.00
875SiSi	86.93	0.13
910As	90.91	99.76
9100SiSi	90.95	0.01
920As	91.92	0.04
9200SiSi	91.96	0.00
930As	92.92	0.20

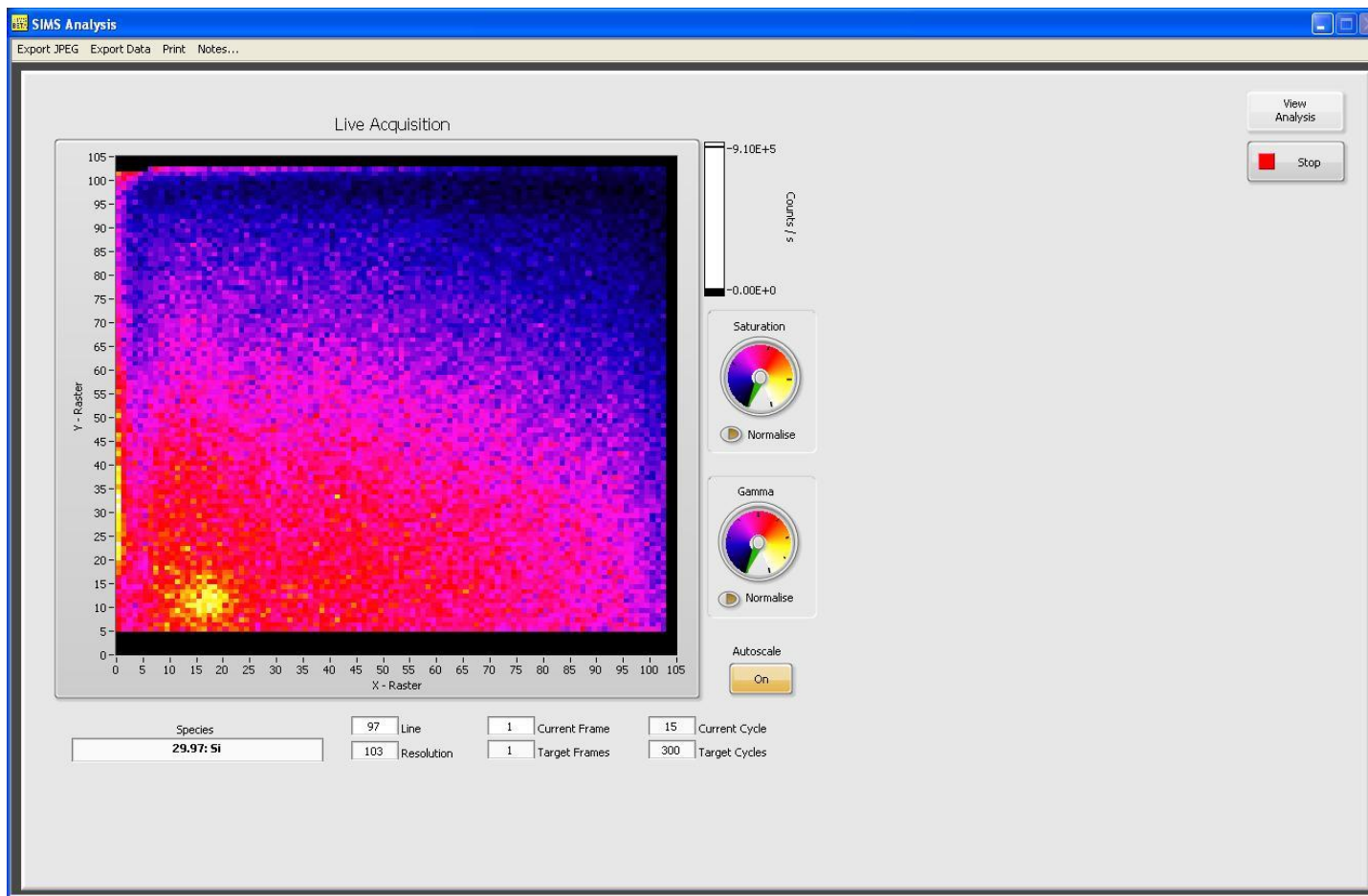
Start Mass Stop Mass

An integral interference calculator identifies possible mass interferences and suggests relative signal intensities

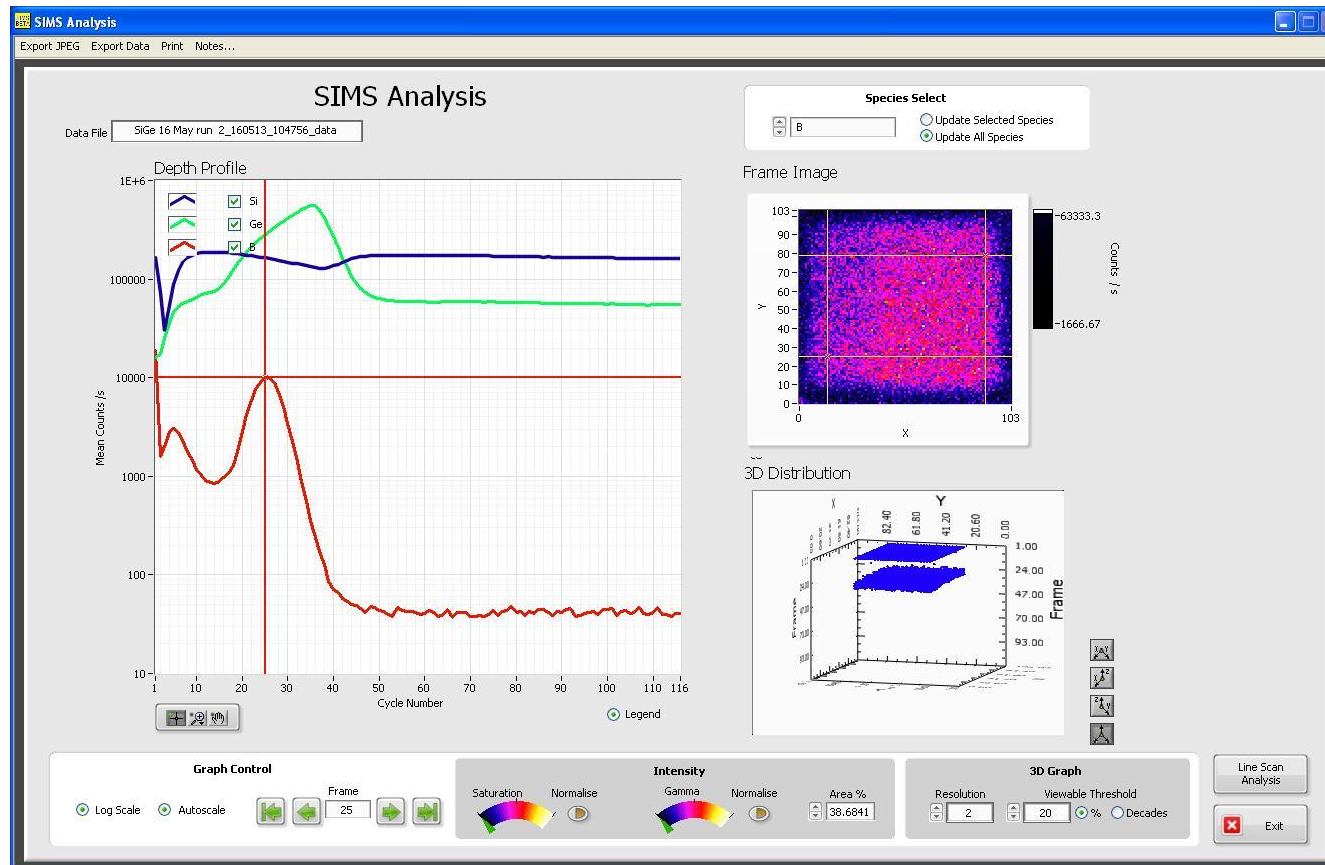


The experiment flow shown here has three channels (Si, Ge and B).

Species can be selected or deselected for analysis – this allows a non-expert user to control a range of experiments from a single template.



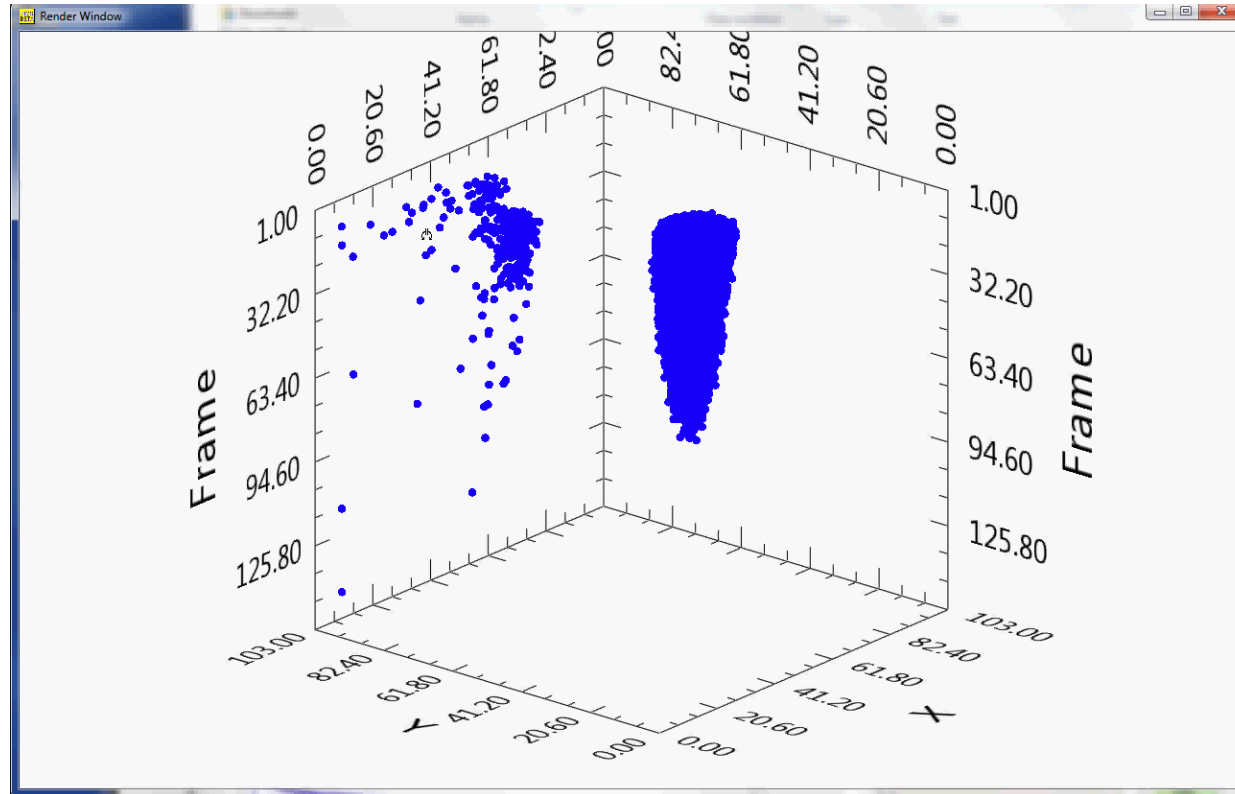
During analysis the live acquisition window displays the signal so that the progress of the experiment can be monitored and surface features observed.



During analysis the analysis window displays the depth profile, image data and a 3D representation of the distribution. It also controls the electronic gating.

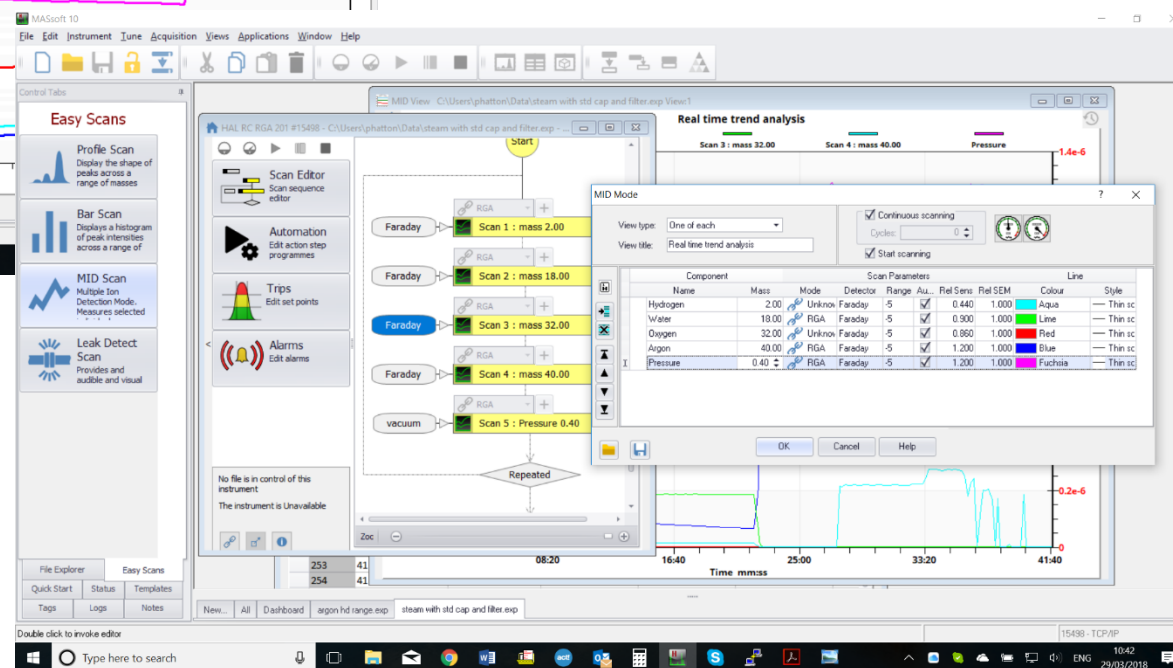
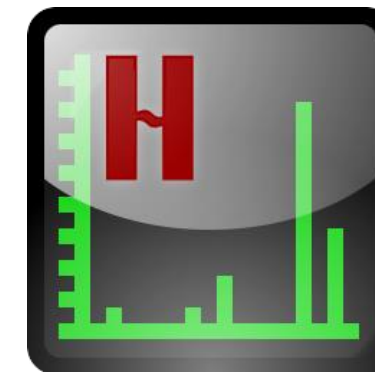
The electronic gate can be optimised independently and interactively for each mass and does not have to be concentric or square.

3D Profiling by SIMS



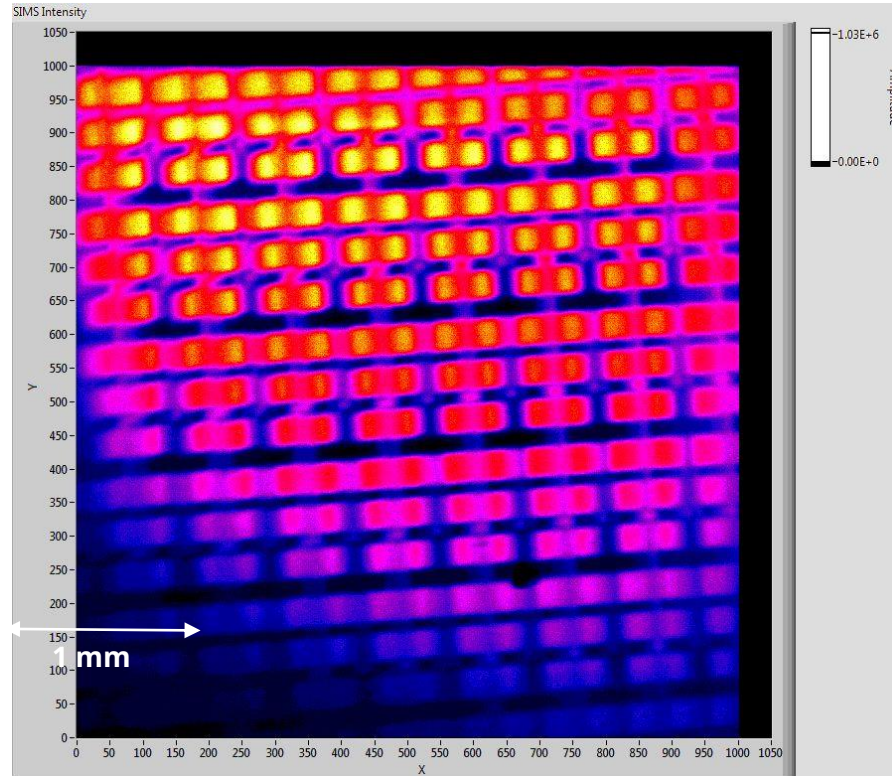
The video shows the mass resolved aluminium signal arising from aluminium oxide grit particles embedded in the work-piece after a grinding operation. Volume is 800 μ m square x 35 μ m deep.

MASsoft Professional control software



A multilevel software package allowing both simple control of mass spectrometer parameters and complex manipulation of data plus control of external devices.

Elemental Surface Mapping



Elemental Surface Map of semiconductor resistor array.

- Easy to use elemental surface mapping software.

Summary

- Small and easy to use SIMS and SNMS
- Fast characterisation of layered structures
 - Nanometre depth resolution



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- A photograph of a modern, two-story office building with a grey facade and large glass windows. The building has a prominent entrance on the left side. A large, semi-transparent white circle is overlaid on the left side of the image, containing text. The sky is clear blue, and there are some trees and bushes in the foreground.
- www.HidenAnalytical.com
 - The Hiden website is an excellent resource with product pages, brochures, catalogues, product pages with some application notes, presentation and other information.
 - Contact +44 1925 445225 for direct support.