CAMECA®
SCIENCE & METROLOGY SOLUTIONS
/ AMETEK®



NanoSIMS-HR™

The next frontier in nanoanalysis for science & high-tech

NanoSIMS-HR

Secondary Ion Mass Spectrometer

Cryogenic compatible

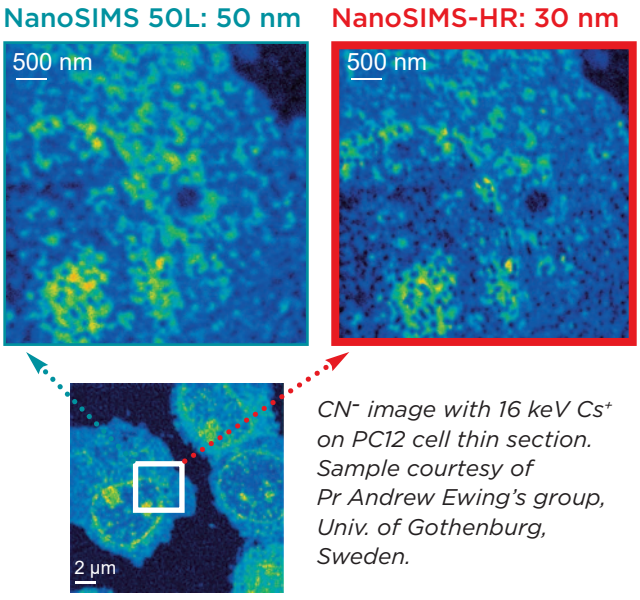
Unprecedented 30 nm lateral resolution

High throughput, reliability & uptime

The **NanoSIMS-HR** is the next generation of the world-acclaimed NanoSIMS 50/50L Secondary Ion Mass Spectrometer series which have contributed to major advances in the most diverse fields of fundamental research and industrial innovation: material sciences and semiconductor, geo- and cosmochemistry, plant and soil sciences, environmental microbiology, cell biology and medical research.

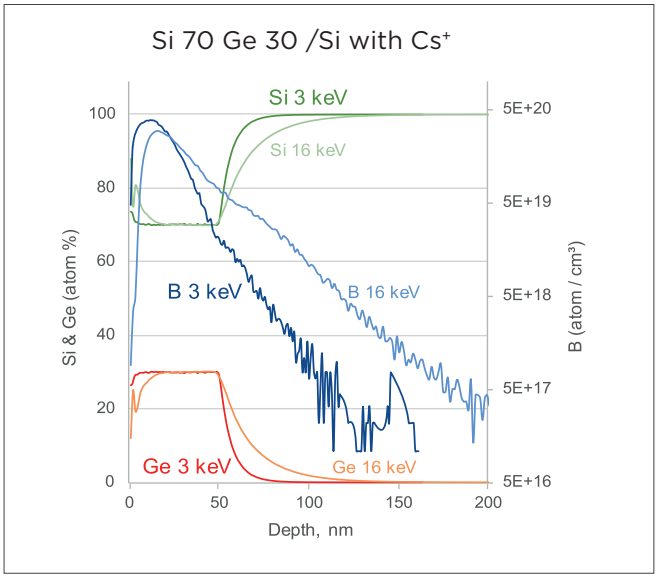
With the new **NanoSIMS-HR**, CAMECA delivers breakthrough instrumental innovations that will boost the versatility of this unique ion microprobe, improve data quality, and enable scientists and engineers to accelerate discovery and innovation under ever increasing workloads and tighter deadlines.

The NanoSIMS-HR's 30 nm lateral resolution minimizes lateral beam dilution and therefore enhances measurement accuracy.



CN^- image with 16 keV Cs^+ on PC12 cell thin section. Sample courtesy of Pr Andrew Ewing's group, Univ. of Gothenburg, Sweden.

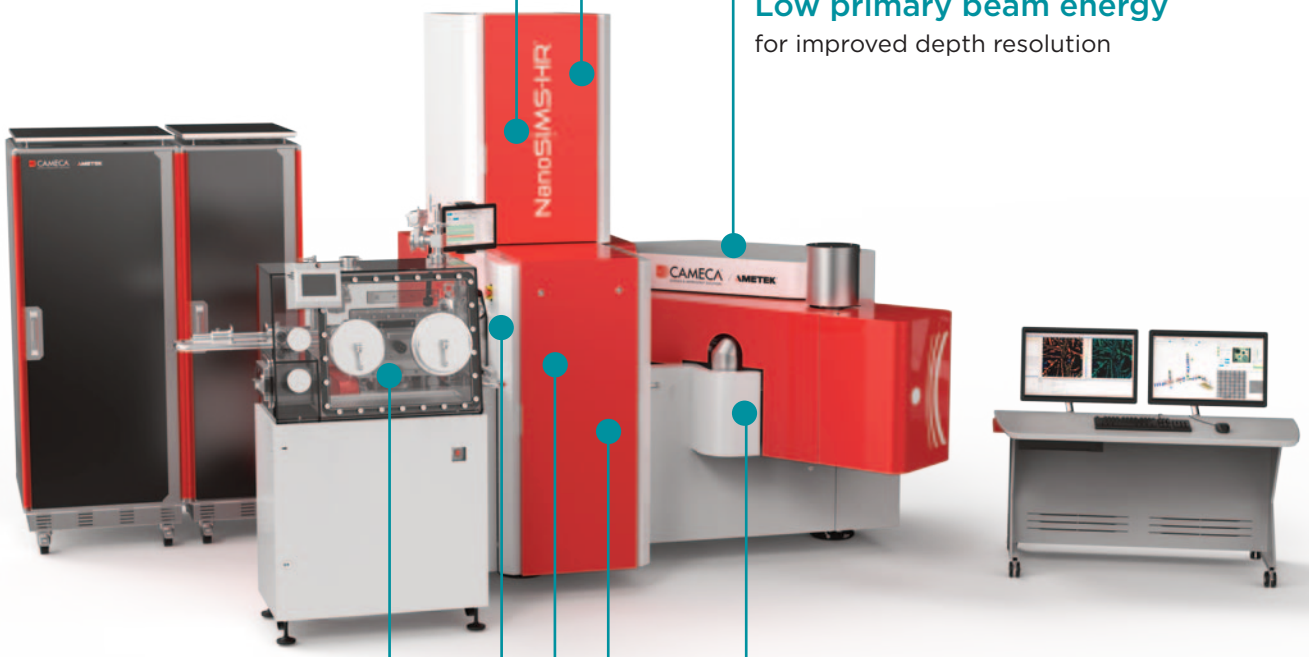
Boron depth profiling in multilayer structure: the NanoSIMS-HR's low impact energy capabilities enable superior depth resolution.



Unprecedented lateral resolution
for sharper imaging down to 30 nm with cesium source

Redesigned Rf-Plasma oxygen source
for improved robustness and optimum uptime

Low primary beam energy
for improved depth resolution



Optimized vacuum system
for optimum uptime and reduced cost of ownership

Customized glovebox
for atmospheric sensitive sample preparation

Cryogenic accessory
for biological and volatile-rich sample analysis

Enhanced sample handling
with automatic sample holder exchange

Increased productivity
up to 10x faster unattended chained analysis thanks to improved sample navigation accuracy within 500 nm

NanoSIMS-HR: Key improvements

Unprecedented lateral resolution: ≤ 30 nm (cesium source); ≤ 50 nm (oxygen source)
Improved depth resolution: ≤ 12 nm / decade (cesium source @ 4 keV impact energy)
High throughput: 2.5x faster image acquisition with no compromise on resolution (cesium source)
Automated sample exchange for safe and remote operation, ease-of-use and increased productivity
Novel sample stage design for unequaled accuracy and up to 10x faster unattended chained analysis
A choice of large sample holders for samples of multiple sizes
Glovebox and cryogenic accessories for biological and volatile-rich sample analysis

The next frontier in nanoanalysis for science & high-tech

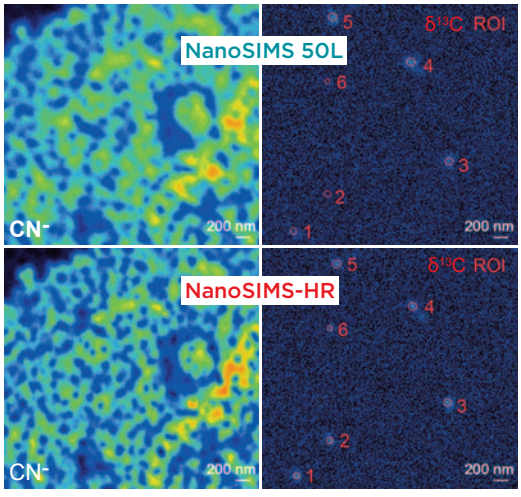
Highest sample fidelity

- Unprecedented lateral resolution (30 nm) thanks to new cesium source and redesigned platform equipped with anti-vibration isolation
- Depth resolution down to 12 nm per decade for depth profiles down to 8 x 8 µm² area thanks to new electronics facilitating instrument tuning
- Pristine sample analysis with glovebox and cryogenic accessories

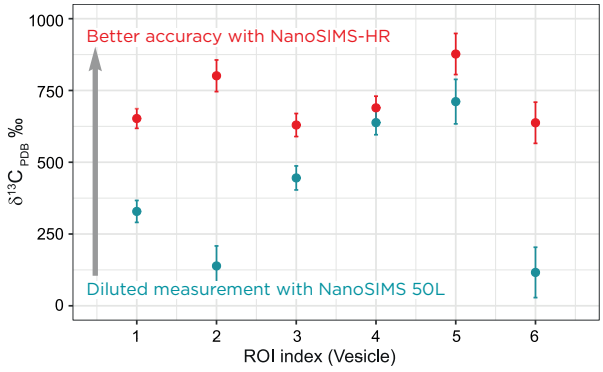
Improved throughput

- 2.5x faster image acquisition at 100 nm lateral resolution thanks to brighter cesium source with higher current density
- A variety of larger sample holders can now accomodate more samples of various sizes
- 10x more precise sample stage enabling faster acquisition of smaller images, and thus 10x faster unattended chained analysis

Accurate isotopic measurements

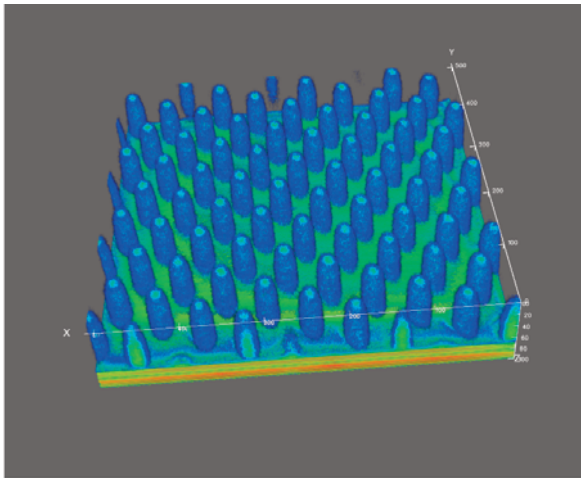


Sample courtesy of Pr Andrew Ewing's group, Univ. of Gothenburg, Sweden.



δ[13]C isotopic composition of six regions of interest in [13]C-dopamine labeled vesicles of PC12 cell: lateral beam mixing is minimized with 30 nm lateral resolution, reducing the dilution of the isotopic composition for superior accuracy.

High throughput 3D imaging



Array of silicon nanowires.

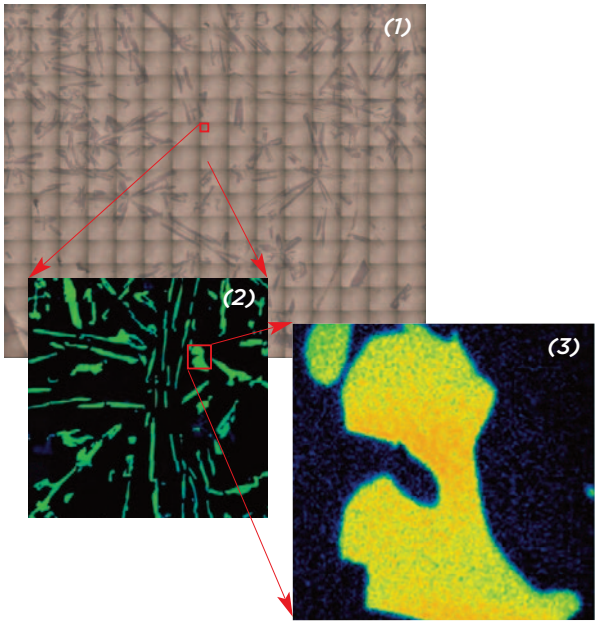
3D recontruction of a sequence of [28]Si⁻ images acquired in less than one hour with Cs+ source (5pA primary current / 100 nm lateral resolution).

Sampe courtesy of Dr Paweł Piotr Michałowski, IMiF, Poland, Jonas Müller and Guilhem Larrieu, LAAS-CNRS, France.

Ease of use

- Automated introduction from storage to analysis chamber
- Easy and accurate navigation on 3.6 x 4 mm^2 optical image to directly target regions of interest
- New high resolution electronics facilitating peak centering and tuning optimisation
- Remote operation facilitating large analysis sessions that necessitate multiple sample holders

From microscopic view to nanoscopic analysis



Si crystal in Al matrix.

(1) Optical microscope mosaic (total area: 3.6 x 4 mm^2) for real time and accurate navigation on the sample surface within 500 nm (x and y movement)

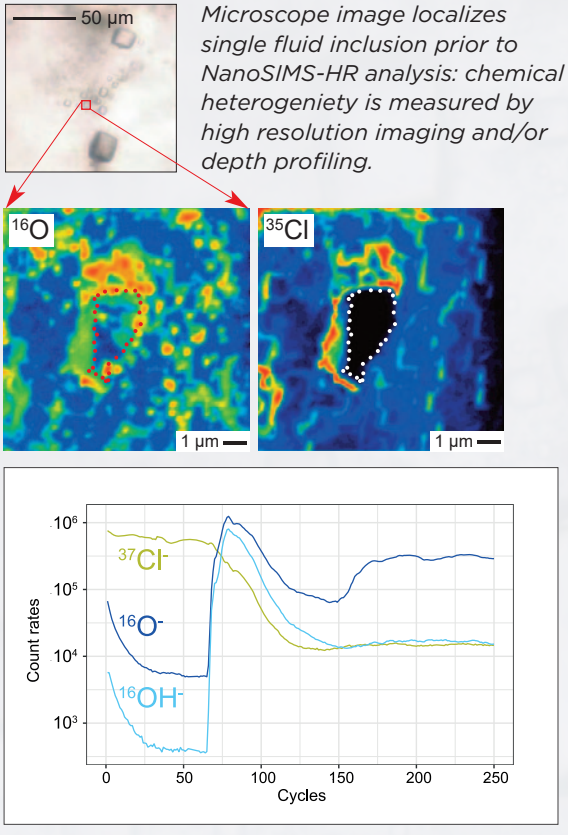
(2) Secondary ion mosaic (total area: 100 x 100 μm^2) with similar navigation capabilities

(3) Single high resolution image (10 x 10 μm^2)

Reliability & Uptime

- Upgraded Rf-Plasma O^- source with optimum cooling system
- Latest Pfeiffer turbomolecular and primary pumps
- New control electronics including redesigned high voltage power supply

Heterogeneity inside **single** fluid inclusion revealed by the NanoSIMS-HR's new cryo capability



Microscope image localizes single fluid inclusion prior to NanoSIMS-HR analysis: chemical heterogeniety is measured by high resolution imaging and/or depth profiling.

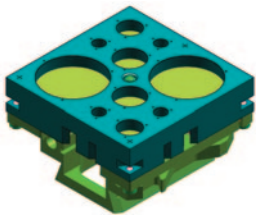
NanoSIMS-HR with cryo capability uniquely characterizes sub-µm heterogeneity inside complex multi-phase fluid inclusions.

Samples courtesy of the Lithosphere Fluid Research Lab, Budapest, Hungary.

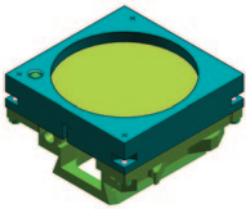
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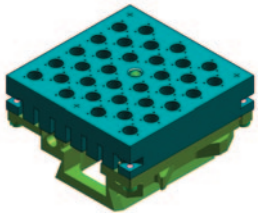
The NanoSIMS-HR comes with a large choice of sample holders enabling easy mounting and management of numerous samples of various sizes.



2 x Ø 1"
+ 2 x Ø 1/2"
+ 2 x Ø 10.4
+ 4 x Ø 1/4"



2 x Ø 2"



34 x Ø 1/4"

NanoSIMS-HR: Overview

Lateral resolution	≤ 30 nm (cesium source)
Multiplex imaging	Up to 7 masses from H to Pu
Detection limit	≤ $2x10^{14}$ P atom/cm^3 in Si within 12 μm^2
Depth resolution	≤ 12 nm/decade @ 4 keV
Push-button sample exchange	within 5 minutes
Sample stage accuracy	≤ 0.5 µm
Reproducibility	≤ ± 1.65‰ (1σ) δ^{30}Si in full holder
Cryo stage*	down to -140 °C
Glove box*	humidity ≤ 10 ppm
Footprint	L 6.80 m / W 5.20 m / H 2.85 m

** accessories*

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