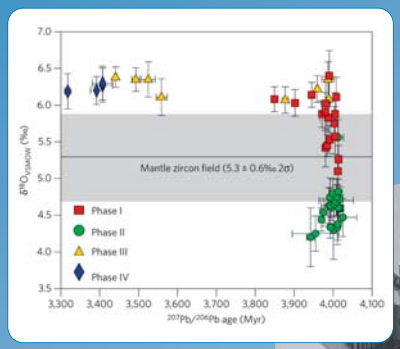
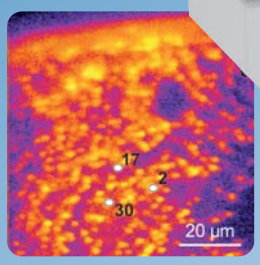
CAMECA®
SCIENCE & METROLOGY SOLUTIONS

IMS 1300-HR³

New Generation Ion Microprobe for Path-breaking Advances in Geoscience





High Reproducibility
High spatial Resolution
High mass Resolution

Stable Isotopes
Geochronology
Trace Elements
Nuclear Safeguards
Environmental Studies

SIMS

AMETEK®
MATERIALS ANALYSIS DIVISION

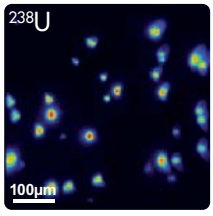
Addressing the growing demand for small scale, in situ isotopic measurements at high precision and productivity, CAMECA introduces the IMS 1300-HR³ ion microprobe, successor of the internationally acclaimed IMS 1280-HR.

The IMS 1300-HR³ delivers unmatched analytical performance, opening a wide range of research directions, from stable isotopes, geochronology and trace elements to small particles and beyond.

This new ultra high sensitivity Secondary Ion Mass Spectrometer marks a new generation in CAMECA's large geometry magnetic sector SIMS design. Previous models have been adopted by top-ranked geoscience labs to perform high precision in situ analyses at high mass resolution on complex geological samples.

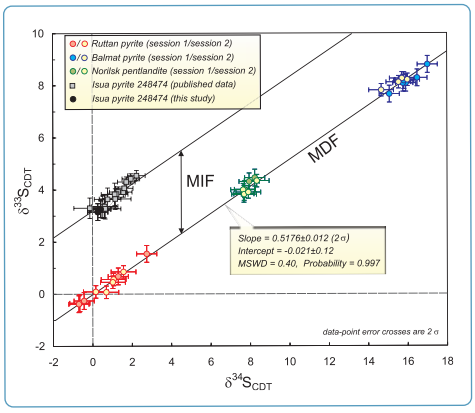
Key features inherited from the IMS 1280-HR and previous models:

- Large geometry design to provide optimum sensitivity at high mass resolution
- Versatile multicollector system for highest precision isotope measurements
- Dual primary ion sources for analysis of positive & negative secondary ions
- Superior ion imaging capabilities (microscope and microprobe modes)
- Enhanced magnet control system for high reproducibility at high mass resolution
- Remote operation, full automation, powerful application-dedicated software



Uranium scanning ion image

3-sulfur isotope analysis with tenth-permil precision

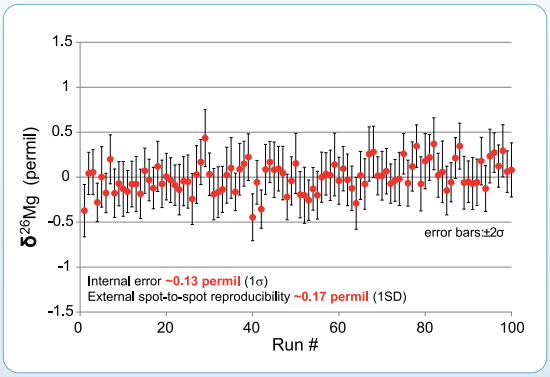


Data from B.S. Kamber & M. J. Whitehouse, Geobiology (2007)

Advances & benefits of the IMS 1300-HR³

- **High brightness RF-plasma oxygen ion source** with greatly enhanced beam density and current stability, dramatically improving spatial resolution, data reproducibility and throughput
- **Automated sample loading system with motorized sample height (Z) adjustment** significantly increasing analysis precision, ease-of-use and productivity
- **UV-light microscope** for enhanced optical image resolution, together with dedicated software for easy sample navigation (developed by University of Wisconsin, USA)
- **Low noise 10^{12} Ω resistor Faraday cup preamplifier boards** for measuring low signal intensities

With the new IMS 1300-HR³, CAMECA greatly improves the performance of its large geometry SIMS, already a market leader, and now offers the geoscience community a unique combination of High Reproducibility at High spatial Resolution and High mass Resolution!



Mg isotope analyses in San Carlos Olivine using small primary beam <1.2 µm (RF-plasma O⁻ source).

High stability of the primary current (<2%) during the total analysis session (100 spots in10 hours).

Results demonstrate excellent precision at high spatial resolution and high throughput.

IMS 1300-HR³: High Reproducibility • High spatial Resolution • High mass Resolution

High brightness oxygen ion source

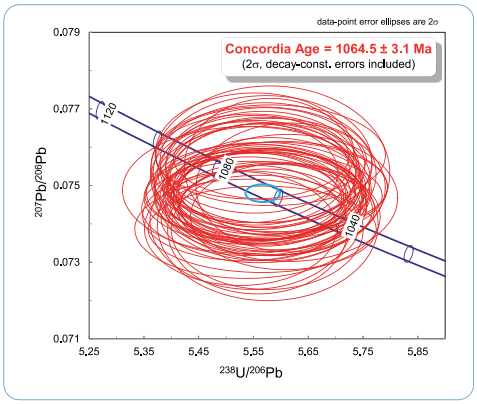
Replacing the Duoplasmatron ion source (Duo), the high brightness RF-plasma oxygen source offers:

- More than ten times higher beam density (O^- / O_2^-) for large as well as for small beam size (<0.5 µm). O_2^+ mode is also available.
- Improved short and long term beam current stability (< 2% over 10 hours)
- Much longer lifetime (now several months between source maintenance)

Major analytical benefits:

- Greatly improved spatial resolution while keeping the same analytical precision
- Shorter analysis time and/or better statistics at equally small spot size
- Excellent reproducibility over long time analyses due to improved current stability
- Enhanced productivity thanks to reduced maintenance and shorter analysis times

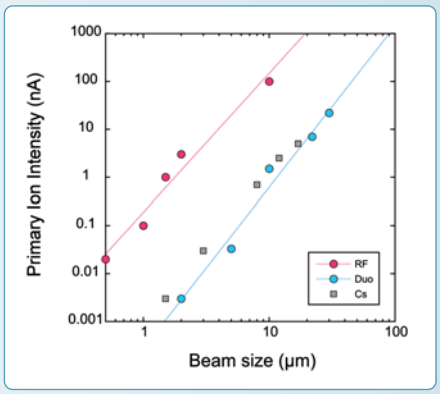
The RF-plasma oxygen source brings major performance improvements that open new analytical capabilities for isotopic analysis of small grains or phases, ion imaging of complex structures at high spatial resolution, and detection of low concentration trace elements.



U-Pb dating in 91500 zircon using RF-plasma source.

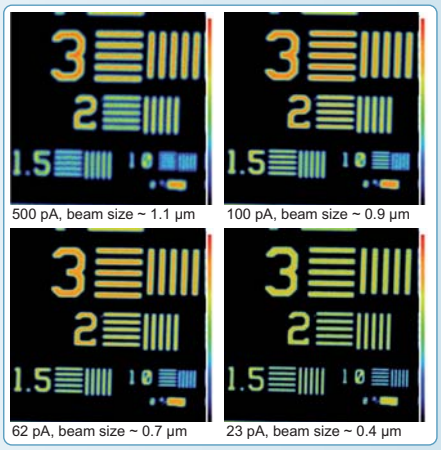
Excellent age precision, better than 0.3% (2σ, n = 52 spots) at high spatial resolution (O_2^- projected primary beam, Ip = 20nA, beam size <10 µm).

High throughput (5 analysis per hour) with no compromise on data reproducibility.



Courtesy of N. Kita, University of Wisconsin, USA.

Comparison of primary beam current vs beam size for RF-plasma O^- , Duo O^- and Cs^+ ion sources. Duo and Cs: WiscSIMS lab results for their typical analysis settings. RF-plasma source clearly provides the highest beam density.



Si scanning ion images illustrating high beam current for very small primary beam sizes (RF-plasma O^- source).

Automated storage chamber & Z adjustment

The IMS 1300-HR³ can be equipped with the field-proven CAMECA IMS motorized storage chamber. Holder exchange between storage and analysis chambers is fully automated and computer-controlled. Multiple sample mounts can be analyzed in chained or remote mode, greatly improving ease-of-use and productivity.

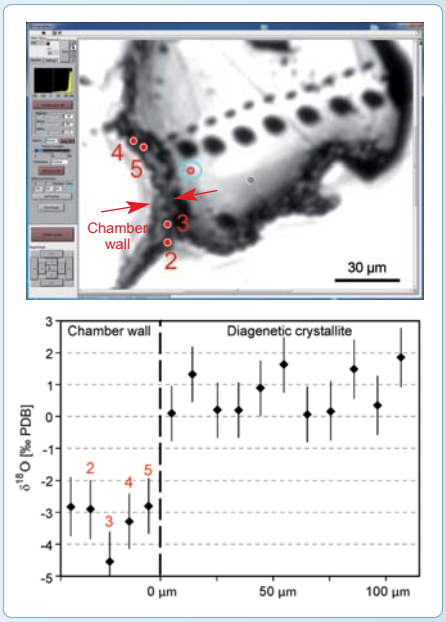
Sample Z-positioning is now fully automated and can be performed at the beginning of every analysis in chained and unattended mode. It ensures a constant distance between the sample surface and the extraction plate which is mandatory for high precision measurements.

UV-light optical system

Resolution of the sample surface optical image is improved by a factor of two thanks to the new UV light microscope developed by University of Wisconsin. It includes dedicated software for sample imaging, which greatly enhances the accuracy of positioning, ensuring easy and efficient sample navigation and instrument operation.

FC detectors with 10^{12} Ω resistor electrometry

Low noise FC 10^{12} Ω resistor preamplifiers for measuring low signal intensities allow to fill in the gap between EMs and FCs count rate range. They offer high precision for challenging applications such as $^{36}S/^{32}S$ ratio in sulfides or elemental/isotope studies requiring fine scale characterization.



Data from R. Kozdon et al. Paleoceanography (2013) & N. Kita et al., JAAS (2015)

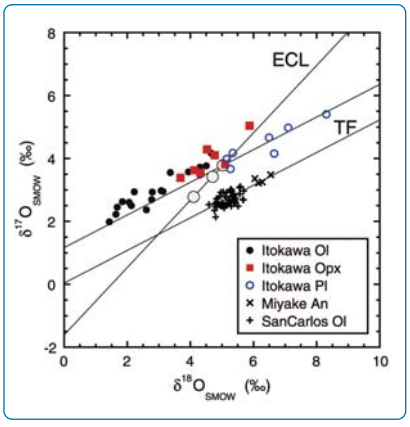
Top: UV-light microscope image of a foraminifera cross section after SIMS analysis showing traverses of 10µm and 3µm spots. Bottom: Oxygen isotope analyses with 3 µm spots. Paleoclimate isotope signatures are recorded in the thin chamber wall and can be studied thanks to precise beam positioning.

High Reproducibility
High spatial Resolution
High mass Resolution

IMS 1300-HR³

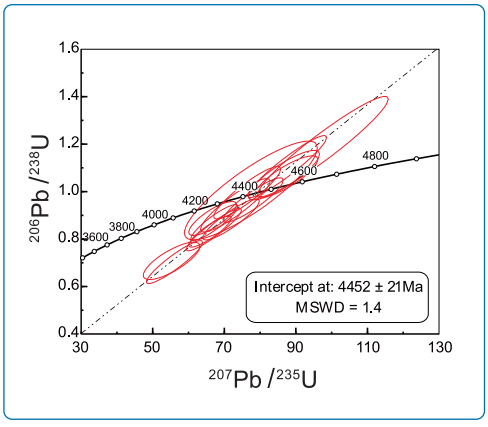
The most powerful & versatile ion microprobe for all applications in geo- & cosmochemistry, geochronology, environmental studies...

Stable isotopes



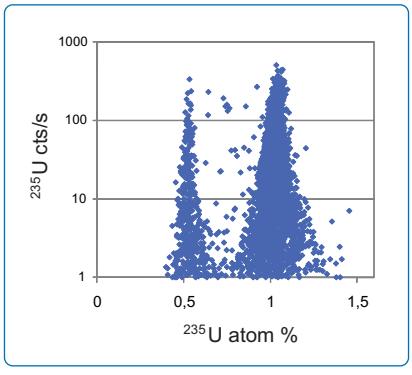
Data from H. Yurimoto et al., Science (2011)

U/Pb dating



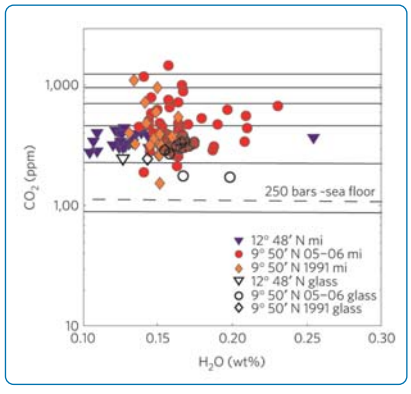
Data from: O. P. Popova et al., Science (2013)

Small particles



Data from P. Peres et al., Surf. Interface Anal. (2012)

Trace elements



Data from V.D. Wanless & A.M. Shaw, Nature Geo (2012)

CAMECA is the world premier provider of microanalytical instrumentation. We deliver cutting-edge science and metrology solutions, and offer our customers unparalleled support and maintenance service through the comprehensive AMECARE program.

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