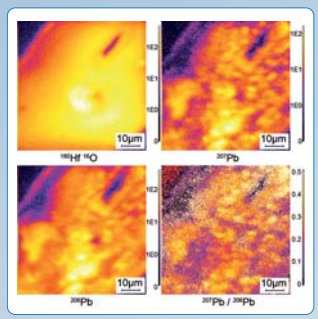
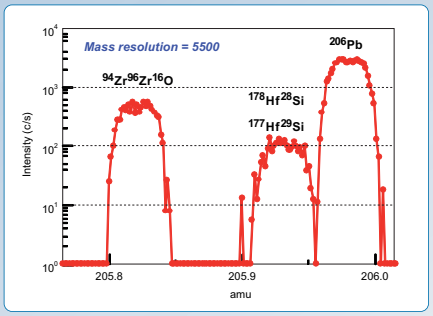
CAMECA®
SCIENCE & METROLOGY SOLUTIONS

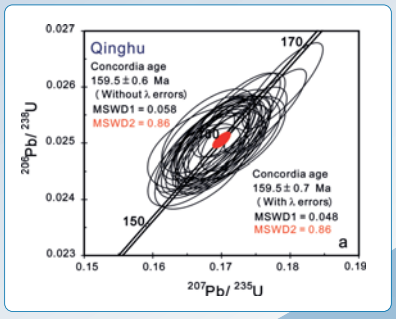
IMS 1300-HR³

KLEORA

The Specialized Ion Microprobe for World-leading Research in Geochronology







- **Best SIMS analytical performance**
- **Highest precision isotopic measurements**
- **Spot analysis, imaging, depth profiling**
- **Ease-of use & high throughput**

AMETEK®
MATERIALS ANALYSIS DIVISION

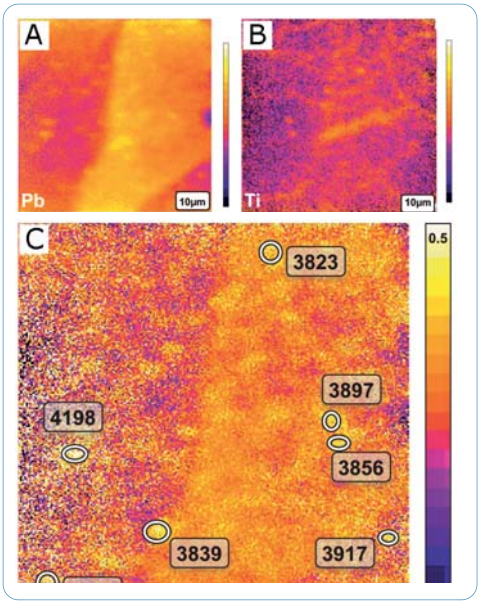
In order to meet a growing demand from geochronologists, CAMECA introduces KLEORA, a new SIMS instrument fully optimized for advanced mineral dating.

Based on the new generation ultra-high sensitivity large geometry IMS 1300-HR³ ion microprobe, KLEORA provides benchmark sensitivity for in-situ U-Th-Pb isotopic analyses in a high throughput, easy-to-use platform.

Both the IMS 1300-HR³ and KLEORA inherit the instrumental excellence of CAMECA's ultra high sensitivity ion microprobes already adopted by top-ranked geoscience labs.

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

- Large geometry design to provide high transmission at high mass resolution, required for analyzing low Pb concentration while eliminating interfering molecular ions.
- Oxygen flooding technique for improved Pb sensitivity (up to a factor of 7) and highly reproducible analytical conditions
- Superior ion imaging capabilities for trace element mapping in zircon grains (inhomogeneity, zonation)
- Enhanced magnet control system for high reproducibility at high mass resolution
- Remote operation, full automation, powerful geochronology dedicated software

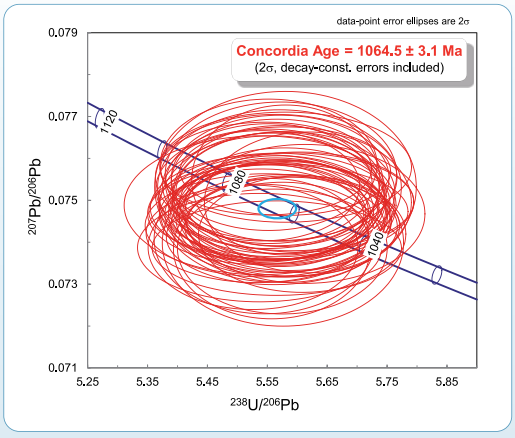


Ion imaging for problematic zircon dating
Top: Pb and Ti scanning ion images.
Bottom: $^{207}Pb/^{206}Pb$ ratio image revealing a surprising µm-scale patchy Pb ratio distribution (Pb/Pb ages for ellipse areas in Ma).
Data from M.A. Kusiak et al., Geology (2013)

KLEORA benefits from the breakthrough instrumental advances 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 new source
- **Automated sample loading system with motorized sample height (Z) adjusment** significantly increasing analysis precision, ease-of-use and productivity auto storage auto-z
- **UV-light microscope** for enhanced optical image resolution, together with dedicated software for easy sample navigation (developed by University of Wisconsin, USA) uv-light

With KLEORA, CAMECA offers a high throughput, easy-to-use ion microprobe, uniquely combining High Reproducibility with High spatial Resolution and High mass Resolution, and perfectly taylored to the needs of geochronologists!



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.

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

KLEORA delivers:

- **In situ SIMS analysis with excellent sensitivity at high spatial resolution**
- **Superior analytical performance: isotopic ratio precision down to permil level**
- **Versatility: spot analysis, ion imaging, depth profiling...**
- **Ease-of-use & high throughput**

KLEORA is the ultimate solution for U-Pb dating due to:

- **Benchmark precision:** better than 0.3% (2σ) for age precision in 91500 standard zircon.
  - Excellent data statistics (reduced uncertainty) due to high density primary beam new source
  - Benchmark long-term repeatability due to highly stable primary current new source
  - Highly reproducible conditions due to oxygen flooding and automated sample height adjustment auto-z

- **High productivity:** typically 5 analyses/hour for U-Pb spot analyses.
  - Short analysis time while keeping high precision and lateral resolution new source
  - Reduced maintenance (ion source and primary beam apertures with longer lifetime) new source
  - Multiple sample mounts analyzed in automated, unattended mode auto storage

- **Small spot size with high beam density** for excellent lateral resolution: tens of micron beam size with > 100 mA/cm² density, down to 0.5µm with > 10 mA/cm² new source

- **Outstanding ion imaging capabilities:** sub-micron lateral resolution for microscope mode, and better than 0.5µm for scanning ion imaging new source

- **Optimized depth profiling** with high sputtering rate, excellent sensitivity and dynamic range

- **Ease-of-use:**
  - computer-controled sample exchange and sample height ajustment auto storage auto-z
  - easy analysis area selection uv-light
  - remote control, multi-user operation

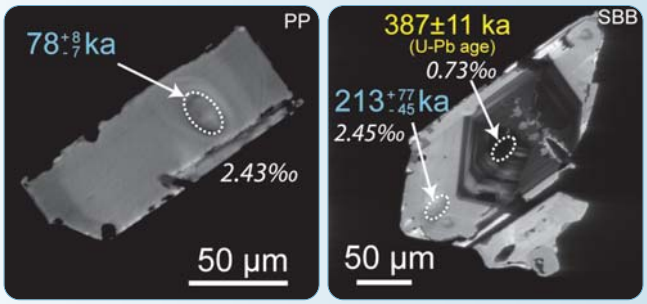
- **Dedicated software:**
  - Geochronology data reduction module for U-Pb age determination
  - Winimage and Wincurve for powerful imaging and depth profiling data processing

- **Fast installation:** pre-tuned at our factory, the system is typically commissioned in less than six weeks

- **Low running cost** due to limited consumables and reduced maintenance of the new RF-plasma source

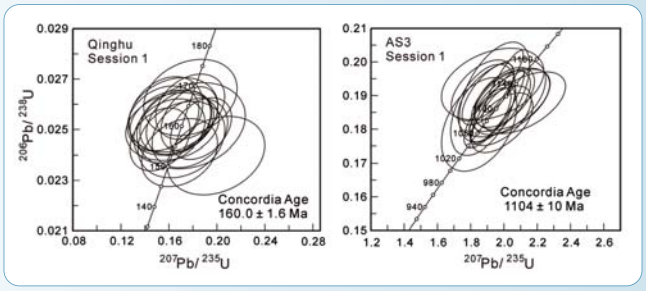
- **Standards:** includes geochronology standard samples.

High spatial resolution, in situ geochronology (U-Pb, U-Th), either grain by grain, or by subgrain domains, revealing complexities that cannot be resolved by bulk analysis methods.



Magmatic dating and isotope study of individual crystals from the Yellowstone supervolcano:
CL image of zircon dated for U-Th ages (blue) and U–Pb ages (yellow).
Data from K. E. Watts et al.,Contrib Mineral Petrol (2012)

Unique adjustable, small spot size capabilities using Gaussian primary ion beam illumination instead of conventional projected mode.



U-Pb dating at a scale < 5µm on zircon standards demonstrating close to 1% age precision and accuracy. Gaussian primary illumination mode, O_2^- spot size < 5µm.
Data from Y. Liu et al., JAAS (2011)

Standard configuration

	IMS 1300-HR³	KLEORA
RF-plasma O source New	•	•
Cs microbeam source	•	
Auto-Z motion New	•	•
Auto storage chamber New	•	•
High resolution UV- light microscope New	•	•
Oxygen flooding	•	•
Normal-incidence Electron Gun	•	
Multicollector system	•	
NMR control	•	
Geochronology software	•	•

KLEORA can be upgraded to a full IMS 1300-HR³ model at any time.

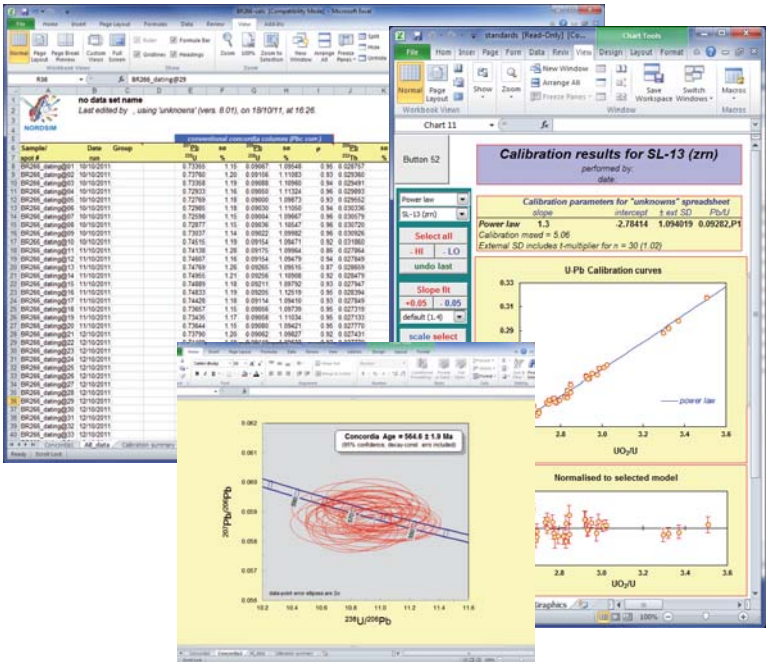
Based on the new IMS 1300-HR³ ion microprobe, KLEORA delivers superior SIMS analytical performance in a high throughput, easy-to-use platform, covering the entire range of geochronological applications.

Powerful U-Pb dating data processing software

KLEORA includes a specific geochronology data reduction software running on MS Excel™ platform, developed at NORDSIM by Dr. Martin Whitehouse.

It offers outstanding features for accurate and highly productive data processing:

- Direct import of SIMS files in Excel
- Fast and easy processing of large volumes of data
- Multiple types of calibration including Pb/U vs. UO_2/U using power law parameters
- Common lead correction methods
- Age table display
- Export for Concordia diagram plotting.



From precise age determination of zircon to dating of other U-rich minerals such as apatite, rutile or baddeleyite, KLEORA provides new types of innovative dating methods.
Refer to our Geochronology application note for more information.

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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