



World Leader in Micro & Nano Analysis

CAMECA e-newsletter - December 2013

AMETEK®
MATERIALS ANALYSIS DIVISION

Welcome to the 9th issue of the CAMECA electronic newsletter!

We are pleased to report on recent instrumental developments and application and we take this opportunity to introduce you to new CAMECA sales and service staff members who will contribute to our growing success on emerging market:

Daniel Andrade is our new sales manager for South and Central America, operating from the CAMECA office within AMETEK do Brasil in São Paulo,

Evgeny Norman has been appointed sales support scientist for Russia and CIS area. In India, Alim Khan has taken over sales of SIMS and APT instruments while Shekhar Uchagaonkar will continue to focus on EPMA.

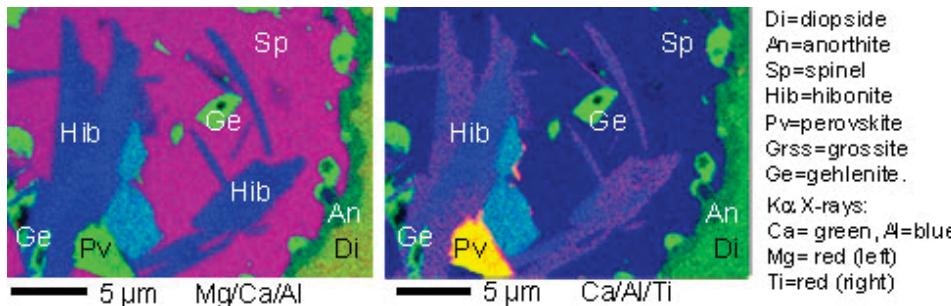
We thank you again for your continued support and wish you great success in all your projects in 2014.
Happy Holiday Season!

EPMA: SXFive & SXFiveFE

ACCURATE QUANTITATIVE ANALYSIS AT HIGH SPATIAL RESOLUTION WITH FE-EPMA

Recent analyses by our EPMA application lab of **complex extraterrestrial samples** such as the so-called "Paris Meteorite" demonstrate the **high resolution capabilities of our SXFiveFE** Field Emission microprobe. A calcium-aluminium-rich inclusion (CAI) containing refractory phases formed by condensation of the gas in the solar nebula was analyzed. X-ray elemental mappings were recorded with the **SXFiveFE** at 8 keV electron beam energy and 10 nA beam current.

The maps below clearly reveal the typical condensation sequence – hibonite, perovskite and grossite encased in spinel. With these experimental conditions, the analytical resolution measured from Ti K_a line is **better than 200nm**. The high resolution Ca/Al/Ti X-ray map also demonstrates zoning in hibonite, suggesting supersaturation of the gas in Ti before perovskite could nucleate and accommodate it.



Thanks to its **fine beam size**, the **SXFiveFE** delivers **high accuracy quantitative analysis of these small crystals**:

	MgO	Al ₂ O ₃	SiO ₂	CaO	TiO ₂	Total *
Hibonite	0.27	89.74	0.24	8.29	0.20	98.74
Grossite	0	76.92	0.16	21.06	0.19	98.34
Perovskite	0	0.54	0.15	39.36	56.63	96.68
Spinel	26.15	70.78	0.22	0.20	0.06	97.42
Gehlenite	0.06	36.32	21.12	40.26	0.14	97.91
Anorthite	0.03	36.23	44.03	19.08	0.01	99.38
Diopside	17.08	2.20	53.40	25.28	0.51	98.47

(* Total in Ox wt%)

Sample courtesy of Dr. R. H. Hewins, Rutgers University USA and Museum National d'Histoire Naturelle, France.

GROWING SUCCESS ON EVERY CONTINENT!

Over the past months, both the **SXFive** and the **SXFiveFE** have been preferred over competing instruments in all regions of the world!



In Europe, **University of Babes-Bolyai**, Cluj, Romania selected our SXFive to equip their Department of Geology, **Ruhr University**, Bochum Germany chose the SXFiveFE, while **Université Paul Sabatier**, Toulouse France purchased both SXFive and SXFiveFE models. **University of Warsaw**, Poland will add a SXFiveFE to their EPMA laboratory already equipped with a SX 100.

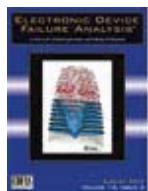
In Asia, the **Indian Institute of Technology** in Mumbai and the **Indian School of Mines** in Dhanbad selected the SXFive for geological and material applications.

In South America, **CNEA, Argentina's National Research Center for Atomic Energy** chose a SXFive model while in South Africa, **Wits University** (University of the Witwatersrand), Johannesburg selected our **SXFiveFE** for its unequalled performance in terms of quantitative analyses at high spatial resolution.

University of Wisconsin, USA, selected a SXFiveFE based upon the instrument's outstanding performance and reliability and their more than two decades of positive experience with CAMECA.

CAMECA MAKES THE COVER OF MICROSCOPY TODAY

The SXFiveFE Electron Probe recently made the cover of **Microscopy Today**. Feature article by our EPMA experts C. Hombourger and M. Outrequin demonstrates how the implementation of a Schottky emitter



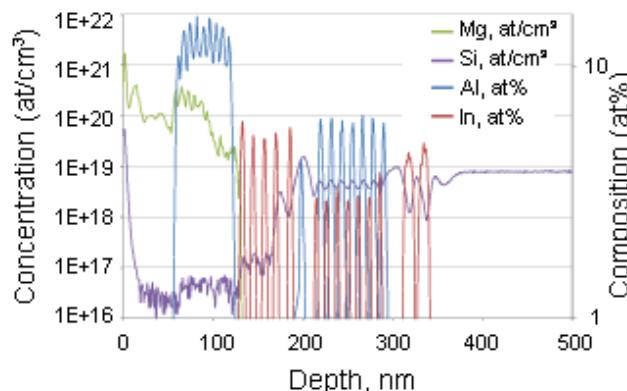
field-emission gun significantly improves the spatial resolution and detectability of the EPMA technique.

A copy of the article will be sent [on request!](#)

SIMS & NanoSIMS

NEW LED OPTION FOR THE CAMECA IMS Wf

CAMECA offers a new option for the IMS Wf, specifically targeted towards LED development and process control. **Main key features of the new LED option include:** a low energy Cs Source mounted on the 36° primary column, better vacuum in the analysis chamber, the addition of a rapid loadlock, improved ease-of-use and automation (analysis of multiple 4" and 6" wafers in chained or remote mode), etc.



Depth profiles in a LED device obtained on the IMS Wf under LED configuration showing excellent depth resolution and detection limits.

Analytical conditions:
Cs+ primary beam,
1keV for Mg, In and Al,
2keV for Si.

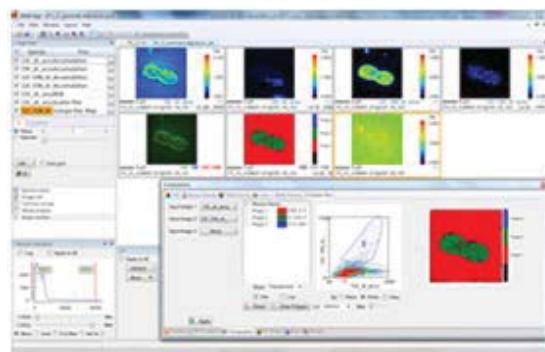
By ensuring optimized detection limits, sensitivity and depth resolution as well as improved uptime and productivity, **the new LED option transforms the IMS Wf into the most powerful process characterization tool for LEDs.** Please contact your local rep for more information, or email cameca.info@ametek.com

HIGH PRECISION MEASUREMENTS OF S ISOTOPES WITH IMS 1280-HR SHED NEW LIGHT ON PLATE TECTONICS

By analyzing volcanic rock that erupted millions of years ago on an island in the South Pacific, an international team of researchers from Blaise Pascal University (France), Boston University (USA), and Swedish Museum of Natural History Stockholm (Sweden) found clues about when components of the rock first left Earth's surface and began their long journey through its interior.

In-situ isotope composition was characterized using **IMS 1280**; the three most abundant S-isotopes were measured at good spatial resolution (<10 µm) and excellent precision using simultaneous collection on FC detectors. Data provide the key to the authors' discovery: because mass-independently fractionated (MIF) Sulphur isotope signatures were generated exclusively through atmospheric photochemical reactions until about 2.5 billion years ago, material containing such isotope signatures must have originated at the Earth's surface in the Archean. The full study was published in [NATURE April 25 issue!](#)

NEW IMAGE PROCESSING SOFTWARE FOR THE NANOSIMS AND THE IMS SERIES



WinImage II has just been launched, adding many new functionalities to the previous WinImage version, such as more flexible displays, different superimpositions, scatter plots, batches, HSI display.

Based on the newest Aphelion™ imaging software suite and running under Windows 7, it will be progressively upgraded with more functions.

A SUCCESSFUL SIMS CONFERENCE

The **19th International Conference on SIMS** was held for the 1st time in Korea Sep 29-Oct 4. Many thanks again to all our users, customers and partners who visited our booth and attended the traditional CAMECA Reception!

The magnetic sector was well represented, highlighted by the Alfred Bennighoven invited lecture given by Pr Claude Lechene from Harvard Medical School, who showed his researches in the field(s) of biology using the NanoSIMS. Atom Probe Tomography was also promoted by Tom Kelly and most attendees were very satisfied by a varied, well balanced and very interesting program.

Recent analysis data obtained on the IMS 7f-Auto were presented, as well as improved Dynamic SIMS characterization results on LED materials and further developments of Extra Low Impact Energy SIMS data reduction algorithm using the Atom Probe Tomography technique. Poster and/or slides will be sent [on request!](#)

IMS 7f-Auto



A new 12-page brochure for the **IMS 7f-Auto** is available and will be sent [on request](#).

Since launching our latest SIMS model, several tools have already been delivered to Asia and Europe, mainly used for R&D of new generation electronics devices and display technology.

3rd EUROPEAN NanoSIMS USERS MEETING

The **3rd European NanoSIMS Users Meeting** organized in Luxemburg City by SAM-CRPGL on October 14-15 gathered some 70 attendees from 15 NanoSIMS labs mainly in Europe, but also from Japan and the USA.

Atom Probe Tomography (APT)

10 YEARS and 60 LEAP® SYSTEMS LATER!

CAMECA is very proud to announce the **10 year anniversary of its first Local Electrode Atom Probe** (LEAP) shipment!



Just as significant a milestone, today there are more than **60 LEAP systems** installed and operating worldwide supporting a variety of users and applications! The first LEAP ever delivered was to the prestigious Oak Ridge National Laboratory (USA) way back in 2003. ORNL later went on to purchase the 30th LEAP system produced. Since then, ORNL's LEAPs have played a key and extensive role in helping attain its laboratory's mission of delivering scientific discoveries and technical breakthroughs to accelerate the development and deployment of solutions in clean energy, security and economic opportunity (www.ornl.gov).

LEAP systems are used for high-resolution, high-sensitivity, **3D sub-nanometer compositional investigations** of metals, ceramics, geological materials, semiconductor devices, organic materials, and composite structures. You can find the 60 LEAP's operating across many of the top tier academic, government and industrial research centers throughout the world.

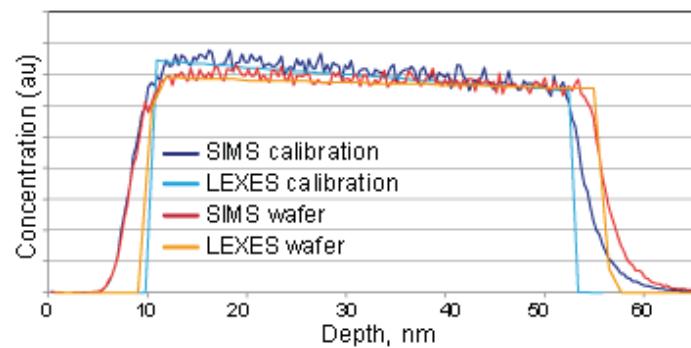
More info at www.atomprobe.com

Shallow Probe EX-300 (LEXES)

IMPROVED PERFORMANCE FOR IN-DEPTH LAYER STACKS

CAMECA recently released version 1.5 of **LEXES-Pilot** which includes a new module for **Multi-Layer Processing**.

This new module improves the precision of in-depth measurements of non-homogenous films (thickness and composition of main and capping layers) by using new routines developed for non-homogenous in-depth layer stacks.



Multilayer processing on a capped graded SiGe layer. Precision is better than 2% for top Ge concentration, Si capping thickness and SiGe thickness, better than 2.5% for the bottom Ge concentration.

Our R&D and application scientists have successfully teamed to allow our LEXES tool to fit various depth profiles such as gradient, bi-layers, etc. This is another important step for the CAMECA Shallow Probe that can now deliver extended solutions for strain engineering integration.

LEAP ACHIEVES SEMI S2 CERTIFICATION

In addition to all LEAP products already meeting the mandated and demanding CE certifications, CAMECA just recently certified its 4000X Si system to the world recognized **SEMI S2 standard**. SEMI is the association serving the micro and nano-electronics industries which sets the industry standards in order to ensure quality, reliability and safety (www.semi.org). The S2 certification program ensures our customers their LEAP systems meet operational and safety guidelines for semiconductor manufacturing equipment, required by many of the top research and manufacturing centers worldwide.

EX-300 AT TOP FOUR SEMICONDUCTOR FOUNDRIES



Based on LEXES, a unique surface probing technique pioneered by CAMECA, our Shallow Probe metrology systems have now been adopted by the Top Four

Semiconductor Foundries. LEXES technology has become a recognized standard for semiconductor R&D and ramping-up phases at the most advanced nodes as well as for high-volume production monitoring, and we are proud to offer semiconductor manufacturers innovative solutions to address their current and future process control challenges including 3D FinFet structures.

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