LEAP® Access Program

Providing Novel Research Opportunities with Atom Probe Tomography

CAMECA introduces the **LEAP Access Program**, an initiative to provide LEAP access to groups, post-doctoral researchers, and graduate students new to the technology. This program reflects our commitment to help scientists access the highest analytical performance and accelerate discovery processes in their specialized fields.

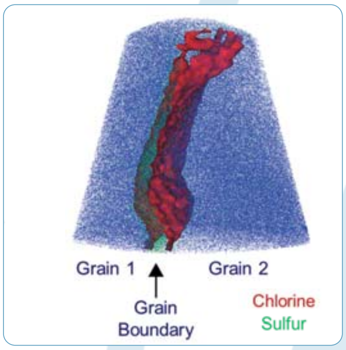
Interested parties are invited to submit a short technical proposal of their study at www.atomprobe.com. Winning proposals will be sponsored on a quarterly basis with up to $5,000 and will benefit from professional project guidance from CAMECA and partner organizations with expertise in the technology. Funding will cover sample preparation, travel, accommodation, and LEAP access.

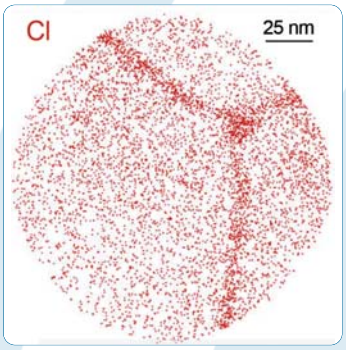
The LEAP Access Program is intended for any group new to atom probe tomography and will be awarded based on the strength of their proposal and the need for 3D subnanometer chemical information to further their research. More details can be found at www.atomprobe.com

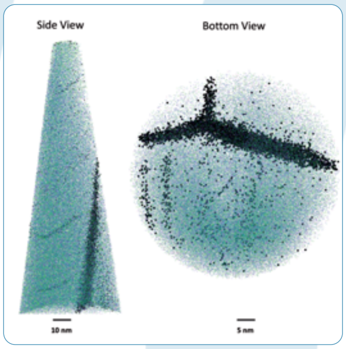
When accepting funding from CAMECA, research groups commit themselves to delivering a 3-6 page extended abstract of their work within three months of the completion of their research. These topics will be promoted to the atom probe tomography community and are expected to be published by the primary author, keeping CAMECA aware of all publications arising from the funding.

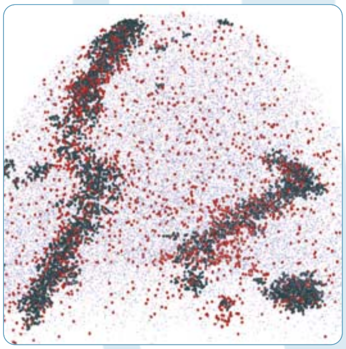
Apply online:
www.atomprobe.com/LEAP-access-grant/apply.aspx

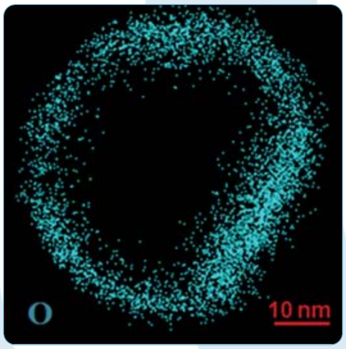
Have questions?
Contact your local CAMECA representatives
http://www.cameca.com/company/worldwide/index.aspx
or use the email address below.

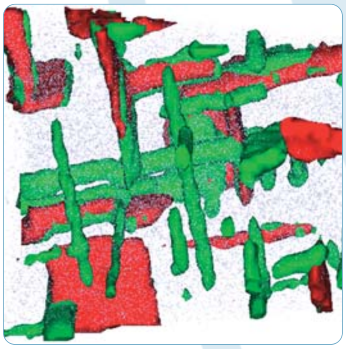


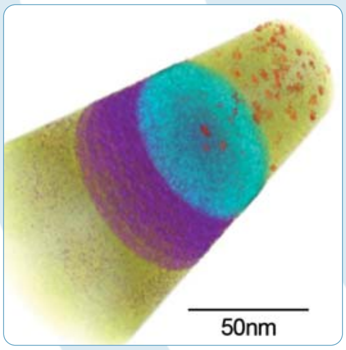












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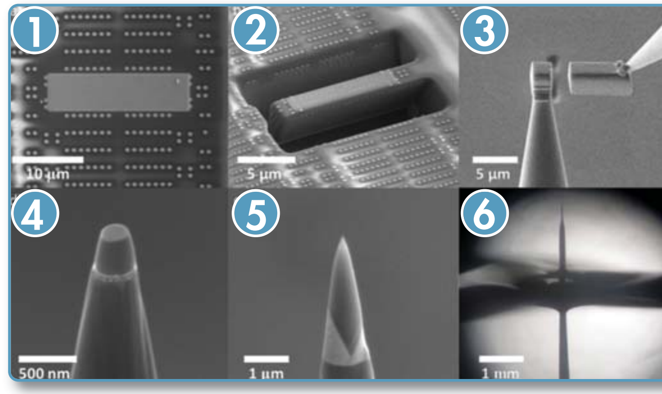
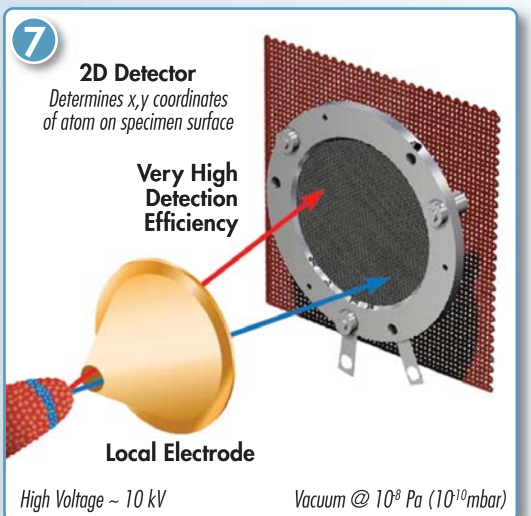
AMETEK® MATERIALS ANALYSIS DIVISION

Three Steps to 3D Nanoscale Analysis
An Introduction to Atom Probe Tomography

Step 1: Specimen Preparation

An atom probe specimen usually has a nanoscale region of interest (ROI) requiring both 3D compositional imaging and analysis. The sample is formed into a needle shape containing the ROI. Common APT specimen preparation methods using electropolishing or a Focused Ion Beam system (FIB) are very similar to TEM methods except instead of forming a thin sheet, a needle shaped sample is desired. At the right, standard FIB liftout and mounting of a specimen (figures 1 through 3) and then sharpening the sample with the ROI left at the very apex (4 and 5). In 6, a wire geometry sample is being electropolished.





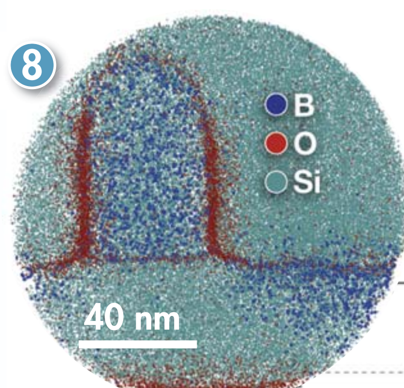
Step 2: Data Collection

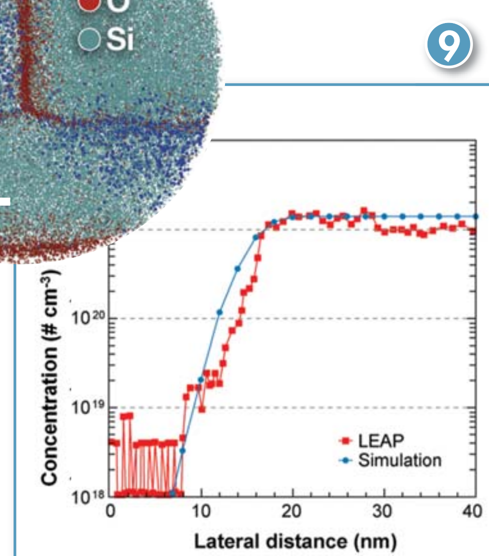
An atom probe produces images by field evaporating atoms from a needle-shaped specimen and projecting the resultant ions onto a detector 7.

A high magnification results from the ~ 80nm tip being projected onto an 80mm detector resulting in a magnification of approximately 10^6.

An atom probe identifies atoms by their mass-to-charge-state ratio *(m/n)* using time-of-flight mass spectrometry. Charge state, *n*, is typically 1 to 3.

The specimen is held at approximately 50K to reduce surface diffusion during the experiment. The high electric field results in 100% ionization and the high speed detector is capable of measuring up to 80% of the collected ions, independent of ion mass.





Step 3: Data Visualization and Analysis

Examples of data output are illustrated by a slice of a 3D atom map of a transistor† 8, and a dopant composition profile‡ 9. The image shows the positions of individual atoms (oxygen is red and boron is blue) in the transistor with subnanometer resolution. From the reconstructed data set many types of useful analyses are possible. These include 3D visualization, 2D atom mapping 8, 1D depth profiling and line scanning 9, as well as mass spectra and compositional analysis from user-selected volumes.

† *Lauhon, L. J. et al, MRS Bulletin "Atom Probe Tomography of Semiconductor Materials and Device Structures" 34(10) (2009) 738.*

‡ *Moore, J. S.; Jones, K. S.; Kennel, H.; Corcoran, S., Ultramicroscopy "3-D Analysis of Semiconductor Dopant Distributions in a Patterned Structure using LEAP" (2008), 108, 536–539.*