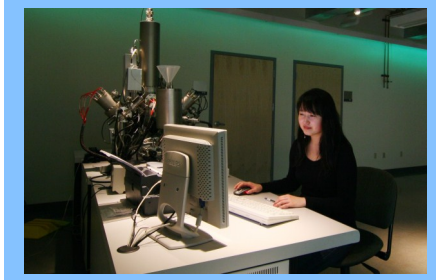
About CAMCOR in Oregon

CAMCOR is a full-service, comprehensive materials characterization center at the University of Oregon open to outside clients. Benefit from our technical expertise as we work with you to solve your problems and meet your deadlines. Remote access from your office allows you to interface directly with the experts and the instrument in real time.

http://camcor.uoregon.edu



CAMCOR at the University of Oregon

CAMCOR
Oregon's High-Tech Extension Service

UNIVERSITY OF OREGON

ONAMI
OREGON NANOSCIENCE AND MICROTECHNOLOGIES INSTITUTE

Microanalytical Facility
CAMCOR @ UO
Instrumentation includes:
CAMECA SX 100 Electron Microprobe
CAMECA SX 50 Electron Microprobe
FEI Quanta 200 ESEM/VPSEM Microscope

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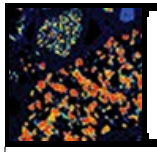

Microanalytical Facility

Quantitative
Chemical Analysis Services

Microanalytical Facility
CAMCOR @ UO

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Quantitative Chemical Analysis Services

Quantitative analysis is performed using Electron Microprobe Analysis (EPMA). EPMA provides unique sensitivity and high accuracy for a wide variety of materials in bulk, thin films and particles. Each element is detected by an optimized, wavelength dispersive spectrometer (WDS). Results of 1-2% relative accuracy for most elements and matrices is achieved using known samples as reference standards. EPMA, with x-y spatial resolution of ~1 µm, is able to produce high resolution maps. Data collection is fully automated enabling statistical (many points) analysis and large area mapping.

Typical applications:

- Quantitative chemical analysis of bulk, thin film and particle samples
- Detection of trace elements and impurities in metals
- Contamination in bulk materials and films

User Disciplines:

Thin film chemistry, materials scientists, metallurgy, geology, oil and gas, semiconductor

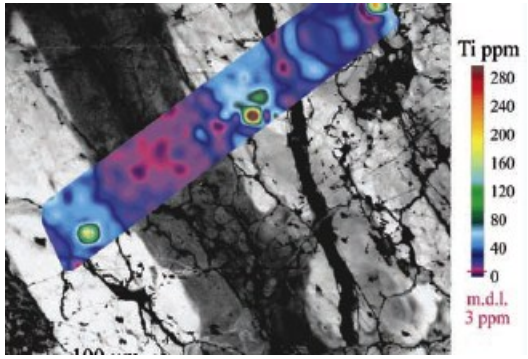
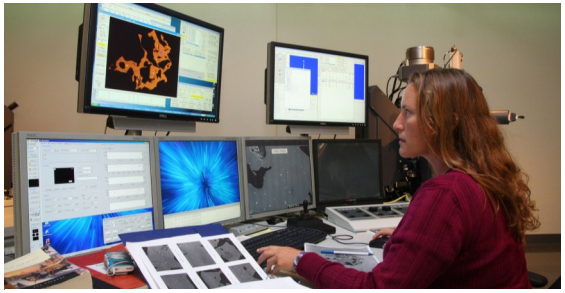


Figure 1. Cathodoluminescence image of quartz with Ti concentration overlain in ppm.



Industrial client operating the CAMECA SX-50 EPMA .

Bulk Samples

EPMA is frequently used to quantify bulk materials with respect to elemental composition and stoichiometry. Elemental detection limits are typically on the order of 100 ppm using WDS and 1000 ppm using EDS. Bulk samples are typically prepared by polishing in metallurgical mounts or glass slides followed by a conductive coating of ~50 nm.

The example in Figure 1 shows an image of a quartz vein from a copper deposit in Butte, Montana. It is overlain with a quantitative map of Ti concentrations (in ppm) based on 395 analysis points.

Common samples include ceramics and glass, metals, rocks, solar and semiconductor materials.

Thin Films

Special procedures have been developed allowing for successful characterization of thin films, single or layered structures. The model uses a combination of lower electron beam accelerating voltage and modeling of the beam interaction with the sample.

Figure 2 shows the spread of the electron beam as it passes through the thin film. Using well known models for EPMA, films on the order of 50 nm have been characterized. Ultra-thin films (<50 nm) and multi-layer film systems can also be characterized. More complex samples where the substrate and film contain the same elements are characterized using an iterative approach using EPMA and XRR to yield thickness and composition.

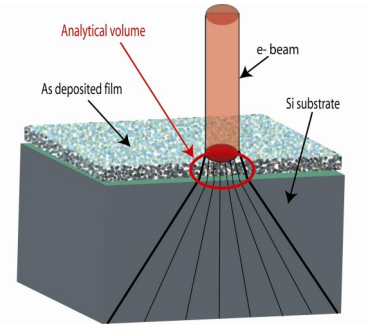


Figure 2. Interaction of the electron beam with the film. Area circled in red is modeled to quantify thickness and composition.

Common samples include single and multilayer thin films used in semiconductor, solar thin film.

Why EPMA and WDS?

WDS Bragg spectrometers which "disperse" the x-ray spectrum so each element of interest can be detected individually for optimum detector throughput. WDS has elemental sensitivity down to concentrations in the 10-100 ppm levels for bulk materials, films and particles. WDS has better spectral resolution than EDS. Overlapped elements such as S in the presence of Pb or Mo; W or Ta in Si; and Ni in Ti, can be identified.

When accurate quantitative analysis or analysis of trace elements is required EPMA will deliver the best results.

Work with us.

Services are available on a pay by hour or project basis.

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