

University of Manitoba Secondary Ion Mass Spectrometry Laboratory

Lab Supervisor:

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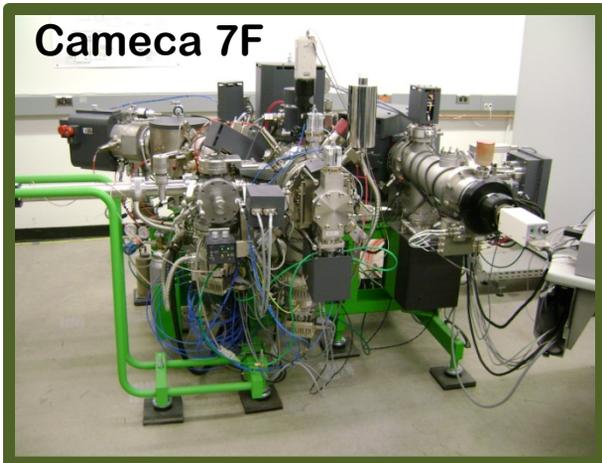
Lab Manager:

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Facilities:

Cameca 7F



Services:

Quantitative analyses on selected material based on the availability of reference material:

- Stable isotopes H, B, O, S, Fe, Cu
- U-Th-Pb geochronology
 - U-minerals
- Trace element analysis
- Depth profiling
- Ion Imaging
- Archaeology: provenance studies, hydration dating

Fee Schedule:

Fee for service and industry rate: \$3000 per day

External academic rate: \$1100 per day*

Univ. Manitoba rate: \$600 per day*

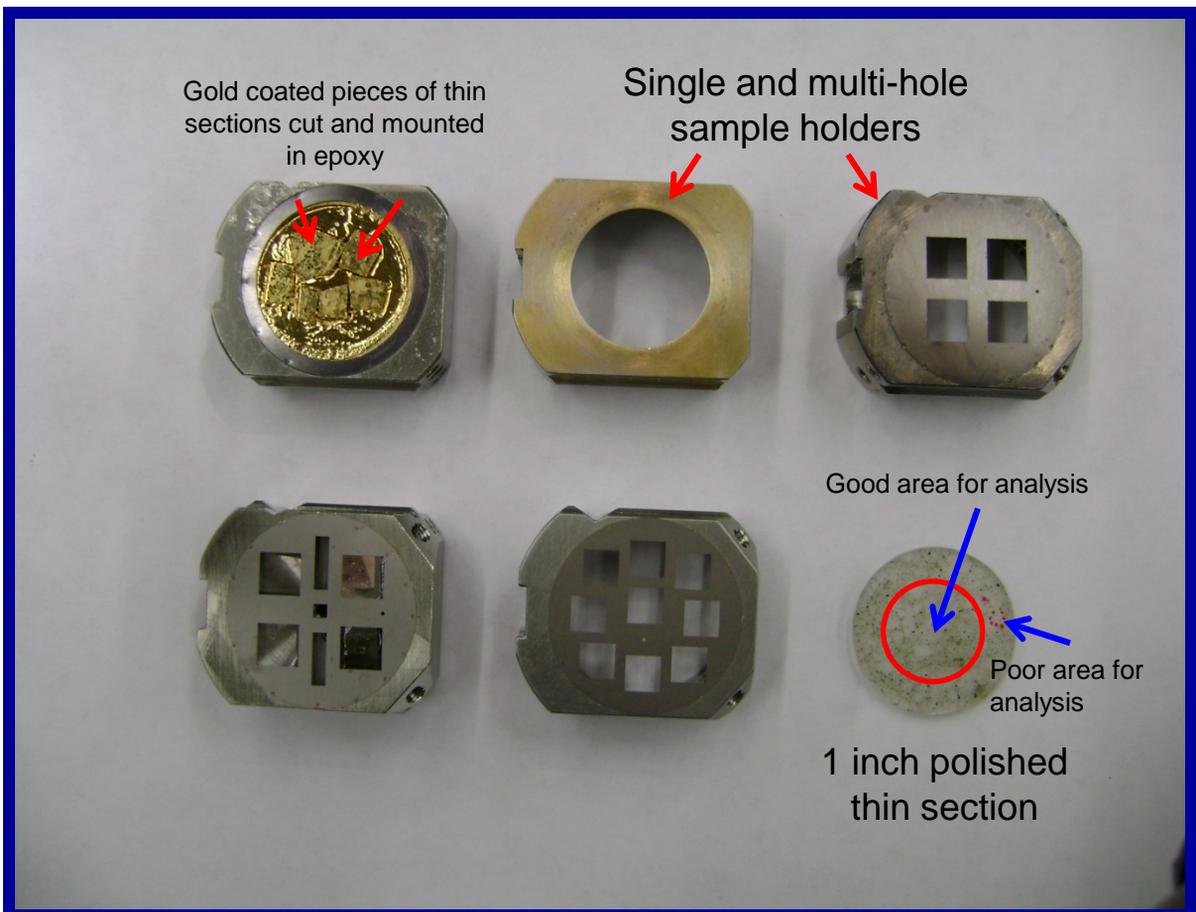
Sample preparation: \$11/hour (see sample prep. guide)

*collaborative rate = 50% discount

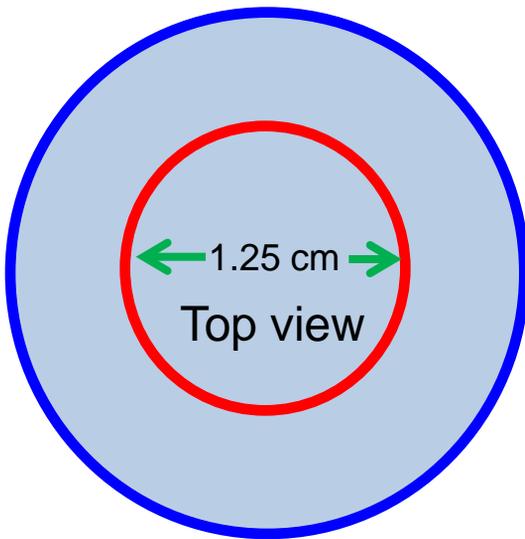
Sample Preparation Guide:

SIMS samples need to be flat and well polished. Relief must be at an absolute minimum. They can be thin sections or grain mounts, but they must fit within the 1 inch (2.5 cm) diameter SIMS sample holders. Sample height should be no less than 5 mm and a maximum of 12 mm. We routinely use Buehler Epothin® or EpoxiCure® epoxy resins and hardeners to make sample mounts. Analysis areas or grains need to be near the center of the thin-section or grain mount. Samples will be gold coated and once in the SIMS, they will only be visible by reflected light. Therefore, detailed sample maps at different scales are often required (see subsequent section on map prep). Please see examples of sample mounts below or refer to papers in:

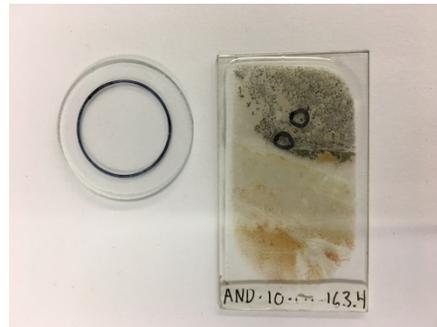
Fayek, M., 2009, *Secondary Ion Mass Spectrometry in the Earth and Planetary Sciences: Gleaning the Big Picture from a Small Spot*. Mineralogical Association of Canada, v. 41, 150 p.



Sample Preparation Guide:



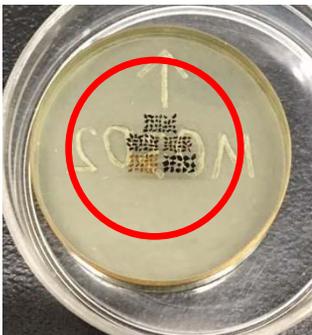
 Area available for analysis



 2.5 cm 



 < 1.2 cm



Ideal sample layout



Okay sample layout



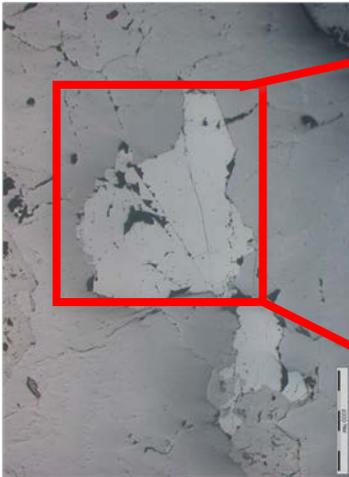
Poor sample layout

Sample Map Preparation:

The CAMECA IMS7f is equipped with an optical microscope that is used for sample navigation and ultimately location of the desired area for analysis. The quality and F.O.V. of the optical image is not ideal and therefore very detailed sample maps are required for navigation. A combination of reflected light, transmitted light and back-scattered electron (BSE) images at different scales are often required. Reflected light images using a microscope's 5x objective are the best, as these images will be most similar to those displayed by the SIMS. However, images at larger scales are often useful to help navigate larger areas, such as thin sections. Transmitted light images and BSE are useful for grain identification to ensure the proper grain/mineral is being analyzed, or to differentiate areas related to alteration or mineral zonation. Map preparation is very important as this will optimize the user's time on the instrument.

Examples of good sample maps:

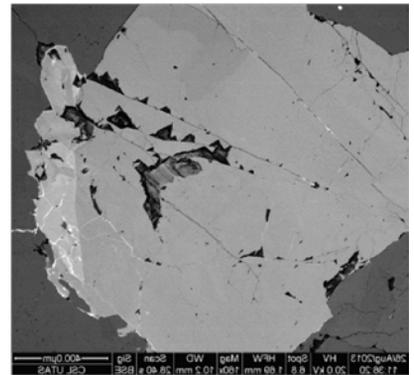
2x Reflected Light Image



5x Reflected Light Image



BSE Image (shows alteration)



Macroscopic images of samples are also useful for navigating



SIMS Analysis Checklist

*****Please note: Samples that are not prepared properly or are poorly documented may be sent back to the user*****

- ✓ SIMS instrumentation time is booked. There can be a 2-3 month wait for analytical time, so plan accordingly
- ✓ You have double checked that we have the available reference material. Reference material and unknowns must be matrix matched, therefore we can only analyze minerals that we have reference material for
- ✓ A master list that includes sample names and the number of analytical points on each sample
- ✓ Samples are the correct size, well polished and clean of carbon coating (pages 2 & 3)
- ✓ Samples are well marked (circles around areas of interest) and well documented (reflected light 5x, BSE, analytical points etc.; page 4)

Frequently Asked Questions

Q: How many points are collected for spot analyses in a day?

A: This depends on the type of analysis being performed. For example, Sulphur isotope analysis takes less time than Oxygen. Normally 20-25 points can be obtained on your samples for S and 15-20 for O. For U-Pb dating often only 10-15 points can be obtained in a day. The variation will depend on how many reference material points need to be run during the day.

Q: How many different phases can be analyzed in a day?

A: Generally only a single phase is analyzed per day, this is because SIMS requires reference material to be matrix-matched. In rare cases, two mineral phases can be analyzed on the same day, but only if the number of analytical points on the samples is low (<10 per phase).

Q: How much sample preparation can be done at the University of Manitoba?

A: Thin sections can be sent to the U of M if they are well documented and the areas of interest are clearly marked. Generally, we do not mount grains for users, grain mounts must be made by the user and sent to the U of M for analysis.

Q: Is there an additional charge to have someone at the U of M run the analyses on our samples?

A: No, the charge is the same whether you come and analyze the samples yourself, or if you just send the samples to be analyzed by lab personnel.

Q: How soon can I expect to get instrument time?

A: The schedule is highly variable, however general wait times to obtain time on the instrument are 2-3 months. So plan your projects accordingly.