User Guidelines for the MC-ICP Mass Spectrometer at the BigNano Stable Isotope Laboratory

Preamble

These user guidelines cover the use of the nu-plasma multicollector-ICP-mass-spectrometer (MC-ICPMS) of the BigNano stable isotope laboratory of Prof. Krämer (chair of Geochemistry and head of the Big Nano Stable Isotope Laboratory). Any user of the MC-ICPMS laboratory has to fully comply with the general laboratory safety rules and guidelines of the University of Vienna.

Instrument time allocation for scientific work

In order to use the instrument, requests for a specified amount of user time needs to be sent to Prof. Krämer at least 1 month before the earliest instrument time allocation. Instrument time allocations are made on a monthly basis. Reservations for external users can be made on longer time scales. Inexperienced users need to include two additional instrument days (for training purposes). In this case, instrument time allocation will depend on availability of a lab supervisor conducting the training. Sample preparation has to be finished before the measurement.

In general, proposers can't request instrument time for third parties. No financial gain can be recovered by a user from measuring for or giving access to a third party. All collaborating groups that are using the data measured at the MC-ICPMS facility need to be listed in the request. The request is submitted by the scientists who are responsible for the measurement and who get recognition for the research results. Any exceptions have to be agreed upon by Prof. Krämer in advance and violations can lead to a permanent loss of user status. All persons who will get access to the MC-ICPMS and who are working on the instrument need to be listed by name, their contact e-mail and telephone number.

Instrument time allocations are marked in the instrument calendar. However, these times are not binding to the stable isotope lab management, as unexpected disturbances and down-times of the instrument may lead to short term modifications of the measurement time allocations. Therefore it is advisable for any user to check the instrument calendar in the days before the measurement. We ask users to inform the lab supervisor as soon as possible, if the instrument will not be used during the allocated instrument time. Instrument time allocations do not include use of the clean room laboratory and it is not permitted to enter the clean room facility.

Costs

The costs that have to be recovered for measurements are grouped in three groups

Primary costs:

- Argon Gas
- Consumables

- Regular hardware maintenance: cones, nebulizer-/autosampler tubes, torch, extraction lens, high resolution slit, tubes and connectors for gases and peristaltic pump, oil for pumps, filters for ventilation systems etc.
- Repairs: turbo pumps, chiller, RF-Generator, circuit boards etc.
- Costs for general maintenance and repair by the manufacturers

Secondary costs: instrument depreciacion

Personnel support: support during the measurement use

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An instrument day as defined in time allocation and cost calculations lasts from 8:00 to 18:00 am for users that are external to Prof. Krämers group. Experienced users can apply for extended instrument days from 8:00 to 8:00 on the following calendar day at no additional cost, provided that the Universtiy of Vienna safety rules are not violated. The costs per instrument day of using the MC-ICPMS (not including costs for sample preparation or use of the clean room) are as follows:

a) Internal users (members of the Institute of Environmental Geosciences) and their cooperation partners, external users of the University of Vienna and/or the BigNano consortium (only primary costs are recovered)

650 € / instrument day (including overhead, if applicable)

b) Analyses for external research institutions (recovery of primary, secondary and personnel support costs):

1500 € / instrument day (including overhead)

c) Analyses for external companies (including overhead):

3000 € / instrument

These costs are subject to revisions. Once instrument time is granted, costs are fixed at the rate at the time of instrument time allocation.

Sample preparation

Sample preparation is the responsibility of the users and will not be performed by or in the BigNano laboratory unless other arrangements are made with Prof. Krämer. If liquid samples are analyzed, they need to be fully dissolved, i.e. solutions need to be clear with no visible particulate matter. Organic substances need to be completely removed from the sample (e.g. by ashing and digestion with H_2O_2 and HNO_3. Analytes need to be chemically separated from the matrix and diluted to match the standard (e.g. 100-500 ppb in wet mode or <= 100 ppb in dry mode). Correct dilution needs to be checked before the measurement.

Using the MC-ICPMS

- The startup of the instrument is done by the user, unless other arrangements are made with Prof. Krämer.
- Users have to fill out the log file

- All problems with the hardware need to be noted in the log file
- A gain calibration has to be performed at least once per day, and a sensitivity check (solutions: In; laser ablation: Si/Al/U) and gain calibration has to be perfomed after startup and before end of the usage period.
- Instrument tune parameters, vacuum readings, slit settings including the high resolution slit setting and use of cones have to be reported for each method that is run during the allocated instrument time.
- The lab supervisor need to be contacted to find out which cones are available to the user
- Cones, nebulizer, spray chamber etc. need to be cleaned
- At the end of the user time, the instrument has to be returned to the initial state (e.g., move the HR slit out of the beam etc.)
- The workplace and instrument has to be left clean and orderly
- Anything that is not part of the BigNano facility, for example solutions, samples, equipment such as laser ablation etc. have to be removed after the user time: pack it in / pack it out!

Coupling other instruments to the MC-ICPMS or hard/software modifications

Coupling of instruments other than the desolvating nebulizer and autosampler of the BigNano facility is only allowed with the written consent of Prof. Krämer. Prerequisite for this is a detailed description and documentation of the coupling and the nature of the analytes and matrix that are fed into the ICP before the measurement. Also, any modifications to the hard- and software of the MC-ICPMS that are not part of normal operation are not allowed unless the written consent of Prof. Krämer has been given to a specific modification that has to be described in detail and well documented. At the end of the user time, the instrument has to be returned into the same state as before the measurement and equipment that was brought into the lab by the user has to be removed.

Taking care of the laboratory

- It is not allowed to enter the clean room laboratory without written permission to do so.
- If you notice anything broken in the labs or any problems with the machines report it at once to the lab supervisor.
- Notify the lab supervisor if we run out of supplies (i.e. gloves/tissues etc.)
- Everyone is responsible for keeping the ICP room clean and dust free – please replace the sticky mats when dirty!
- Common cones (sampler and skimmers) should be cleaned gently prior to use (typically with Al-oxide powder/citranox/water/ethanol in ultrasonic bath) – they are both delicate and expensive so please be careful with them.
- Nebulizers can be cleaned overnight before use by hooking them up to the peristaltic pumps. If you are cleaning a neb, write your name in the book and be sure to take the neb off cleaning and stop the peristaltic pump when you are finished.

- Dirty spray chambers/torches should immediately cleaned when they are taken out of the instruments. Breakages and loss of these items occur when they are left hanging around the ICP room.

General rules

The laboratory rules of the University of Vienna, the Institute of Environmental Geosciences and these laboratory rules of the MC-ICP Mass Spectrometer at the BigNano Stable Isotope Laboratory as well as oral or written instructions by Prof. Krämer or the lab supervisor have to be followed at any time. Failure to do so and any activity that may be detrimental to the instrument and the laboratory or to the safety of persons will lead to the termination of user time and possibly to the permanent exclusion of user status. Any damage that arises from misuse of the equipment (including lack of proper sample preparation) will be charged to the user who caused it.

Publications

All publications that are produced based on results obtained at at the BigNano Infrastructure should be registered by the head of the BigNano Stable Isotope facility. All publications based on results obtained at at the BigNano Infrastructure must have the following information in the acknowledgment of the publication:

Measurements of XYZ* were performed using the BigNano Stable Isotope Lab University of Vienna, Austria

Future use of the instrument will be negatively impacted by failure to acknowledge the BigNano Stable Isotope Lab.

Consent agreement

This laboratory guideline for the MC-ICPMS at the BigNano Stable Isotope Laboratory will be continuously updated by the laboratory head. The current version (1.2, 29.10.2012) supersedes all previous versions.

I have read and understood the rules listed above and the general laboratory safety rules and guidelines of the Department of Environmental Geosciences and the University of Vienna, and I am willing to comply with these rules

Wien,…….. ……..

Date Name and Signature