

Laboratory and usage regulations of the Laboratory for Field-Emission Scanning Electron Microscopy and Ion Beam Applications (FIB-FESEM) of the Core Facility “Electron Beam Microanalysis” (CFE)

University of Vienna

Faculty of Earth Sciences, Geography and Astronomy

1. Organizational units/departments involved

University of Vienna, Faculty of Earth Sciences, Geography and Astronomy:

- Department of Lithospheric Research (DfL)
- Department of Geology (IfG)
- Department of Mineralogy and Crystallography (IfMK)
- Department of Paleontology (IfP)

2. Infrastructure

The DualBeam instrument **FEI Quanta™ 3D FEG** combines a field-emission SEM (FESEM) for scanning electron microscopy at high spatial resolution with a FIB-instrument for nanoscale machining using a focused ion beam to prepare cross sections and electron transparent foils. Besides high-resolution imaging, and semi-quantitative elemental analysis by energy-dispersive X-ray spectroscopy (EDX), the EBSD-system allows the spatially resolved analysis of crystal orientations.

The FIB-FESEM instrument serves the researchers of the Earth Science departments of the Faculty of Earth Sciences, Geography and Astronomy of the University of Vienna. In addition, members of other faculties and centres of the University of Vienna and external partners have access to the FIB-FESEM laboratory in the framework of research cooperation and contract research.

Responsible for the organization of the laboratory operation, as well as for the maintenance of the instrumentation are:

Prof. Mag. Dr. Rainer ABART (Head of Laboratory)
Tel: ++43-1-4277-53319 Email: rainer.abart@univie.ac.at

Mag. Dr. Gerlinde HABLER (Laboratory Management)
Tel: ++43-1-4277-53475 Email: gerlinde.habler@univie.ac.at

3. Financing, consumables contributions

To cover the operating and maintenance costs for the FEI Quanta™ 3D FEG and for the peripheral equipment, the users of the FIB-FESEM laboratory pay consumables contributions. Tiered cost rates apply: 1) the **UNIVIE INTERN** rate applies for usage by members of the University of Vienna, 2) the **UNIVIE EXTERN research cooperation** rate (UNIVIE INTERN +25%) applies for research collaborations with partners external to the University of Vienna, and 3) the **UNIVIE EXTERN contract research** rate (UNIVIE INTERN + 60%) applies to contract research without any scientific collaboration with members of the departments listed under point 1. The UNIVIE INTERN rate is based on empirical values, assuming 150 days of equipment use (thereof 50% SEM, 50% SEM+FIB) for research and 50 days for service per year. Rates may be adjusted annually.

Rate per slot ^(*1)	UNIVIE INTERN	UNIVIE EXTERN research cooperation	UNIVIE EXTERN contract research
FESEM applications	100 €	125 €	160 €
FESEM + FIB applications	200 €	250 €	320 €

(*1) Slot 1 = 9:00 – 13:00; Slot 2 = 13:00 – 17:00; Slot 3 = 17:00 – 9:00 (following day)

4. Structure: roles - competencies – responsibilities

Roles within the FIB-FESEM laboratory		
role	competences	tasks / responsibilities
Head of laboratory	responsibility for the laboratory	implementation and monitoring of the laboratory regulations
	supervision of laboratory operation	monitoring of laboratory operation
	provision of equipment	representation of lab before CFE-, faculty- and university management
	accounting	§27 project processing
Lab manager	coordination of service assignments	maintaining the operational readiness of the device
	assessment of the competences of the Operator	training of the Operator, holding instrument courses
	scheduling coordination	ensuring efficient laboratory operation
	independent application of methods	service to the User for the application of established methods ^{(*)2}
	methods development	service to the User for the implementation of special methods of data collection ^{(*)2}
	documentation of usage	collection of information regarding device usage, data output
Lab technician	technical device support	device maintenance, troubleshooting, carrying out repairs
		responsibility for the instrument during use
Operator	data collection for the User	support for the User during the preparation, execution and follow-up of data collection ^{(*)2}
	independent application of methods after assignment of competences by the Lab manager	service to the User for the application of established methods ^{(*)2} responsibility for the instrument during use
	methods development as coordinated with the Lab manager	service to the User ^{(*)2} for the implementation of special methods of data collection

^{(*)2} service to the User according to time capacities; scientific staff who have contributed to data collection or data analysis and thus made a significant scientific contribution must be named as co-authors in all publications in which these data are used.

Functions outside the FIB-FESEM laboratory		
role	competences	tasks / responsibilities
CFE contact person	first point of contact for the User of the respective department	supporting the User from the respective department in the planning of analytical projects allocation of the pre-financed device usage in coordination with the leadership of the respective department
	contact person for CFE personnel and for the leadership of the respective department	communication between CFE staff and members of the respective department coordination of the settlement of consumables contributions invoices
User	development of analytical plans in coordination with CFE contact person / Lab manager	filling out the application form for FIB-FESEM use taking note and signing the special laboratory- and usage regulations of the FIB-FESEM lab
	sample preparation	provision of suitable sample material

5. Personnel

role	person	
Head of laboratory	ABART Rainer	
Lab manager	HABLER Gerlinde	
Lab technician	SCHUSTER Roman	
Operator	GRIFFITHS Thomas	SCHUSTER Roman
CFE contact person DfL	GRIFFITHS Thomas	
CFE contact person IfG	SCHÖPFER Katerina	
CFE contact person IfMK	LIBOWITZKY Eugen	
CFE contact person IfP	BAAL Christian	

6. Regulations for usage

6.1. Application and development of plans for utilization of FIB-FESEM equipment

For the User belonging to one of the departments involved in the Core Facility Electron Beam Microanalysis (CFE) (see section 1), the CFE contact person of the respective department is the first point of contact for development of plans for FIB-FESEM use. The respective CFE contact person, in consultation with the respective department management, decides how to allocate pre-financed device usage of the respective department and notifies the Lab manager of planned equipment usage. For the User belonging to another organizational unit of the University of Vienna (not listed under point 1), or for the external User, the initial contact person is the Lab manager.

The User provides the filled and signed application form (see section 7) to:

Gerlinde HABLER, Email: gerlinde.habler@univie.ac.at

6.2 Making an appointment

A measurement day is divided into three slots: 9:00-13:00, 13:00-17:00, 17:00-9:00 of the following day. The smallest bookable time unit is one slot. A working day contains 3 slots (24 hours). Booking the overnight slot is possible only in combination with the afternoon slot of the same day. The overnight slot is restricted to automated FIB-FESEM applications, which do not require attendance of the Operator.

An appointment to use the FIB-FESEM instrument is made with:

Dr. Gerlinde HABLER, Tel. 4277-53475, Email: gerlinde.habler@univie.ac.at

The appointment is binding. If the User is unable to attend, this must be announced at least three working days before the planned date for using the equipment. Repeated unjustified non-attendance of an agreed appointment or unjustified postponements at short notice may lead to exclusion from laboratory use by the Head of Laboratory. An agreed appointment can be cancelled or postponed by the Lab manager if unforeseen disruptions in laboratory operations occur. Users are not entitled to reimbursement of any costs related to postponement or cancellation of appointments incurred in connection with the planned analytical undertaking.

6.3 Sample preparation

Specimen properties:

Depending on the method, different qualities of the sample surface are required. The condition of the sample material and the preparation requirements (e.g. embedding material, polish) must be clarified during planning (section 6.1). The samples must be absolutely clean, dry, and free of any grease or dust. Thorough cleaning with pure ethanol and distilled water, and subsequent drying in a desiccator or drying cabinet is required. For applications under high-vacuum conditions, the samples must have an electrically conductive surface layer. Non-conductive samples usually are coated with a

thin carbon layer. Different thicknesses of the carbon layer are required for different methods (15-20 nm for BSED, EDX, FIB; c. 4-7 nm for FSD, EBSD and SED-imaging at high spatial resolution). To achieve a high-quality carbon coating, it is important that the samples are coated in an absolutely clean, grease-free, dust-free and dry condition. After carbon coating, the samples may only be handled with laboratory gloves and must be kept dry in dust-free containers. Any contamination by fingerprints must be avoided.

Positioning on the sample:

For positioning on the specimen, it is advisable to take a picture of the entire specimen (scan or macro photo) - preferably before final cleaning and coating. Reflected light images are most similar to electron-optical images and are therefore best suited as an orientation aid. For thin section samples, it is recommended to take reflected and transmitted light images of the areas of interest and of their surroundings, using varying magnifications. Ideally, both transmitted and reflected light images are taken in combination, capturing the same areas at the same magnification(s).

6.4 Raw data, data transfer, publication

The data generated in the CFE on behalf of or for the User are handed over to the respective User for use in his/her own scientific research or, in the case of contract research, for further unrestricted use. CFE officials are permitted to use any data generated in the CFE for teaching purposes, for internal university reports, and for public relations or advertising purposes relating to the CFE, provided that the Operator who has generated the data is named. Use of the data for scientific purposes is only permitted with the consent of the User to whom the data was transferred.

We aim to make data generally accessible and usable in accordance with the FAIR Data principle after an embargo period to be defined individually for each project. For output from scientific projects, the embargo period should be a maximum of five years. For results from contract research, the embargo period is unlimited.

In any publications in which data generated in the CFE are used, the CFE and the respective laboratory must be named, and this naming must be reported to the responsible Lab manager.

The laboratory must be named in publications using the following designation:

EN: „FIB-FESEM laboratory of the Core Facility Electron Beam Microanalysis, Faculty of Earth Sciences, Geography and Astronomy at the University of Vienna (AT)”

DE: „FIB-FESEM Labor der Core Facility Elektronenstrahlmikroanalytik, Fakultät für Geowissenschaften, Geographie und Astronomie der Universität Wien (AT)”

In addition, scientific staff working at the CFE who have contributed to data acquisition or data analysis and thus made a significant scientific contribution must be named as co-authors of publications in which data from the FIB-FESEM laboratory are used.

6.5 Recording the use of equipment in the laboratory logbook

The Operator must record the use of the equipment truthfully and correctly in the laboratory logbook. This serves the purpose of time recording for the billing of consumables contributions for device use.

6.6 Reference to the Special Laboratory Regulations and to the General Laboratory and Workshop Regulations of the University of Vienna

The User undertakes to take note of, comply with and observe the special laboratory and usage regulations. Furthermore, the guidelines of the General Laboratory and Workshop Regulations of the University of Vienna (Gazette 2020/2021 - 24th edition, No 91, issued on 24.02.2021) apply:

https://mtbl.univie.ac.at/storage/media/mtbl02/02_pdf/20210224-24.pdf

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7. Application form for access to the FIB-FESEM laboratory

(please send the completed and signed application form via email to gerlinde.habler@univie.ac.at)

Name of **Applicant**: _____

Affiliation: _____

Name of the **collaborator/supervisor affiliated with** the Faculty of Earth Sciences,
 Geography and Astronomy (University of Vienna): _____

- 1) Analytical project description and aims (max. ½ A4 page)
- 2) Type of sample material
 - thin section / rock chip / powder / embedded powder / others
 - sample preparation procedure, type of resin used
 - sample description: sample classification, composition, phases, grain sizes
- 3) Analytical method(s) to be applied
- 4) Required expenditure of machine time
 - number of samples
 - number and size of sample domains
 - required spatial resolution/step size
 - estimated machine time
- 5) User experience with analytical methods and software for pre-processing, data acquisition and post-processing
- 6) Financial commitment

The consumables fee for FIB-FESEM usage

 - UNIVIE INTERNAL: 100 Euro/FESEM slot; 200 Euro/FIB slot;
 - UNIVIE EXTERNAL research cooperation: 125 Euro/FESEM slot; 250 Euro/FIB slot;
 - UNIVIE EXTERNAL contract research: 160 Euro/FESEM slot; 320 Euro FIB slot

will be covered by project: _____
- 7) Embargo period for raw data after data transfer to User _____

- Herewith, I confirm that I have read the Special Laboratory Regulations of the FIB-FESEM laboratory, and I agree to adhere to the regulations specified therein.**
- Herewith, I confirm, that the scientist(s), who contributed to the collection and/or processing of data acquired in the analytical project specified above, will be involved as co-author(s) in publications which include these data.**

Signature, date _____

(User of the FIB-FESEM laboratory)