

Specific lab rules/procedures for soft matter facility

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The soft matter characterization facility offers user access to 10 different instruments: AFM (C268), Instron – tensile testing (K206a), rheometer (C419), dynamic mechanical thermal analyzer (DMA), contact angle meter, surface tension meter, viscometer, densimeter, refractometer (all in C257). The facility is part of MACAL, so usage will primarily follow MACAL policies

https://www.su.se/polopoly_fs/1.659424.1687165477!/menu/standard/file/policyMACAL_2023-03-28%20%281%29.pdf

1. General policy for training

In particular: all instruments are registered in a booking system (LIMS). New users who want to use equipment unsupervised must contact the soft matter lab manager Jing Li and undergo training until they are approved as independent users. Only independent users are entitled to book and operate instrumentation. For MACAL being able to operate as an open user facility, it is of utmost importance that users comply strictly to the rules and procedure set up by the facility managers for using MACAL lab space and instrumentation. Operating equipment in a manner not complying to training procedures, manipulating equipment, or operating equipment without booking is considered unauthorized use and can be penalized in the form of additional fees or even suspension.

When entering/working in labs C419 and C257, it is requested to wear a lab coat, safety goggles and close-toed shoes, since chemicals are handled in these labs. Users should wear shoe covers for entering C268 as it is a clean room. As for all MACAL labs, users have to notify the facility manager if they intend to use the facility after 6 pm or on weekends. And after using the facility during evenings/weekends, users have to check-out by sending a text message/email to the facility manager. External (i.e. not MMK) users will be given outside office hour access only in exceptional cases. It is understood that users will keep the lab space clean, and remove samples and/or waste generated after measurements. Further, instruments have to be left in their original service state for the next user. A no-show up fee will be charged if a user removes a booking with shorter notice than 24 h. In order to maximize efficacy, regular training sessions will be organized within a fixed week every month (on maximally five consecutive work days). Jing Li will maintain a queue system for training sessions (essentially based on a first come first serve principle). Most instrument trainings can be done in 4 h slots, and may be necessary to be repeated in order to achieve independent user approval.

Trainings of MMK students (bachelor, master, and PhD) is free of charge. Any advanced level training sessions provided for instrumental operation, experimental design, and method development, catering to both students and senior researchers (including MMK), are considered as assisted usage of an instrument. Such sessions are subject to a fee. (see facility homepage <https://www.su.se/department-of-materials-and-environmental-chemistry/research/infrastructure/soft-matter-1.606264>) It is not possible to have bachelor students trained at the AFM, and master students will only be trained in case they perform a 60 credits project work. However, if the user does contract research paid or subsidized by a company, the external non-academic user fee is applied and the operator fee for the external user is additionally charged for the training.

Several instruments (such as Instron, DMA, contact angle and surface tension meters) offer flexibility in accommodating non-standard and advanced setups or experimental conditions. Requests pertaining to both standard and non-standard setups must be addressed with Jing Li, at least one week prior to the intended usage.

Individuals seeking training on these instruments are required to complete a specialized registration form provided by Jing Li. Upon submission, the applicant will be contacted to discuss arrangements for training. Time spent beyond one hour by the facility manager for changing set ups will be counted as assisted usage of the instrument. Finally, it should be noted that given the large variation of the instrumentation in soft matter facility covering various techniques, trainings only covers operation of the instrument following standard protocols of each instrument. It is the responsibility of each user to familiarize themselves with the theoretical foundations of the techniques prior to the commencement of training, and customize their own experimental program which may require optimization of experimental parameters. Jing Li could provide suggestions for customizing users own experiments, this will only be done for some occasions when a user has performed test measurements for his\her own materials without success. In case extensive help is provided by the facility manager, an assistance fee will be charged.

2. Specific policy for AFM training

Atomic force microscopic (AFM) based methods are complex and the atomic force microscope (multimode-VIII(MM8)) is a sensitive instrument and therefore a strict system/regulation for how to use it and how to introduce and train new users is needed to keep it in working order. Furthermore, the running costs are significant and the users are required to share the costs necessary to maintain it.

AFM Access

New users who want to use AFM should contact Dr. Jing Li, the facility manager. She will then organize how the access should be achieved and give priority between the projects. There are three levels of access to the instruments;

- 1) Basic AFM studies
- 2) Long-term studies with operator
- 3) Long-term studies without operator

In this context, the operator is Dr. Jing Li if no others are stated.

Basic AFM studies refer to simple AFM morphological characterization of samples in air. Depending on user's interest and the instrument's capacity, the sorts of basic training of AFM imaging can include conventional tapping mode, or PeakForce tapping (ScanAsyst) mode or contact mode. Basic AFM studies may be performed by users independently after having received basic AFM training (see below) or it can be operator-assisted in case a research group does not have the competence.

Long-term studies with operator is applied for a research group that has a long term project (i.e. min. 6 months) where advanced AFM is a main study focus. A PhD student (or a researcher in some special cases) from the PI's group who is in his\her early year period of a research project can be trained by Jing Li. Long term studies with operator are also applied for a research group who lacks its own AFM competence and does not intend to acquire such. In this case, the PI will buy out Jing Li's time to conduct the study for a long term project. The PI and MACAL will discuss arrangement of conducting such study by Jing Li from case by case.

Long-term studies without operator are only applied when the research group has its own strong competence of AFM skills for a range of advanced AFM-based methods or have collaboration with a researcher inside SU with

such competence. However, it is very important that the responsible person for the MACAL-laboratory is informed about this arrangement, especially when external researchers are involved. Jing Li can help and train them when needed. External users are expected to compensate Jing Li's salary for conducting the training.

Training of new users of AFM

Learning the operation of the AFM demands a great deal of time and commitment, especially operation of advanced AFM. The PhD course "Introduction into Atomic Force Microscope (KZ41005)" or equivalent (theoretical self-studies using a suitable tutorial in AFM and instruction films on internet are an option) is a prerequisite. It is important that the AFM instrument is run after the same protocol. All new users will therefore be given basic training in how to run the AFM.

The extra instrumentation/accessories for AFM tip mounting, sample preparation, scanner calibration, laser alignment make the number of possible studies numerous and the user will need special training for each technique. It should also be noted that to learn basic AFM, approximately 2 ~ 3 full days are required, while advanced AFM like PeakForce quantitative nanomechanical property mapping (PFQNM), and other advanced AFM modes (depending on the instrument's capacity) typically takes 10 ~ 15 full days. To learn additional techniques like data analysis using Nanoscope, additional training periods are needed.

Basic AFM training

Basic training is performed with a standard protocol and takes a minimum of 8 hours. It will allow the user to understand the working principle and capabilities of the instrument, as well as enable its basic operation. Basic AFM training will be arranged for swiftly, but preferably after the having passed the PhD course KZ41005. A person who wants to be trained in basic AFM should fill in a special registration form provided by Jing Li. The applicant will then be contacted and the research leader of the applicant will be informed about arrangement of the basic training.

Advanced AFM training

Advanced AFM training refers to long-term studies, i.e. research projects of min. six month duration. Advanced AFM training requires repeated sessions over a period of ca. 3 months. Since the time available for Dr. Jing Li is limited it is estimated that only up to three users per year can be trained at the advanced level. It is therefore necessary to make priority lists (internal users from MMK have the highest priority). However, it is the intention that each research group, which has a need for repetitive AFM studies, should have at least one member with access to the AFM. The training will be more efficient if the adept prepares the sessions with intensive studies of relevant literature and instruction films on internet. The usage hours of the instrument for conducting advanced AFM training will be charged. A person who wants to be trained in advanced AFM should fill in a special registration form provided by Jing Li. The applicant will then be contacted and a meeting, that also includes the research leader, will be scheduled to discuss the time line and focus of the advanced training sessions.

3. Disclosure and safety policy

3.1. A user must inform the facility manager (Jing Li) about the nature of their samples for a use of MACAL soft matter instruments.

3.2. A risk assessment should be conducted in advance by the user who intends to use instruments/lab spaces that belong to soft matter facility on testing of hazardous/harmful/pathogenic (bio) materials that may cause harm to humans. And the risk assessment should be evaluated by the lab manager (Jing Li) together with a safety officer at MMK.

3.3. Microorganisms in risk class 2 (BSL-2, may cause human infections) and risk class 1 (genetically modified organisms) is completely forbidden at MACAL soft matter lab.

4. Acknowledgements and Publication

If substantial help beyond basic training is given by the facility manager, e.g., support with advanced data collection and data interpretation, leading to results that are included in a scientific publication, this may justify co-authorship of the facility manager. This follows the Vancouver recommendations for co-authorship (<https://innsida.ntnu.no/wiki/-/wiki/English/Co-authorship>).

Special policy of acknowledgements and publication of AFM studies

In the publication or report, any assistance provided by Dr. Jing Li should be acknowledged. In the case that Jing Li acquired and/or interpreted the results, she should be invited to be co-author of the publication. If Jing Li's contribution is not enough to justify co-authorship, the acknowledgement in the publication should be: "The authors acknowledge the assistance of Dr. Jing Li at MMK, Stockholm University".

Finally, it should be noted that AFM is such a broad scientific field that the researchers at MMK do not cover every scanning probe microscopic based technique and method in detail. This means that for some more advanced techniques the researcher has to get the competence from outside MMK.