

## Specific lab rules/procedures for soft matter facility

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facility manager

The soft matter characterization Facility in Materials Analysis Center at Arrhenius Laboratory (MACAL), Department of Chemistry (Kemikum), Stockholm University, provides user access to a suite of 10 instruments: AFM (C268), Instron Universal Testing Systems (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

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### 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. Lab coat, safety goggles, and closed-toe shoes are required in labs C419 and C257. Shoe covers must be worn in C268 (clean room). Users must inform the facility manager before using the labs after 6 PM or on weekends, and check out via text or email afterward. After-hours access for external (non-Kemikum) users is granted only in exceptional cases. Users must clean up after use, dispose of waste properly, and return instruments to their default state. A no-show fee applies for cancellations made less than 24 hours in advance. Monthly training weeks will be held (up to 5 consecutive workdays during a week). Dr. Jing Li will manage a first-come, first-served training queue. Most trainings are conducted in 4-hour sessions and may require repetition before independent use is granted.

Training is free of charge for Kemikum students (bachelor, master within the Sustainable Chemistry program, and PhD). However, advanced training sessions—covering instrumental operation, experimental design, or method development—are considered assisted usage and are subject to fees. For details, refer to the facility homepage: <https://www.su.se/department-of-chemistry/research/infrastructure/soft-matter-characterization-1.773714>

Bachelor students are not eligible for AFM training, and master's students will only be trained if undertaking a 60-credit thesis project. For contract research funded or supported by a company, external non-academic user fees apply, including operator fees for training. Several instruments (e.g., Instron, DMA, contact angle, and surface tension meters) support advanced and non-standard setups. Standard requests must be submitted to Dr. Jing Li at least one week in advance; non-standard requests require a minimum of two weeks' notice.

Training procedure and user Responsibility: Individuals interested in training must first complete a user registration form, available from Dr. Jing Li. Once submitted, the applicant will be contacted to arrange training. If instrument setup requires more than one hour of the facility manager's time, this will be considered assisted usage and will be subject to the applicable fee. Due to the wide range of instrumentation and techniques available in the Soft Matter Facility, training sessions focus strictly on the standard operational procedures of each instrument. Users are expected to familiarize themselves with the theoretical background of the techniques in

advance and to design and optimize their own experimental protocols as needed. While Dr. Jing Li may offer guidance for experiment and method customization, this support is limited to specific cases, typically after users have attempted measurements on their own materials without success. Any substantial assistance beyond standard support will be subject to an assistance fee.

## 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. The basic studies are intended for researchers who need help with minor AFM studies or do not have the competence within their group to perform the study. It also includes so called test runs to check if AFM is a feasible technique. Depending on user's interest and the instrument's capacity, the sorts of basic training of AFM imaging can include conventional imaging modes. 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 are extensive studies with repeated sessions at the AFM. Since the time available for Jing Li is limited, it is necessary to discuss these studies with MACAL. Long-term studies with operator are intended for research groups undertaking extended projects (minimum duration of 6 months) where advanced AFM is a central focus. Under this collaborative framework, a PhD student from the PI's group, particularly in the early phase of their research, may receive hands-on training and mentorship from Jing Li. This collaboration is designed to establish joint research efforts and co-publication opportunities between the PI's group and Jing Li. Long-term studies with operator access are also available to research groups that lack in-house AFM expertise and do not plan to develop this capability. In such cases, the PI will buy out Jing Li's time to conduct the study for a long term project. The specific terms and scope of Jing Li's involvement will be discussed and agreed upon jointly by the PI and MACAL on a case-by-case basis, ensuring alignment with the project's goals and timelines.

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 PeakForce quantitative nanomechanical mapping (PFQNM) typically takes 10 ~ 15 full days. To learn additional techniques like basic and advanced data analysis using Nanoscope software, 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 requires repeated sessions over an approximate duration of three months. To manage demand, priority will be given to internal users from Kemikum, and a priority list will be established accordingly. The goal of this training program is to ensure that each research group with a need for recurrent AFM studies has at least one member proficient in operating the AFM. Prospective trainees are encouraged to prepare in advance by studying relevant literature and online instructional materials, which will help optimize the effectiveness of training sessions. Please note that usage hours for the AFM instrument during training sessions will incur standard operational charges. To apply for advanced AFM training, interested individuals must complete a special registration form provided by Dr. Jing Li. Once the form is submitted, the applicant will be contacted to schedule a meeting with Dr. Jing Li and their research leader. This meeting will be used to discuss the objectives, timeline and focus areas for the advanced trainings of AFM.

## **3. Acknowledgement and Co-authorship Policy**

Significant contributions by the facility manager such as support with advanced data acquisition or interpretation that directly leads to publishable results may warrant co-authorship, in line with the Vancouver recommendations for co-authorship (<https://innsida.ntnu.no/wiki/-/wiki/English/Co-authorship>). Advanced assistance provided by Dr. Jing Li should be appropriately acknowledged in publication or report. If she has contributed to data acquisition and/or interpretation, she should be offered co-authorship. When her contribution does not meet the

threshold for authorship, the following acknowledgement should be included: “The authors acknowledge the assistance of Dr. Jing Li at the Department of Chemistry, Stockholm University.”

Please note that AFM and scanning probe microscopy (SPM) encompasses a wide range of techniques, and not all are fully covered by Kemikum’s internal expertise. This means that for certain advanced techniques the researcher has to get the competence from outside Department of Chemistry.

#### **4. Disclosure and safety policy**

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

4.2. 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 Kemikum.

4.3. 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.