

Helmholtz Nanoelectronic Facility

www.hnf.fz-juelich.de



USER MANUAL

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1 INTRODUCTION

Welcome as a user of the cleanroom. It is the main cleanroom Facility of Forschungszentrum Juelich. The facility will guarantee a ISO 2 cleanroom, together with a couple of important behaviour and safety rules. It is important for each and every one to follow these rules to ensure a clean and healthy working environment.

In the HNF caustic, corrosive, toxic, explosive, carcinogenic, flammable and asphyxiating chemicals and gases are used. In the interest of your own safety and the safety of others, you should read this manual carefully and follow the procedures described. Any questions or concerns should be directed towards a HNF staff member.

HNF expects to users of all user levels that they aware the dangers of the activities for which they are responsible, that they warn people at risk and that they take care to protect the health and safety of other users. All users are bound to rules or measures in the interest of health, safety and welfare of all. Don't abuse them.

The policies outlined in this document will change as the facility will grow. Many of these procedures and policies will be adapted to the larger user community that the HNF will support in future. You will find all rules and policies on the web page www.hnf.fz-juelich.de.

In addition to these laboratory regulations the following regulations apply:

- The statutory provisions (Chemicals Act, Hazardous Substances Act, etc.)
- The Guidelines for Laboratories (GUV- R 120)
- The relevant Technical Rules for Hazardous Substances (TRGS)
- The General Safety Regulations FZJ
- The Waste Disposal Regulations FZJ
- The applicable health and safety guidelines

HNF regards the nature of the work carried out by any individual user as confidential, and shall make every reasonable attempt to prevent breaches of that confidentiality. HNF does not accept responsibility for the consequences of any breach of the confidentiality by third parties who by any means gain illegitimate access to information from HNF.

2 DUTIES OF ANY USER:

- Visitors need a permission of the HNF Office to enter the building or shall be accompanied by an HNF staff member.
- All exterior doors have to be kept closed. All doors leading from the stairs to the floors or into the workrooms, laboratories or clean rooms are fire doors and must always be closed. The doors do not close automatically in case of fire alarm.
- Keep cleanroom doors closed at all times. The supply and exhaust air works only with closed doors!
- Eating and drinking are prohibited in all rooms except in room 6003. Food and beverages cannot be stored in HNF.
- Smoking is strictly forbidden throughout the HNF.
- Report disruptions in the technical building equipment (ventilation, heating, plumbing, electrical, water, gas) immediately to - 3193 or the HNF Office (Tel.: 6364)
- At the entrance coats and jackets have to be hung on the coat racks. Lockers/deposit boxes are available in the lobby for free. The HNF is not responsible for the items in the entrance and in the lockers/deposit boxes.
- Entering the HNF behind the entrance is only permitted wearing overshoes!

2.1 PROCEDURE AT WORK

- The own workplace and all community facilities are to be kept in good condition.
- All workplaces should be cleaned up regularly.
- The necessity of chemicals to remain in the laboratory has to be revised on a regular basis. Un-necessary chemicals are to be removed or disposed of.

2.2 REPORT OF PROCESS PARAMETERS AND DATA

The HNF has a system for reporting process parameter and data named Livingdatabase (Phoenix). Each user of the clean room is required to enter promptly its process parameter data within one week in Phoenix. Any breach of obligation -> see red card policy.

2.3 ACKNOWLEDGEMENTS, CO-AUTHORSHIP, AND PHOTOCREDIT POLICY

To ensure that the HNF and its staff are recognized for their efforts, there is a policy that describes the situations where the HNF and its staff should be acknowledged in papers and presentations. Plus if a HNF

staff member has made a significant contribution to a project, a co-authorship must be made on the respective papers.

For papers, a suggested acknowledgement reads: “This work was performed in part at the Helmholtz Nanoelectronic Facility of Forschungszentrum Juelich”. In presentations, listing the Helmholtz Nanoelectronic Facility along with your acknowledgements will suffice.

2.4 STORAGE IN THE FACILITY

There is a limited amount of storage for user samples and materials in the clean room. Ask the staff for use. There is no storage outside the clean room.

All items in the cleanroom should be clearly labeled with the user’s name and the user’s institute. The staff periodically disposes of things left unlabeled, or belonging to inactive users. All samples or masks not stored in your bin, at the end of the day, will be placed in the lost and found box. The items in the lost and found box will be disposed of at two-week intervals.

At the end of each calendar year an inventory of all storage boxes of the users is made. All storage cases that are not assigned to a user after two requests for identification will be disposed of.

2.5 TOURS

Guided tours for groups of all kinds in the HNF are welcome. Groups can only enter the HNF after consultation with the management of HNF. Our experience is, that tours with more than 15 participants, are difficult. During a tour without entering the clean room no special safety precautions must be taken.

3 HNF ACCESS AND RED CARDING

The access is coordinated by the HNF Office, it is the first contact for users in scientific and technical matters. HNF Office organizes the application process, the acceptance of applications for scientific projects and the assessment of their scientific and technical feasibility. The HNF Office implements the recommendations of the HNF Board of Directors. It coordinates the work of HNF.

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3.1 ACCESS/REGISTRATION

- Use the web based registration of the Livingdatabase (Phoenix) on the HNF web page. After this we will contact you to regulate the administrative and financial responsibilities.
- Prepare a detailed run sheet of your process/project. You have to upload the run sheet during the registration process. An example of a normal run sheet is on our website.
- Fill in the right locations in the online registration under "Work description". You can apply for:
 - Cleanroom
 - SEM/FIB area
 - Nanocluster
 - Optical Lab
 - E-Beam Lab
- The system will send you a mail (livingdatabase@fz-juelich.de). The registration is only done if you confirm the registration by the link in the mail.
- While experts checking your run sheet, you will get an invitation to do a safety exam. The safety exam is based on the Lecture HNF Beginners and Lecture HNF Cleanroom (renewal). You can find the lectures on the HNF website -> downloads.
- The system will let us know, if you pass the exam and send us your exam results. When we get the info, we will send you your invitation to the cleanroom introduction.
- After participation of the cleanroom introduction you can start to contact the equipment manager for equipment instructions.
- **Be prepared for a flexible approach!** Many new users change their plan of attack significantly once they arrive and become better acquainted with the facility, its staff, and capabilities.

Keep your run sheet up to date! If you change your process and use different or new materials or chemicals you have to download the new version in the Livingdatabase (System -> my user details) and need the written clearance of the HNF-Office.

3.2 ELECTRONIC KEYS

Each accepted user of HNF receives an electronic key to enter the building and the cleanroom. The following rules apply:

- Entering and leaving the building exclusively via the entrance E1.
- Access keys may not be sold or given to other people. Should a user be encountered with a foreign key, he and the owner of the key are excluded indefinitely from using the HNF.
- The electronic key must be returned after finishing work or leaving the HNF for more than 3 month
- Visitors need a permission of the HNF Office to enter the building or shall be accompanied by an HNF staff member.

3.3 OPENING HOURS

Working with hazardous materials or chemicals in the HNF is permitted within the core working time of the FZJ. Working outside the official working hours requires a written permission of the Facility Manager.

The cleanroom is open within the core working time of FZJ, 8:00 am – 16:30 pm, Mo-Fr.

4 “RED CARDING” (SUSPENSION/PENALTY)

Not obeying the cleanroom rules is a serious offence. It will have an effect on the cleanroom conditions or on the safety of all other cleanroom users. The number of repeated violations will affect the severity of the penalty.

All technicians working for HNF and the cleanroom management are members of the facility support staff and are obliged to report all violations including names to the facility manager. The facility support staff may also enforce a cleanroom exclusion for the day on which the safety violation is observed.

After the first violation

An official warning is given and possible cleanroom exclusion for up to one week

After the second violation

A second official warning is given and three weeks of cleanroom exclusion

After the third violation

Permanent cleanroom exclusion

EXAMPLES OF VIOLATIONS

- User do not follow the instruction of HNF staff
- Violation of working safety, security policies and cleanroom regulations
- Damage of equipment due to violation of the work rules after sufficient instruction or unauthorized changes to equipment
- Violation of access arrangements
- Use of equipment without training and without booking
- Using Materials and Chemicals not allowed in HNF
- Not enter promptly the process parameter data in Phoenix
- Using a foreign E-key.
- Intimidation of other users (over their work area in the laboratory, damage to equipment of other users, etc.)
- Etc.

5 GUIDELINES FOR THE USE OF EQUIPMENT

A part of the equipment of tHNF is only run by equipment managers, another part of the equipment in the facility is hands-on equipment for users. Each major instrument is under the charge of a staff member, referred as equipment manager. The equipment manager will train users on that instrument. When the equipment manager is satisfied, the user will be authorized to use the system without further supervision. Much of the equipment in the facility is highly complex and delicate.

Each instrument necessarily has rules and operational procedures which are set by the equipment manager to assure the continued operation of the instrument. Violation of these procedures or carelessness in operation can result in damage to the equipment, down-time and considerable expense. Consequently, careless or damaging use of equipment will result in suspension of user privileges, either for a specific instrument or the facility as a whole (see chapter 4.3).

5.1 EQUIPMENT RULES

Use of cleanroom equipment is only allowed after an extensive course. These courses are given only by the responsible technician. Use of equipment is subject to special rules depending on the type of equipment. The additional rules will be provided during the equipment course.

- It is not allowed to use equipment if you are not instructed and permitted to operate the equipment
- It is not allowed to use the equipment without a reservation in the Living Database
- It is not allowed to make hardware or software modifications in any way
- Keep the equipment and working area clean
- Report any faults or defects to the responsible technician immediately

An extensive list with all equipment and responsible technicians can be found on the HNF website. Misuse of equipment and unauthorised use of equipment will result in a penalty. No device or instrument may be removed without permission from the management of the HNF.

5.2 BOOKING EQUIPMENT

HNF equipment is reserved through Livingdatabase. Each user receives an accepted HNF user account for the booking system. On equipment that is in heavy demand, the HNF reserves the right to implement special booking rules to the instrument (to ensure fair access to all users).

Equipment Rules:

- No use of equipment without prior booking! Equipment must be booked through the Livingdatabase (Phoenix).

- A momentarily unused equipment can be booked through two terminals in the cleanroom.
- Before using equipment you will be prompted to confirm the booking. After confirmation, the booking is mandatory and cannot be cancelled any more. Only the equipment manager can.
- If a user is 15 min late for their reserved time on equipment, the reserved time may be claimed by anyone in the lab.
- You must finish your process in a timely manner. Avoid to run into someone else's timeslot.
- Users are obliged to enter the used parameters of the equipment in the Phoenix system no later than one week after use.
- Special permission must be given to any user that wishes to reserve a piece of equipment for more than 24 hours.

6 CLEAN BEHAVIOUR RULES

The following rules have to be obeyed. Following these rules will lead to proper cleanroom behaviour.

- Follow cleanroom dressing procedure. Only enter the cleanroom with cleanroom clothing, the provided nitrile gloves and safety glasses
- Always use cleanroom clothing in the appropriate way when working inside the cleanroom and be sure your own clothes are covered properly by the cleanroom clothing.
- Only place your cleanroom clothing on one of the hangers. Do not leave the clothing lying around. Always attach your name card to make your cleanroom suit personal and for recognition inside the cleanroom.
- Do not forget to log off leaving the cleanroom
- At all times it is prohibited to open your cleanroom suit inside the cleanroom.
- Do not store your cleanroom suit unnecessary when not working in the cleanroom for a longer period. Put your suit in the dirty laundry bin in that case.
- It is prohibited to take dust-generating materials like (uncoated) wood, paper, cardboard of rusted and materials inside the cleanroom. Also styrene foam is not allowed. Only use exclusively special cleanroom paper.
- Do not eat or drink inside the cleanroom. Chewing gum is also not allowed.
- No make-up, perfume, cologne, aftershave, or scented lotions may be worn in the cleanroom.
- If you have a cold we ask you not to enter the Clean room. Blowing your nose is not possible in the clean room. If we find you have a serious cold, we have to ask you to leave the clean room!
- Sandals, shoes with high heels or shoes with metal eyelets are not allowed in the clean room.
- Do not smoke inside the cleanroom. Do not smoke just before entering the cleanroom; wait at least 3 hours before entering.
- Wearing contact lenses is prohibited.
- Do not open emergency exits unnecessary. The supply and exhaust air works only with closed doors
- It is not allowed to run inside the cleanroom. Always move calm and in a controlled manner.
- Always keep your workspace clean. Store materials in the personal cleanroom box. Do not leave materials lying around.
- Personal listening devices (MP3, mobile phones, etc.) are not permitted. Tablet computers may be used in the clean room with a protective cover if they have access to the Wireless LAN network of the Research Center.
- Orders by the support staff have to be obeyed at all time.

7 SAFETY POLICY

When starting work at HNF and therefore at the Research Centre there is one top priority for every new member of staff: proper instruction about safety and health protection at the place of work. This is required by the law on occupational safety. You are therefore obliged to thoroughly understand and carefully apply the information given to you by your supervisors and by FZJ. After all, this concerns nothing less than your own health and safety and that of your new colleagues.

- Each person working in a laboratory has to learn about locations and functions of the safety devices as well as escape routes, fire alarms and emergency plans.
- Escape and rescue routes have to be kept free at all time.
- There are fire extinguishers in the immediate vicinity of the equipment and workspaces:
 - Powder extinguishers in all corridors
 - CO₂ fire extinguishers at the ends of the central corridor in the cleanroom.
- Used fire extinguishers, including those with a damaged seal must be submitted immediately after use for refilling and then returned immediately to their place.
- Respirators are allowed only for special work (e.g. with toxic gases).
- Emergency shower and eyewash can be found in the wet areas and disposal areas next to the doors. They are checked once a month. The review is documented.

For safety rules and behavior see Lecture HNF Cleanroom (renewal).pdf on the HNF website -> downloads

7.1 CHEMICAL PROCESSING RULES

It is not allowed to use wet chemical processing without a proper introduction and instruction by a staff member. All wet chemical processing has to be performed inside the designated wet bench.

When performing wet chemical processing it is obligated to use personal safety protection like proper chemical gloves and personal safety equipment.

- It is prohibited at all time to take chemicals inside or outside the cleanroom yourself
- Before handling hazardous substances find out the dangerous properties by reading Safety Data Sheets or publications of the manufacturer
- It is prohibited to perform chemical processing that is not described in a procedure/run sheet
- All containers on wet benches **MUST** be labeled with the user's name, institute and what chemical is in the container, the safety symbols, and date. Otherwise the solution will be disposed of. Initials for your name are **NOT** sufficient.
- Dispose your own chemicals in the designated waste containers when ready.
- Make mention if chemicals are running out.

- Particularly dangerous substances must be replaced by less dangerous substances whenever possible.
- Any person who intends to bring chemicals into HNF must obtain approval from HNF staff. No further action is required for common chemicals that are listed at the front of HNF's MSDS binder. However, if the chemical does not appear on the common chemical list, the permission of the HNF is required. If the chemical has not been used previously in the facility, the staff member and the user must determine the safety concerns develop procedures for safely working with this chemical.
- MSDS (material Data Safety Sheets) sheets for chemicals used at the HNF are organized alphabetically in binders, which are located next to the clean room wardrobe area. A sign shows the location of the binders. MSDS sheets for the most common chemicals in use at the HNF have been compiled into a single binder for easier access.

Not following these rules will have a direct effect on the safety of yourself and your colleagues. Breaking the rules will result in a penalty.

7.2 SAFETY DELEGATE

The safety officer of the HNF acts as advisor on all safety issues. Individuals are hereby invited to inform the HNF staff or the safety officer on all risks and any safety-compromising behavior in their workspace. The objective is:

- Hazard identification and design of appropriate guidelines
- Examination of error messages and suggestions for corrections
- Recommendation of changes in the HNF-User Guideline
- Security information updates
- Maintaining the responsiveness of HNF with accidents and emergencies
- Check the safety instructions
- Ensuring compliance with WHMIS legislation by the user
- Monthly review of emergency equipment

Security Officer: Mr. Rainer Benczek, Phone 6805, email: r.benczek@fz-juelich.de

8 NO-GOES IN HNF

- Copper in any form is totally forbidden in HNF cleanroom
- Pure Perchloric acid in any concentration is totally forbidden in HNF building
- Smoking in the HNF Building is totally forbidden

9 IMPORTANT PHONE NUMBERS

9.1 EMERGENCY TELEPHONE NUMBERS

- Phone 77
- Identify yourself
- Report the type of emergency:
- Report the location: HNF 02.14, Entrance E1

9.2 PROBLEMS WITH THE BOOKING SYSTEM:

Jürgen Moers	Phone: 2344	Mail: j.moers (at) fz-juelich.de
W. Albrecht	Phone: 6364	Mail: w.albrecht (at) fz-juelich.de

9.3 TECHNOLOGY QUESTIONS

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W. Albrecht	Phone: 6364	Mail: w.albrecht (at) fz-juelich.de

9.4 CLEANROOM PROBLEMS IN GENERAL

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9.5 SAFETY

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