

# RULES AND BASICS FOR THE NANO-LABORATORY

## 1) Instructions and information

### General:

- The lab can only be used by users which have received the proper introduction and training by UiB authorized personnel.
- You have the final responsibility for your own safety in the lab, do not carry out experiments where you don't have the appropriate training, have not been approved or safety measures are not met.
- Dress up according to regulations
- **Tidy up** when you have finished your work. Clean all items you have used and bring tweezers, scissors, and beakers back to their original place!
- You can only use instruments for which you have been granted user status by authorized UiB personnel.
- **Booking of instruments:**
  - instruments requiring booking have an associated google calendar to which you will be given access once you completed lab introduction and basic training for that specific instrument. (Martin M. Greve can add you to the google calendar system of the Nanolab: e-mail: [martin.greve@uib.no](mailto:martin.greve@uib.no) )
  - If you have **troubles** with an instrument or an alarm signal appears, contact **immediately** Sabrina Eder (+47 94204733) or Martin M. Greve (+47 90079974). **Do not try to fix it yourself!**
- Read the file '**alarm signals and power failure**' on the wiki page to ensure you know how to react in emergency cases. ( [https://wiki.app.uib.no/nanolab/index.php/Main\\_Page](https://wiki.app.uib.no/nanolab/index.php/Main_Page))

### Restricted activities: (NOT allowed!)

- Use of any instrument you have not received the proper introduction and basic training by UiB personnel.
- Use of tape (only cleanroom tape is allowed).
- Bring drinks, food, chewing gum, bags, and coats.
- Use of tobacco in any form.
- Re-using blue shoe covers, facemask, hair covers or gloves.
- Wearing shorts, midriff tops, tank tops or hats.
- Bring paper/carton into the laboratory.
- Working in the cleanroom if you suffer from sneezing and coughing.
- Sanding, drilling, sawing, filing, soldering and similar activities producing particles or smoke
- Any fast activities (running, walking fast, waving arms, slamming doors etc.)

### How to dress up correctly:

All necessary clothes, covers, etc. can be found in the cupboard or storage room of the laboratory.

- Wear clean freshly laundered clothes. Avoid wearing clothes made of wool (contamination due to fibers).
- Put on blue shoe covers at lab entrance.
- When you enter the clean room area, use a second pair of shoe cover (white). DO NOT use cleanroom shoes from others!
- Put on a new **HAIR COVER** – Assure all hair is inside the cover.
- Put on a new **BEARD COVER**
- Put on a clean **LAB COAT** and button all the way up. Lab coats may be re-used several times as long as in clean and good condition.
- Put on **GLOVES** and **PROTECTIVE EYEWEAR**.
- From the point of entering the semi-clean room protective EYEWEAR is mandatory.
- **Check yourself in the mirror before proceeding!**



Figure 1: Example of correct dressing.

#### Clean room:

- Bring **NO** paper/carton in the clean room. There are special books and pencils available.
- The usage of your mobile phone in the clean room is also not allowed. (exception: medical emergencies)
- Parts being brought in must be removed from their package if containing wood, cardboard or paper of any kind. Place empty packages in the garbage room (main elevator, level A1).
- Any item brought into the cleanroom must be thoroughly wiped down with cleanroom tissue and Isopropanol. For this, use the fume hood in the semi-clean room.
- **Tidy up** when you have finished your work and bring cleaned tweezers, scissors and beakers back to their original place!

#### Safety:

- You **must bring your mobile phone with you to the lab at all times**, so you have access to a phone in case of emergency.
- If you wish to use your mobile phone in the lab, wipe it clean with a cloth and isopropanol when you enter. Do not bring your mobile phone out in the clean room.
- It is your responsibility to always familiarize yourself with the safety aspects before you start working with chemicals. Read the MSDS sheets for the chemicals you work with and know which safety equipment you need to use. If in doubt - Contact **Sabrina Eder** or **Martin Greve**.
- If you are working with strong acids/bases or other dangerous chemicals, you are **not allowed** to be alone in the room. Always make sure there is a second person and inform the person about your experiment.

- If you are working in the lab outside of general work hours always inform a second person that you are in the lab and let the person know once you are finished.
- Work with dangerous chemicals is **not allowed** outside regular work hours.
- If you have problems with a machine DO NOT try to repair it – Contact **Sabrina Eder or Martin Greve**.
- If you spill acid/bases on yourself: Rinse affected area of your body at least 15 min with water, contact health personnel. In case of HF: Use the HF-crème , contact health personnel. You can find it attached to each fume hood.

Familiarize yourself with:

- The location of the extinguishing equipment and how it works.
- The nearest fire alarm.
- Escape routes.
- Safety shower, eye wash, HF antidote, and first aid kit.
- Safety data sheets (SDS, MSDS) of all the chemicals and materials you are going to use.



Important phone numbers:

The University's security phone (manned at all hours):(+47) 55 58 80

81Giftinformasjonssentralen/Poison information 22 59 13 00

Fire 110

Police 112

Ambulance 113

In the event of fire / fire alarm:

- If you discover a fire:
  - Your own safety comes first.
  - If possible, try to limit or stop the fire using the fire extinguishers found in the laboratory.
  - If this is not possible, close doors, leave the building, press the fire alarm and proceed to the mustering point (outside of the IFT).

## 2) Chemicals and Consumables

Working with chemicals:

- You may only use chemicals for which you have received the proper training and have been authorized to use it by UiB personnel.
- Keep your working area clean. All used beakers and working surfaces **shall be cleaned!!**
- Be aware of potential hazards and safety measures (check MSDS which you can find online). For many substances there are NO toxicological

studies and data. Those chemicals have always to be treated as toxic and potentially carcinogenic substances!

- To avoid contamination of substances **ALWAYS** pour from the original containers to smaller beakers or vials (mark them with the name of the substance, your name/initials and date). **DO NOT** directly remove from the original containers using pipettes, spatulas, etc. Close original container tightly after use (especially with hygroscopic substances).
- Self-made solutions and fillings: must be **clearly labeled** (chemical component, name of owner, date of mixing and if necessary hazardous symbol) and **well sealed** at the used work area or fume hood.
- Reactions in the fume hood: have to be clearly **labeled** (solvents, reactants, name, date, time). For overnight or unattended reactions, you have to fill out the “overnight/unattended reaction” form. You can find laminated sheets in the fume hood.
- All users are obliged to inform lab staff about problematic/dangerous chemicals in the lab as well as problematic/dangerous handling of chemicals occurring in the lab.
- In is NOT allowed to remove any chemicals from the lab.
- To avoid a pileup of chemicals, consider if there are chemicals you will not have any use for anymore. If so, contact lab staff about the possibility of recycling this chemical.

#### Ordering:

- Check first if it is already available in the storage room, if not send the order request to [Sabrina.Eder@uib.no](mailto:Sabrina.Eder@uib.no).

#### Received chemicals/consumables:

- Chemicals/consumables are stored in the Nano Lab storage room (different chemical cabinets labeled with acids, solvents, consumables).
- All new chemicals that you want to use in the lab need to be approved by either Martin Greve or Sabrina Eder.
- For new chemicals:
  1. Write down the date of arrival and your name.
  2. Write down the date of opening and your name.
  3. Be aware of shelf life and storage conditions.
- If necessary, update the “Material Safety Data Sheet”-folder next to the entrance of the Nano Lab and bring a copy to Sabrina Eder. Also check the online database.

#### Safety information:

Read the material safety data sheet before starting to work with new chemicals. Use **always** a laboratory coat, protective shoes, goggles and protective gloves when working with chemicals.

- Check MSDS-Folder or
- MSDS you can find in online platforms

### 3) Waste

### Disposal in the lab:

Following waste containers are available in the fume hood:

- **Non-halogenated solvents** (*e.g.* acetone, isopropanol, NMP, methanol) and **halogenated solvents** (*e.g.* chloroform): Self-made solutions and mixtures must be emptied into the appropriate containers. **NEVER IN THE SINK!** **Exception:** Acids and bases diluted with water. For these, a neutralizer carries out neutralization.



- Closed container for needles and sharps (broken Si-wafer or glass slides).
- Little “waste-bin” for contaminated (also isopropanol and acetone) tissue. **Empty** the waste bin **daily** into the yellow rubbish bin.



Non-contaminated tissue and plastic can be directly disposed in the yellow big rubbish bin.

**IMPORTANT:** Empty chemical bottles, glass vials, needles, and other sharps must not be disposed as household waste.

- **Problematic waste:** shall be packed in **yellow** plastic containers. When the container is filled up, it has to be sealed. Empty chemical bottles and vials should be completely empty and evaporated (leave them over night open in the fume hood) before they can be disposed of as problematic waste.
- **Containers containing hazardous waste:** must be put in **red** plastic containers with lids. They need to be either labeled by their original packaging or, if not available, they must be labeled appropriately in another way.
- **Solvent cans:** Used solvents must be collected in dedicated plastic or glass cans (typically used solvent can). Do not fill up more than  $\frac{3}{4}$  and state all solvents poured into it. Make always sure, that everything is stored at a good ventilated room. (Solvent cupboard)
- **Water waste:** must be collected in the dedicated plastic can.



Once the solvent and water waste canisters in the fume hood are filled up to  $\frac{3}{4}$ , they need to be emptied into the corresponding storage canister.

There are two different colors on the canisters, depending on the solvent:

**BLUE** cans: For halogenated solvents containing fluorine (F), chlorine (Cl), bromine (Br), iodine (I) and astatine (At).

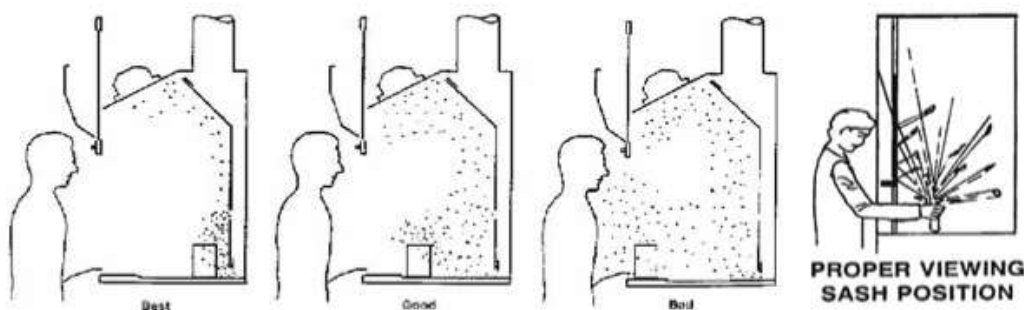
**WHITE** cans **black lid:** For solvents that do not contain halogens (acetone, isopropanol, methanol, NMP).  
**WHITE** cans **white lid:** For water waste.

You can find the canisters in the storage room in the solvent cupboard. There is a big difference in cost for disposal of solvents with or without halogen - so **do not** mix them. **Remember:** It is very important that all waste packaging is **labeled** correctly with the **type of waste**.

**Temporary storage/pick up locations** for hazardous waste and problematic waste is at Realfagbygget. If there is waste that's needed to be disposed of, discuss this with Sabrina Eder and she will give you the instructions.

For the waste a "hazardous waste declaration" has to be filled: Write down all the used chemicals and give the list to Sabrina Eder.

#### 4) Fume hoods



Fume hoods protect you from fumes you are working with. This system works only if you bring the sash down at least 2/3 of the way.

##### How to use a fume hood correctly:

- Perform all work involving hazardous or volatile materials in a fume hood.
- Check that the fume hood is operating correctly before you start to work. Check operation lights of the fume hood (green: OK, red: not working). Check also the airflow by watching the attached tissue in the fume hood. Always keep work at least 15 cm away from the opening of the fume hood.
- Use the sash as a safety shield when boiling materials or conducting an experiment with reactive chemicals. Always keep the sash as low as possible.
- When the fume hood is not in use, ensure that all materials inside are in sealed containers (close ALL containers).
- If the fume-hood is not working correctly, please call Sabrina Eder (+47 94204733).
- Prepare a plan of action in case of an emergency, such as a power failure, uncontrolled exotherm reactions, spills etc., especially when using extremely hazardous chemicals or acids. HF antidote gel is taped on the left side of the fume hood. A chemical spill kit is stored under the fume hood.

- For long-term experiments fill out the overnight / unattended experiment form and post on the sash of fume hood.

### **DON'Ts:**

- DO NOT place your face or head inside the hood. Keep your hands out as much as possible (change gloves if they are contaminated).
- DO NOT use a fume hood as a storage area, they should contain only working volumes of chemicals.
- DO NOT modify fume hoods or hinder their functionality in any way.
- DO NOT place extension cables or other spark producing sources inside the hood.

### **5) Spill management:**

As for any laboratory work, you should evaluate the health and safety of what you are doing. Evaluate the consequences of potential chemical spills and you must identify the potentially hazardous properties of all chemicals you use (material safety data sheets). Before starting any work with chemicals, verify that all necessary safety equipment and cleanup materials are available. Most importantly, before cleaning up a simple spill, be sure that you can do it safely. **You must have the right protective equipment (gloves, goggles, lab coat, etc.).**

Under the fume hood in the semi-clean room is a spill kit available. This contains cushions (to avoid further spreading), absorbent tissues, special gloves and disposal bags. In the cleanroom are special absorbent tissues stored under the fume hood. You also find gloves, safety goggles and a waste bag.

The following steps should be taken during spill cleanup:

- Prevent the spread of dust and vapors: If the substance is volatile or can produce dusts, close the laboratory door and increase ventilation (*e.g.* through fume hoods) to prevent the spread of dusts and vapors to other areas.
- Control the spread of the liquid: Make a dike around the outside edges of the spill. Use absorbent materials such as spill pillows or absorbent tissue (stored under the fume hoods).
- Absorb the liquid: Add absorbents to the spill or use absorbent tissue, working from the spill's outer edges toward the center.
- Collect and contain the cleanup residues: The spill residue or the absorbent should be wiped or otherwise placed into plastic bags and in the yellow waste container (**label** the container).

## **Bergen Nanostructures Laboratory training declaration**

I hereby declare that:

- I have read and understood the guidelines in the “Basic for the laboratory” document.
- I have been shown how to dress correctly for working in the laboratory.
- I am familiar with the safety equipment available in the lab and I know how to react in case of a power failure / alarm signal. I have read and understood the guidelines in the “alarms and power failure” document.
- I have been shown the infrastructure for carrying out chemical experiments and how to get information about the safety and hazards of chemicals (MSDS).
- I am responsible for my chemical reactions and have been shown how to dispose chemicals and wastes correctly.
- I’m familiar with the “buddy” concept and will not leave the lab if other users are working with chemicals.
- I’m responsible for my own actions and the other people surrounding me in the lab.

Failing to comply can lead to limited access to the lab or in worst cases the user will be expelled from the lab.

New users name :

Date:

Name of lab assistant: