

Operation Procedure for SMiF Wet Hoods (Solvent, Spin Coat, Acid, and Develop Hoods)

Safety

- Users must wear proper personal protective equipment (PPE) for the hoods.
 - For the Solvent and Acid hoods the PPE includes a chemical face shield, chemical apron, safety goggles and chemical gloves.
 - For the spin coat and develop hoods this includes standard cleanroom gloves and safety goggles
- Only use chemicals in their properly designated hoods.
 - **Do not use any acids in the solvent or spin coat hoods**
 - **Do not use solvents in the acid hoods**
- Chemicals and materials are NOT to be stored in any hood. Please return all chemicals to their properly designated chemical storage cabinets after use.
 - Chemicals should be stored as follows:
 - Solvents: Yellow flammable storage cabinets
 - Developer: Blue storage cabinet beside the develop hood
 - Acids: Blue storage cabinets near the acid hoods
 - Items requiring refrigeration: Refrigerator in the photo area
 - All chemicals must be labeled with:
 - Name of the chemical as it appears on the SDS
 - Physical and health hazards of the chemical
 - Contact information for the owner of the chemical (when applicable)
- You must receive permission from the SMiF staff, and have an SDS, before bringing any new chemicals or materials into the lab
- All hoods are only available for use from **8am until 8pm** each day, they will be shut down and locked out at all other times
- There must be another person present in the lab in order to do any chemical processing (other than routine photolithography)
- Keep the work surfaces of the chemical hood clean and uncluttered.
 - Properly dispose of all chemical waste (contact SMiF with questions)
 - If you need to do chemical processing in a hood for an extended amount of time (e.g. overnight) you must contact SMiF staff first.
 - **Do not leave unlabeled chemicals unattended in the chemical hoods**

The following actions should be taken in the event of a chemical spill:

Spills Contained Inside a Chemical Hood

- Avoid breathing vapors from the spill and leave the immediate area of the chemical hood
- Alert people in the immediate area of the spill
- Notify SMiF immediately by calling emergency numbers posted near the phone
- Wait for instructions from SMiF or for SMiF personnel to arrive to complete the clean-up of the affected area.

Spills Outside of a Chemical Hood

- Attend to injured or contaminated persons and remove them from exposure

- Press the closest manual alarm button (blue box) and evacuate the lab
- Make yourself available to the SMIF staff and/or emergency responders and be prepared to tell the following:
 - What chemical(s) are involved
 - How much was spilled
 - Where the spill is located
 - Nature of any injuries

All accidents involving chemicals and all accidents involving personal injury must be reported to the SMIF management in writing (e-mail) as soon as possible after the incident. Explanations should include the nature of the event, the procedures being followed or not followed at the time, and suggested actions for preventing future similar incidents. All injuries should also be reported within 24 hours to Workers' Compensation, via a form available on the HR web site:
<http://www.hr.duke.edu/forms/injury.html>.

Acid and Develop Hood Operation

- Make sure the EPO button is not pressed and the Power Reset button is on/green
- Touch the screen to activate it
- The **Main** screen gives information about the hood. The hood lights can be activated on this screen by pressing the **Lights** button
- Press **Operator** to go to the operation screen
 - **Slow Fill** and **Fast Fill** sections are for the cascade rinse tank (if present)
 - Press the buttons to activate them (turn green)
 - Fast Fill only operates for 2 minutes and then stops
 - Slow Fill works until manually stopped
 - The **Agitation** button activates a nitrogen bubbler in the cascade tank. It only functions if the tank is filling (not under idle conditions)
 - The cascade tank has a continual “weep” drain. There is no quick drain.
- **Plenum** wash cleans the underside and rear of the acid hoods. This operates for 1 minute and can be used if contamination is present (such as from a spill). It operates automatically once a day at the hood shutdown time. Press the button on the touch screen to activate it.
- The **Sink** section operates the gooseneck sinks and drains
 - The gooseneck sink will turn on for a short time by either pressing the **gooseneck** button on the touch screen or by pressing the foot pedal.
 - It will turn off automatically after a short period of time
 - The pressure can be adjusted via the knob on the gooseneck
 - **Pour ALL Acid waste (and Developer waste) into the sink drain for proper disposal.** These drains lead into a house acid waste neutralization system.
 - Press the **Drain** button to open the drain
 - The drain will not open if chemicals are above 50°C
 - The drain has a water dilution in it to reduce the chemical waste concentration

- Rinse the sink with water from the gooseneck or water sprayer after draining chemicals to wash out any residues
 - Press the **Drain** button to close the drain. *Do not leave the drain open if it is not needed.*
- The **Timers** button on the touchscreen operates some simple/basic timers
 - The timers have NO control function in the hood, they are just simple timers
 - They can be programmed for up to 9999 seconds. Press the time button to edit as needed
 - The timer alarm must be **Reset** to silence it
- The glove wash tanks can be operated by rotating the knobs inside of them (if they are present in the hood)
- The blue handled water sprayers are **NOT DI water**. They are for eyewash purposes only or to be used as a backup water supply in the event the DI water system isn't functional
- Acid/Develop Hood Hotplate Function:
 - The hotplates have heat and stir ability
 - Press the right arrows to set the setpoint for heating
 - Press the **Heat** button on the hotplate (small light turns green) to activate the heat
 - Press the left arrows to set the setpoint for stirring (if desired)
 - Press the **Stir** button on the hotplate (small light turns green) to activate the stir function
 - Press the **Heat** and/or **Stir** buttons when finished to turn them off (green lights should turn off)
 - **Reset** sets the temperature setpoint back to 0°C and the stir value to 60
 - The hotplates have external “in-beaker” temperature probes available; please see SMIF staff if you would like to use these. While they can be more accurate, they also have some critical hazards associated with using them
- Wash and hang dry all beakers on the beaker pegs when you have finished using them
- Bagged and labeled solid acid or developer waste can be left in the back of the hood for pickup by SMIF staff
- Empty acid or developer bottles can be rinsed in the sink and left in the hood for pickup by SMIF staff

Solvent Hood Operation

- Make sure the EPO button is not pressed and the Power Reset button is on/green
- Touch the screen to activate it
- The **Main** screen gives information about the hood. The hood lights can be activated on this screen by pressing the **Lights** button
- Press **Operator** to go to the operation screen
- The explosion-proof hotplates can be turned on via the touchscreen or via their respective green power buttons
 - The setpoints can be checked and changed by holding down the arrows on the respective hotplate controller
 - Please turn off the hotplates after using them via the touchscreen or their respective green power buttons

- The **Timers** button on the touchscreen operates some simple/basic timers
 - The timers have NO control function in the hood, they are just simple timers
 - They can be programmed for up to 9999 seconds. Press the time button to edit as needed
 - The timer alarm must be **Reset** to silence it
- If the hood is equipped with an ultrasonics bath (such as in the large ADA solvent hood), then it can be controlled via the touchscreen as well
 - Open the cover and fill the bath to the desired level with solvent
 - Alternatively, the bath can be filled with IPA and a beaker of chemical can be placed in it for processing smaller samples
 - Power the ultrasonics on or off via the touchscreen (the intensity can be adjusted via the front knob on the ultrasonics controller)
 - When finished press the **Drain** button on the touchscreen to drain the ultrasonics bath, then close the drain via the same button.
- Liquid non-halogenated solvent waste can be poured down the cup drains, which lead into 5 gallon carboys located behind the hoods
 - If the carboy full alarm appears on the screen, silence it via the touch screen and contact SMIF staff
 - Halogenated solvents must be disposed of in separate labeled “mayo-jar” style waste containers
- Solid solvent waste can be placed in a zip lock bag and placed in one of the solvent waste trash cans located in the photo area by the spin coat hoods. Fill out a chemical label with the chemical name, your name, and date and place label on the outside of the zip lock bag
- Empty solvent bottles can left in the hood for pickup by SMIF staff
- There is no water attached to the solvent hoods. Any beakers can just be left to air dry on the beaker pegs or if desired they can be rinsed slightly with IPA before being allowed to dry
- The hoods are equipped with a CO2 fire suppression system. If the local hood fire alarm starts to beep (the fire alarm strobe on the hood will also flash) then back away from the hood as the CO2 system will activate 10 seconds after the alarm starts. Alternatively, if there is a fire in the hood the hood’s local fire pull alarm can be pulled for immediate release of the CO2 fire suppression.
 - Exit the cleanroom and contact SMIF staff as soon as possible if this occurs

Spin Coat Hood Operation

Note: COATHOOD1 is only for photoresist processing. COATHOOD2 is for processing all materials including photoresist

- Make sure the EPO button is not pressed and the Power Reset button is on/green
- Touch the screen to activate it
- The **Main** screen gives information about the hood. The hood lights can be activated on this screen by pressing the **Lights** button
- Press **Operator** to go to the operation screen
- The explosion-proof hotplates can be turned on via the touchscreen or via their respective green power buttons

- The setpoints can be checked and changed by holding down the arrows on the respective hotplate controller
- Please turn off the hotplates after using them via the touchscreen or their respective green power buttons
- The **Timers** button on the touchscreen operates some simple/basic timers
 - The timers have NO control function in the hood, they are just simple timers
 - They can be programmed for up to 9999 seconds. Press the time button to edit as needed
 - The timer alarm must be **Reset** to silence it
- Headway Spinner Programming:
 - The spinners are programmed and controlled by their respective controllers
 - SMIF Staff will give instruction on programming the spinners (including setting up the speed, ramp and step time for each recipe step)
 - Line the spinner bowl with aluminum foil for each use to catch any chemical waste that is generated from spinning
 - Choose an appropriate chuck for your sample
 - The chuck **MUST BE SMALLER** than your sample in order to keep photoresist and other chemicals from going down the vacuum line and clogging the spinner
 - Verify that there is a chuck o-ring present in the bottom of the chuck, if not then contact SMIF staff
 - The spinners are started and stopped via their respective footswitches
 - Clean up the chucks after use and properly dispose of any waste (including the foil). If acetone is used to clean, remove the o-rings from the chucks first to avoid having the acetone destroy the o-rings. Put the o-ring back in the chuck once the chuck has been cleaned.
- Liquid non-halogenated solvent waste can be poured down the cup drains, which lead into 5 gallon carboys located behind the hoods
 - If the carboy full alarm appears on the screen, silence it via the touch screen and contact SMIF staff
 - Halogenated solvents must be disposed of in separate labeled “mayo-jar” style waste containers
- Solid solvent & resist waste can be placed in a zip lock bag and then placed in one of the solvent waste trash cans located in the photo area by the spin coat hoods. Fill out a chemical label with the chemical name, your name, and date and place label on the outside of the zip lock bag
- Empty solvent and photoresist bottles can left in the hood for pickup by SMIF staff
- There is no water attached to the spin coat hoods. Any beakers can just be left to air dry on the beaker pegs or if desired they can be rinsed slightly with IPA before being allowed to dry
- The hoods are equipped with a CO2 fire suppression system. If the local hood fire alarm starts to beep (the fire alarm strobe on the hood will also flash) then back away from the hood as the CO2 system will activate 10 seconds after the alarm starts. Alternatively, if there is a fire in the hood the hood’s local fire pull alarm can be pulled for immediate release of the CO2 fire suppression.
 - Exit the cleanroom and contact SMIF staff as soon as possible if this occurs