1.0 **Equipment Purpose**

1.1 Msink5 is a dedicated HF release sink located in 382 of the Marvell Nanofabrication Laboratory. The etch tanks and rinse tanks on the left side of the sink are dedicated to Special Projects. These particular tanks require staff approval to use. Msink5 is considered a metal contaminated sink. Once wafers or materials are processed at this sink, they may not continue processing at msink1, msink6, msink7 or msink8. The storage drawers below the sink are reserved for Special Projects and chemical storage.

2.0 **Manual Scope**

2.1 This manual covers general information about the HF tanks available at msink5, general information about the special application (project) tanks, aspirator operation and how to dispose of chemical waste (used-up chemicals) at this sink.

3.0 **Applicable Documents**

3.1 Chapter 1.7 - Material & Process Compatibility Policy

3.2 Chapter 2.0 - General Cleaning Procedures and Sink Summary

4.0 **Definitions & Process Terminology**

4.1 **Constant Flow Rinse Tanks** – DI water station used to rinse off excess acid and/or contaminants from cassette

4.2 **Emergency Red Button**: Cuts power to the sink in case of emergencies. Push the big red Emergency Stop button to cut the power to this sink. Report promptly on FAULTS.

5.0 **Safety**

5.1 Follow general safety guidelines for the lab: the safety rules outlined in Chapter 1.01 - Marvell Nanolab Chemical Hygiene Plan and the following.

5.2 Never touch any surface while wearing chemical-resistant gloves that other lab members may come into contact with. This includes table tops, door handles, computer keyboards, face shields, aprons, etc. If you need to step away from the sink at any time, rinse off the gloves, dry with techni-cloths, and put them away in your drawer until you are ready to resume your work at the sink.

5.3 For more details, see MSDS sheets for HF.

6.0 **Process Data**

6.1 Available in comments on tool
7.0 **Available Processes, Gases, Process Notes**

7.1 Chemically resistant gloves should be worn on top of the nitrile gloves, plus a face shield and apron must be worn at all times while working at msink5 with HF solutions.

7.2 Msink5 is an acid sink, therefore no heating of solvents are allowed at this sink.

7.3 Teflon boats can be used at this sink, see Figure 6

7.4 The left most baths and rinse tanks are assigned to special application projects, only to be used upon approval from the staff. These tanks are equipped with an aspirator and plenum draining system for capturing process waste solutions, and draining into carboys located behind the sink (chase 383).

<table>
<thead>
<tr>
<th>Bath</th>
<th>Chemical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Etch Baths 1, 2, 3, 4, 5, &amp; 9 (special projects)</td>
<td>Reserved for Special Projects (mobile ion/metal contaminated). Process Staff approval required to use this side of msink5</td>
</tr>
<tr>
<td>Right Etch Baths *6, 7, &amp; 8 (general use)</td>
<td>BHF and HF release (metal contaminated)</td>
</tr>
<tr>
<td>Right Rinse Baths 12, 13 &amp; 14 (general use)</td>
<td>DI Water bath 12 drains to general use side</td>
</tr>
</tbody>
</table>

*Note = bath 6 cannot be used for acids.

**Important Note:** Msink5 is considered a metal contaminated sink, once wafers or materials are processed at this sink, they may not continue processing at msink1, msink6, msink7 or msink8, and by default into any of the furnaces.

8.0 **Equipment Operation**

There are two dedicated aspirators available at msink5. The aspirator hose on the right side is exclusively used for draining HF (acid waste) from the Petri dishes or the General HF Tanks, (the type of waste permitted to get drained into the main Nanolab waste stream). The aspirator hose on the left side is exclusively used for **Special Project Tanks** and the type of acid waste that needs to get collected.

8.1 **Control Key Description (top right-hand side)**

8.1.1 Control Key Functions for Overall Sink Operations

8.1.2 Emergency Stop – The big red button for used for emergency stop. This will cut the power off to the entire sink

8.1.3 Power On - Power is ON when white light is on

8.1.4 Under Voltage – System is ON when white light is on

8.1.5 POWER Supply - Turns main power ON located at top of control panel

8.2 **Rinse Station Operation (cascade-type)**

8.2.1 Place wafers in the tank - tank can initially be empty, or full of DI water.
8.2.2 Push the “Start” button on the top panel. Rinse will finish when time is up. It can be stopped by pushing the “Stop” button on the top. (It does not drain automatically, so any rinse water left, needs to be aspirated out of the tank)

8.2.3 Resistivity and pH monitors of the water rinse baths are automatically controlled (settings cannot be changed, but refer to manufacturer’s manual for any adjustments needed).

8.2.4 Rinse tanks 11 & 12, can be slowly drained by the “Drain” button on the top panel.

8.3 General Use Etching (BHF or HF release process, Tank 6, 7, and 8 (Figure 2 and 3)

Etching instructions are applicable to all HF tanks unless noted here or announcement by operation manager. The 3 General Use HF tanks can be used for HF etch/release. Out of the bottle HF and BHF or diluted version of these solutions can be used at these room temperature (non-heated) tanks.

8.3.1 Use the tanks according to Marvell Nanolab chemical Hygiene plan (chapter 1.01) and safety guidelines outlined in general cleaning procedure (chapter 2.01). Never add water to acid when diluting acid/s. When mixing acids with water, remember to ADD ACID TO WATER and NOT WATER TO ACID!

8.3.2 Label your work (process) with a blue process ID slips provided in a holder at this sink, if you need to leave the immediate area for the time being.

8.3.3 Acids or acid waste from the General Use side (right baths) or Petri dishes, can be drained with the aspirator on the right side of the bench. This can be activated by pressing the yellow “Start/Stop Aspirator” button located at the top front panel. (Do not aspirate or drain material requiring collection, with this one). Keep the sink top clean and wipe down any water or liquid left behind on the sink top.

8.4 Special Project Tanks (Figure 4 and 5)

The tanks at the far left side of the msink5 are reserved for Special Projects. These tanks require staff approval to use. Msink5 falls into category of metal contaminated sinks in the Nanolab, once wafers or materials are processed at this sink, they may not continue processing at msink1, msink6, msink7 or msink8.

8.4.1 Waste chemicals from these tanks can be drained (rinse baths) or aspirated into the plenum using the hose on the left side and the yellow “Start/Stop Aspirator” button on the top panel, then moved to the carboys behind the sink (chase 383) using the “Pump” button on the top panel. A “High Level” sensor will turn red on the top panel and give an alarm, if the plenum level gets too high. A “Low Level” sensor will stay on as normal. If the high level alarm goes off, then you first check your carboy level to make sure there’s enough room to put more chemical waste into that one, and pump out the plenum. Keep checking the carboy levels and stop the pumping when it gets about 2 inches from the top. (Use the “Reset Buzzer” button on top to silence/clear the alarm). Make sure not to top off OR overfill the carboy (suggestion is 90% full). Replace the full carboy with an empty one if necessary (be careful!). Make sure to clearly tag/ID the chemical on the sticker. Upon disabling the sink, report the number of full carboys (if any) that are ready for pick-up. Staff regularly picks up the waste from this station.

8.5 Panel Control Buttons (top of bench)

Rinse stations and heated baths can be operated from available keypads mounted on top of the bench, as follows:
Chapter 2.5

8.5.1 **Millenium Panel Control** – (one on each side of the bench, used to control settings for the items indicated on the label) – A & B buttons are used to enter the control and scroll through the settings; OK is to highlight and choose that setting to change; + and – are used to increase or decrease the settings; ESC is to escape the setting changing mode.

8.5.2 **Rinse Tanks** – have “Start” (green) & “Stop” (red) buttons on top, with their corresponding bath number labeled next to it.

8.5.3 **Heated Tanks** – have temperature settings on the top panel, use the up and down “Arrows” to change the set values for the bath temperatures, and the green “Start/Stop Heating” button to turn it on or off. Heated baths also have “Fault Level” sensors, to alert you if a heated bath’s level is too low and a “Reset Fault Heating” button to clear the fault, once the bath is replenished. When you are done using the heated baths, turn the heater off and aspirate the solution out of the tank.

8.5.4 **Select Stirred button** – used for wafer boats in bath 5; when turned “On” – robot arm will agitate up and down in the bath, when turned “Off” – robot will not agitate, but instead lower the boat into the bath for the set time, then raise it out when it’s done.

8.5.5 **IR Heater** – bath 6 has two upper plates (above the bath) that can heat-up using infrared, the control is on the top panel and can be turned “On” or “Off”.

8.5.6 **Addition H2O2 button & Spiking H2O2 hose** – are for Special Projects usage and are used for adding small amounts of H2O2 into the etch baths on that side.

8.5.7 **Horizontal or Vertical Select button** – is for baths 10 & 11 on Special Projects side and are used for changing water flow patterns depending on which way wafers are sitting in the tanks.

8.5.8 **Deck hoses** – both N2 and water spray guns are on either side of the bench, and a water spigot is on the right side with a handle & hose.

8.5.9 **Weighing Scale** – is under a cover in front of bath 6 on the General Use side, which can be used for weighing items at the bench.

9.0 **Troubleshooting Guidelines**

9.1 If Emergency Stop is pushed, follow instructions:

9.1.1 Pull out EPO button.

9.1.2 Report on Faults.

10.0 **Tool Etiquette**

10.1 N/A
11.0 *Figures & Schematics*

Figure 1 – Msink5

Figure 2 – General Use Side Control Panel
Figure 3 – General Use side of msink5

Figure 4 – Special Projects Control Panel
Figure 5 – Special Projects Side of msink5

Figure 6 – Dedicated 4 and 6 inch Teflon cassettes marked as msink5
12.0 Appendices

12.1 DECK HOSE Instructions

The de-ionized (DI) water deck hose for the sinks is ALWAYS available for emergencies; it provides a good safety backup in the event of exposure to chemicals.

12.2 Small Pieces processing: Table top processing of small pieces can be performed in msink16 and msink18 general use sinks (preferred). Process staff approval is required. Ask the Nanolab Staff if you require special accommodations at msink5.

12.3 Chemical bottles to stock in drawers below:

2 HF, 1 BOE, 1 H2SO4, 2 HNO3, 1 H2O2 and 1- 2 IPA
NanoLab Qualification Form

(TOOL NAME)

(MERCURY TOOLNAME) (TOOL LOCATION)

Name ____________________ Office _________________ Date ________________
Campus Phone __________________ Home Phone __________________
Login _________________________ Trainer _____________________
Equipment Qualification Test Passed (Initial) _______________________

Oral Qualification Checklist

○

Superuser Login Name ____________________ Date ________________
Superuser Signature___________________