1.0 **Equipment Purpose**

1.1 Msink14 is a MOS wet station for exclusive use in preparing 6" diameter Si wafers for the AMATEPI tool. This sink is equipped with RCA 1 and RCA 2 baths, as well as a 50:1 DI-H₂O:HF(49%) tank. It also includes two quick dump rinse stations (QDR) and is paired with a spin rinse dryer (SRD).

1.2 This manual covers the materials used, process, operation and safety procedures for this tool.

2.0 **Material Controls & Compatibility**

2.1 Msink14 is reserved for exclusive use in cleaning wafers for the AMATEPI tool. It accepts 6" Si wafers only. Further, the 6" Si wafers processed must contain materials that are compatible with MOS processes. No metals allowed. No III-V compounds allowed. Requests to process exotic materials not associated with MOS processes must be approved by process staff before introduction into any deck or bath.

3.0 **Applicable Documents**


3.2 Material Safety Data Sheets for HF(49%), HCl, NH₄OH, and H₂O₂. Copies are in the Nanolab Office.

4.0 **Definitions & Process Terminology**

4.1 **Quick dump rinse (QDR):** DI water station programmed to rinse wafers to an acceptable resistivity level (>10 Mega Ohm-cm desired at this sink), and to get rid of excess acid or contaminants. It is important to make sure cassettes and wafers go through full QDR cycles, as any remaining acid can contaminate the spin rinse dryer equipment.

4.2 **Spin Rinse Dryer (SRD):** DI-H₂O rinse followed by a spin dry cycle.

4.3 **Basic bath:** A heated tank for the RCA 1 clean recipe of, 5:1:1, DI-H₂O:NH₄OH:H₂O₂.

4.4 **Acid bath:** A heated tank for the RCA 2 clean recipe of, 5:1:1, DI-H₂O:HCl:H₂O₂.

4.5 **Acid Tank:** A non-heated sink-tub for 50:1, DI-H₂O, HF(49%).

4.6 **Teflon™ cassette:** White Teflon™ cassette with the name msink14 stenciled on its side. This cassette is dedicated to msink14 processing and properly balanced to go into SRD to the right of msink14. There is one 6” cassette and one matching handle. Do not move the cassette from msink14.

5.0 **Safety**

5.1 **Fire sprinkler:** There are two fire sprinklers, one mounted on the left wall, and one mounted on the right wall of the sink. Both are designed to activate at a temperature of 286 °F or greater.
5.2 The DI-H$_2$O deck hose is **ALWAYS** available for emergencies. It provides a safety backup in case of accidental exposure to chemicals.

5.3 The tanks and baths in msink14 contain caustic as well as acidic solutions. A face shield, apron, nitrile gloves, chemical resistant gloves and poly gloves must be worn when working at msink14. The face shield is located above the sink; the apron is located to the right of the sink, and the poly gloves are opposite the sink. You must supply your own chemical resistant gloves.

5.4 The red EPO button located on the lower lefthand side, will cut all power to the sink. If there was an emergency situation where you did this, please report it promptly as a fault on Mercury client.

5.5 Do not use metal tweezers at this sink; only clean, Teflon™ tweezers are allowed.

6.0 **Process Data**

6.1 N/A

7.0 **Available Processes, Gases, Process Notes**

7.1 The clean processes are still in a bit of flux as different recipes are evaluated for the Amatepi tool. However, using a complete RCA clean along with an HF dip has given successful results with respect to epitaxial Ge and Si growth in the Amatepi tool. As of June, 2015, the RCA derived clean recipe in Section 8.7, has given excellent results.

7.2 **RCA 1 clean (base solution):** 5:1:1, DI-H$_2$O:NH$_4$OH:H$_2$O$_2$ solution at 80°C located in the back, left-side bath (Figure 1).

7.3 **RCA 2 clean (acid solution):** 5:1:1, DI-H$_2$O:HCl:H$_2$O$_2$ solution at 70°C located in the back, right-side bath (Figure 1).

7.4 **HF dip:** 50:1 DI-H$_2$O:HF(49%) solution at room temperature in the back, to the right of the RCA 2 clean bath (Figure 1).

8.0 **Equipment Operation**

8.1 Enable *msink14* on Mercury client.

8.2 Make sure to dress yourself with the face shield, apron, chemical resistant gloves and poly gloves. For a general RCA 1, HF, RCA 2 clean, first turn on the power, then heat, for the left and right-most baths. Both switches are labeled and located on the upper panel of the sink (Figure 2). If the level of each sink is not at the bottom of its respective white lip, add enough NH$_4$OH to the RCA 1 clean left side, back tank, or HCl to the RCA 2 clean right side back tank, to make it so. The NH$_4$OH is stored on the left side of the sink, and the HCl bottle is stored under the sink. For the RCA 1 clean bath, wait until the temperature display reads 80°C. For the RCA 2 clean bath, wait until the temperature display reads 70°C.

8.3 Next, to reactivate the RCA 2 clean, add 100ml of H$_2$O$_2$ to the bath using the Teflon measuring cup located in the blue storage tray on the upper left-hand side of the sink. You will need two fills as the cup measures 50 ml. The bath will begin to bubble and have an aqua-green appearance (Figure 3). This is normal. Place the measuring cup back in the blue tray. The baths are now ready for wafer processing.

8.4 Load the wafer cassette, located in the same tray as the measuring cup, with your wafers. Please do not place the msink14 cassette on techni-cloths. The msink14 deck is clean. Place your wafer box on a techni-cloth. Transfer your wafer from your box to the msink14 cassette with the wand located on the lower right-hand side of the sink. Place the handle located in the blue tray on the msink14 cassette containing your wafers. Next, place the cassette in the RCA 1 clean bath. After 10 minutes in the bath, take the cassette out and put it in the Quick-Dump-Rinse (QDR) bath,
QDR1 or QDR2, located on the left or right hand side of the sink (Figure 1). Press the reset, then start buttons located on the upper panel of the sink and wait for the process to finish. The bath beeps to let you know when it is done.

8.5 Next, if you are interested in oxide removal, place the msink14 cassette in the 50:1 HF bath directly to the left of the RCA 2 clean bath. Leave it in the bath from a second to a minute, depending on your process parameters, and then transfer the cassette back to the respective QDR. Run the QDR as before.

8.6 After the QDR is finished, place the cassette in the RCA 2 clean bath, and wait for 10 minutes. Take the cassette out and put it in the QDR yet again. When it is done, take the handle off of the cassette, place it back in the blue tray, and put the cassette in the Spin-Rinse-Dryer (SRD) located to the left of msink14. Run the SRD by pushing the green “ON” button and wait until the process is finished. At this point, you can put the face shield, apron and chemical gloves back where they belong as we are done with the cleaning of your wafers. You can disable msink14 on Mercury client.

8.7 **AMATEPI** - by trial and error, we have found that dropping the RCA 1 clean, and performing the HF dip last, is compatible with the Amatepi tool. So, the cleaning order is,

RCA 2 clean, QDR, HF dip, QDR, SRD.

9.0 **Troubleshooting Guidelines**

9.1 **Rinse cycle stopped in the middle of QDR cycles**: Press RESET, then OPEN buttons to dump the water out, press the RESET button to close the drain gate before pressing the START button to restart the QDR.

9.2 If there are problems of a general sort, try power cycling full plenum lockout alarm located on the lower left hand side of the sink.

10.0 **Figures & Schematics**

![Figure 1, sink tank definitions at msink14](image_url)
Appendices

11.1 Empty Bottles must not be left at the msink14. Please take them to 582A and wash them in the bottle wash.
# NanoLab Qualification Form

**TOOL NAME**

**MERCURY TOOLNAME**

**TOOL LOCATION**

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Qualification Test Passed (Signed by Front Desk)

### Oral Qualification Checklist

- Use of the deck hose
- Required protective gear
- What to do with empty bottles
- Users of what tool have exclusive use of the sink?
- The recipe for RCA 1 clean
- The recipe for RCA 2 clean
- The dilution of the HF tank
- What to do if the RCA baths are not quite full
- How much H2O2 should you add to the RCA 2 bath?
- Where are the Teflon measuring cup, wafer cassette and handle located?