

Wetbench #4 – KOH Etching Procedure

Standard Operating Procedure

Revision: 3.0 — Last Updated: Feb.23./2018, Revised by Grace Li

Overview

This document will provide a detailed operation procedure of the KOH wet Bench. Formal Training is required for all users prior to using the system.

Revision History

#	Revised by:	Date	Modification
1	Grace Li	04/10/2014	Initial release
2	Grace Li	02/23/2018	Update PPE
3			
4			
5			

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General Information

Rules to Work on this Bench

- PPE Request in this Bench: Wear Safety goggles; double gloves when work on this bench.
- Remove the outer glove layer when gloves are noticeably contaminated, when moving from one wet bench room to another, or when finished working on this bench.

KOH Etching

Heated KOH solutions can be used for preferential etching of silicon along crystal planes. The etching along $\langle 100 \rangle$ crystal plane will produce characteristic anisotropic V-etch with side walls that form a 54.7 degree angle with the surface (35.3 degree from the normal). The etch rate depends on the doping and crystal orientation of the silicon and the type of KOH solution used. The KOH solution filled in this bench tank is 30%. The etch rate along $\langle 100 \rangle$ plane is about 1.06 $\mu\text{m}/\text{min}$ at temperature of 74-75 °C.



Figure 1

Operation

Heat the tank

- Turn on the power of condenser (in the back side of the condenser)
- Turn on the power of heater
- Press " HEATER" on the "CONTROL" panel (see Figure 1) to start heating (will take 25 min reach and stabilizing at 74-75°C)
- Press "PUMP" to start circling the solution

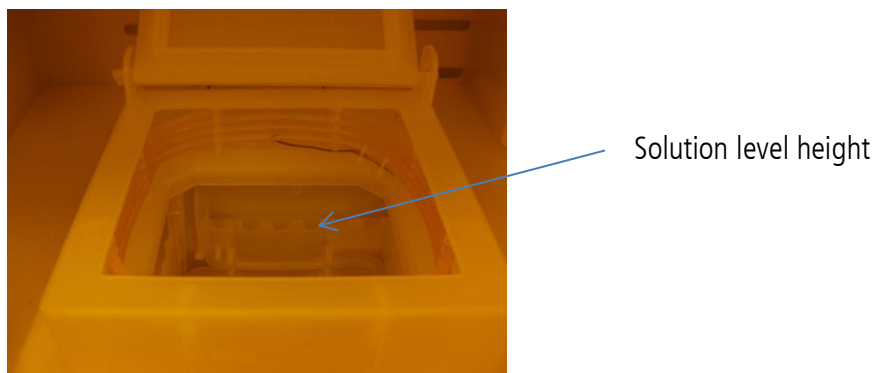
Etch the wafers

- Place your wafers in the designated Teflon wafer cassette or holder
- When the tank temperature to be stabilized, carefully place the wafers into the solution, and starting the timer (to etch 270-300 um thick wafers take about 5 hrs.).

Check the water level

- Check the KOH solution level frequently (every 1- 1.5 hr)
- The solution level in the tank and outside should be almost the same, if NOT, adding DI water to match the level (in order to keep the pump running properly).

Figure 2



Finishing Etching

- Transfer the wafers from KOH Tank to the QDR1 tank.
- Press LOW FLOW on the QDR1 control panel (see Figure 5) and let them rinse for 5 min, then press LOW FLOW again to stop rinse.
- Remove the wafers from QDR1 tank, and let them dry.
Note: very gently if you use N2 spray gun to dry the wafers.
- Turn off the power on the CONTROL panel by press POWER.



- Turn off the power of heater.
- Turn off the power of condenser.
- Clean up the bench top for any of KOH residual and glass wares.

Pictures



Figure 3: Control panel for KOH tank



Figure 4: Wafer cassette and handle

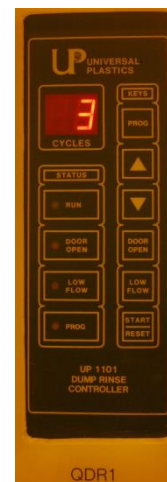


Figure 5: Control panel QDR1 tank

References and Files

1. Note: Adapted for use from <http://snf.stanford.edu/Equipment/wbgeneral/KOHEtch.html>
2. KOH Bench Manual and training notes.

Contact Information

Questions or comments in regard to this document should be directed towards Grace Li (gli@4dlabs.ca) in 4D LABS at Simon Fraser University, Burnaby, BC, Canada.

KOH solution preparation is only made by Clean Room staff.

To dilute 45% KOH to 30% in the KOH Tank:

- Place 5 L of 45% KOH into the Tank
- Add 3.65 L of DI H₂O to make total 8.65 L of 30% KOH solution.