BULK MICROMACHINING WITH KOH SOP

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Introduction

There are two distinct ways to fabricate a micromachined device. The design can be built on top of the silicon wafer, referred to as surface micromachining, or the design can be etched into the wafer using a method called bulk micromachining.

Equipment

This process is to be performed at the Base Hood in the MNTC cleanroom.

- Reflux Condense
- Quartz Beaker
- Magnetic Stir Bar and Cage

Materials and Supplies

45% Solution Potassium Hydroxide (KOH)

Lab Procedures

1. Place magnetic stir bar into the quartz beaker, followed by the magnetic stir bar cage.
2. Pour the 45% concentration of KOH in to the quartz beaker past the level required to cover the samples. Take into consideration the vortex, which will occur during stirring.
3. Place the beaker onto the programmable hot plate and seat the reflux condenser onto the top of the beaker.
4. Connect the reflux water supply/return tubing to the condenser, water supply and drain into the sink. Water should enter the reflux condenser through the side port and exit through the upper port. Be sure to turn ON the water flow by flipping on the "L HOTPLATE COOLING COILS" switch before turning on the hot plate.
5. The temperature probe should be inserted through the top of the reflux condenser so that the tip of the probe is submerged 2"-3" in the KOH solution.
6. The KOH solution will need to be heated to a steady specific temperature for a particular Si etch rate.
7. 0.744 µm/min @ 85°C
8. 0.356 µm/min @ 75°C
9. 0.243 µm/min @ 65°C
10. Set the hot plate to the desired temperature control panel above the hotplate. The magnetic stir bar should be set to 400 RPM.
11. Once the temperature has reached steady state place the samples in a wafer basket. Remove the lid of the reflux condenser and place the wafer basket in the KOH solution.

Make sure the samples are completely submerged in the heated KOH solution. Replace the lid of the reflux condenser and note the time the process started. Generally, the solution will start to form a haze due to the reaction between the KOH and silicon.

12. After etching is complete remove the wafer basket and rinse with DI water. Turn OFF the heat to the hotplate and allow the solution to cool while on the hotplate.
13. Turn OFF the water flow to the top of the reflux condenser by switching off the "L HOTPLATE COOLING COILS" switch.
14. Once the KOH solution has cooled to ambient condition the solution may be placed on a KOH waste bottle to be reused or can be rinsed down the drain of the bench sink followed by a 5 - minute plenum flush.