Class One Plater/ Anodization

Chris Guarino Living notes

Operations Manual

Starting Procedure:

1. Turn the Chiller On and hit Enter.
2. Be sure that the solution level of the Chamber you are planning to us is between 55% to 60% full.
   1. If it is not you can top it off with some DI water. (This may depend on the chamber.)
   2. To rise heads to their full position, “Initiate Heads”.
3. On screen you want to toggle Enabled from False to True.
   1. This begins fluid circulation through the tool.
4. The tool needs to “Warm Up”.
   1. Plating requires certain conditions to be established before continuing. (This is all visible on the Main Screen under the appropriate Chamber.)
      1. The Temperature needs to reach 17 degrees C (Ideal is 20 degrees)
      2. The Ideal Flow Rate needs to be at 20Lpm

Closing Procedure

1. End Circulation. (Only for the Anodization Chamber 3 and Cu Plating Chamber 2)
   1. Set Enabled to False.
2. Turn Chiller off. (Only for the Cu Plating Chamber 2)

Basic Running Procedure:

1. On the Main Screen select the correct Recipe.
2. Remove cap over the Chamber.
   1. There are simple plastic caps over the chambers to avoid debris getting inside.
3. With the correct Chamber tab selected, Click Load.
   1. The carrier head will lower.
4. Click Release (This will happen automatically with Lefty, Righty needs this step)
   1. This will open the carrier head to allow you to place the wafer inside.
      1. If the chamber has not been used in a little while. Exercise the lifters a bit.
5. Load the wafer into the carrier head.
   1. There are three pins that the wafer sits on. You want to make sure that the wafer is properly seated on the three pins.
      1. If not the retaining ring will come down and break the wafer when you have the head “Grip” the wafer.
6. Now click Grip.
   1. You will see the retaining ring close on the wafer, securing it in place.
7. Click the Start Button.
   1. The arm will come down with a tilt to avoid the potential of trapped air under the wafer during plating.
8. Once the process is complete the head will come up and turn over.
   1. Rinse the wafer with DI water and Click Release to release the retaining ring holding the wafer in place.
9. Now place the wafer in the Rinsing Chamber (Chamber 1).
   1. The wafer will sit on four legs.
10. Click Grip
    1. Four gripping arms will move inward and hold the wafer in place.
11. Click the Start Button.
    1. Leave a couple seconds between hitting “Grip” and initializing the rinse. Otherwise the tool believes that the head is still busy.
12. Rinsing recipe sets the time to about 4 minutes, however 2 minutes should be sufficient.
    1. When you are ready to remove the wafer Jump to End (Two Triangles) button.
       1. This will end the cycle and you can remove the wafer.

Drain Solution Procedure:

1. Stop Circulation.
   1. On Main screen set Enabled for the chamber you are using to show False.
2. Click Chemistry
   1. This will show a screen of the tool’s solutions.
3. Select the Chamber Tank you would like to empty.
   1. Selected chamber will display in the top right of the display.
4. Open the 2 valves under the tool and 1 on the back.
   1. The 2 valves under the tool the Filter drain and the Tank Drain.
      1. Filter Drain is below the filter.
      2. Tank Drain is in line with the pump.
   2. The 1 valve on the back is the Outlet Drain.
      1. This will be labeled “Chem X Bottle Reclaim”
5. Place the Chem Reclaim tube in the proper Chem Container.
   1. Cu plating solutions (blue solutions) need to be drained into RSF Waste Reclaim containers (blue container).
   2. Nb anodization solutions (citric acid) can be dumped.
6. Click Reclaim to Bottle.
   1. The pump will switch on and begin to pump all the solution in the selected tank out of the tool through the corresponding tube.
7. Once the pump starts to pump air you need to drain the residual solution from the filter.
   1. Vacuum pressure is keeping some of the solution in the filter and lines.
      1. First turn the pump off, Click Cancel.
      2. Release this pressure by unscrewing the Air Valve on top of the filter.
      3. Turn the pump on, Click Reclaim to Bottle.
      4. Once excess solution has been drained from the filter
8. Once excess solution has been drained from the filter turn the pump off (Cancel) and close all 3 valves that were opened.
9. You may also what to drain the Bowl.
   1. On the Main Screen, under the Chamber you want to drain, Check the box that says Drain Bowl to Tank.

Refill Solution Procedure:

Plating:

1. Put the corresponding “Chem X Bottle Fill” tube into the correct solution container.
2. On the Chemistry Screen select Chem Fill.
   1. The pump will turn on.
3. Once the tank is about 70% full, click Cancel to turn off the pump.
4. Under the proper Chamber window on the Main Screen, toggle Enable to True.
   1. This will restart circulation.

Anodization

1. Because of the mixture of the solution (1.2g/L Citric Acid) we can simply pump 70% DI Water into the tool.
2. On the Chemistry screen, with the correct tank selected, click DI Fill
   1. Click Cancel once the tank is about 70% full.
3. Under the proper Chamber window on the Main Screen, toggle Enable to True.
   1. This will restart circulation.
4. Once the 1.25g/L 2L Citric Acid batch has been running for about 15 minutes (or once Citric Acid crystals are in solution) pour this solution into the Bowl of Chamber 3 (Nb Chamber).
5. Now let the tool circulate for at least 30 minutes to ensure that the 1.25g/L Citric Acid solution has fully mixed with the DI water.

Annealing – This smooths out surface tension of the Cu film after plating.

1. Annealing oven is 9-2.
2. Ensure oven conditions are acceptable.
   1. Oven temperature should be at 100C.
3. Place wafers in a Annealing Oven designated black boat.
4. Anneal for 1 hour. (May change depending on process)
5. Removed wafers from oven and spray down with Nitrogen gun.
   1. This will get the hot air out from between the wafers.
6. Put wafers back in their box.

Solutions:

The we use three different solutions. Each for a different yield.

1. VMS
   1. This is the standard CU plating solution.
   2. In a 4L batch:
      1. 629g CuSO4
      2. 40g Sulfuric Acid
      3. 4ml Cloride
2. 1.25g/L Citric Acid
   1. This is for Nb Anodization
   2. In a 2.0L batch:
      1. 2.0L DI Water
      2. 2.5g of Citric Acid powder
3. CUPRABASE 60P (Pre mixed)
   1. Cu plating (Dual Chamber)
4. CUPRABASE 60N (Pre mixed)
   1. Cu plating (Dual Chamber)