**Washington State University Vancouver Cleanroom**

Standard Operating Procedure

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| **Process:** | Copper Etch | | |
| **Equipment Name:** | M.G. Chemicals #416-E ETCHING KIT | | |
| **Scheduling Name:** | Not Applicable | **Revision Number:** | 0 |
| **Model:** | #416-E | **Revisionist:** | Sam Judd |
| **Location:** | VECS 221 | **Date:** | 11/9/2021 |

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| **M.G. Chemicals cat #416-E Etching Kit contains the following items:**  1) A seven-liter polyethylene tank with clear acrylic lid  2) Mounting bracket  3) **#416-AP** Heavy Duty Air Pump,  4) 3-way adjustable airline manifold  5) Triple line sparging unit  6) **#416-AH** Air Hose for sparging unit  7) **#416-H** 200-Watt vertical Heater  8) Tank mounted thermometer  9) **#416-G** disposable gloves |  | **Voltage: 110 Volts**  **Air pump &**  **Vertical Heater** |

1. **SAFETY REQUIREMENTS**

1. Safety glasses must be worn whenever in the lab, except when wearing protective goggles.
2. **WARNING**: Heating unit must be unplugged to turn off. Do not leave heating unit unattended while it is in use.
3. Do not let Etching tank run dry.
4. Do not attempt to operate etching kit if tank is less than 3/4 full.
5. Avoid skin contact with Etchant or direct breathing of vapor.

**Air Pump Installation:**

1. Air Pump must be placed above the etching tank of etching solution. This will prevent a backflow of etchant into the pump, causing damage to the pump and leakage of etchant.
2. Connect the airline to the output on pump. The pump is operational when plugged into wall outlet.

**Equipment Setup:**

1. Mount the heater opposite the spout end of your etching tank. **DO NOT PLUG IN HEATER yet.**
2. Secure the tank within its mounting bracket. With a sparging unit positioned in the tank, ensure the etchant solution is filled to the level indicated on the quartz element of heater.
3. Wait 15 minutes for the thermostat to adjust itself to the etchant temperature if colder than room.
4. Confirm temperature is set to 32C or the desired temperature for the etch process.
5. Plug in the heater.
6. Final temperature adjusting may be required. The pilot light should turn on and remain lit until the operating temperature has been reached.
7. Allow the heater to operate for one hour. When the desired temperature is reached the pilot light will turn off and the heater will maintain the temperature.

**Etch Process:**

1. Unplug air pump.
2. Load circuit boards onto slots in sparging unit.
3. Lower sparging unit back into tank and plug air pump back in to continue etchant mixing.
4. Check boards for etch progress when adding new board to etch tank.
5. Remove boards when copper is removed as desired.
6. Students take their board to the cleaning station.
   1. Rinse with water.
   2. Rinse with IPA/water solution.
   3. Rinse with acetone if needed to remove resist.
7. Start drilling process if needed for thru-hole boards.

**Cleanup:**

1. Unplug heater and air pump.
2. Place heater and sparging unit on paper towels and wipe clean with wet towels.
3. Pour the etchant into the etchant container. Mark the number of boards etched and date on container.
4. Run water through the sparging unit into tank.
5. Rinse tank with water.
6. Collect rinse water for disposal by technician.