University of Minnesota Nano Center

Oxygen Asher- Standard Operating Procedure

Badger Name: K2 Etcher Asher
Model:
Location: Keller-Bay 2

Revision: 4
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Date: 3/10/20

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1. Scope

1.1. This document provides detailed instructions on how to properly operate the Oxygen Asher.

2. Tool Description

2.1. The Oxygen Asher uses oxygen plasma to chemically remove photoresist and other organic compounds from the surface of substrates (see Figure 1).

Figure 1 *The oxygen asher, located in Keller Hall-Bay 2.*

3. Safety

3.1. After the tool has been running for **2 minutes or longer** the quartz or aluminum foil boat will be **hot**. Allow the boat to cool before removing it from the chamber.

3.2. Do not adjust the gas flow above **400** sccm otherwise you will **damage** the system.

4. Restrictions

4.1. No outgassing material.

5. Tools and Equipment

5.1. Oxygen Asher (see Figure 1)

5.2. Quartz boat

5.3. Aluminum foil

5.4. Timer

6. Procedure

6.1. Loading substrate

6.1.1. The Oxygen Asher is not locked by Badger, which means it is **free to use**.

6.1.2. Make sure that the system is not being used by checking that the **gas flow**, **RF power**, and **vacuum** switches are **off** (see Figure 2). Note: The **mode** switch should always be on **manual**.

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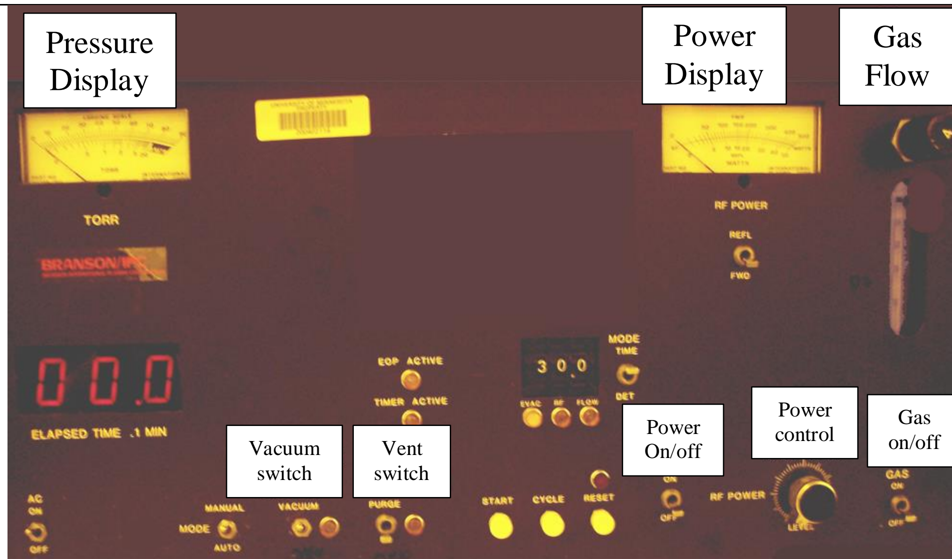

***Figure 2** The control panel of the oxygen asher.*

6.1.3. Before bringing the chamber up to atmosphere, you should unlatch the door by turning the handle.

6.1.4. Turn **purge** on to vent the chamber. **Note**: If the door is not unlatched before the chamber gets to atmosphere there will be a loud squeal.

6.1.5. Once the door pops open, venting is complete. Turn **purge** off.

6.1.6. Load your sample on to a quartz or aluminum foil boat. **Note**: Etch rates vary depending on orientation of sample (horizontal vs vertical).

6.1.7. Load your boat towards the back of the chamber.

6.1.8. Close the chamber door and latching it shut.

6.1.9. Turn the **vacuum** on. Wait for the pressure to reach **0.2 Torr** before continuing.

6.2. Setting parameters

6.2.1. Determine the amount of time need for your run and set it on a timer.

6.2.2. Turn the **gas** flow on. Note: The chamber pressure should jump to between 0.5-4.0 Torr.

6.2.3. Adjust the gas flow needed for your run. **Do NOT adjust above 400.** Doing so will damage the system.

6.2.4. Make sure the **RF power** level is turned all the way down by turning the dial counter clockwise.

6.2.5. **Turn on** the RF power.

6.2.6. **Adjust** the RF power to desired level, keeping it between 50 and 400 watts.

6.2.7. Start your timer. **Note**: The plasma light will be very dull and hard to see through the door. **Do not** rely on seeing the plasma to make sure the tool is working. As long as the oxygen flow is on and there is an RF power, the tool is working.

6.3. Unloading substrate

6.3.1. Once your etch is complete, turn off the RF power.

6.3.2. Turn **off** the gas flow.

6.3.3. Wait for the chamber to **pump down** to 0.200 Torr. This will clear out any remaining particulate.

6.3.4. Turn **off** the vacuum.

6.3.5. Turn purge **on** and unlatch the chamber door (before getting to atmosphere).

6.3.6. Unload your sample and turn **off** purge. Use caution, your sample might be HOT.

6.3.7. Close and latch the chamber door.

6.3.8. Turn on the vacuum. The chamber should always be left in a pumped down state.

6.3.9. Once the chamber has pumped down to 0.200 Torr or less, you can turn off the vacuum. The chamber will remain pumped down even with the vacuum off.

7. Etch rates

7.1. Etch rates vary depending on substrate orientation (see figure 3).

	Vertical		Horizontal	
	AZ1512	**AZ1518**	**AZ1512**	**AZ1518**
100 Watts	42 Ang/min	46 Ang/min	65 Ang/min	62 Ang/min
250 Watts	166 Ang/min	153 Ang/min	231 Ang/min	224 Ang/min

Figure 3 *Etch rates of common resists in different orientation.*