

Standard Operating Procedure: UV Ozone Cleaner

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Hardware Description and Principle of Operation

SAMCO UV-1 UV-Ozone Cleaner

The SAMCO UV-Ozone Cleaner is a compact, benchtop, UV-ozone cleaning system that will not damage delicate electronic devices. The system utilizes a combination of ultraviolet radiation, ozone, and heat to remove organic materials from a variety of substrates, including silicon, gallium arsenide, sapphire, metals, ceramics, quartz and glass. The UV-1 is suited for applications involving substrate cleaning, photoresist descumming, improving wettability and UV curing. The system is compatible with substrates up to 150 mm in diameter and up to 15 mm thick. The substrate heater is capable of temperatures from ambient to 300°C.

Material Requirements

Equipment: substrate and tweezers

Personal Protective Equipment: nitrile gloves, safety glasses and face mask

Procedure

Estimated Time: ~20 minutes

Start Up Tool

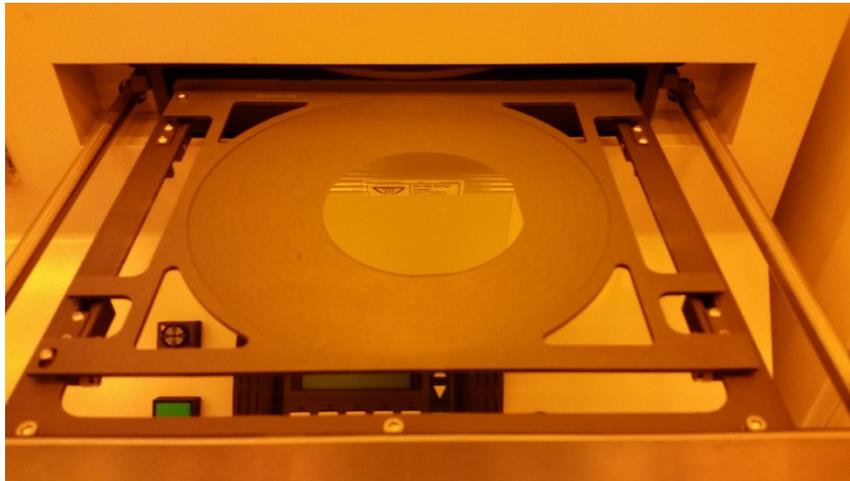
1. Turn on the power for the tool.
2. Set the temperature and time for your process by using the arrows and enter buttons to select the temperature, minutes or seconds and then increase or decrease the setting.
3. Turn on the processes you will be using. You can use the heater, UV and/or the ozone by pressing the respectable buttons. The light on the button will indicate whether or not it is enabled. When the heater is enabled, it will immediately begin to heat to the set temperature, whereas the UV and ozone will only turn on when the chamber is closed and the process is started.



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Process

1. Open the chamber by pulling out the drawer. Place your samples on the tray and then close the chamber and locking it by turning the handles.



2. Press the start button. Your process should begin and the timer will count down from the time you set.
 - a. If you are using the UV for your process, the indicator on the front panel will light up.
 - b. If you are using ozone for your process, there will be oxygen flowing through the airflow meter on the front panel.
3. Once the process has finished, the tool will automatically begin a 3 minute nitrogen purge to remove any residual ozone.
4. Once the nitrogen purge has finished, the tool will alarm to indicate that it is finished.
5. Unlock the chamber by turning the handles and pull out the drawer.
6. Use tweezers to remove your sample from the tray. Be careful, the tray and sample will be hot if you used the heater for your process. The heat will remain on until you shut it off.

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Shutdown Tool

1. The solenoid that locks the chamber closes automatically when the tool is powered off. The tool should be left opened when turning it off so it does not lock shut when powered down. Leaving the tool locked will wear down the door seal. Also if the chamber is closed when it is powered on, it will automatically cycle through a 3 minute nitrogen purge before allowing it to be opened.
2. Turn off the power for the tool.
3. Close the drawer as far as it will close (which will not be completely closed).

UV-Ozone Recipes



Starting Processes for Various Applications for the SAMCO UV-2, UV-Ozone Cleaning System

7/1/16

Application	Time, min	Temperature, °C	O2 or N2	Flow Rate, SLM	UV	Ozone Generator	Comments
Removal of organic contamination on wafers or glass/ceramic substrates, providing a low water contact angle. Can be used prior to substrate bonding or prior to deposition or a wet etch step.	2	100	O2	2	ON	ON	Time depends on amount of contamination. Lower temperatures will require longer processing times. Cleaning can be monitored using water contact angle
Preparation of PDMS for surface bonding. The key is avoiding too much glassification of the PDMS surface. Shorter times should be used at the beginning and increased as necessary	0.5	50-80	O2	2	ON	ON	Clean surface with Scotch tape before UV-ozone process to remove debris
Descumming of photoresist	4	100	O2	2	ON	ON	Temperature should be adjusted to the post development bake temperature or slightly below. Time depends on the amount of scum remaining after develop
UV-curing of resist (to make it stand up for dry etch processes) or UV-curing of other polymers	5	<Tg of polymer	N2	10	ON	OFF	To avoid formation of ozone from residual oxygen in air remaining from loading, purge the chamber with N2 for 3 min before starting process using manual mode (see Operation Manual)
Surface modification of polymers to lower contact angle and improve wettability. Microfluidics	25	30-60	O2	1	ON	ON	COP (cyclic olefin polymer) shows lower contact angle recovery upon storage, up to 6 months, compared to plasma cleaning
Growth of clean oxide on compound semiconductors such as GaAs	5	100-200	O2	2	ON	ON	Wafers are transferred from wet clean/spin dry to UV-2. Processing time depends on thickness of oxide desired. Thin oxide can be boiled off under high vacuum at high temperature before growth of epi using MBE
Stripping of process hardened, ion implanted, or hard baked resist. Stripping polyimide	Thickness dependent	100-300	O2	4	OFF when >250°C	ON	Temperature will depend on processing conditions. Avoid conditions resulting in pyrolysis of the resist, since this will create contamination from the pyrolysis products, when the resist is first placed on the tray or loaded into the chamber with the heater at temperature. Rates can be as high as 60nm/min at 300°C with ozone only

Emergency Stop

- Turn off the power.

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Allowed Activities

- Users can set the time, temperature and flow rate of the oxygen within the parameters described in the recipes above.

Disallowed Activities

- Users are not allowed to change the settings in the setup menu, except when attempting use N2 in your process.

What to watch out for during operation

- Be sure that the ozone is flowing at the rate you need by checking the flow meter on the tool.

Common Troubleshooting Tips

- Follow the process parameters for various applications supplied by SAMCO.

When to call staff?

- If the tool alarms due to low exhaust.
- If the heater keeps alarming due to exceeding the maximum temperature.

Badger Criteria

Report Problem:

- If the heater keeps alarming due to exceeding the maximum temperature.
- If the ozone will not flow even after adjusting the flow meter.
- If the UV light will not turn on.

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Shutdown:

- If the tool alarms due to low exhaust.

Revision History: