
 NUS National University of Singapore  CIBA Faculty of Science, Dept of Physic , Centre of Ion Beam Applications	Procedure No:	CIBA/SOP/Eq 008
Title: <u>Laser Writing</u>	Rev No:	0002
	Issue Date:	31 Oct 2011
Prepared by: Jeroen van Kan	Page:	Page 1 of 4
	Approved by: Asst Prof Jeroen Van Kan	Review Date: 04 Nov 2011

1 Objective:

This Standard Operation Procedure states how direct laser writer should be operated.

2 Responsibilities:

2.1 Director / HOD / PI

The Director/HOD/PI has overall responsibility for ensuring a system is established for the safe use of the direct laser writer.

2.2 Designated Person

There shall be a designated person to oversee the correct operation and maintenance of the direct laser writer.

- a. This person shall periodically inspect the direct laser writer to ensure its operational performance.
- b. He/she will make necessary arrangements for repair works of the direct laser writer.
- d. He/she will report to the Director/HOD/PI unsafe practices by direct laser writer users.

2.3 Staff/ Research personnel

- a. direct laser writer users shall attend appropriate training on the safe use of the machine.
- b. Users shall report any injuries, defects or breakdowns to their supervisor.

3 Procedures:

Before Starting

Ensure you have the following ready.

- The file containing the design to be etched is loaded into the computer (make sure the file is in black and white, not in color)
- The quartz mask/ material to be etched are ready.

Prepare the laser writer

- Switch on roughing pump.
- Open the roughing and compressed air valves.
- Switch on laser power supply underneath cabinet, red button.

Starting Procedures

- Open File uPG101 Exposure Wizard.
 - Click Load design button.

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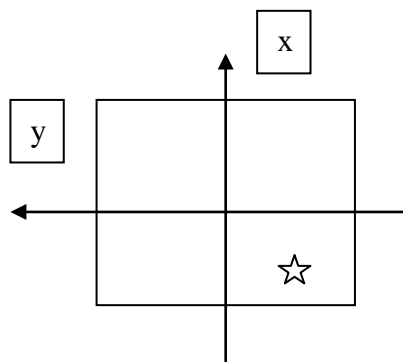
- Select the file containing the design required.
- Set magnification factor to desired value (1 to n).
- Click next.

- Select load substrate.
 - Ensure the **Load Substrate Window** is present before loading.
 - Open both the cabinet door and Laser Writer cover. Place the substrate onto the center of the stage. For small samples, the inner ring vacuum holes on the stage have to be covered before use with **plastic sheets thinner than the sample No glass slide is allowed, it will damage the machine if it breaks!**
 - Turn the red knob to **horizontal** to turn on the vacuum.
 - Close both the Laser writer cover and the cabinet door.



- Key in settings.
 - Select Manual Alignment.
 - Set the Power value and the Percentage.

- Indicate the size of substrate within chamber.
 - Click next.
 - In the window, click the “Find Plate Center”.
 - Click start, when finished, **accept**.

- Click camera, use the camera to locate the desire exposure position.
 - Set the coordinates with respect to the center of the substrate in **microns**, shown below.





Direction of view :
Facing the Laser
Writer.

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- E.g. If you wish to place the design in the area indicated above, 2mm by 2mm away from the centre point. Set the x-coordinates as -2000um and y-coordinates as -2000um.
- Following the coordinate system above, key in the positions with respect to the centre of the substrate to view the area.
- Accept offset. (**make sure x, y offsets are correct**).
- Click next.
- Begin Exposure.
-

After exposure

- After exposure finishes, a window will pop up.
- If further patterning on other areas is required, click **Do Not Remove Substrate** and continue with the step 1 above.
- If not, click **OK** to remove substrate. (do not take out the sample yet).
- The required solutions to be prepared and placed in the clear box.
 - Preparation of the **developer solution** within clean box.
Ensure that all the containers used are clean.
 1. Mix the developer solution with Di Water in the ratio of 1:4. Use 10ml of Az developer, 40ml of Di water. Shake to ensure thorough mixing.
 - Prepare another Petri Dish filled with Di water.
- Open the cabinet door and laser writer.
- Turn Red Knob to Vertical to switch off vacuum.
- Carefully Remove Substrate and Transfer it to Clean Box.

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- Close the Laser Writer and Cabinet Door.

Substrate Developing

- Place the substrate into Petri dish with **developer solution**.
- Wait for 1 minute (gentle shake the Petri dish from time to time)
- Remove the substrate with tweezers and place it inside Di Water Petri dish and rinse.
- Remove the substrate with tweezers and quickly rinse again with new Di water at the basin
- **Dry the substrate on both sides with Air gun.**
- Substrate is ready for observation.
- Deposit the used **developer solution** into the appropriate waste bottle.

Laser Writer Switch off

- Close the wizard.
- Switch off the laser power.
- Close the two valves.
- Switch off the pump.
- Switch off the PC.

Note The μ PG 101 is a class 1 laser product. Opening of the optics cover turns it into a class 3b laser product. Do not open the optics cover.