

AB-M MASK ALIGNER SOP

Revised April 2020

PURPOSE: To polymerize selected areas of photo-resist coated substrate by precise - repeatable aligning of a mask to a pattern thereby exposing the selected part of photo resist-substrate to ultraviolet light through the mask.

SYSTEM OPERATION: To bring the light source into operation i.e. when system is in a full shutdown condition:

1. Log into the tool in your FOM account.
2. Turn **ON** the **POWER** switch on the front intensity controller to the **ON** position.
3. Press **START** to produce ignition of the mercury arc lamp.
4. Check to make sure that the cooling fans are operating, if it is not operating shutdown the system and make sure the 3-prong fan plug is secured in the receptacle in back of the intensity controlling power supply. Also the source should be stabilized in approximately **10 min**, so avoid exposure until such time has passed.
5. Flip the red switch on the front of the ABM Aligner along the bottom right side to **ON**. It should be lit when you do so.

GENERAL SYSTEM OPERATION

1. Make sure all pneumatic switches to **ON** position. Also, make sure you open the nitrogen and vacuum valves.
2. Turn on **POWER** switch to activate shutter timer module.
3. Set timer to desired exposure time for resist. The time table for resists is shown below. Also move alignment optics and light source to **HOME** positions.

| Photoresist (Type) | Time of Exposure (sec) |
|--------------------|------------------------|
| 1813 (P) | 5 |
| 1827 (P) | 8 |
| SPR 220 (P) | 20 |
| OCG (N) | 5 |

LOADING OF PHOTOMASK

4. Ready your photomask. **PULL OFF** the mask vacuum knob. Raise the photomask holder by switching to mask frame to **RAISE** position. Then place your photomask ensuring the brown (chrome coating) side is facing down and it is centered in the holder so that there is enough room to rotate in the assembly. The photomask should be held at rest by the screws. Then carefully lower the mask assembly holder by switching the mask frame to **LOWER** position. Then **PUSH ON** the mask vacuum knob should help in holding both photo mask and holder together as one unit. Then again raise the entire assembly by switching the mask frame to **RAISE** position.

LOADING AND ALIGNING THE SUBSTRATE TO THE PHOTOMASK

5. Position substrate on the chuck in such a way that the wafer flat is parallel to you. Then switch substrate vacuum to **SUB. VAC ON** position.
6. Lower mask assembly (if in up position).
7. The aligning of the wafer to the photomask is the most important aspect. This procedure involves first to align a pattern onto the substrate and then expose it. Now the wafer chuck can move in Z-axis with the pot and both X & Y axes with the right and front knobs respectively. A small gap of 50 μm to 125 μm is set between the substrate and the photomask to examine the mask patterns alignment. Thus we do a Non-Contact setup.

The technique adopted to achieve precise aligning is known as "**Split Field Alignment**". In this technique, the mask aligner microscope actually has two objective lenses side by side. When in the split field mode, the image you see is split in half with the left image corresponding to one location of the substrate and the right half corresponds to another location of the substrate. Now upon adjusting the separation of the objective lenses we can see the same type of alignment marks at two widely separated points on the substrate. Now by adjusting the initially the X and Y axes and then the Z axis you can very easily align the substrate with photomask which completes the aligning process.

8. Make sure when you turn Z control knob counter clockwise until the clutch makes a "**click**" sound which indicates that the wafer is now in contact with the mask.
9. Release the button to lock the chuck.
10. Set the separation gap by turning the Z control knob clockwise to the desired gap setting which you intended it to be.
11. Now that the photomask is aligned to the substrate and when you feel satisfied, switch **CONTACT VAC** to **ON** position.

EXPOSING THE SUBSTRATE TO UV LIGHT

12. Make sure the alignment system is moved away from the Mask and substrate.
13. Adjust the time you desire to expose via the thumbwheel on the left side then Switch to "**EXPOSE**". Make sure you turn away from the UV exposure.
14. Switch **HOME/EXPOSE** to **HOME** to bring system to "**LOAD/UNLOAD**" position.
15. Switch **CONTACT** to the **OFF** position.
16. Switch **MASK RAISE** to lift mask assembly.
17. Switch **SUBSTRATE** to **OFF** position.
18. Unload substrate. Repeat the steps from 4 through 17 for each substrate.
19. Then lower your mask frame and press **MASK OFF** and remove your mask.
20. Turn **OFF** the power controls accordingly the same fashion you turned them on.
21. Logout from the tool in your FOM account.