OAI Model 206 Aligner SOP

1. Scope

1.1 This document provides the procedure for operating the OAI Model 206 Aligner.

2. Table of Contents

1. Scope 1
2. Table of Contents 1
3. Reference Documents 2
3.1 Referenced within this Document 2
3.2 External Documents 2
4. Equipment and/or Materials 2
5. Safety 2
6. Setup Procedures 2
6.1 Check Gas Flow 2
6.2 Start up Machine 2
7. Alignment Procedures 3
7.1 Load Mask 3

7.2 Load Substrate 4
7.3 Align 4
7.4 Expose 5
7.5 Unload Substrate 6
8. Process Notes 6
8.1 Proper Focusing Procedure 6
9. Revision History 7

Figure 1, Illumination Controllers 3
Figure 2, Controls 4
Figure 3, Timer and Power Switch 5

3. Reference Documents

3.1 Referenced within this Document

3.1.1 None

3.2 External Documents

3.2.1.1 OAI Model 206 Tabletop Mask Aligner Instruction Manual

4. Equipment and/or Materials

4.1 Wafer/Sample

4.2 Mask

4.3 OAI Model 206 Aligner

5. Safety

5.1 Follow all Nanofab safety procedures.

5.2 Always wear UV blocking eye protection.

6. Setup Procedures

6.1 Check Gas Flow

6.1.1 Check the vacuum and air regulators (located behind machine).

6.1.1.1 Compressed Air = 60 psi

6.1.1.2 N2 = 30 psi

6.1.1.3 Vacuum = 18

6.2 Start up Machine

6.2.1 Turn on the toggle switch labeled Power. See *Figure 3, Timer and Power Switch*.

6.2.2 Turn on arc lamp power supply (black box for left aligner, white box for right aligner). See *Figure 1, Illumination Controllers*.

6.2.3 Turn on the lamp.

6.2.3.1 Check the settings on the front panel of the constant intensity controller. See *Figure 1, Illumination Controllers*.

6.2.3.1.1 Current-Voltage selector = AMPS

6.2.3.1.2 Intensity-Power selector = WATTS

6.2.3.1.3 Channel = A

6.2.3.1.4 Mode = C/P

6.2.3.2 Turn on the power switch.

6.2.3.3 Depress the Start switch momentarily, releasing when the lamp ignites.

6.2.3.4 Wait 5 minutes for the lamp to warm up.

6.2.3.5 Check that Lamp Power is at 350 Watts. If not, inform the lab staff.

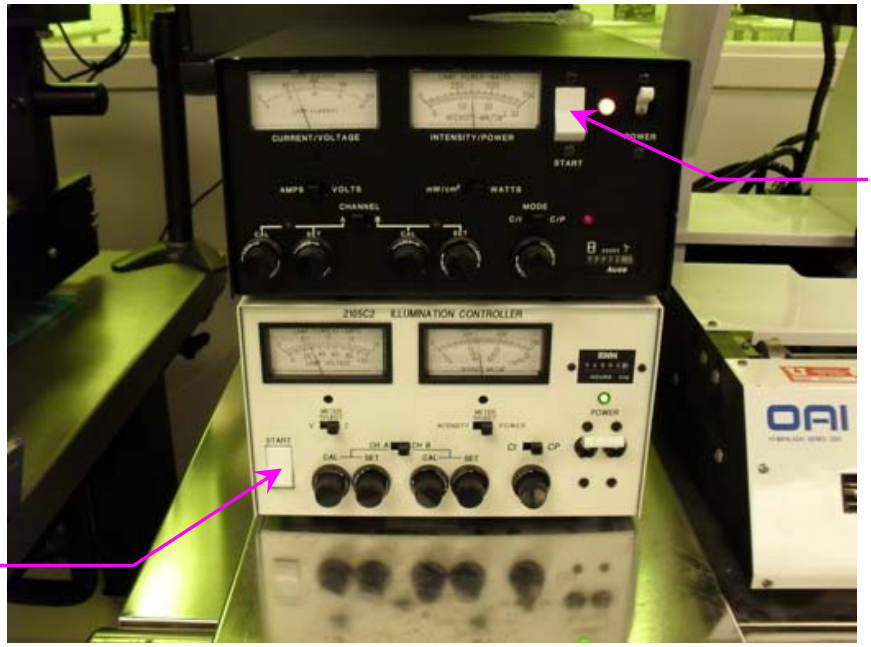

Figure 1, Illumination Controllers

7. Alignment Procedures

7.1 Load Mask

7.1.1 Inspect the mask. Make sure it is clean and oriented such that the chromium (brownish) side is facing down and the top of the mask is away from you.

7.1.2 Loosen the 6 thumbscrews on top of the mask frame.

7.1.3 Slide the mask underneath the two holding clamps until it contacts the 3 pins.

7.1.4 Tighten the thumbscrews.

7.1.5 If necessary, rotate the large circular insert in the mask frame until the mask pattern is squared up with the front of the alignment module.

7.1.6 Push the “Mask Vacuum” knob to fix the mask on the mask frame.

7.2 Load Substrate

7.2.1 Move the microscope to the back of the aligner by pressing in on the button on the main supporting arm and pushing the whole stage back.

7.2.2 Press the button on the black handle on the front of the alignment module and slide the alignment module all the way to the right hand stop.

7.2.3 Switch the “Mask Closed” toggle to “Mask Open”.

7.2.4 Place your wafer in the middle of the vacuum chuck.

7.2.5 When the substrate is properly positioned, switch on the “Sub. Vac.” Toggle.

7.2.6 Switch the “Mask Open” toggle to “Mask Closed”.

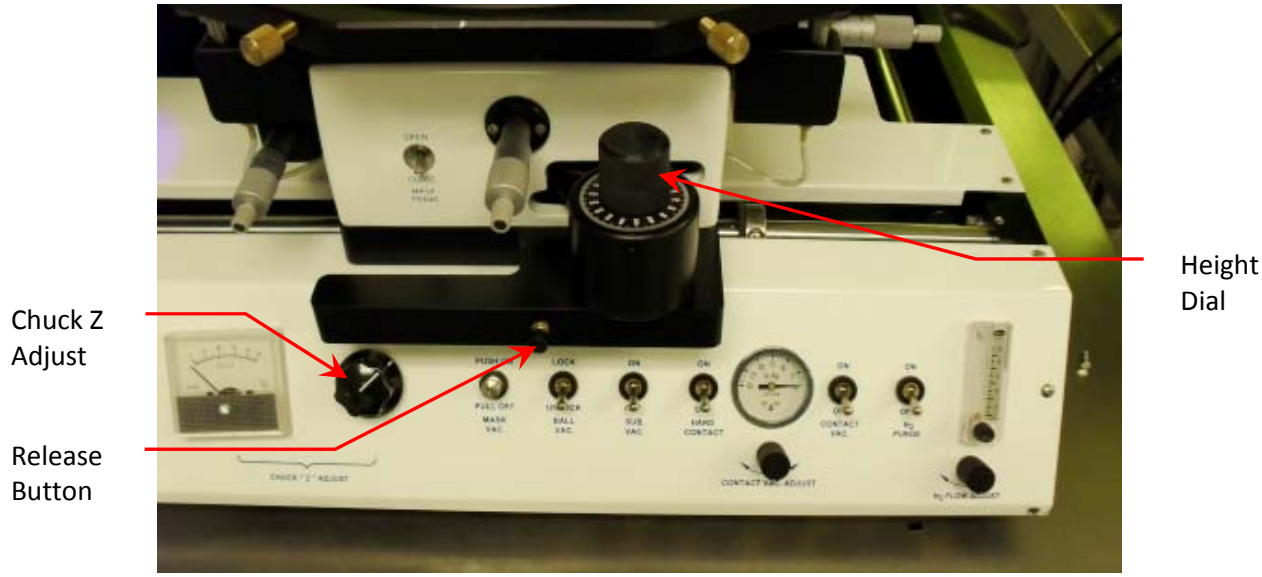

Figure 2, Controls

7.3 Align

7.3.1 Move the microscope back over the mask by pressing in on the button on the main supporting arm and sliding the stage toward you. Finer positioning of the microscope can be accomplished by use the two buttons on the back of the positioning handle just to the right of the microscope. Pressing the top button permits `Y' positioning and the bottom button permits `X' positioning.

7.3.2 Turn on the illuminator to about 40-50% power and focus the microscope on the mask structure (see below for instructions on proper adjustment of the microscope).

7.3.3 Flip the “Ball Vac.” switch to the “Unlock” position.

7.3.4 Raise the substrate toward the sample.

7.3.4.1 Set “Chuck `Z' Adjust” to 15-20 mA. The current controlled here feeds an electronic clutch that engages a belt on the `Z' adjust knob (the big black one on the front of the alignment module). We want the smallest current that allows us to raise the substrate up into contact with the mask. Turn the black knob clockwise until the reading on the ammeter is about 15-20. See *Figure 2, Controls.*

7.3.4.2 Adjust the microscope so that you can see the mask with both eyes. Use low magnification (2x objectives) for set-up and for locating any alignment features because the low magnification provides the greatest depth of field and field of view.

7.3.4.3 Observe the substrate raising and leveling process in the microscope.

7.3.4.4 Slowly turn the numbered black height dial (NOT the chuck Z adjust knob) clockwise on the front of the alignment module to raise the substrate into contact with the mask. See *Figure 2, Controls*.

7.3.4.5 Stop when you feel a significant resistance while turning the black knob and the belt will stop moving. Contacting the mask should also level the chuck.

7.3.4.6 Switch the “Ball Vac.” toggle to the “Lock” position.

7.3.5 Lower the substrate a little (40-50 microns) by rotating the numbered black height dial counter clockwise and align the features using the micrometers. It will be easier if the microscope is properly adjusted for your eyes.

7.3.6 When you are satisfied with the alignment, raise the substrate by rotating the numbered black height dial clockwise until it contacts the wafer to the mask and you feel the belt slipping.

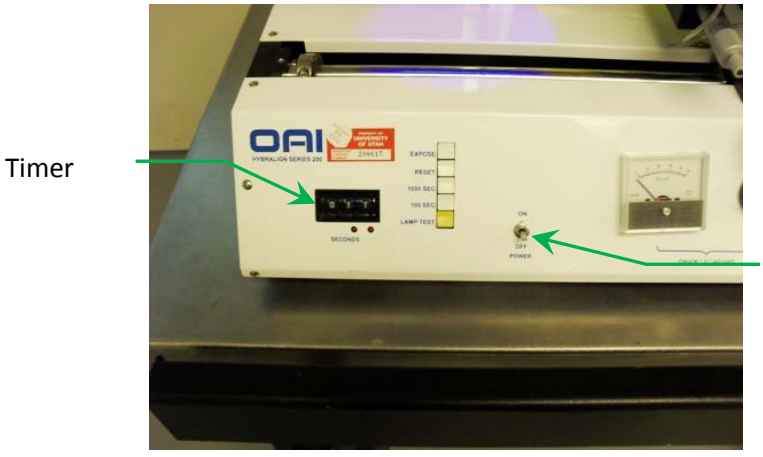

Figure 3, Timer and Power Switch

7.4 Expose

7.4.1 Check or set the desired exposure time (in seconds) on the left of the front panel of the aligner. Shipley 1813 photoresist will require 7-10 seconds depending on the intensity of the lamp. See *Figure 3, Timer and Power Switch*.

7.4.2 Press the button on the handle of the alignment module and slide it under the lamp housing. After about one second, the shutter will automatically open, expose your sample and close. See *Figure 2, Controls.*

7.4.3 Slide the alignment module back to the alignment position.

7.5 Unload Substrate

7.5.1 Lower the substrate out of contact with the mask by rotating the numbered black height dial counter clockwise 3 times.

7.5.2 Move the microscope to the back of the aligner by pressing in on the button on the main supporting arm (that slides on a rail in the base of the aligner) and pushing the whole stage back.

7.5.3 Press the button on the black handle on the front of the alignment module and slide the alignment module all the way to the right-hand stop.

7.5.4 Switch the “Mask Closed” toggle to “Mask Open”. The mask frame will rise to about a 40† angle

7.5.5 Turn off the substrate vacuum.

7.5.6 Remove your substrate.

8. Process Notes

8.1 Proper Focusing Procedure

8.1.1 To achieve these desirable height/depth effects the image coming from the binocular eyepieces must be “fused” into a single image by the observer – this requires some practice and careful setting of the binocular body.
The procedure is as follows:

8.1.2 The operator should move the eyepiece tubes in and out (laterally) to find the place where the distance between eyepiece centers matches the distance between the pupils of his own eyes. This is the “interpupillary distance” and will vary somewhat from operator to operator. When these distances are equal (or “match”), one central image is seen by the operator.

8.1.3 Finally it is necessary to adjust the microscope so that focus remains sharp through the whole range of magnification (zoom) and so that the image is seen sharply focussed in both the right and left hand eyepieces.

8.1.3.1 Set the microscope magnification to the highest power by turning the zoom control ring counter-clockwise.

8.1.3.2 Focus sharply on the specimen.

8.1.3.3 Set the microscope to the lowest magnification by by turning the zoom control ring clockwise. Do not touch the focus.

8.1.3.4 Looking with the right eye through the right-hand eyepiece, turn the eyepiece diopter adjustment ring until the image is precisely in focus.

8.1.3.5 Do the same with the left eye and left-hand eyepiece.

8.1.4 The fused microscope image should now be uniformly sharp throughout the zoom range without refocusing.

9. Revision History

Rev	Date	Originator	Description of Changes
1	11 Jan 2010	Sam Bell	