

MICROWRITER Sope

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DEMONSTRATION EXAMPLES

A number of on-line demonstrations are available on YouTube, including:

• Basic operation: loading and exposing a sample:

http://www.youtube.com/watch?v=IY2JMaVQv7A

(first character is lowercase letter L)

• Basic operation: developing and viewing a sample: <u>http://www.youtube.com/watch?v=ay3ducflc71</u>

(final character is lowercase letter L)

Lens' magnification	Exposure resolution, um
x3	5
x5	2
x10	1
x20	0.6

Navigation through the program to be done sequentially using 3 main panels.

■ T X	Navigation through the program to be done sequentially using 3 main panels.
Align wafer	
Prepare pattern	
Expose	

LOADING WAFERS

MAX THICKNESS of the SAMPLE is 15 mm.



1	If the door is locked ('Lock' button illuminated red), then press the 'Lock' button and wait for it to stop flashing. Open the front door.	
2	Place the wafer onto the stage , centered as well as possible (you may add a small drop of DI water on the backside of your sample to enhance the adhesion forces of the wafer to the chuck if it is your concern).	
3	Close the front door and press0020the 'Lock' button.	

FOCUSING

Always start with x5 magnification.

To avoid the risk of collision between the objective lens and the wafer, only change from the lowest magnification lens to higher magnification lens once you are certain that the wafer surface is in focus at the lower magnification.

Collision can cause permanent damage to the wafer, the chuck and the objective lens.



1	Enter into the box marked Thickness on the Align Wafer form an estimate (in microns) for the thickness of the wafer	Wafer thickness Thickness (um) 322.3
2	If you are not sure of the approximate thickness of the wafer, use the real-time microscope to look at an edge of the wafer and try different thickness values until the edge comes into sharp focus.	
3	Click the Autofocus button on the Align Wafer form. To stop the process before it completes, click the Autofocus button a second time.	
4	It may be necessary to refocus slightly (either manually by using Page Up /Page Down or rolling the mouse wheel or automatically by clicking the Autofocus button) when moving from a low magnification lens to a higher magnification lens .	Microscope

PREPARING EXPOSURE PATTERN

Prepare pattern

"Prepare pattern" panel.

1	Click the + sign at the top of the job list to create a new job.	Job list Display size
2	Click the newly created job in the job list to select it.	Job list Display
3	Choose the design file (Files can be common graphical formats (TIFF, BMP etc) or the lithography standards CIF or GDS2).	File name mixerR1.cif Position on wafer X (mm) 0 Y (mm) 0 Layer thkox Group name
4	Set position on wafer to (0,0).	File name mixerR1.ctf Position on wafer X (mm) O Layer thkox Group name
5	Alternatively, you might print multiple design files. In that case, you have create a separate job for each	

	chip and need to enter the position of the chip into the job position boxes.	
6	For CIF and GDS files a given job can only access one layer. To expose multiple layers from the same CIF or GDS2 file, you will need to create a new job for each layer and give them all the same position and file name.	File name mixerR1.cif Position on wafer X (mm) 0 Y (mm) 0 Layer thkox Group name
7	Quality "Normal" to be used the first time a new pattern is being exposed; only once the exposure time and the resulting quality of this mode have been assessed should other modes be considered. (Detailed explanation of quality modes and file formats see in DMO manual section "2.9 Preparing exposure pattern").	Scale Quality Exposure size Normal High Exposure Dose correction Native Dose correction (um) Resolution 2um Wavelength 385nm Kormal Exposure mode Normal Xormal Xor
8	Keep "Dose correction" equal "1 " if other value was not recommended for your particular case. (Detailed explanation when "Dose correction "could be different from 1 see in DMO manual section "2.9 Preparing exposure pattern").	Scale Quality Vorma wm Exposure size 3.820 x 0.917 mm Exposure Dose correction 1 Focus correction (um) 0 Resolution 2um v Wavelength 385nm v Exposure mode Vorma v
9	Keep "Focus correction" equal "0 " that is provided by the autofocus mechanism. The sign of the focal correction is such that a positive value is equivalent to increasing the entered wafer thickness. A further correction for each specific job may also be supplied in the Prepare Pattern panel. (Detailed explanation when "Focus correction "could be different from 0 see in DMO manual section "2.10 Exposing"). The "Optical resolution " will determine which	Scale Quality Normal Exposure size 3.820 x 0.917 mm Exposure Dose correction 1 Focus correction (um) 0 Resolution 2um Wavelength 385nm Exposure mode 1000000 Scale
10	objective lens is selected during the exposure.	Quality Itormal Exposure size 3.820 x 0.917 mm Exposure Dose correction 1 Focus correction (um) 0 Resolution 2um Wavelength 385nm Exposure mode Itormal

EXPOSING

1	In Expose panel enter the resist dose into the text box marked Resist Sensitivity.	Global exposure parameters Resist sensitivity (mJ/cm2) 4500 Global focus correction (um) Time remaining (hours: minutes : seconds)

2	Enter "0" into the global focus correction unless you have special circumstances (such as a sample with an abnormal optical response because of underlying layers that causes the autofocus to be shifted).	Global exposure parameters Resist sensitivity (mJ/cm.2) 450d Global focus correction (um) 0 Time remaining (hours: minutes : seconds) Time remaining (hours: minutes : seconds)
3	Click the green traffic light button in the Expose panel to start the exposure.	Global exposure parameters Resist sensitivity (m)/cm2] aso(Global focus correction (um) Time remaining (hours: minutes : seconds)

REMOVING WAFERS

As soon as the exposure is complete you can remove the wafer. Unlock the door by pressing the 'Lock' button; the motion stage will automatically move to the front to allow the wafer to be removed. Open the front door of the enclosure, remove the wafer and **close the door again.**

CONTACT PADS TO FLAKE

1	Load the wafer and focus	
2	 Find the flake. If the flake coordinates are known, use manual stage control to navigate. Otherwise, in "Align wafer" panel activate "Wide field viewer" and click on green traffic light. When the flake appeared in the wide field view, stop the scan and double click on the flake image. Close "Wide field viewer". 	
3	Open "Centre wafer" window and zero coordinates on the flake.	
4	Define the pixel size under "Microscope → Options" matching expose pixel size in "Prepare pattern" panel.	Microscope Tools Wafers Snapshot Ctrl+S Export image Wide field viewer Ctrl+W Eocus Assist Ctrl+F Options
5	Define the required "Blank border width" to place the contact pads.	Microscope options Export image Pixel size (um) 0.5 Blank border width (um) 0
6	Go to "Microscope →Export image".	Microscope Tools Wafers Snapshot Ctrl+S Export image Wide field viewer Ctrl+W Focus Assist Ctrl+F Options

7	Open the file in Paint. Draw pads in blue or white color and save the file.	
8	Go back to "Align wafer" panel and refocus.	
9	 Under "Prepare pattern" panel 1. Create new job 2. Upload .bmp file 3. Verify pixel size, quality, dose correction, focus correction, resolution, and exposure mode. 	Scale 798 x 635 pixels at 0.500 x 0.500 um/pixel Quality Normal v v v Exposure size 0.399 x 0.318 mm v Exposure v v v v Dose correction 1 v v v Resolution 1um v Advanced Wavelength 385nm v v
10	 Switch to "Expose" panel 1. Insert "Resist sensitivity" value 2. Click on green traffic lite. 	Resist sensitivity (mJ/cm2) 75

ALIGNMENT BY ALIGNMENT MARKS.

1	Load the wafer and focus.	
2	Upload first design and print (do not forget	Preparing exposure pattern.
	correct center definition and current	
	position!).	
3	Print and develop first design.	
4	Put the sample back to the tool chuck.	
5	Find the pattern and focus.	
6	Navigate to the first alignment mark.	
7	Open the "Global markers" window.	

8	Enter marker 1 and type marker	💀 Global markers — 🗌 😽
U	coordinates from the first design file in	File Tools
	coordinates from the first design file in	Marker actual positions
	"Marker expected positions" window.	Marker 1 🔔 🐼 🗡
		Marker 3
		Marker 4 👃 🔕 🗡
		Marker expected positions
		X1 (mm) 0.3 Y1 (mm) 1.1
		X2 (mm) 0.3 Y2 (mm) -1.1 $+ + + + + + + + + + + + + + + + + + +$
		X3 (mm)0.3 Y3 (mm)1.1
		X4 (mm) -0.3 Y4 (mm) 1.1
		Favourites
		Correct for
		✓ Offset ✓ Slope
		X(mm) 0.0000 Y(mm) 0.0000 Theta (deg) 0.0000
		X stretch (%) 0.000 Y stretch (%) 0.000 Shear (%) 0.000
		Reset all
-		
9	Repeat #8 for 2-nd and 3-d markers.	Counties
9 10	Repeat #8 for 2-nd and 3-d markers. Check in for rotation and stretch/shrink	Correct for Goreen Rotation Stretch and shear
9 10	Repeat #8 for 2-nd and 3-d markers. Check in for rotation and stretch/shrink and press coordinate-transform button.	Correct for Offset Slope Rotation Stretch and shear
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9 10 11	Repeat #8 for 2-nd and 3-d markers. Check in for rotation and stretch/shrink and press coordinate-transform button. Navigate to the design center.	Correct for ✓ Offset ✓ Slope
9 10 11 11 12	Repeat #8 for 2-nd and 3-d markers. Check in for rotation and stretch/shrink and press coordinate-transform button. Navigate to the design center. Choose the second design file.	Correct for Offset Slope Rotation Stretch and shear +++++++ Preparing exposure pattern.
9 10 11 11 12 13	Repeat #8 for 2-nd and 3-d markers. Check in for rotation and stretch/shrink and press coordinate-transform button. Navigate to the design center. Choose the second design file. Expose.	Correct for Offset Slope Rotation Stretch and shear +++++++ +++++++++++++++++++++++++++
9 10 11 11 12 13	Repeat #8 for 2-nd and 3-d markers. Check in for rotation and stretch/shrink and press coordinate-transform button. Navigate to the design center. Choose the second design file. Expose.	Correct for Offset Slope Rotation Stretch and shear ++++++++ Preparing exposure pattern. Global exposure parmeters Resist sensitivity (m/cm ²) asoci Global focus correction (um)
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MULTIPLE SAMPLES EXPOSE

1	Place multiple samples on the chuck.	
2	Find first sample and focus on it	Wafer thickness
-		Thickness (um) 322.3
		Missessee
		Magnification 🗵 🗸 🗆 x4
		Min Max
		Lamp
		Quick access
2	Identify contax of the comple	Wafer thickness
5	identity center of the sample.	Thickness (um) 322.3
		Microscope x4
		· · · · · · · · · · · · · · · · · ·
		Min Max Lamp
4	Go to "Wafers 🔿 Add an additional	Alignment Microscope Tools Wafers
	wafer" and give a name to new wafer	Manu Add an additional wafer
		V (mm)
		Theta (deg) 0.0000
		Add a Wafer X
		New wafer name
		OK Cancel
-		
5	iviove to the next sample and repeat steps	
	"2" and "3".	

6	If you have more samples, then repeat "4", "2" and"3". All wafers will be listed under "Additional wafers	Quick access
7	 Use "Prepare pattern" panel to set up: 1. Create job list for all samples 2. For each job assign "Group name" using the "Wafer name" from "Align wafer" pattern. 	Position on wafer X (mm) 0 Y (mm) 0
	 If samples require different energy doses, then enter actual dose in "Dose correction" field and "1" in "Resist sensitivity" field. 	Layer thkox Group name 2 Exposure Dose correction 75 Focus correction (um) 0 Resolution 2um ~ Wavelength 385nm ~ Exposure mode Normal ~
		Global exposure parameters Resist sensitivity (mJ/cm2) Global focus correction (um) 0
8	Expose.	Global exposure parameters Resist sensitivity (mJ/cm2) 4500 Global focus correction (um) Time remaining (hours: minutes : seconds)

PREPARE PATTERN PANEL ADVANCED FEATURES

DOSE/FOCUS TEST

Perform the following steps in case when standard dose and focus settings are not applicable for your particular case.

1	In Prepare pattern panel open "Tools → Job list builder"	Tools Options Job list builder
2	Chose Test File	
3	 Select "Area to fill" considering test file size and desired number of test points, Center position" "Annotation" if needed "Center-to-center" separation Choose "Dose-focus test" settings "Job order" 	Write field for repeat Write field fiel Hi:\Gabriel Guendelman\Unverted_T_25mu.cdf Area to fill Fill a Rectangle Fill a Rectangle of size 33 mm Centre X position (mm) 0 Centre Y co-centre separation of 6.6 mm (b) and o mm (b) Dose-focus test Prepare as focus test (gradient along y) with 5 1 write fields arranged as 5 2 columns by 1 rows Update Job order Add to position
4	Click on "Add to position list"	Add to position list
5	In "Expose" panel set initial value of expose energy	Resist sensitivity (mJ/cm2)
6	Expose	Clobal exposure parameters Resist sensitivity (mJ/cm2) 4500 Clobal focus correction (um) 0 Time remaining (hours: minutes : seconds)