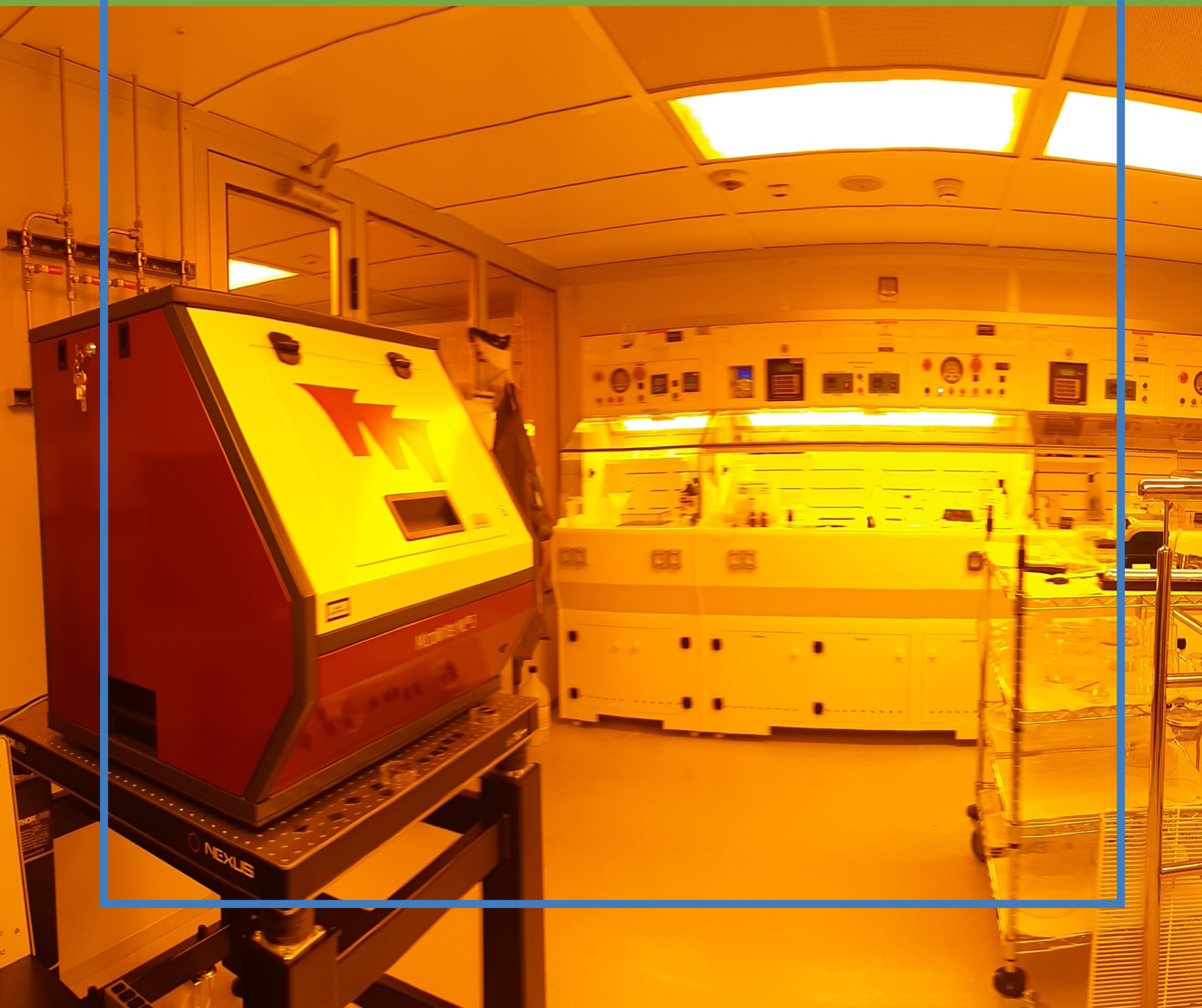
WEIZMANN INSTITUTE OF SCIENCE

MICRO WRITER SOP

STANDART OPERATION PROCEDURE

by Leonid Tunik



DEMONSTRATION EXAMPLES

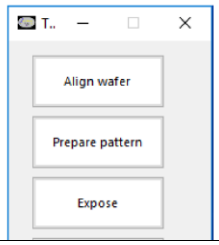
A number of on-line demonstrations are available on YouTube, including:

• Basic operation: loading and exposing a sample:
http://www.youtube.com/watch?v=lY2JMaVQv7A (first character is lowercase letter L)

• Basic operation: developing and viewing a sample:
http://www.youtube.com/watch?v=ay3ducfIc7I (final character is lowercase letter L)

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

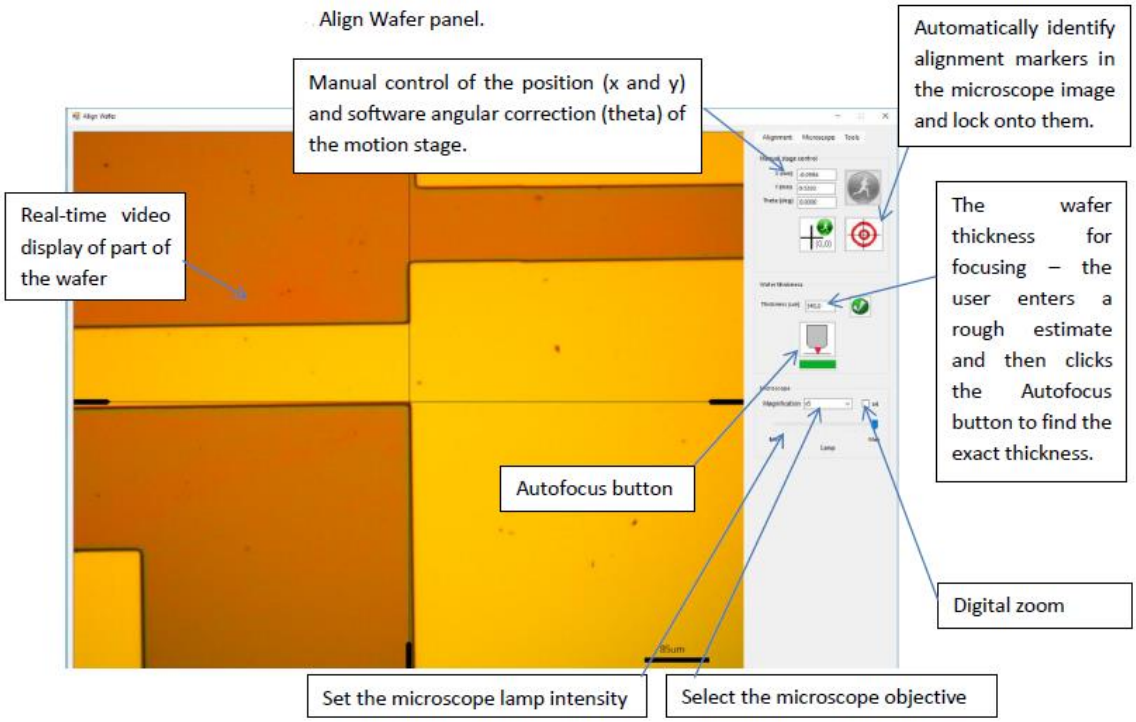
Navigation through the program to be done sequentially using 3 main panels.



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

LOADING WAFERS

MAX THICKNESS of the SAMPLE is 15 mm.



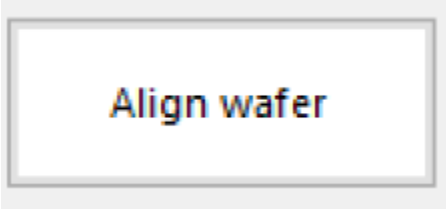
1	If the door is locked ('Lock' button illuminated red), then **press the 'Lock' button and wait** for it to stop flashing. Open the front door.	
2	**Place the wafer onto the stage**, centered as well as possible (you may add a small drop of DI water on the backside of your sample to enhance the **adhesion**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

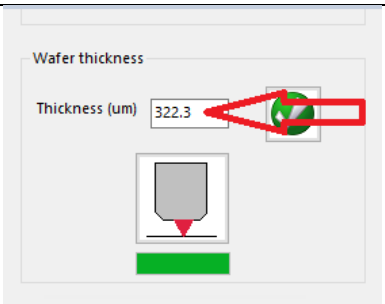
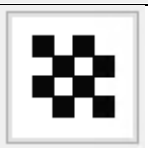
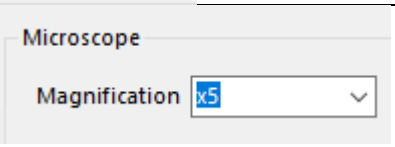
FOCUSING

Always start with x5 magnification.

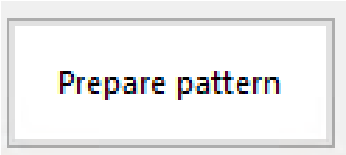
To avoid the risk of collision between the objective lens and the wafer, only change from the lowest magnification lens to higher magnification lens once you are certain that the wafer surface is in focus at the lower magnification.

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

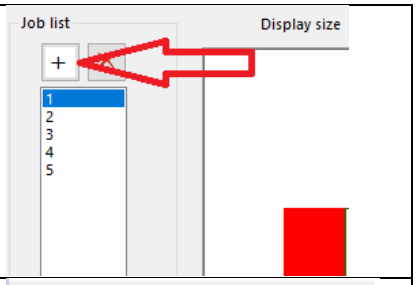
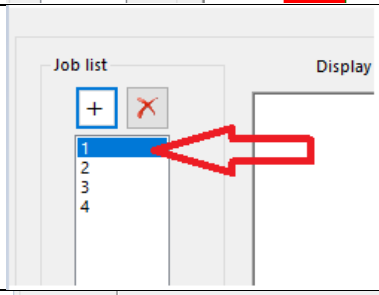
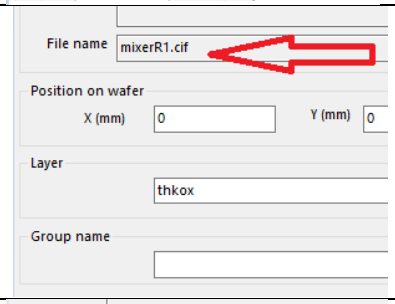
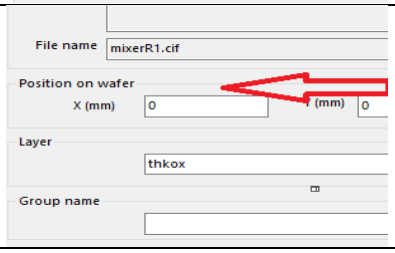


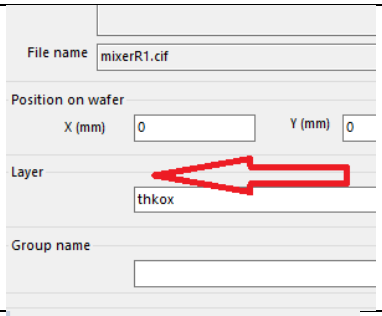
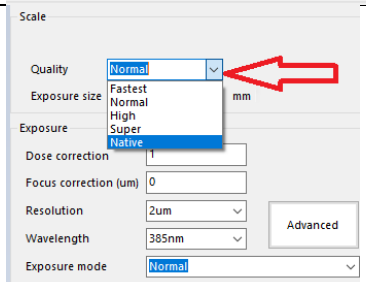
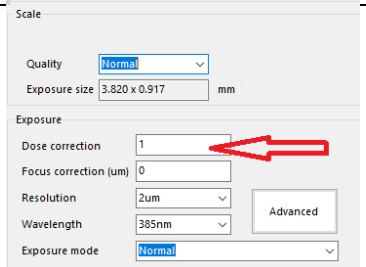
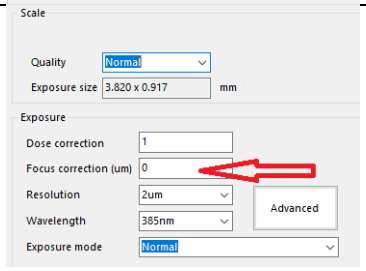
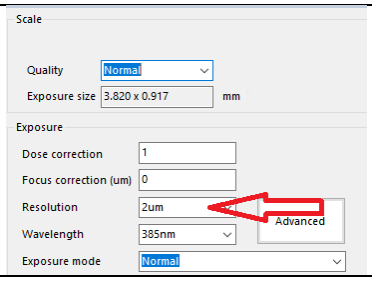
1	**Enter into the box marked Thickness on the Align Wafer form an estimate (in microns) for the** thickness of the wafer	
2	If you are not sure of the approximate thickness of the wafer, **use the real-time microscope** to look at an edge of the wafer and try different thickness values until the edge 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**.	

PREPARING EXPOSURE PATTERN

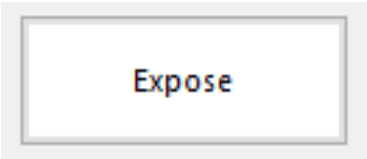


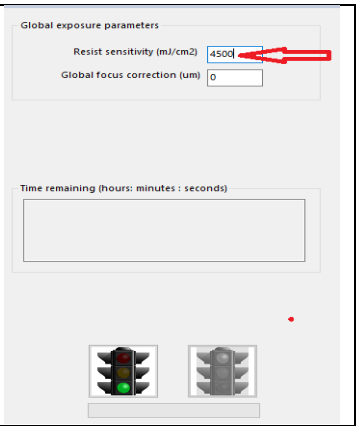
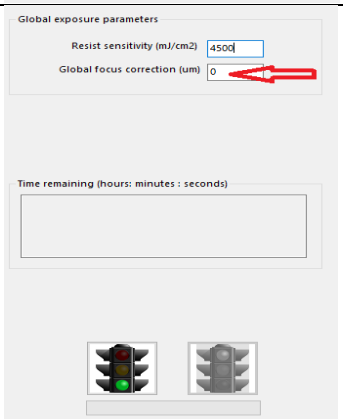
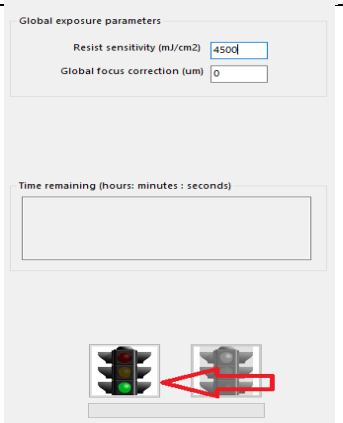
“Prepare pattern” panel.

1	**Click the + sign** at the top of the job list to create a new job.	
2	**Click the newly created job** in the job list to select it.	
3	**Choose the design file** (Files can be common graphical formats (TIFF, BMP etc) or the lithography standards CIF or GDS2).	
4	**Set position on wafer to (0,0).**	
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.	
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”).	
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”).	
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”).	
10	The “**Optical resolution**” will determine which **objective lens is selected during the exposure.**	

EXPOSING

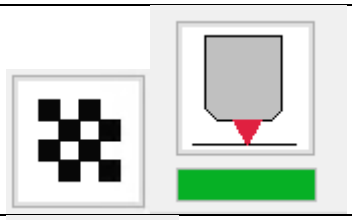
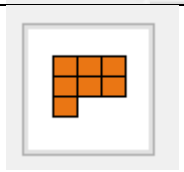
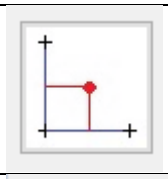
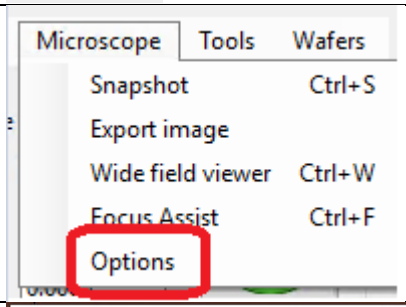
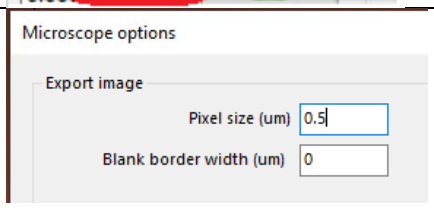
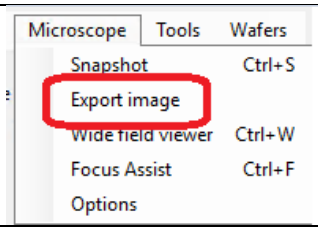


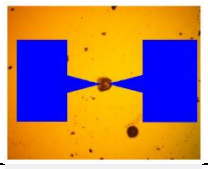
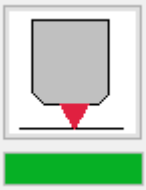
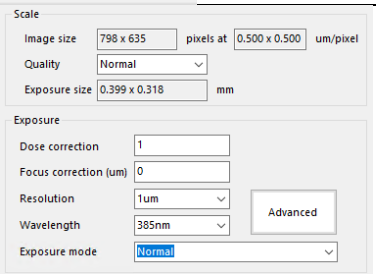
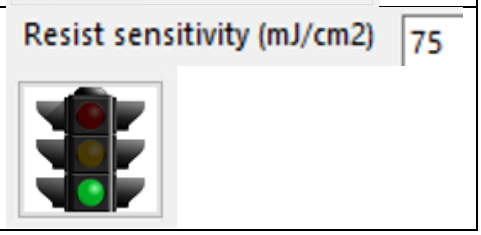
1	**In Expose panel enter the resist dose** into the text box marked Resist Sensitivity.	
2	**Enter "0" into the global focus correction** unless you have special circumstances (such as a sample with an abnormal optical response because of underlying layers that causes the autofocus to be shifted).	
3	**Click the green traffic light button** in the Expose panel to start the exposure.	

REMOVING WAFERS

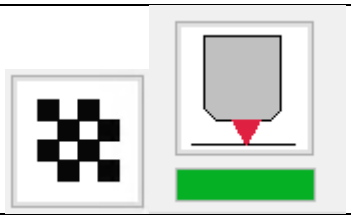
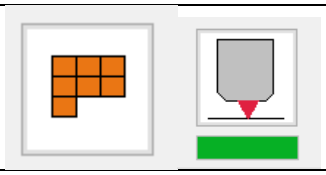
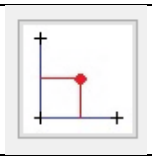
As soon as the exposure is complete you can remove the wafer. Unlock the door by pressing the ‘Lock’ button; the motion stage will automatically move to the front to allow the wafer to be removed. Open the front door of the enclosure, remove the wafer and **close the door again.**

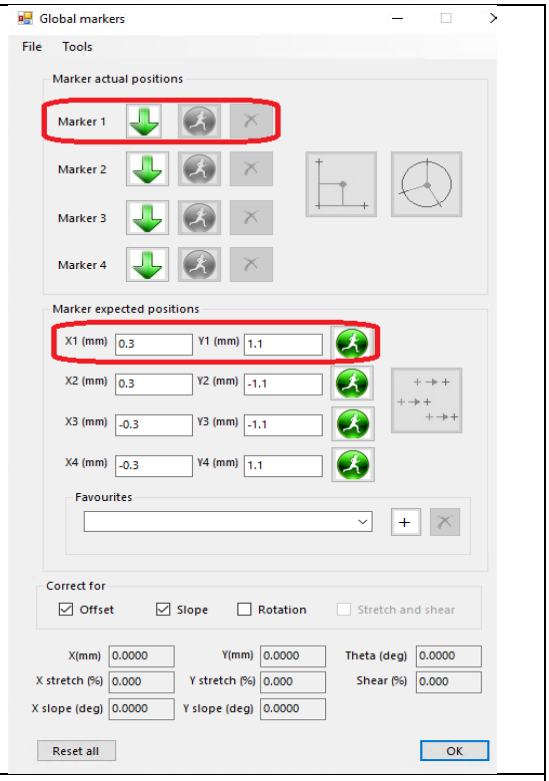
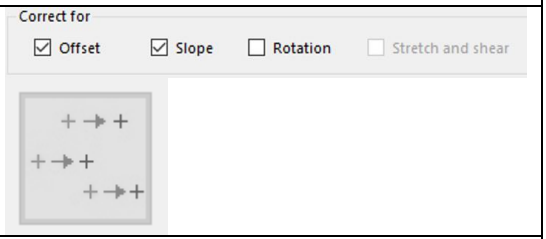
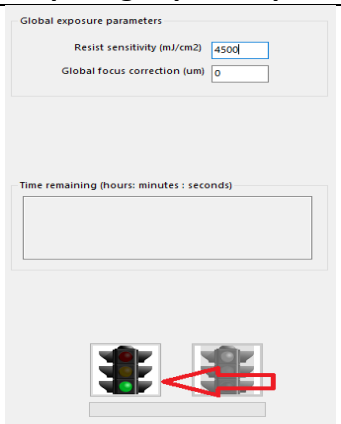
CONTACT PADS TO FLAKE

1	**Load the wafer and focus**	
2	**Find the flake.** 1. If the flake coordinates are known, use manual stage control to navigate. 2. 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.	
5	**Define the required "Blank border width"** to place the contact pads.	
6	**Go to "Microscope ➔Export image".**	

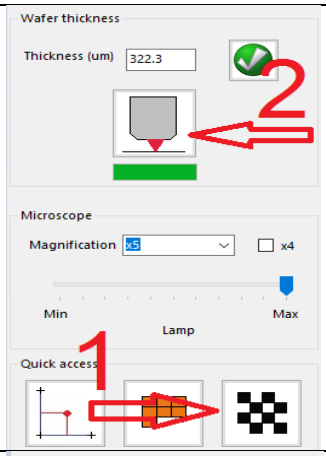
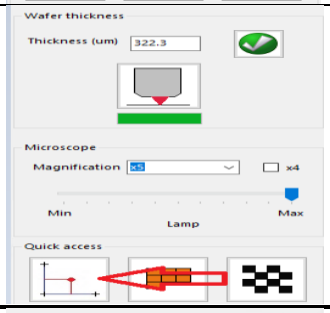
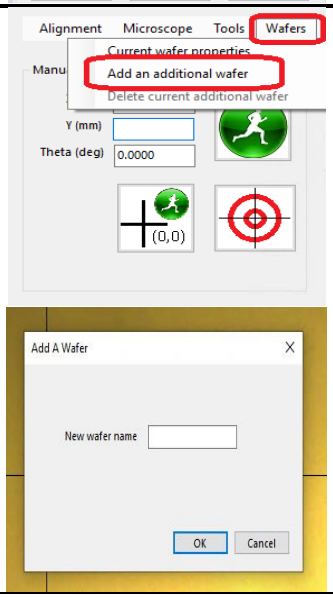
7	Open the file in Paint**. Draw pads in blue or white color** and save the file.	
8	**Go back to "Align wafer" panel and refocus.**	
9	Under "Prepare pattern" panel 1. **Create new job** 2. **Upload .bmp file** 3. **Verify pixel size, quality, dose correction, focus correction, resolution, and exposure mode.**	
10	Switch to "Expose" panel 1. **Insert "Resist sensitivity" value** 2. **Click on green traffic lite.**	

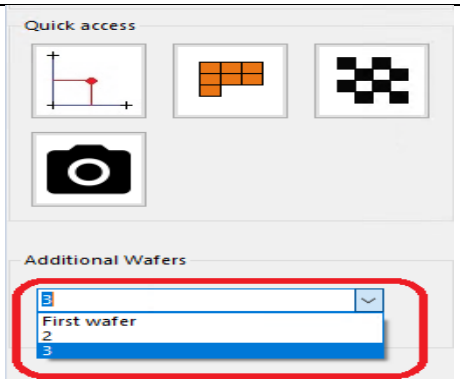
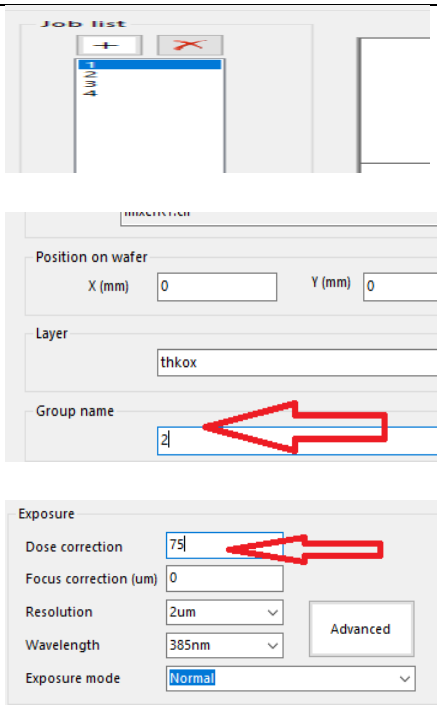
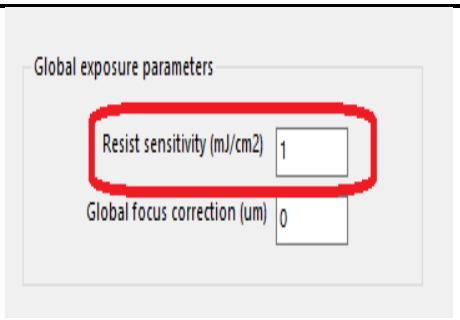
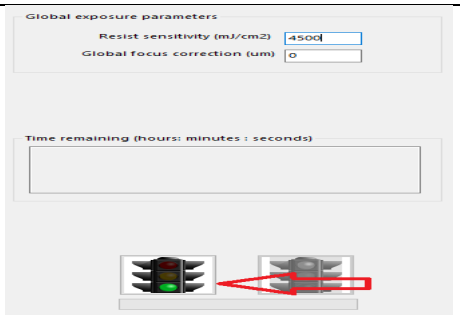
ALIGNMENT BY ALIGNMENT MARKS.

1	**Load the wafer and focus.**	
2	**Upload first design and print** (do not forget correct center definition and current position!).	**Preparing exposure pattern.**
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 coordinates from the first design file in "Marker expected positions" window.**	
9	**Repeat #8 for 2-nd and 3-d markers.**	
10	**Check in for rotation and stretch/shrink and press coordinate-transform button.**	
11	**Navigate to the design center.**	
12	**Choose the second design file.**	**Preparing exposure pattern.**
13	**Expose.**	

MULTIPLE SAMPLES EXPOSE

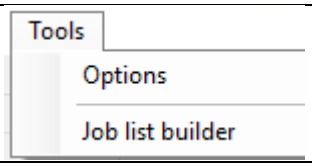
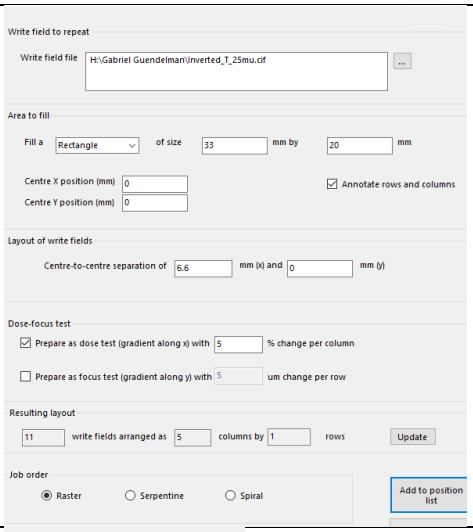
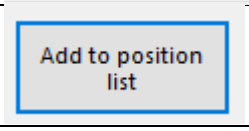
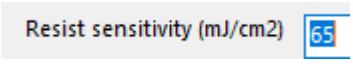
1	**Place multiple samples on the chuck.**	
2	**Find first sample and focus on it.**	
3	**Identify center of the sample.**	
4	**Go to "Wafers ➔ Add an additional wafer" and give a name to new wafer**	
5	**Move to the next sample and repeat steps "2" and "3".**	

6	If you have more samples, then repeat “4”, “2” and”3”. *All wafers will be listed under “Additional wafers*	
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.** 3. **If samples require different energy doses, then enter actual dose in “Dose correction” field and “1” in “Resist sensitivity” field.**	
		
8	**Expose**.	

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"**	
2	**Chose Test File**	
3	**Select** **1. "Area to fill" considering test file size and desired number of test points,** **a. "Center position"** **b. "Annotation" if needed** **2. "Center-to-center" separation** **3. Choose "Dose-focus test" settings** **4. "Job order"**	
4	**Click on "Add to position list"**	
5	**In "Expose" panel set initial value of expose energy**	
6	Expose