

Heidelberg MLA150 Standard Operation Protocol

1. Start

- Enable Heidelberg MLA150 at iLab BRK Lithography Core Kiosk
- If the MLA150 menu is not already open, then **double-click the icon**



- If you have new design file to convert, copy design file to "HIMT\Designs\gdsii"
- Rename your design file starting with your Purdue ID, ex) park218_mask1

2. Setup Job

Job

- If you like to set up a new job, click:



- If you like to save your job, rename the job name starting with Purdue ID
- If you like to repeat the saved job, click



- Select the exposure mode
 - Standard: general exposure
 - Series: dose test

Substrate

- The smallest sample size is 10mm x 10mm (carrier chip not allowed)
- Double click "Substrate Template"
- Select your substrate size or at least the shape (automatic round or automatic rectangular)

- Click:



Layer

- Layer
 - First Exposure: Exposure without alignment. The coordinate (0,0) of the

layout will be at the center of the wafer.

- Layer "X": Exposure with alignment
- Laser
 - 405nm: all positive AZ photoresist (AZ1518, AZ10XT)
 - 375nm: photoresist sensitive to 365nm (AZ MiR703)
- Design
 - Double click DesignEntry or empty orange box. In the "Load Design" dialog, select and load converted designs.
 - If you need conversion, click on "Convert Design" in "Load Design" dialog. It will open "GUI HIMT CONVERT" Interface. Go to step 3.

- Alignment Crosses

For layers with alignment, users will need to load a template for the alignment mark coordinates. Provide the center coordinate of crosses from design software such as "KLayout".

- Resist: do not use

3. Conversion (for design conversion)

- File -> NewJob
- Job name: starting with Purdue ID, ex) park218_mask1, click "OK"
- Select design format with "Add"
- It will allow you to select your design file. Click "Open"
- Software immediately reads the design and populates the "GDSII Options" interface.
- GDSII Structure: Select the correct cell name from your design file.
- Select the GDSII layer to exposure, and click "Create Default"
- Check with "Viewer" to make sure whether you choose correct cell and layer.

- Check whether the design is positioned on the center by comparing “Upper/Lower Border” and “Left/Right Border”. If it is not centered and it is your first expose without alignment, please check “Automatic Center” to make the center of pattern to (0,0)
- Exposure Mode: “high quality” or “fast”
- Standard Options: “invert” for bright filed mask for negative photoresist. (make sure the expose area). You can use “XOR” with the background pattern with the same layer number
- Click “Complete Task”. When asking a filename, just confirm the original job file name by clicking “Save”
- Conversion preparation will start and end. Click “Finish” and the tool returns to “Load Design” dialog. Continue to Alignment cross.

4. Sample Loading

- Once all the fields are green, click on “Load Substrate” on the bottom.
- Open the window by pressing “Open/close” button
- **Wear the new yellow gloves (not the one used from solvent hood)**
- Follow the instructions on the screen and on the panel and load the samples on the stage.
 - Place adjustment aid according to wafer diameter
 - Place wafer and align flat to adjustment aid
 - Activate vacuum and check wafer
 - Remove adjustment aid
- Close the window and click on “continue”. Be patient with delay in closing window

5. Alignment (skip for first exposure)

- Click on “Alignment”
- Click on “Move To First Cross”

- Starting with the “overview” camera, locate your first cross on the wafer and use the navigation tools to place it of the camera window



- Using “target” button and directly clicking in the camera window is the easiest way to center the alignment mark.
- Once the cross is correctly centered in the “High Res” camera window, users can optimize brightness and focus.
- Choose your alignment mode and click “measure” to start the detection process
 - CrossAlignment: automatic detection of the center of the cross
 - ManualAlignment: users will click the center of the cross in camera window
- When the blue cross is positioned correctly at the center of the alignment mark, users can click “Accept Position” and repeat the same procedure for all the other alignment crosses.

6. Exposure

- In the Alignment Options, user can check alignment corrections to apply. Rotation should always be checked and user can decide to apply additional scaling and shearing corrections.
- Make sure to enter dose [mJ/cm²].
- When ready, click on “Start Exposure”

7. Sample Unloading

- When the exposure is finished, unloading is available
- Open the window, turn off the vacuum, unload your sample, and close the window.