

Ellipsometer Operating Procedure

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Start up:

1. Check that the APC UPS on the floor is on (“Online” is green color)
2. Turn the nitrogen regulator yellow knob clockwise and set to about 40 psi (nitrogen gas reduces the amount of ozone generated by the lamp).
3. Check the motorized stage is on (look for four green lights under the stage)
4. Check that the Monochromator “320” under the table is ON (green light should be on in the back of the unit)
5. Check that the Blue Controller (“CTRL UNIT”) under the table left side is ON (four green lights on front panel)

(If the Blue Controller not on, press switch on the front panel. Wait about 4 minute the sample stage will move to the back, and right and back to the origin.)

6. Check that the Infrared Supply (shiny box) shows 3 green LED lights
7. Turn on the Lamp Power black switch (round red light should come on).
8. Turn on the Windows XP computer under the table.
9. Turn on the LCD screen and wait for XP to start up.

Check Ellipsometer Operation:

10. Turn on the Lamp by pressing the round blue button on the top. The round red light will go off.

11. Carefully use plastic tweezers place calibration sample (SiO_2 , 2 by 2 cm) on stage. Do not scratch the sample surface. Do not touch with bare hands.

Turn the microscope “light” to “ON”
(You do not have to turn “vacuum” ON.)

12. Alignment: level the sample by using the 2 round knobs under the sample stage (look into the microscope, cross hairs should intersect at the center)
13. Turn off the microscope light.
14. Double click “DeltaPsi2” icon on XP desktop to start software.
15. Click on the fifth icon from the left on the tool bar (“hand” shaped figure for “Manual Measurement”)
16. The “Ellipsometer Views” screen will start up.

If a “Hardware Options” menu pops up, do not click “calibrate motor position” and do not change any of the values on the menu. Choose “Cancel”.

If you get an error message (for example “ Electronics not turned on”) report to Technician right way.

17. Check that there is a dark green spot is on the top right hand corner of the Ellipsometer Views screen. This indicates the ellipsometer modulator is warmed up.

18. Look at S0 on the screen and turn stage height adjust vernier handle to get maximum value.
19. If S0 goes too high and exceeds 100 mV, click “S0 adjustment” to rezero.
20. Close the Ellipsometer Views screen
21. On the left hand side of the screen, Under “Application Lib”
 - “Recipes”
 - Double click “ test sample .rci “ to start the recipe screen.
 - Click on “Run”
 - Type in a sample description. The data will be stored with file name “ lot number. sample description . spe “ where “spe” is “spectrum”
 - Click OK to accept sample description.
 - There will be a pause of 30 seconds and then you will hear the shutter clicking open and close many times.
 - The data points will be taken from 0.6 to 6.5 eV. Then a fit will be done.
 - A results screen will show thickness about 833 Angstrom with a chi-square of less than 0.5.
 - Close the results screen.
- recipe results are saved in Recipe Results / yyyy.mm.dd / recipe name / sample description. aah bbmn ccs .rcr

Close the .rci screen.

22. Carefully put the calibration sample back into its case.

Measuring samples:

- Do not leave Lamp running all the time. Turn off the lamp by pressing the round red button when you are not taking data on samples.
- Document to consult : DeltaPsi2 Software Reference manual (shortcut to this 200 page pdf file is on the XP desktop).
- When the program says a recipe or procedure or model “ has been modified and do you want to save it”, you should “Cancel”, then do a “Save As” on the running window and enter a new name.
- **If a “Hardware Options” menu pops up, do not click “calibrate motor position” and do not change any of the values on the menu. Choose “Cancel”.**
 1. Carefully place sample on the stage.
 2. Open “Ellipsometer Views” the fifth icon from the left on the tool bar (“hand” shaped figure for “Manual Measurement”)
 3. Turn on microscope light and align cross hairs using round leveling knobs.
 4. Turn off microscope light
 5. Peak S0 using “height adjust” vernier. If S0 goes too high and exceeds 100 mV, click “S0 adjustment” to rezero.
 6. Close “Ellipsometer Views”
 7. User Library / Acquisition Routines/ and double click “ general-acquisition . acq “
 8. Click “Run”

9. Enter lot number (if you want) and enter sample description. The data will be stored in file called “ lot number. sample description . spe “ where “spe” is the raw data “spectrum”
10. Click “OK”
11. Graph pops up (S0 mV) and data points start to appear.
12. Raw spectrum file *.spe goes to User Library / Results / Acquisition data/
13. Open a model file (for example Application Library/ Models/ SOI.mdl) by double clicking.
14. Drag and drop a data file (*.spe) onto the line “ Exp. File” .
15. Adjust the model layers, the dispersion, fit parameters and the starting thickness guess .
16. Click Fit
17. The Results screen will show the chi-square and fitted values.
- 18. *** Do a “Save As” to save your model under a unique name. Do not overwrite existing standard models. *******

** The raw data spectrum file can be copied to a USB key and loaded to your office computer.

** You can install the ellipsometer software on your office computer and borrow the software key (single use license) . Then work on developing a model and fitting to produce a consistent result and low chi-square. Use “DeltaPsi2 Software Reference” pdf manual (200 pages) , the “ Quick start Modelling” pdf document and the examples in the “ Sample practice Problems” to learn how to model.

Shutdown Procedure :

The Blue Controller (“CTRL UNIT”) under the table left side should always be left ON (check for green lights on its front panel).

1. Use the key sequence Alt-F4 to close the DeltaPhi program
2. Shutdown Windows XP
3. Turn off the LCD monitor
4. Make sure the Lamp Power switch is off
5. Make sure the nitrogen gas regulator is set counter clockwise to 0 psi.
6. Cover the stage and lamp assembly with the plastic sheet.
7. Don't touch the power bar switches.
8. Don't touch the UPS supply unit.
9. Fill in the Log sheet (Name, Date, Time, Lamp Hours, Description of samples, Procedures used, comments)
10. Return the calibration sample to the technician.

If the ellipsometer is not going to be used for a long time :

1. Turn off the motorized stage (left side, back of stage)
2. Turn off the “320” Monochromator under the table
3. Turn off the Infrared Supply (silver box, in the back)
4. Don't touch the power bar switches.
5. Don't touch the UPS supply unit.