

STEP BY STEP INSTRUCTIONS ON DATA ACQUISITION AND DATA PROCESSING WITH THE WVASE32 ELLIPSOMETER

1. In order to operate this instrument you need to obtain a username and a password to log in the computer. For this purpose contact [Dr. JD Deng](#).
2. If the Lamp of the Monochromator is not on (the button next to the “Lamp” indication is not lit up) press this button, then press the Ignition button and leave the system for 30 minutes to warm up.
3. Write your name and all the additional information in the WVASE32 Log Book.
4. **Position the sample**
 - First you need to position your sample on the sample holder of the ellipsometer. Turn the switch located at the lower part of the instrument from “Vent” to “Vacuum” and put your sample on the holder. The vacuum holes will keep it in place.
 - There are two sets of vacuum holes: one consists of the two holes located right above and below the gap of the holder and the other consists of the four holes located on the two horizontal lines above and below the gap. In order to choose among the two sets you can move the black cable at the back side of the holder between the two available ports.
5. Log in the computer using your username and password. The program which controls the ellipsometer and does the data fitting is the Wvase32.
6. **The software**
 - Once the program opens you want to pull up the Hardware window. Click on Window -> Hardware at the top right corner of the screen.
 - If the window opens with the message “Hardware NOT initialized” click on the Initialize menu item at the top of the screen and wait until the initialization is complete. Enter a username when asked.
7. **For each new sample you need to follow the alignment procedure as described below:**
 - Insert the alignment detector in the socket located inside the right hand side circular aperture which is labeled “input” (part 4 on the schematic, I PLAN TO REFER TO THE SCHEMATIC ON PAGE 2-30 OF THE MANUAL). The alignment detector is inside the plastic cylinder next to the ellipsometer.
 - Make sure that you have the Hardware window in front and select the Acquire Data -> Align Sample menu item from the top of the screen. An

indication appears about inserting the alignment detector and mounting the sample. If you have followed the previous steps click “OK”.

- The computer controlled sample stage will move to 0° for alignment. WVASE32 will move the monochromator to the “white light” position and dynamically display the alignment detector targeting crosshair.
- The user must tilt the sample stage using the two knobs on the back of it to center the alignment crosshair on the computer screen. At the top of the targeting crosshair screen there are two indications X and Y among others. The alignment is good when both X and Y are between -1 and 1. The X indication is in general more important than the Y.
- After you are done remove the alignment detector from the socket and store it back in the cylindrical plastic box.
- The user cancels the alignment screen by pressing <escape> or selecting cancel from the menu and the computer returns the sample to the angle of incidence where it was prior to the alignment.
- An indication which says “maximize intensity by translating sample along the z-axis” appears. Click “OK”. Then maximize intensity as represented by the red line by moving the micrometer on the left side of the sample stage. Once you are done press <escape> to cancel this screen.

8. Before taking data you need to calibrate the system.

- If you have already calibrated the system since you logged in you don't need to calibrate again.
- Make sure that the Hardware window is still in front and select the Acquire Data -> Calibrate System menu item from the top of the screen. On the window that appears select Fine in the Calibration Mode adjustment and click “OK”.
- Once the calibration is 100% completed the Calibration Data graph appears.

9. Data Acquisition.

- With the Hardware window still in front select the Acquire Data -> Spectroscopic Scan menu item from the top of the screen. The V.A.S.E. Scan screen appears.
- Enter the desired wavelength range and the wavelength increment which you want to use in your scan. Make sure to express everything in the units that appear at the end of this line.
- Select the angles at which you want to take data. If you don't know the optical constants of the material you are measuring it's better to take data at 3 angles. Refer to the manual for more information. If you want to take data at one angle only, insert this value to both boxes, then the increment does not matter.
- A typical value for Revs/Meas is 20.

- Notice the last indication on the screen: “Skip Wavelength Range: 13500.00 to 14500.00 A”. The fiber which the ellipsometer is using has a dead range over these wavelengths. If you need to work on that range you can replace the fiber (part 2 on the schematic). The replacing fiber is inside the top right drawer of the computer desk. When you have all the settings ready click “OK”.
- You can create your own folder in the DAT folder and save your data there. After entering a comment for the experimental data click “OK”.
- During the scan the error values on the Psi and Del quantities as they appear at the top of the Hardware window should be less than ± 1 . If they are larger than that probably something is wrong. First check that you have removed the alignment detector.
- Once the scan is completed the data appear on the Graph window.
- The graph shows both the Psi and Delta data. If you want to see one at a time make sure that you have clicked on the Graph window and select the Style menu. There you can deselect the 2D option. Under the Type menu you can alternate between the Psi and Delta data.

10. Fitting the Data.

- First you have to construct the model which describes your sample’s layers. The software will use this model to fit the data. For this purpose you will use the model window. If the model window is not present you can select it by clicking on Window -> Model at the top right corner of the screen.
- Consult the manual’s chapter “The Model Window” on what is the best and proper way to construct your model.
- Once you have built your model you will use the Fit window to do the fitting. On the Fit window menu at the top of the screen you select the Normal Fits -> Normal Fit item. Again you can refer to the manual for more information.

11. Finishing your job.

- Remove your sample and turn the vacuum switch from “Vacuum” to “Vent”.
- If you have used the replacing fiber replace it with the default fiber and store the replacing fiber back in place.
- Leave the angle of incident at 75°
- Make sure your work is saved, exit the Vase program and log off the computer.

