Quick Guide to Operating the Jobin Yvon Unisel Ellipsometer

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Data Acquisition

1. Log on the instrument using FOM.
2. Check and make sure the **Controller (JY_CRTL_UNIT), TANSFORMER, Spectrometer (HR460),** and **Computer** are ON. *If they are off, see the NFCF staff for assistance*.
3. Open the **N₂** valve.
4. Turn on the **Xenon arc lamp** and/or the **IR Power supply** and let them warm up for 10-15 minutes.
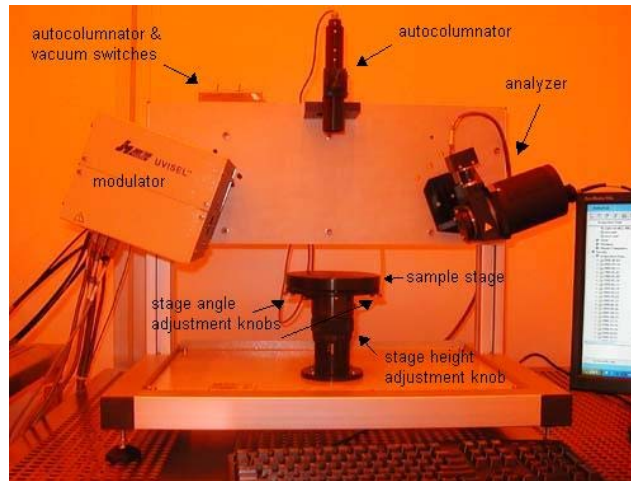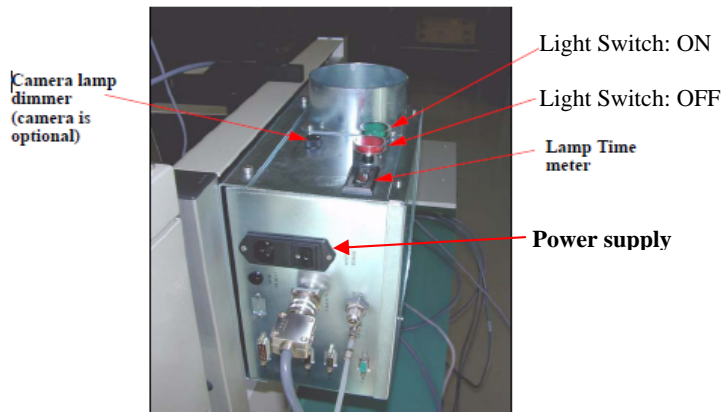5. Turn on the **Autocolumnator**.

Figure 1a. Ellipsometer.

Figure 1b. Power supply unit for the Xenon arc lamp.

6. (*optional*) Double click the **"DeltaPsi2" icon** to load the **DeltaPsi2** software.

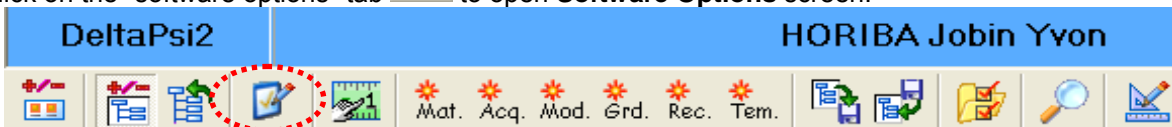7. Click on the "software options" tab to open **Software Options** screen.

Figure 2. Menu bars on the DeltaPsi2 interface

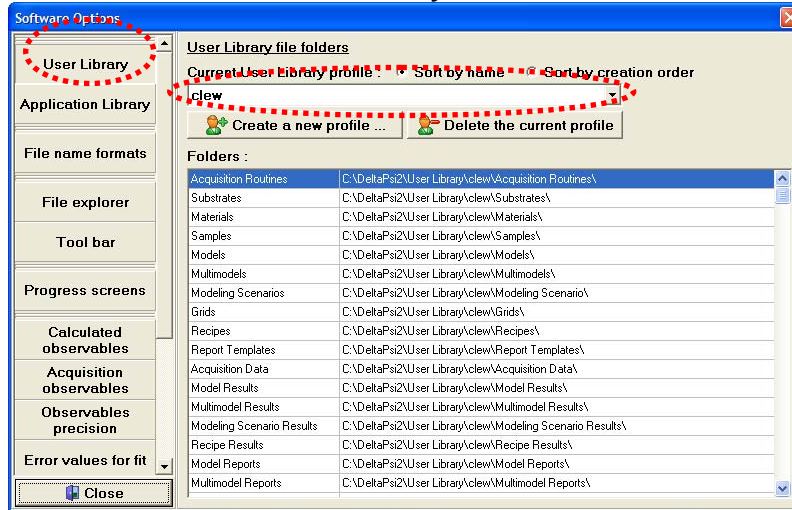8. On the left-hand selection menu, choose "**User Library**".

Figure 3. "Software Options" window.

9. On the right-hand screen, choose your user library profile in the drop-down menu or click "**Create a new profile**…".
10. Close the "**software options**" window.
11. Click the "**manual measurement**" icon to open the "**Views**" screen.
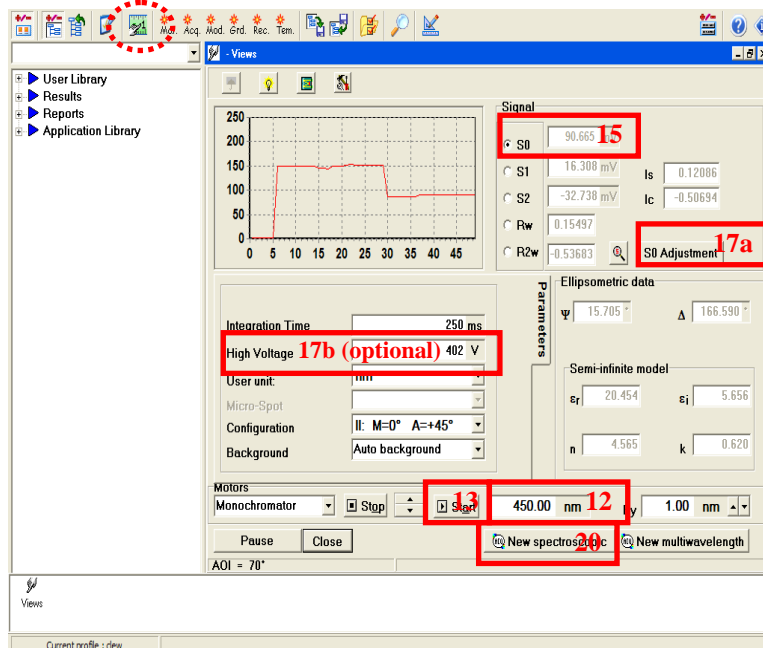

Figure 4. Views screen.

12. Toward the bottom of the window, just _above_ the "**New spectroscopic**" button; enter "**450**" (unit is nm) as the wavelength. Press Enter.
13. Click the "**Start**" button just to the left of where you entered 450.
14. Place your sample on the stage and locate the sample spot by placing a piece of weighing paper over the sample. Once you have positioned the spot where you want to take your measurement, remove the weighing paper.
15. Adjust the height of the stage by turning the height adjustment knob underneath the stage. Turn the knob back and forth until the **S0** reaches a maximum.
16. Look through the autocolumnator and align the crosshairs so the centers overlap by turning the two silver

knobs underneath the stage.
17. On the "**Views**" screen, click "**S0 Adjustment**" or manually change the **High Voltage** so the **S0** is between **80-100 mV**.
18. As for the rest of the parameters, **Figure 4** shows the most common settings.
19. Click "**New spectroscopic**".
20. You will now see the "**Acquisition Routine**" window. Again, **Figure 6** shows the most common merge settings, but you may change them as necessary.
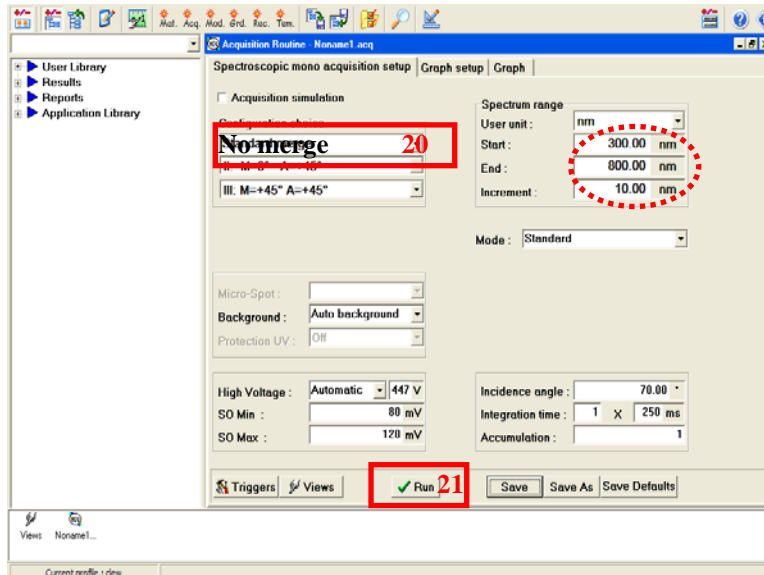

Figure 6. Acquisition routine screen before sample run.

The spectrum range will depend on your sample.

21. Click "**Run**". A window will pop-up and say that "**Views will be closed**". Click "**Ok**".
22. Enter your sample name and any comments you need. Click "Ok".
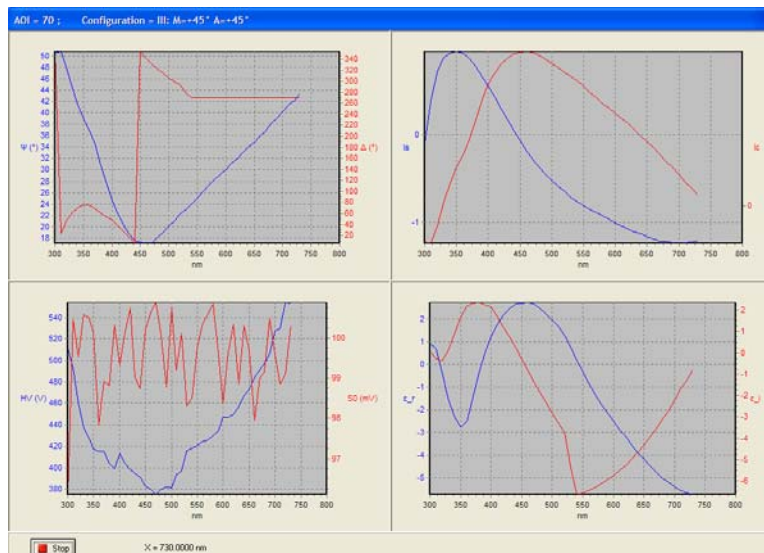23. The ellipsometer will then run your sample and you will see a window with various spectra:

Figure 7. Spectra during sample run.

24. When the measurement is finished, the spectra window will disappear and you will see the acquisition routine window:
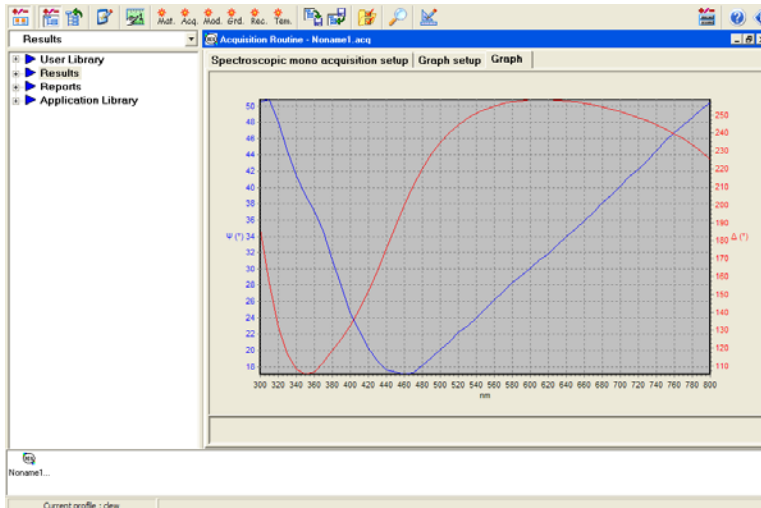
Figure 8. Acquisition routine after sample run.

25. You now need to fit your model to the data.

Model Fitting

1. Click on "**Create a new model**..." icon , or open an existing model you created before. Make sure "**User Library**" is selected and then click on the "**Spectroscopic Model**" button.
2. First, build a model of your substrate and your material. The purple bar is your substrate.
3. In the left-hand selection menu, expand "**Application Library**" --> "**Materials**". Find your substrate material and drag it to the purple bar on the right. If your substrate is a mixture of two or more materials, you may drag other materials into the same purple bar. Try to define the percent composition as close as possible (50% and 50% is the default composition for a two-material model).
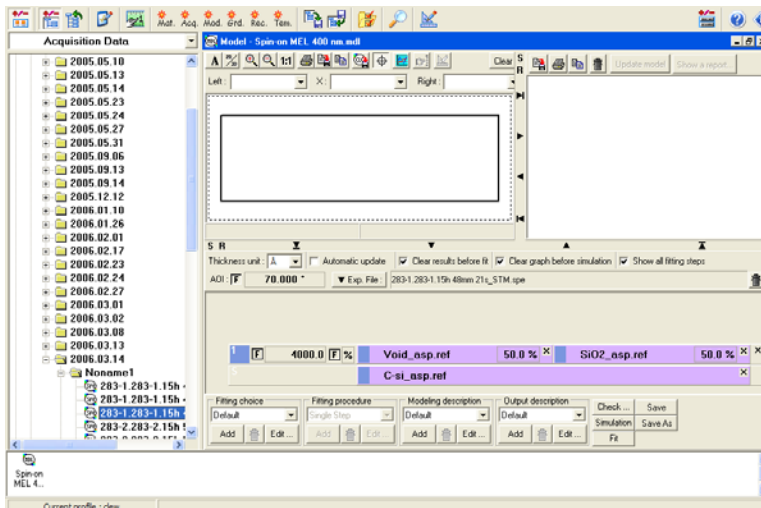

Figure 9. Model window.

4. Build your sample material. Choose another material from the "Materials" menu and drag it anywhere in the gray area above the purple substrate. Again, you can add more materials to this first layer and define the percent composition. You can also add more layers by dragging more materials from the menu on the left to the gray area above your sample model.
5. To the left of the purple bars, each layer will be defined starting with the substrate ("**S**"), your first layer ("**1**"), second layer ("**2**"), and so on. A default thickness of 1000 Å will be given for each layer as an initial guess.
6. To fit the model to the data, check the box to the left of the thickness, and an "**F**" will appear. If your layer

7. If your substrate and/or your layer(s) are porous, you can add "**Void_asp.ref**" from the "Materials" on the left. In the model, void space is treated like a chemical material.
8. If you want to create your own material, click the "**Mat**" icon.
9. Next, you need to add your data to the model. In the left-hand selection menu, expand "**Results**" --> "**Acquisition Data**" --> "**(date)**" --> "**NonameX**". Choose the run that you want to model. (*If you used the Standard Merge, use the file that ends in "_STM.spe".*) Drag your run to the gray bar that is above your model and to the left of the trash can.
10. The angle of incidence of the light (the angle between the analyzer and your sample, as well as the modulator and your sample) should be 70 degrees but your run will not be exactly 70 degrees. If you want to see how close your run was to 70 degrees, check the box to the right of "AOI".
11. Under "Modeling description" toward the bottom of the screen, click "**Edit**...". Under the "**Modeling conditions**" tab, you will probably want to select "**Experimental file full spectral range**". This will fit your model to the spectral range that you defined in the initial "**Acquisition Routine**" window before your run. However, if you want to use a smaller range, you can use a "**User defined spectral range**". Click "**Ok**".
12. Click "**Fit**". You will now see a window that shows the parameters that you wanted to find. If the fit (X^2) is not good enough (*the spec. for our system is $X^2 < 2$*), you can close this window and modify your model.
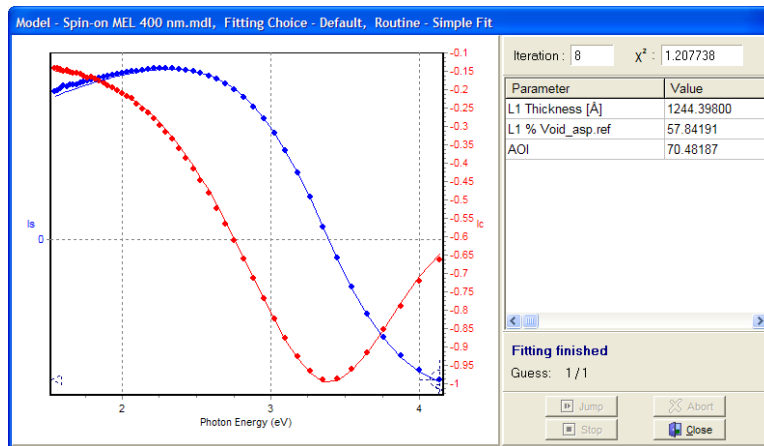

Figure 10. Modeling results.

NOTE: *You may save your model for future use by clicking "**Save as"**. You can later find this model in the left-hand selection menu under **"User Library" --> "Models"**. Double-click on your model to open it.*

13. Data Exporting: use "Save graph to a file" to save the graph window in TIFF format, or other option for text format.
14. When your work is done:
    a. Close the modeling window.
    b. (*optional*) Close the "**Jobin Yvon / Horiba**" windows. (Your data will automatically be saved.)
    c. Turn off the **IR Power supply** and the **Autocolumnator**.
    d. Turn off the **Xenon arc lamp.**
    e. Close the **N₂** valve.
    f. Log off the instrument via FOM.

Recommended Wavelength Steps

Film Thickness	Steps in eV	Steps in nm
<200nm	0.1eV	15-20nm
200-500nm	0.05eV	10nm
500-800nm	0.025eV	5nm
800nm – 1.2μm	0.02eV	5nm
>1.2μm		2nm