

# M44 Variable Angle Spectroscopic Ellipsometer *Ex Situ* Operation Instructions

Note: This guide does not take the place of reading the manual!

## Step 1: Log in to the logbook!

Figure 1:  
M44 Ellipsometer

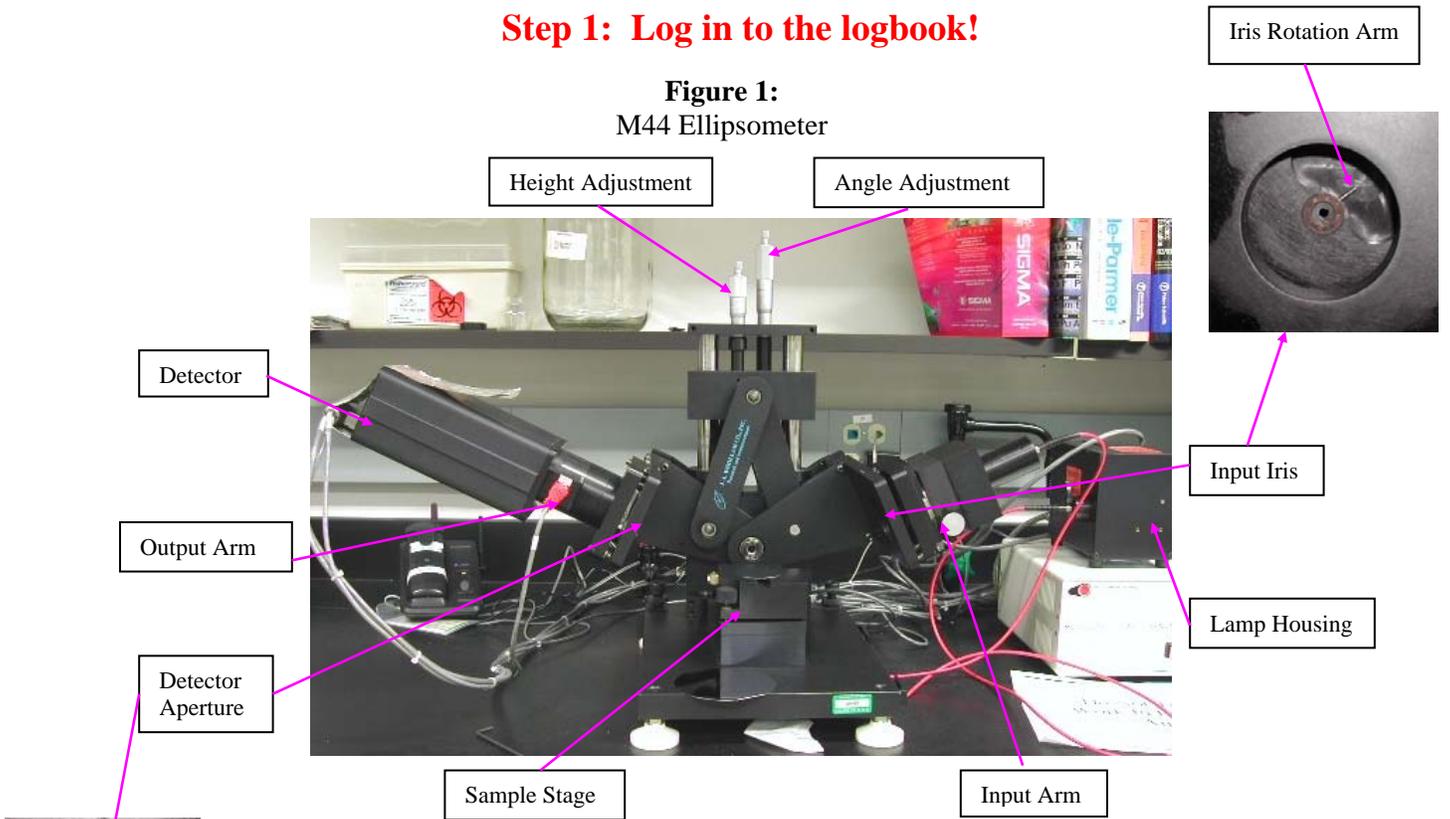
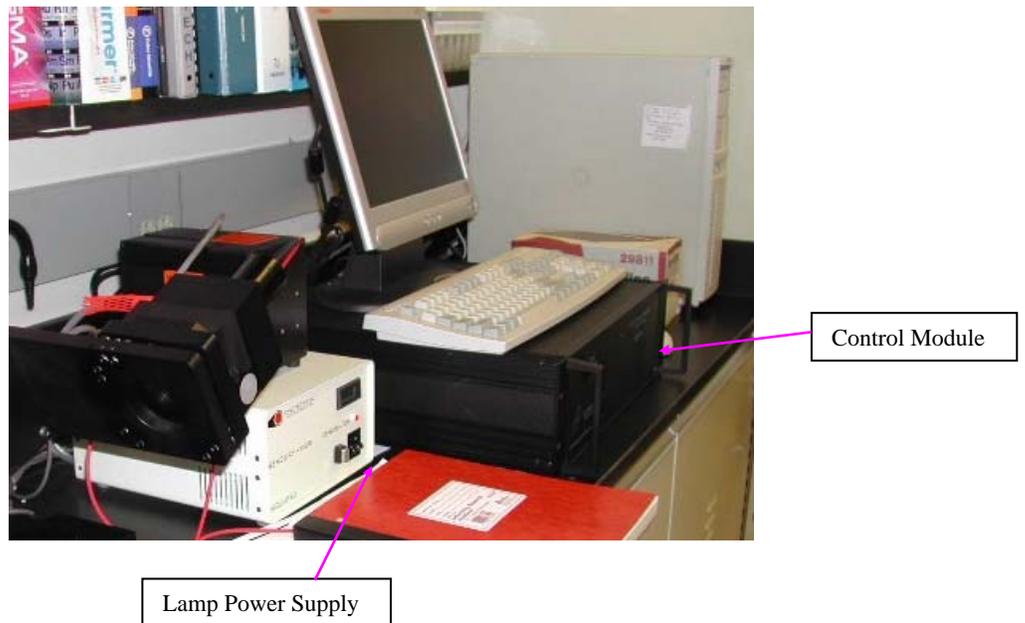


Figure 2:  
M44 System Setup



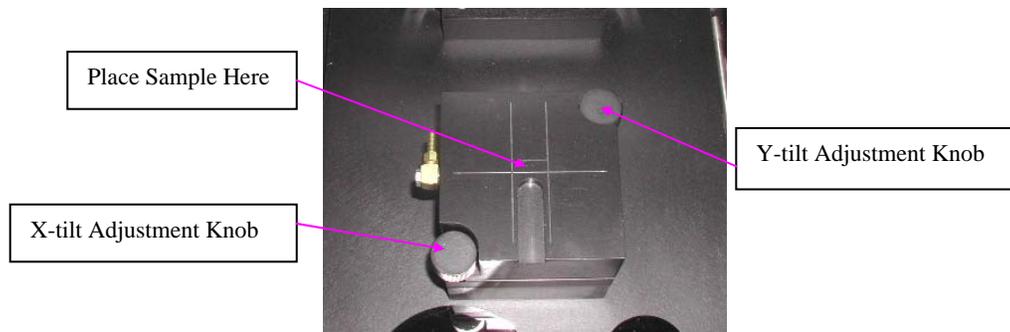
## Part One: Startup

1. The startup procedure for the ellipsometer system is as follows (refer to figure 2):
  - Turn on the power supply for the lamp (you must do this first!)
  - Turn on the control module
  - Turn on the computer and monitor.
2. Once the computer has started up, it will ask you for a user name and password. Just hit cancel.
3. Open up the Ellipsometer software by double clicking on the “WVASE32” program icon.
4. After the Software opens, go to ‘Window’ > ‘Hardware’ in the upper right corner of the WVASE screen.
5. Push the silver button on the lamp power supply to turn on the white light.
6. Click on ‘Initialize’ in the upper left side of the screen.
7. Enter a user name for the log file and press ‘OK’. You have now started up the ellipsometer.

## Part Two: Sample Alignment (re-align every time you load a new sample)

1. Once you have started up the ellipsometer hardware and software, place your sample on the sample stage.

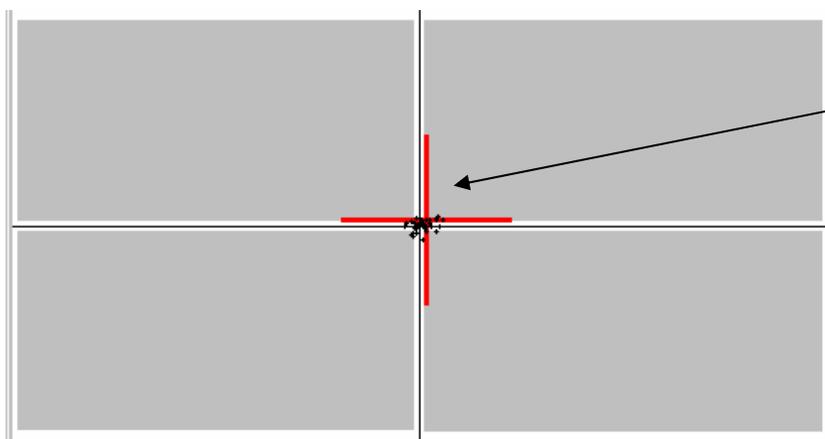
**Figure 3:**  
Sample Stage



2. Use the angle adjustment micrometer (see figure 1) to change the angle of incidence. For most samples, the exact value of the angle of incidence doesn't matter. The best results usually come from using an angle of incidence in the middle of the range. To figure out how to set the micrometer, go to ‘Move’ > ‘Angle of Incidence’ in the Hardware menu bar. Type in the angle you want to use (between 40 and 90 degrees), and the software will give you the equivalent in millimeters to set the micrometer to.
3. Raise or lower the sample stage by adjusting the height micrometer until the light from the lamp (seen as a small white circle) is centered over the detector aperture (see figure 1). Adjust the iris rotation arm to make the circle of white light bigger if needed.

4. Go to 'Acquire Data' > 'Align Sample'. You should see the screen depicted below in figure 4. Adjust X- and Y-tilt knobs until the crosshairs are centered on the screen. Once this is done, press escape on the keyboard

**Figure 4:**  
**Alignment Screen**



If the crosshair jumps around excessively, try pressing the silver button on the lamp power supply, then re-initializing the hardware.

### Part 3: Sample Calibration (re-calibrate every time you load a new sample)

1. On the Hardware menu go to 'Acquire Data' > 'Calibrate System' and check the 'Coarse Calibration' box. Then press ok. The calibration will take several minutes.
2. Once the course calibration has completed, click on the Hardware window, then go back to 'Acquire Data' > 'Calibrate System', but this time check the 'Normal Calibration' and press OK.

### Part 4: Acquiring Data

The first thing you must do before collecting data with the ellipsometer is to create a model for the software to fit the data to:

1. To start, go to 'Window' > 'Model'. A blank window should appear on the screen, and a new menu bar should appear at the top.
2. Click the 'Add Layer' menu in the Model menu bar, and find your substrate in the list of various materials available. For example, if you are using a silicon substrate, select 'si\_jell.mat' and press OK. Press OK when a second window appears.
3. If you only have 1 layer on top of your substrate, go to 'Add Layer' in the menu bar and select the material used for your film. Enter an approximate thickness, and check the 'Fit' box. Then press OK.
4. If you have more than one layer on your substrate, select the appropriate materials and thicknesses of your materials in the order that they were placed on the substrate.

Now you can have the ellipsometer collect data:

5. Return to the hardware menu bar by clicking on the open Hardware window. If you have closed the window, go to 'Window' > 'Hardware'. The same process can be used to bring up any menu bar you might want to see.
6. Go to 'Acquire Data' > 'Dynamic Scan'. When the window appears, press the 'Acquire Single Scan' button. The data acquisition should only take a couple of seconds.
7. Go to 'Window' > 'Fit' (or if it is already open, click on the Fit window), and select 'Normal Fit' from the menu bar. The computer will then fit the data it took to the model you created.
8. To save your fit data, go to 'File' > 'Copy to Clipboard' on the Fit menu bar, and paste the information in whatever word processing program you prefer.

### **Shutdown:**

There is no particular shut down order. Just make sure you close the program, and shut off the computer, control module, and lamp power supply.