

This instruction covers the set-up and safe use of the Filmetrics F40-UV thin film measurement system. This machine is a thin film measurement system that uses an ultraviolet light source and is capable of measuring a vertical film ranging between 4nm and 25um. A [Filmetrics F40-UV training video](#) is also available. As with any tool in the BNC cleanroom, you must schedule time on the tool through iLab before use.

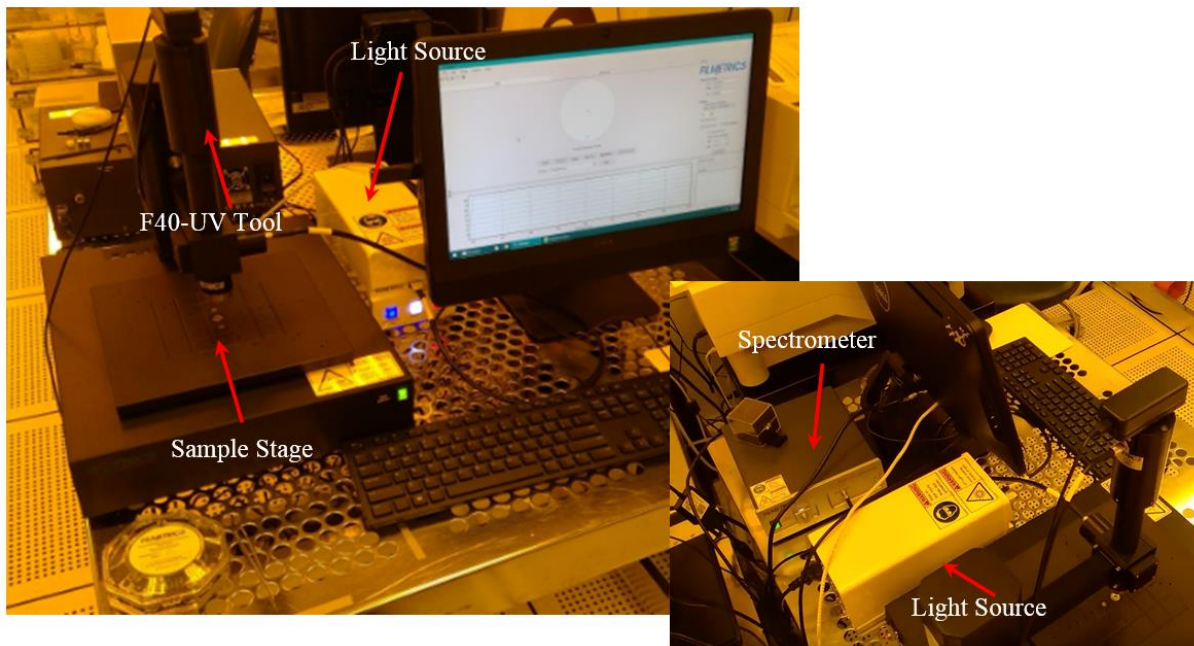
1. SAFETY REQUIREMENTS

- 1.1 Safety glasses must be worn whenever in the cleanroom, except when using a microscope or when wearing protective goggles.
- 1.2 Keep fingers, samples, tweezers, pens and other materials clear of the Filmetrics F40-UV stage perimeter (pinch point) of the sample stage as noted by the yellow caution label.

2. EQUIPMENT

- 2.1 Filmetrics F40-UV
 - o F40-UV tool
 - o Sample Stage
 - o Light Source
 - o Spectrometer
 - o Filmetrics Focus/Reflectance/Thickness Standard wafer

3. TOOL CONFIGURATION



4. CYCLE OF OPERATION

- 4.1 Verify all three buttons on the light source are lit as well as the "light source" toggle switch on the sample stage. Refer to Section 6 for the startup procedure.
- 4.2 Open the FILMapper software if it is not already running. Wait for the stage to move/initialize. There should be a window with 3 tabs at the top; Map, Measure and History. The Map tab is used for mapping the measured samples, the Measure tab is for single point measurements and the History tab is for reviewing historical data.

BASELINE

- 4.3 Using tweezers, load the Focus/Reflectance/Thickness Standard (located in the wafer compact). This is a silicon wafer and is extremely fragile.
- 4.4 Select the "Measure" tab and turn on the camera image by clicking on "Live Video" in the left camera window. The Zoom slider is a digital zoom for the 10X optical magnification.
- 4.5 The 25 micron measurement spot (major advantage) should be visible in the center of the Live Video image.
- 4.6 Select the Map tab and then left click on the "Baseline" button.
- 4.7 Left click on the "Take Sample Reflectance" button before focusing (use the Z-axis up/down arrows in the "Measurement Spot Window" to adjust the focus) on the Standard wafer.
- 4.8 Move the stage to X +30 for the Reflectance Measurement by typing in 30 next to "X" and clicking on "Move"
- 4.9 Click "OK" after the stage has stopped moving and wait for the status bar to fill. The "Thickness Standard" spot should be under the optic column.

- 4.10 Click on "Take Reflectance Standard"
- 4.11 Click "OK" after the stage has stopped moving and wait for the status bar to fill
- 4.12 When "Step 3 of 3: Take Background" appears on the screen, close the shutter by pressing the shutter button on the Light Source
- 4.13 Click on "Take Background" button and wait for the status bar to fill
- 4.14 Click on the "Finish" button when the baseline procedure is complete.
- 4.15 Press the shutter button on the Light Source to open the shutter
- 4.16 Click on the Measure tab to measure the Standard Wafer oxide thickness
- 4.17 Select the "ZZZ SiO2 Std Wafer by Dan" recipe in the far right dropdown window and click on OK. Click OK if a warning dialogue box appears
- 4.18 Click on the "Go To..." button and enter 30 for the "x" value before clicking on "Apply", then "OK". This will move the sample stage to the SiO2 region of the standard wafer
- 4.19 Click on the "Measure" button and wait for the spectrum analysis to complete.
- 4.20 The Measurement results are displayed in the lower right area of the monitor. Compare the SiO2 measured value with the value listed on the wafer compact. The measurement should be very close (within 1%) of the actual thickness printed on the compact. If not, contact Birck Staff for support.
NOTE: "Goodness of fit" is how well the measured value matches the expected value; 1 is a perfect fit

MAPPING MULTIPLE POINTS

- 4.21 The Baseline must be performed before proceeding.
- 4.22 Click on the "Map" tab to map a sample for film thickness and uniformity data on a non-patterned large (50mm - 100mm) sample. The number of data points can vary from 5 up to 115 points.
- 4.23 Select the Recipe dropdown window located below the sample diameter to select the film recipe to be used and a preview will be displayed
- 4.24 Place the sample in the center of the sample stage using the 25mm grid as a reference.
- 4.25 Use the Up and Down arrow next to "Focus:" ("Measure" tab) to bring the sample into focus. The single arrows are slow up/down movement and the double arrows are fast up/down movement. Return to the "Map" tab.
- 4.26 Click on the "Start" button. The individual data point can be seen under the "History" tab. Minimize the lower window (click the down button) to display dataset statistics. The display can be changed for more options.
- 4.27 Perform the Shutdown procedure at the end of the session.

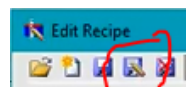
SINGLE POINT MEASUREMENTS

- 4.28 The Baseline must be performed before proceeding
- 4.29 Any sample size and shape can be measured. Larger samples should be centered on the stage and smaller samples should be offset so they lay flat on the stage surface (not on the mounting hardware).
- 4.30 Place the sample in the center of the sample stage using the 25mm grid as a reference. Offset small samples from the center of the sample stage so it will lay flat on the stage.
- 4.31 Select the "Measure" tab and turn on the camera image by clicking on "Live Video" in the left camera window. The Zoom slider is a digital zoom for the 10X optical magnification.
- 4.32 Use the Up and Down arrow next to "Focus:" ("Measure" tab) to bring the sample into focus. The single arrows are slow up/down movement and the double arrows are fast up/down movement.
- 4.33 Position the yellow (25um) dot in the "Live Video" over the area to be measured. The stage can be moved using the buttons in the Live Video display.
- 4.34 Select the desired recipe using the dropdown menu on the right side of the screen
- 4.35 Press the "Measure" Button side of the window.
- 4.36 The Measurement results are displayed in the lower right area of the monitor.
- 4.37 Perform the Shutdown procedure at the end of the session.

5. SUPPLEMENTAL DATA (Edits and Saving Data)

EDITING RECIPES

- 5.1 Select the "Measure" tab and click on the "Edit Recipe" button.
- 5.2 Select the "Film Stack" tab and make adjustments to the appropriate layer or approximate (nominal) thickness.
- 5.3 Select the "Analysis Options" tab for Wavelength options and Analysis method.
- 5.4 Select the "Alarms" tab for poor measurement alert settings.
- 5.5 Select the "Map" tab for Measurement configuration including wafer size, coordinate system, number of points to measure and the edge exclusion.
- 5.6 Additional recipe parameter details can be found in Section2 of the Filmetrics User Manual. A copy of the manual can be found on the [Birck Wiki](#).
- 5.7 This is NOT AN OPTION --Use the SAVE AS button (shown below) and create a different/unique filename before clicking on "Save". File>save measured Spectrum



- 5.8 Click on "OK" and try the new recipe.

SAVING DATA

- 5.9 Select "File" on the "Measure" tab before clicking on the "Save Measured Spectrum..." option.
- 5.10 Create a folder with your name under C:<<Users>Filmetrics Users>Documents and enter a name before clicking on "Save"
- 5.11 Another option is to save a screen shot by selecting "Save Screen to File..." option.
- 5.12 Create a folder with your name under C:<<Users>Filmetrics Users>Documents and enter a name before clicking on "Save"
- 5.13 The data can be saved to a new, virus free USB storage device by plugging it into the USB port located on the left side of the PC monitor

6. STARTUP and SHUTDOWN

STARTUP

- 6.1 Depress each of the three buttons on the light source box (Deuterium lamp, Shutter and Halogen lamp).
- 6.2 Warmup wait time must be 5 minutes for films thicker than 250nm or 15 minutes for films thinner than 25nm or if measuring the refractive index.
- 6.3 Open the FILMapper software located on the computer desktop and wait for the stage to move/initialize.

SHUTDOWN

- 6.4 Verify sample has been removed from the stage.
- 6.5 Close the software by clicking on the (red) "x" in the upper right corner of the monitor
- 6.6 Turn off the Deuterium lamp, Shutter and Halogen lamp by pressing the three buttons on the light source.

REVISION RECORD

Reason for Revision	Date of Revision	Person Responsible
Initial Release	10/11/19	Rich Harlan