# Filmetrics F40 UV Thin Film Measurement System Standard Operating Procedure



## NYU Tandon School of Engineering Nanofabrication Facility

# Contents

# 1. Startup



**Light Source Button**

Figure 1: F 40 UV Spectrometer
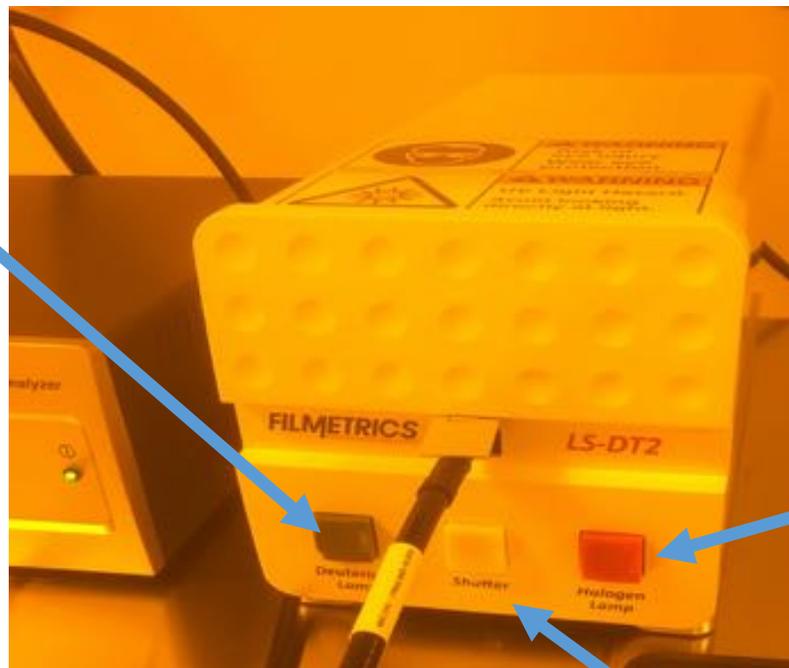


**Deuterium Lamp Button**

**Halogen Lamp Button**

Figure 2: LS-DT2

**Shutter Button**

- **Turn on light source on the front panel of the F 40 UV spectrometer by depressing the "light source" button. (See Fig. 1) Please allow 5 minutes of warm-up time.**
- **Press the "Deuterium lamp" and "Halogen lamp" button on the LS-DT2 (See Fig. 2). Wait 15 minutes, then press the "Shutter" button.**
- **Start the FILMeasure software on the computer by double clicking the icon on the desktop.**

2. **Baseline and Reference Check**
   - **The F40 UV should be baselined and referenced checked before the start of each run, or after switching to a different type of film to be measured.**

**Focus Field**

**Standard SiO$_2$ Sample**

**Reflectance Region**
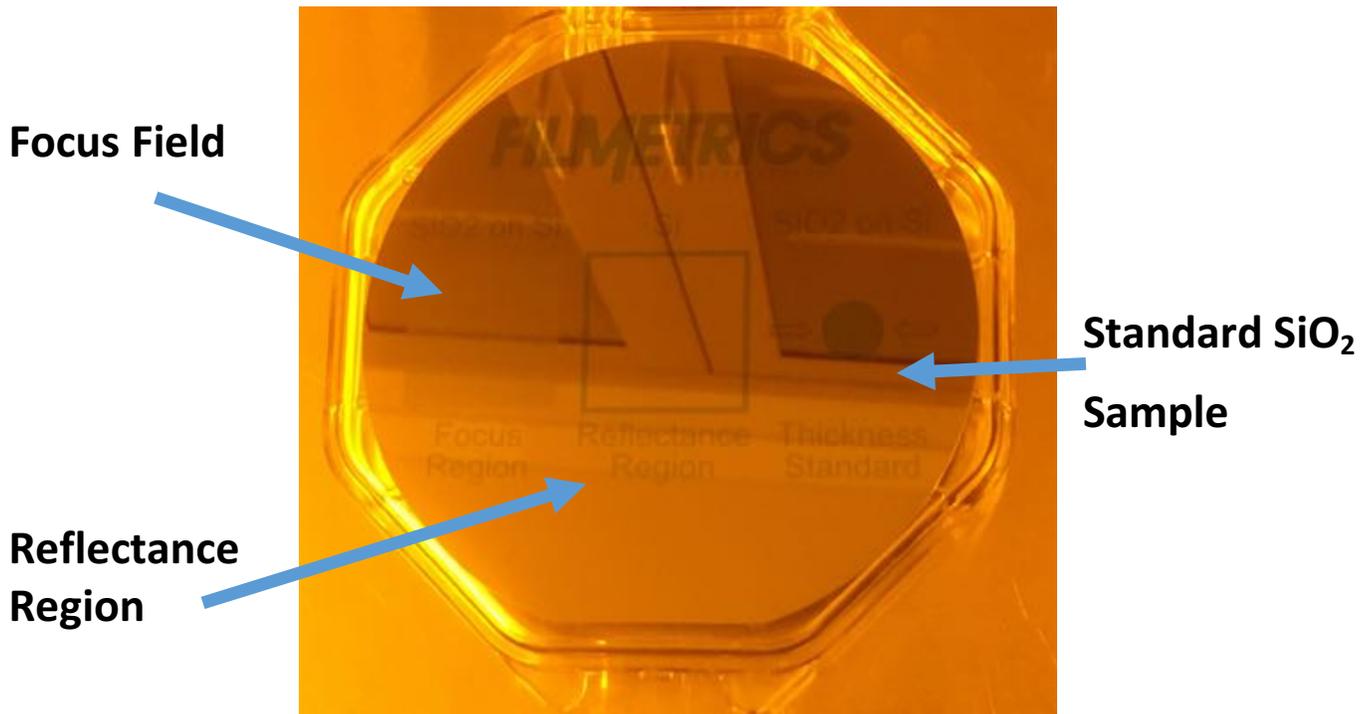


**Figure 3: 4" Filmetrics "Focus/Reference" Wafer**

**2.1.    Baseline Settings**

   **2.1.1.    Measure Tab**

- **Select the "Measure Tab" at the top of the screen**

   **2.1.2.    Focus the camera/optics**

- **Select the "Live Video" Tab in the "Measure" menu. In the "Live Video" menu, change the focus slider to the highest magnification.**

- **Place the 4" Filmetrics "Focus/Reference" wafer on the measurement stage and ensure that the "Focus field" is underneath the objective lens**

- **Adjust the camera focus with the z-axis micrometer on the measurement stage until a clear image of the "Focus Field" can be seen**

**2.2.    Measurement of the Standard SiO$_2$ sample**

   **2.2.1.    Step 1**

- **On the "Focus/Reference" wafer, move the area designated as "Standard SiO$_2$ Sample" underneath the objective lens. (See Fig. 3)**

- **Focus on the area using the "Live Video" focusing procedure as outlined in 2.1.2 if necessary.**

- **Click on the "Baseline" radio button. A "Sample Reflectance" dialog box will appear.**

- **Click the "Take Sample Reflectance" radio button in the dialog box.**

### 2.2.2. Step 2

- **The dialog box for Step 2 will open when Step 1 is complete.**
- **The "Reflectance Region" on the "Focus/Reference" wafer should be placed under the objective lens.**
- **Focus on the area using the "Live Video" focusing procedure as outlined in 2.1.2 if necessary.**
- **Choose "Si" from the pull-down menu of the "Reflectance Standard" box.**
- **Click the "Take Reflectance Standard" button**

### 2.2.3. Step 3

**Reflectance Substrate**
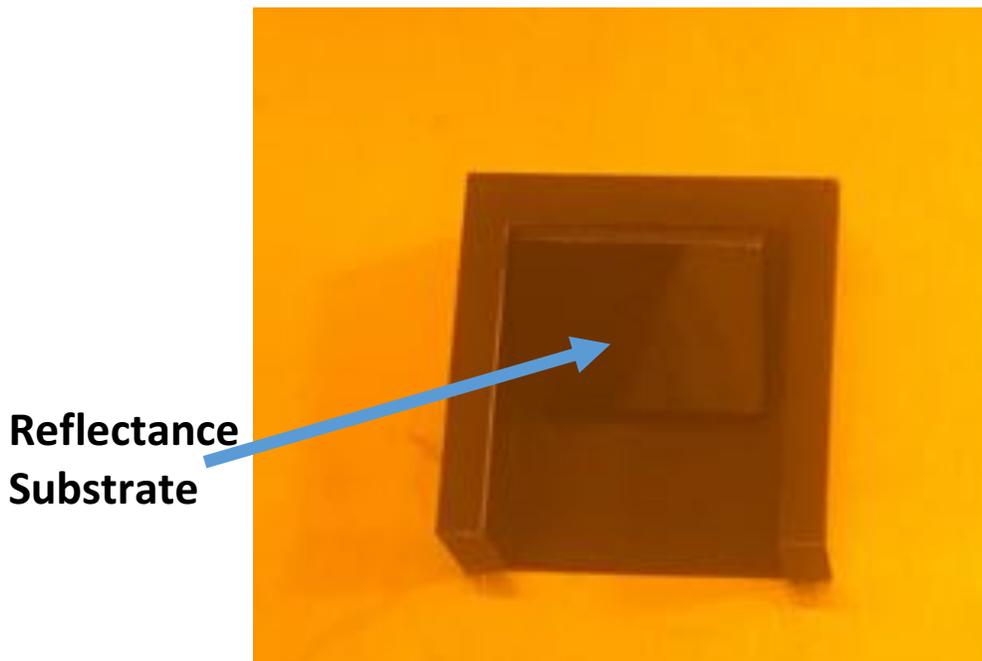
**Figure 4: 45°-Angled Reflectance Substrate**

- The dialog box for Step 3 will open when Step 2 is complete.
- Place the 45°-angled "reflectance substrate" underneath the objective lens. (See Fig.4)
- Click the "Take Background" button.
- After the background measurement is complete, click "Finish".

### 2.2.4. Measurement

- On the "Focus/Reference" wafer, move the area designated as "Standard $SiO_2$ Sample" underneath the objective lens. (See Fig. 3)
- Click the down arrow on the box above the "Edit Recipe" button.
- Select the "$SiO_2$ on Si" from the dialog box, and click "OK".
- Click "Measure" to measure the thickness of the standard, which should be 9966 Å.
- The measurement should be within ± 42 Å of the expected thickness.
- Remove the "Focus/Reference" wafer.

3. Measurement on Sample-Note: If the measurement substrate is blank Si, skip to 3.3, and go to 3.4 for measurement

### 3.1. Step 1

- Click "Baseline". The "Take Sample Reflectance" Dialog Box Appears.

- **Place the sample beneath the objective lens.**
- **Focus on the area using the "Live Video" focusing procedure as outlined in 2.1.2 if necessary.**
- **Click the "Take Sample Reflectance" button.**

**3.2.    Step 2**

- **The dialog box for Step 2 opens when Step 1 is complete**
- **Place the substrate underneath the objective lens**
- **Focus on the "reference" field using the "Live Video" focusing procedure as outlined in 2.1.2 if necessary.**
- **Choose the substrate material from the pull down menu of the "Reflectance Standard" box.**
- **Click the "Take Reflectance Standard" button.**

**3.3.    Step 3**

- **The dialog box for Step 3 opens when Step 2 is complete**
- **Place the 45° angled reflectance substrate underneath the objective lens.**
- **Click the "Take Background" button.**
- **Click "Finish" when done.**

**3.4.    Creating/Editing Measurement Recipes**

**Figure 5: Edit Recipe Screen**

- **Select the desired recipe from the pull-down menu above the "Edit Recipe" button and click "OK".**
- **Click "Edit Recipe" to open the "Edit Recipe" dialog box. (Fig. 5)**
- **Click "Film Stack" to add, remove, or change the film types in the stack to be measured.**
- **When edits are finished, click "Apply" then "OK" to apply changes temporarily.**
- **To save an edited recipe, click "Apply" then "Save Recipe as a Different Filename" (disk with pencil icon), change the filename, then click "OK".**
- **3.5.    Measuring your Sample and Reviewing the Data**

- **Place sample beneath the objective lens.**
- **Use the "Live Video" focusing procedure as outlined in 2.1.2 if necessary.**
- **Select the desired measurement recipe, edit and/or "Save As" as desired.**
- **Use the live feed and the x- and y- micrometers to locate the area of interest.**
  - **Use the "Center" tab to move the spot measurement location to the center of the live video display.**
  - **Use "Settings" to adjust the spot size for measuring.**
  - **Use "Zoom" to locate smaller areas/features to be measured.**
  - **Click "Measure". The thickness measurement results should be located in the lower right-hand side of the screen.**

4. **Leaving the tool in an "Idle" state**
   - **Turn off LS-DT2 only; press deuterium and halogen lamp buttons, then press the shutter button.  Switch off pressing switch on the rear side of the instrument**
   - **Do not close FILMeasure software or turn off measurement computer or system main power.**