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Filmetrics SOP
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Filmetrics F-20 UVX, Thin Film Analyzer Standard Operation Procedure

Revision: 1.0 — Last Updated: Dec.10/2010, Revised by Grace Li

Overview

This document will provide a detailed operation procedure of the Filmetrics F-20 UVX. Formal Training is required for all users prior to using the system.

Revision History

#	Revised by:	Date	Modification
1	Grace Li	Dec.1, 2010	Initial Release
2	Tom Cherng	Dec.16th, 2010	First revised
3			
4			
5			

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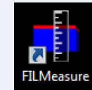
General Information

The Filmetrics F-20 UVX is used to measure the thickness and optical constants (n and k) of dielectric and semiconductor thin film. The wavelength range is from 200 to1700 nm, and measurement range of the film is from 3 nm to 250 µm. The film must optical smooth and within this thickness range. Films that cannot be measured include very rough films and metal films.

Operation Procedure

1. Start Up

- Turn on the power, and allow the system warm up for 30 min. The power including:
  - ▵ Main power (power bar)
  - ▵ Push the knob to turn on Deuterium lamp, hologen lamp and shutter in the **HIGH POWER UV-VIS** control box
  - ▵ Light Source **power button on** FILMETRICS control box**.**
- Sign in the Log Book and notice the previous comments.
- Click on the" FILMeasure" software icon located on desktop. 

2. Film thickness measurements

The measurement steps described below is for the films thickness **greater than ½ micron**, for example: SiO2 on Si
. For the film thickness: (a) less than ½ micron on **thick** transparent substrate: TiO_2 on glass;
(b) less than ½ micron on **thin** transparent substrates: MgF_2 on glass slide. Please refer to "Operation Manual" for more detailed information.

Step 1: Select the film recipe

- Select the film structure to be measured, in this case "SiO_2 on Si", from the **Recipe**

Step2: Edit the film recipe.

- Click the **Edit Recipe** button to open the dialog box
- Check to see that the film sequence matches the actual sample

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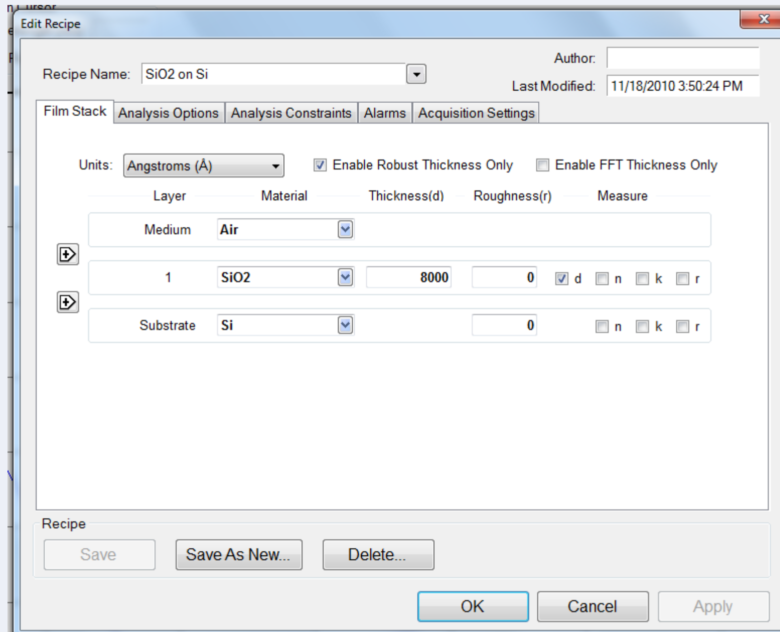

- Enter your best guess for the thickness of the film to be measured
- Check only the SiO_2 layer is being measured

Step 3: Take a Baseline Measurement

- Clicking on the **Baseline** button on the main screen
- Follow the guide from the dialog box through the process:
  - ► First step will consist of a measurement of your sample,
  - ► Second step will measure the reference substrate. (Remove your sample and put a substrate which is the same as your thin film substrate).
  - ► Then make a background measurement by removing the reference substrate from the sample stage.

Step 4: Make the measurement

- Placing your sample on the stage
- Click on the **Measure** button, the FILMesure will then acquire the reflectance spectrum and calculate the corresponding thickness.

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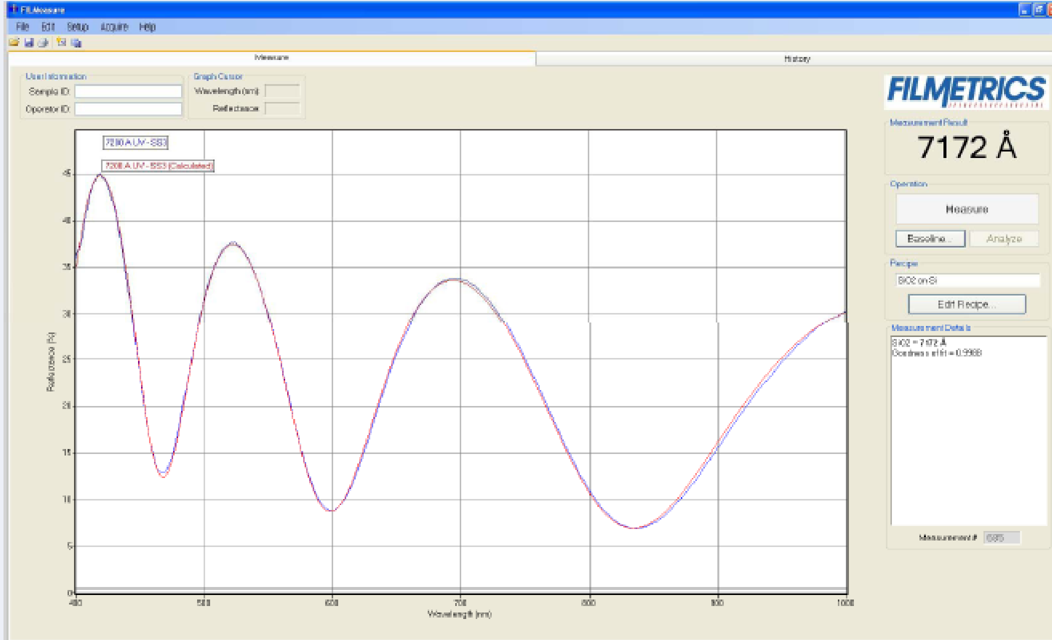

Measured and calculated reflectance spectra when measuring the thick-

The film thickness accuracy depends on the measured and calculated data fitting. If both measured (the blue line on the graph) and calculated reflectance (the red line on the graph) coincides in wavelength with the minima and maxima, then the film thickness is more accuracy. In most cases they will not fit well and separated in some wavelength range. You need go to " Edit recipe" window to adjust the model parameters.

There are several possible causes of an unsuccessful fitting. Those will described in Case #1, #2, #3 and #4 in Operation Manual '**Troubleshooting**" section (page 63-64)

3. Shutdown

- Turn off the **Light Source** power button
- Turn off the three LEDs in the **HIGH POWER UV-VIS** control box
- Turn off the **power** of the power bar
- Sign out the Logbook

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Reference and Files

Operation Manual for the **Filmetrics F-20** .

Contact

Questions or comments in regard to this document should be directed towards Grace Li (gli@4dlabs.ca) in 4D LABS at Simon Fraser University, Burnaby, BC, Canada.