ATAMI Standard Operating Procedure

# Filmetrics F20EX

Last saved by Randy Greb on 2/28/2019 7:29 PM

| Revision | Date | Description/Change | Curator |
|---|---|---|---|
| 0 | 12/19/2019 | New document | Randy Greb |
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| | | | |
| | | | |

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# Contents

## Scope:

Collection of Thin Film thicknesses with the Filmetrics F20EX at Atami.

Introduction to recipe setup for the system.

## System Specifications:

See Description on Atami website.

## Safety:

### General

Normal room protocol.

### PPE Required

Normal room PPE.

### Hazardous Energies

**Electrical**

NA

**Mechanical**

NA

**Stored/Potential**

NA

**Thermal**

NA

### Materials/Consumables Hazards

NA

### Interlocks
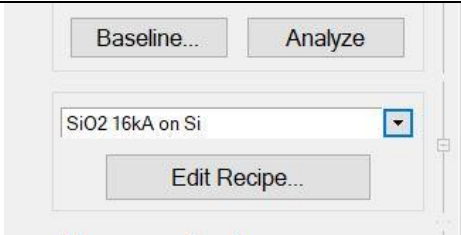
NA

## Training Requirements:

1. Pass all ATAMI required safety courses
2. Finish lab tour with qualified ATAMI trainer.
3. Complete all hands on training for this system and signed off by trainer.
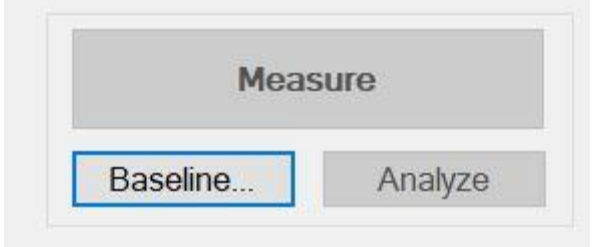4. Verify access to this document for reference.
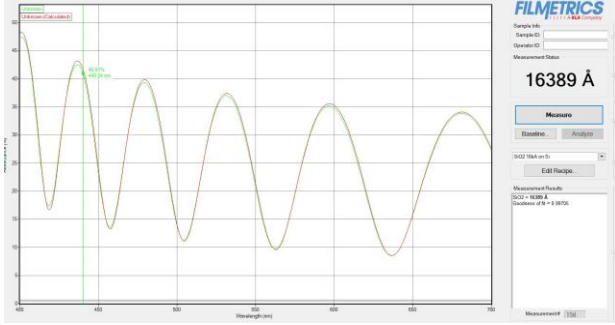
## Standby Condition:
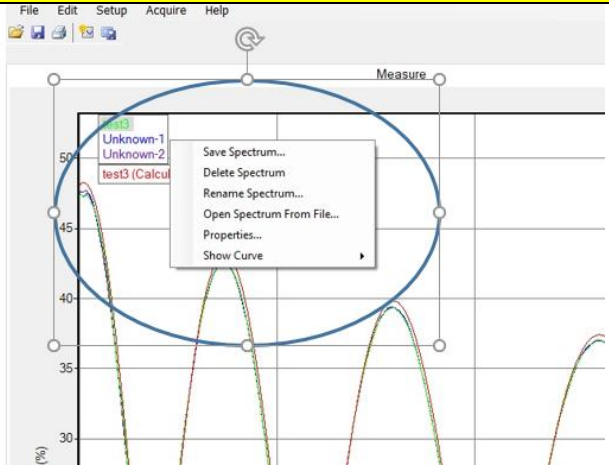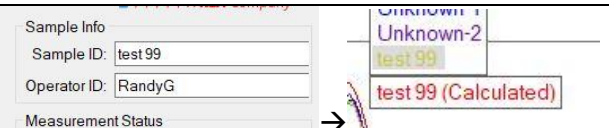
1 Close software
2 Turn light source off.
3 Turn analyzer power off.
4 Put computer to sleep.
5 Log out of card reader.

## Procedures:
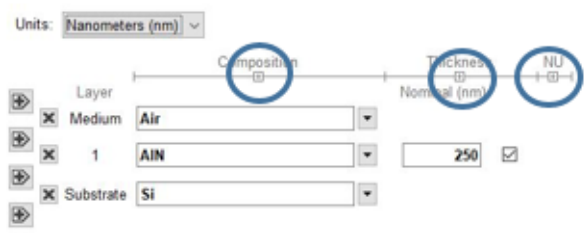
### How to turn on the system and do a basic measurement:
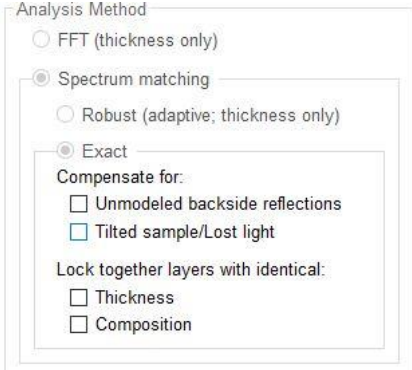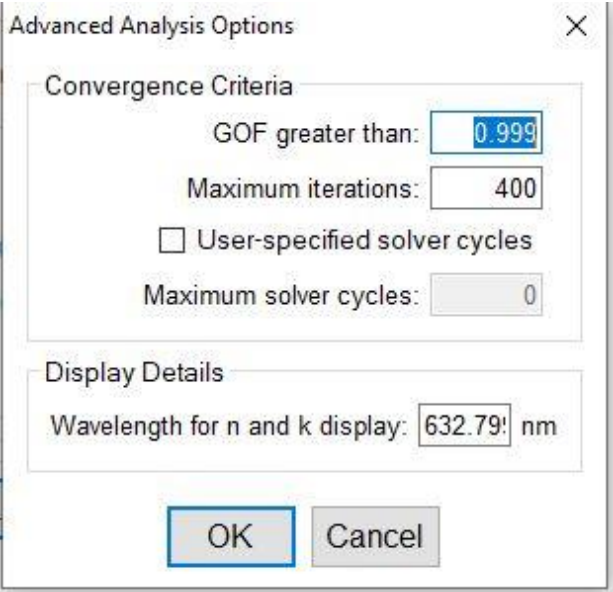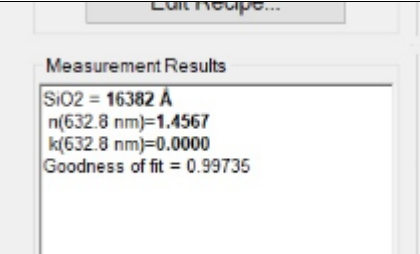
| Step | Action | Notes |
|---|---|---|
| 1 | If power is off, the switch is at the back right of the system. Turn it on. | |
| 2 | Then press the green light source button to turn on the light source. | |
| 3 | Then open the software with the FILMeasure icon. | |
| 4 | Let the lamp warm up for 20 minutes if you want accurate measurements. You can proceed if you just want a quick measurement. | |
| 5 | If you have a known recipe, select it from the dropdown. Otherwise, you'll have to create your own recipe per the procedure below. | |

| Step | Action | Notes |
|------|--------|-------|
| 6 | Place your sample under the light source and press the "Baseline" button.<br><br>Then follow the prompts. The steps are also outlined here. |  |
| 7 | Press "Take Sample Reflectance". | The system will measure reflectance from your sample. |
| 8 | Remove your sample and place one of the reflection samples on the stage. | ATAMI has two standards (Si for bright, BK7 for darker surfaces). You can use either one of these, or use your own, if it matches one of the choices in the reflectance standard drop-down list. |
| 9 | Press "Take Reflectance Standard" | The system will measure reflectance from the reflectance sample. |
| 10 | Remove the Reflectance standard so that there is nothing on the stage. | |
| 11 | Press "Take Background". | The system will measure background noise to be subtracted from the measurement. |
| 12 | After background light level is collected, press "Finish". | |
| 13 | Put your sample back on the stage and press "Measure". | The Filmetrics will then collect the spectrum (reflectance % by wavelength) and display it on the screen. It will also show the value for film thickness, the goodness of fit to the thickness model, and the calculated spectrum for the recipe your used.<br><br>Repeat measurements will be added to the screen. |

| Step | Action | Notes |
|---|---|---|
| 14 | You can right click on the measurement to delete it, rename it, etc… | |
| 15 | You can edit the sample ID and it will display as the name of the plot. | |
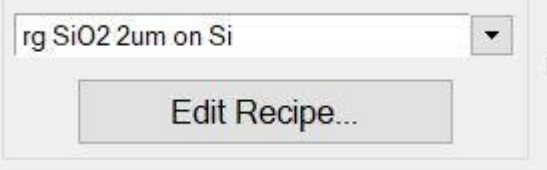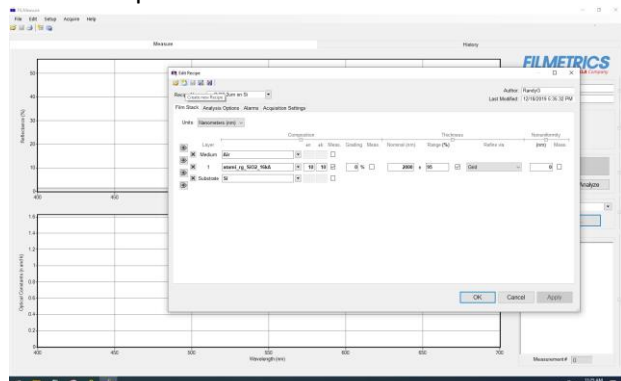
## How to collect n and k values:

| Step | Action | Notes |
|---|---|---|
| 1 | Choose your starting recipe and then press the "Edit Recipe" button. | |
| 2 | Open up all the recipe options by pressing the little plus boxes. | |
| 3 | At this point you can select the check boxes under measure to get information in addition to thickness. | The robust measurement option in the Analysis Options tab will only work for thickness measurements. Any other measurements will |

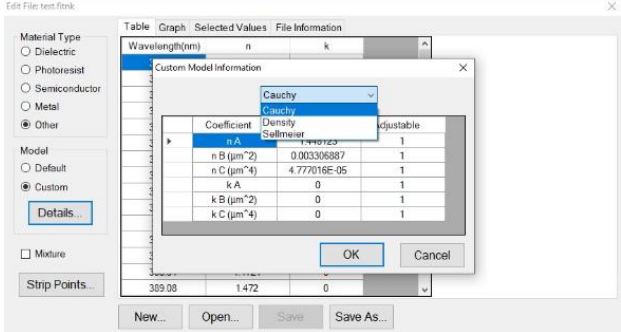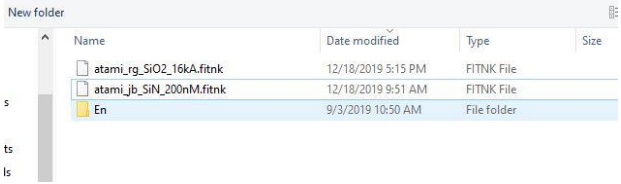| Step | Action | Notes |
|------|--------|-------|
|  |  | switch it to the setup as shown.<br><br>The advance button will allow some changes in the calculations and wavelength used for displaying n and k.  The default is 632.79 nm. |
| 4 | After you change this setup, you can press OK, then Measure again, and the new information will be available. | SiO2 = **16382 Å**<br>n(632.8 nm)=**1.4567**<br>k(632.8 nm)=**0.0000**<br>Goodness of fit = 0.99735 |

## How to create a new recipe:

| Step | Action | Notes |
|------|--------|-------|
| 1 | Press the "Edit Recipe" button. |  |
| 2 | Select an existing recipe to edit, or press the "Create New Recipe" icon. | If you create a new recipe, the default recipe will be loaded as a starting point from there. |
| 3 | Build your film stack in the "Film Stack" tab. | For best result try to get the film stack and associated thickness in the recipe to match as closely to the actual materials as possible.<br><br>This is also where you tell the recipe what to measure.<br><br>The tabs ("Analysis Options", "Alarms", "Acquisition Settings") can be modified for your particular recipe.  Refer to the user manual for more details on these options.<br><br> |
| 4 | You can save the recipe to a different name.<br><br>After re-naming, you can also then save it to a different file location as a backup. | You cannot modify the default recipe. |

## How to import n and k values in to a new custom material file:
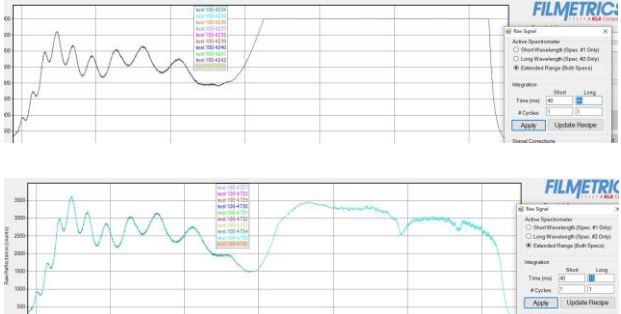
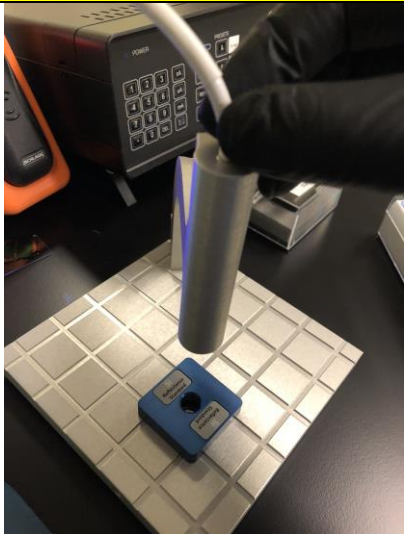| Step | Action | Notes |
|------|--------|-------|
| 1 | After measuring n and k from your sample, select "File-> Save measured n & k...", and save the file to your ATAMI user directory. | This will save the table of n and k values by wavelength. |
| 2 | Select "Edit -> Material Library..." | |

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| Step | Action | Notes |
|------|--------|-------|
| 3 | Press "Open" and then import the values from the file you just saved (extension will be .fitnk). | The Table will then fill in with the saved values and Selected values will be saved. |
| 4 | The model will then be custom. There are three algorithms that you can choose from and fine tune. |  Refer to the supplier documentation and academic literature for more details. |
| 5 | Set the material type, and then Choose "Save As..." to save it. For custom, local materials, **always save the Material Type as "other"** with the naming convention listed here. | The standard material types are reserved for the standard material files from Filmetrics. |
| 6 | **Always save it with this naming convention -** atami_initials_filmtype_thickness.fitnk<br><br>See example to the right. This ensures quick, safe material file management. You can also save backups in your user directory. |  |

## How to adjust illumination:

**This should only be done if you are having issues getting good data from your sample.**

| Step | Action | Notes |
|------|--------|-------|
| 1 | Select the recipe you will be using. | |
| 2 | Place the reflectance standard used with your recipe on the the stage (Si or BK7). | |
| 3 | Select "Setup -> Raw Signal..." | The raw signal will then be displayed. |
| 4 | If any region of the spectrum saturates (4000 counts or higher), you may need to adjust integration times. |  |

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| Step | Action | Notes |
|---|---|---|
| 5 | Adjust the signal by very carefully moving the fiber optic up and down to achieve best maximum signal across the wavelength range of interest. |  |
| 6 | Please note that you will have to reduce Baseline before doing any further measurements. | |

## Misc How To:

**Clear all the graphs in the display:**
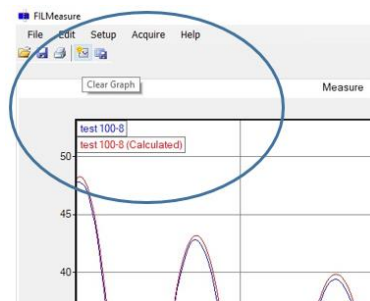


Press the Clear graph icon:

**Save measurement data to a CSV file, delete measurements from history, etc::**

Go to the History tab and use save All **Measurement Functions:**.
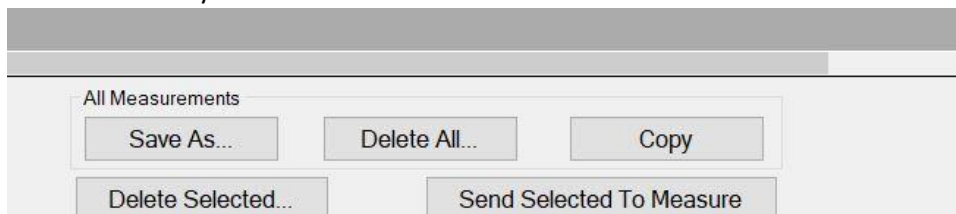


## Standard or Example Recipes:

## Default:

This is the default recipe used when creating a new recipe.  It uses SiO2 on Si.

## Basic Troubleshooting:

### If you:

| Step | If | Then | Notes |
|------|-----|------|-------|
| 1 | **Have a poor goodness of fit on the same sample after getting good results:** | 1. Be sure to do the Baseline before all measurements. | Illumination may have changed. |
| 2 | **Have a poor goodness of fit on a new sample.** | 1. Check your recipe setup, relative to the sample. 2. Be sure to do the baseline setup. 3. Illumination may have dropped.  Check for maximum illumination per the procedure above. | |

### Any other issues:

| Step | If | Then | Notes |
|------|-----|------|-------|
| 1 | Miscellaneous Software and Hardware issues. | Contact ATAMI staff. | |

## Attachments: