Filmetrics F54
Thin Film Mapping Analyzer
User Manual
WARNINGS

DO NOT TOUCH/BEND THE FIBERS

KEEP HANDS AWAY (high speed stage)
WARNINGS

**DO NOT TOUCH/SCRATCH:**
stage reference & background mirror

**AVOID SAMPLE CRASH:**
Measurement objectives
Turn the light source on
Start the FILMapper software

Stage initializes without warnings: KEEP HANDS AWAY!
Move the stage to **Load** position

**RISK OF DAMAGING THE OPTICS:**
Do not load with stage under the objective!
Sample loading: good practice

OK (stage at 0,100)

NO EXCHANGE UNDER OBJECTIVE!
Choose a **Recipe** and **Edit** it

From **Wafer Map** tab:

From **Measurement** tab:

(Under **Thickness**, n, k, r)
Pick a **Recipe**

- **CMI** folder: standard recipes (DO NOT MODIFY)
- **Users** folder: custom recipes
Define the stack (Film Stack tab)

- Choose the **units** (µm, nm, Å)
- Define **substrate/film(s)/medium**
- Input expected **thickness** (nominal ± range), tick to measure (enable fit)

• -> Move to Analysis Options
Specify Analysis Options

- Limit the **Wavelength Range** if appropriate
- Adjust moving-average **Smoothing** to denoise the spectrum (use >=1000um to disable)
- Change **Method** to Exact for stacks and/or thickness <150nm

-> Move to **Wafer Map**
Choose a Wafer Map

- Modify **measurement configuration** (sample size, number of points, exclusion, ...)
- OK to limit **autofocus in center** for the sake of speed

-> Move to **Acquisition Settings**

Advanced options (including Deskew) under **Wafer Map** tab: Edit -> Map Pattern...
Acquisition settings

- Enable/disable **Autofocus**
- Available methods are Goodness Of Fit, Max of reflectometer signal, and Image-based focus

- Save As to create a new recipe (DO NOT OVERWRITE CMi ones)

-> Acquire a **Baseline** (optional) and perform a **Measurement**
Objective and Baseline

- Select the objective matching the current configuration (IMPORTANT!)

- Optional: take a Baseline measurement (lamp warm-up time ~5min)
Objectives

- **5x** - red ring (spot size 50µm)
- **15x** - violet ring (spot size 17µm)
Baseline procedure

1. Load your sample
2. Acquire sample reflectance
3. Unload sample and load reference standard (Si)
4. Acquire reference standard reflectance
5. Let the machine acquire the background (45° mirror) and align the stage
6. Unload reference standard and load your sample

To move the stage (when prompted)

• Loading position is (100,0)
• Wafer center is (0,0)
Baseline calibration sample for SiO2 on Si

Filmetrics calibration sample:
1. Sample reflectance calibration region (go to 30,0)
2. Reference reflectance calibration region (go to 0,0)
3. (patterned sample region)

One Si wafer available for reference reflectance calibration
Baseline steps

1. Sample reflectance (your wafer)

2. Reflectance standard (Si wafer)
Baseline warning

Software issues a warning in case of important **intensity difference** after new baseline.

This can be due to:

- Lamp state (off or burnt, not warmed-up)
- **Objective** used for last baseline

Acknowledge if it makes sense!
Point measurements

• **Navigate** to the point of interest by means of
  • camera and \( r/\theta \) controls (arrows), or
  • **Go To...** button (wafer center: 0,0)

• **Click** **Measure**
  Check goodness of fit (GOF)
Measurement summary (History tab)

• Basic **statistics** available in realtime on all stored data => **Purge** history

• **Export** to text/spreadsheet
Wafer Mapping

Click on Start

Interacting with the map:
• **Left click**: go to point
• **Right click**: mark as invalid/interpolate from neighbours
Turn lamp off when done!
# Tool specifications

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<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Thickness Range</strong></td>
<td>~20nm -- ~40um</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>2nm or 0.2%</td>
</tr>
<tr>
<td><strong>Precision</strong></td>
<td>0.2nm</td>
</tr>
<tr>
<td><strong>Stability</strong></td>
<td>0.05nm</td>
</tr>
<tr>
<td><strong>Wavelength range</strong></td>
<td>380-1050nm</td>
</tr>
<tr>
<td><strong>Spot size</strong></td>
<td>250um aperture: 50um@5x, 17um@15x (on request) 500um aperture: 100um@5x, 33um@15x</td>
</tr>
<tr>
<td><strong>Typical speed</strong></td>
<td>5 points: 5”</td>
</tr>
<tr>
<td></td>
<td>25 points: 25”</td>
</tr>
<tr>
<td></td>
<td>56 points: 29”</td>
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