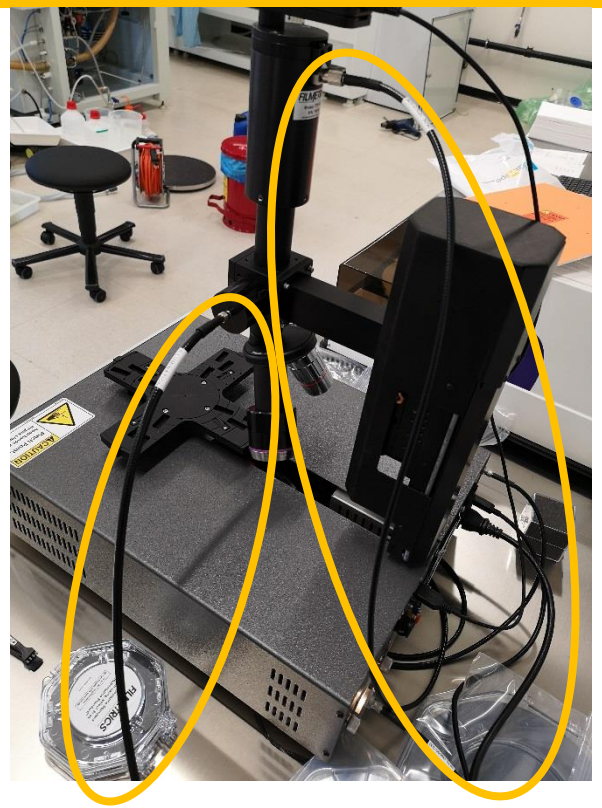
Filmetrics F54

Thin Film Mapping Analyzer

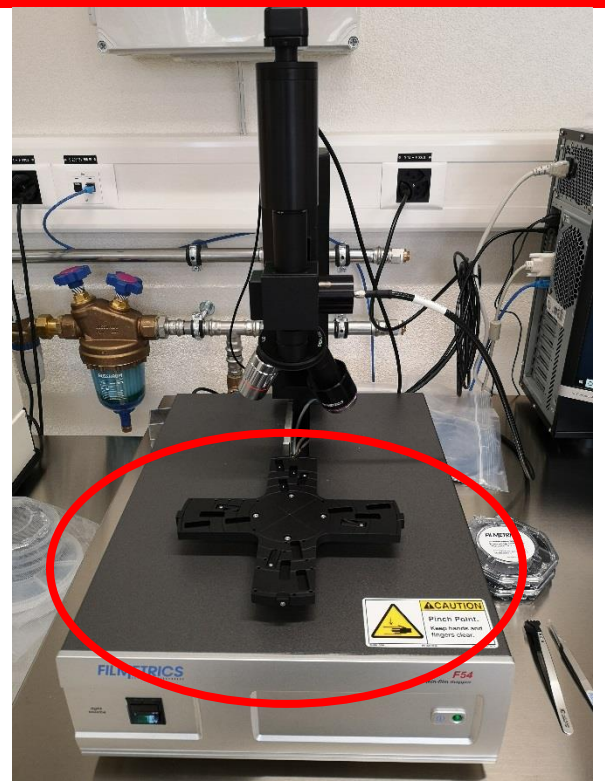
User Manual

WARNINGS

DO NOT TOUCH/BEND THE FIBERS



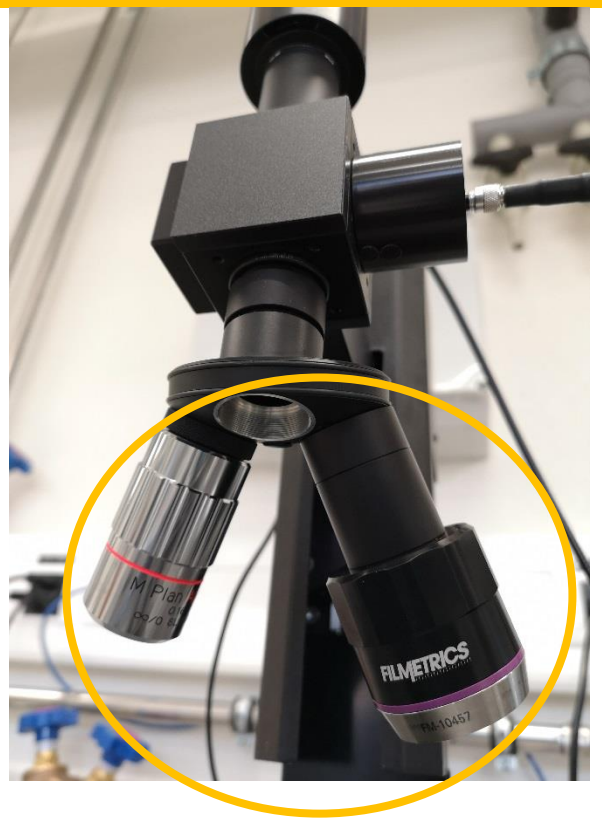
KEEP HANDS AWAY (high speed stage)



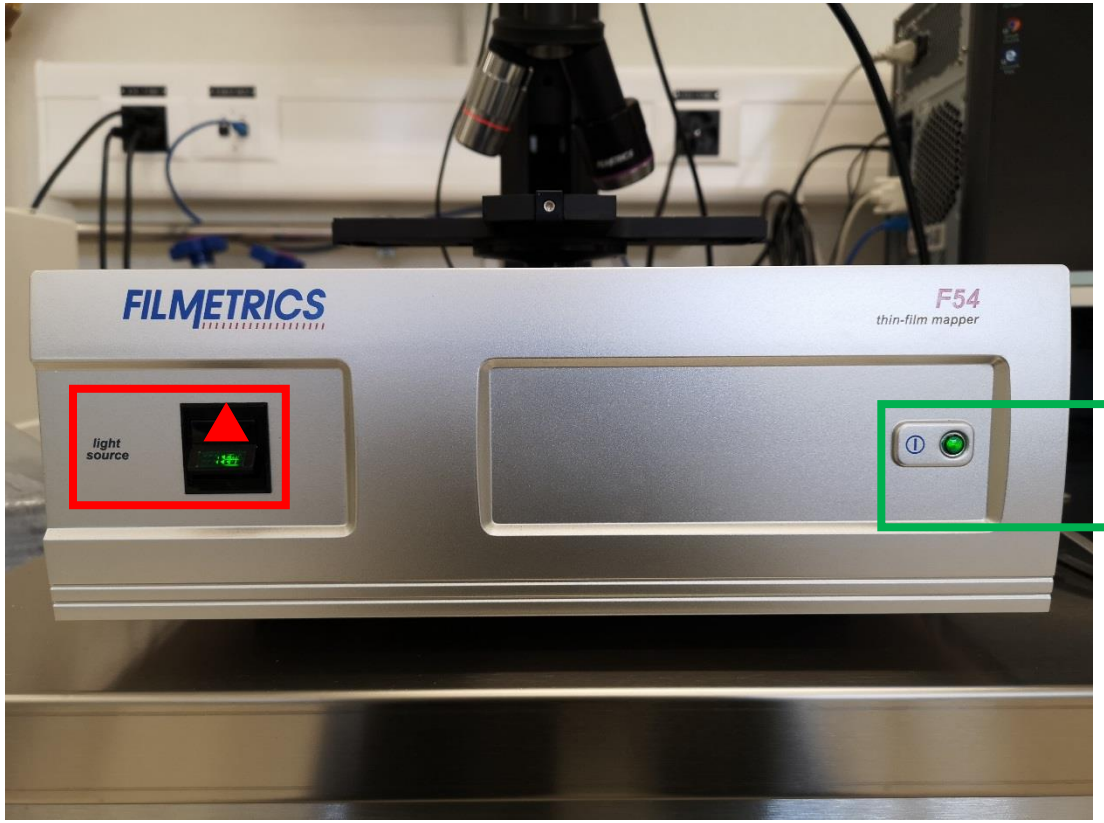
WARNINGS

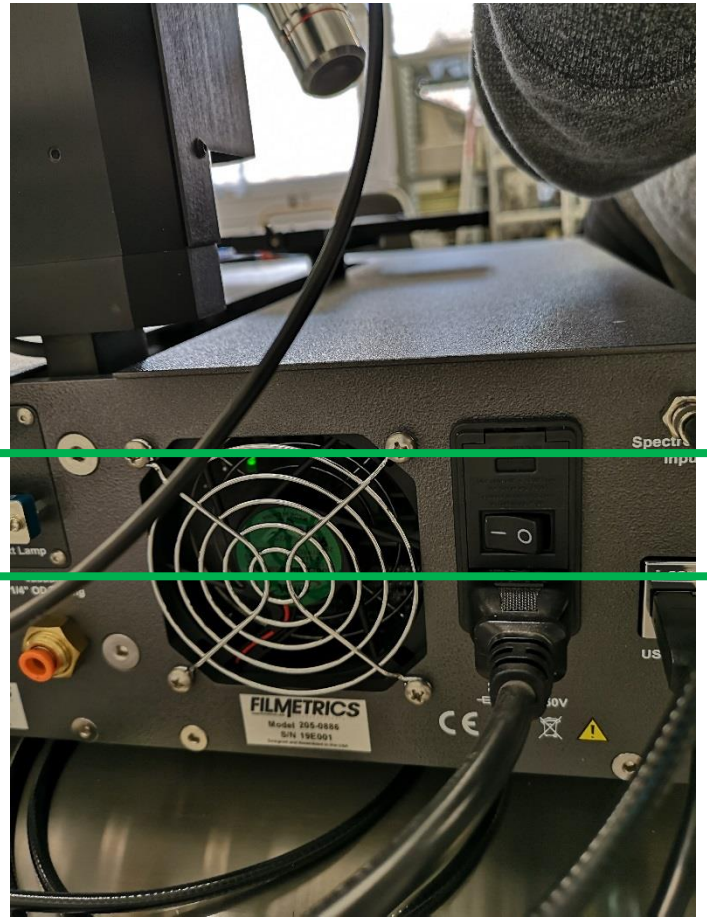
DO NOT TOUCH/SCRATCH:
stage reference & background mirror

AVOID SAMPLE CRASH:
Measurement objectives



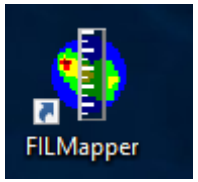
Turn the light source on

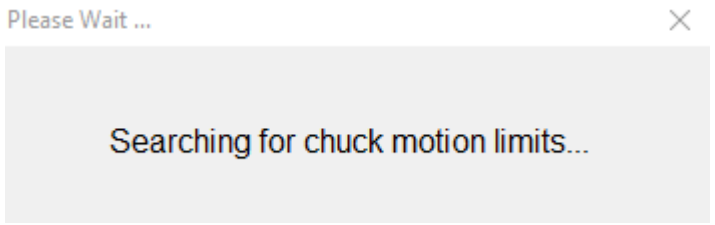


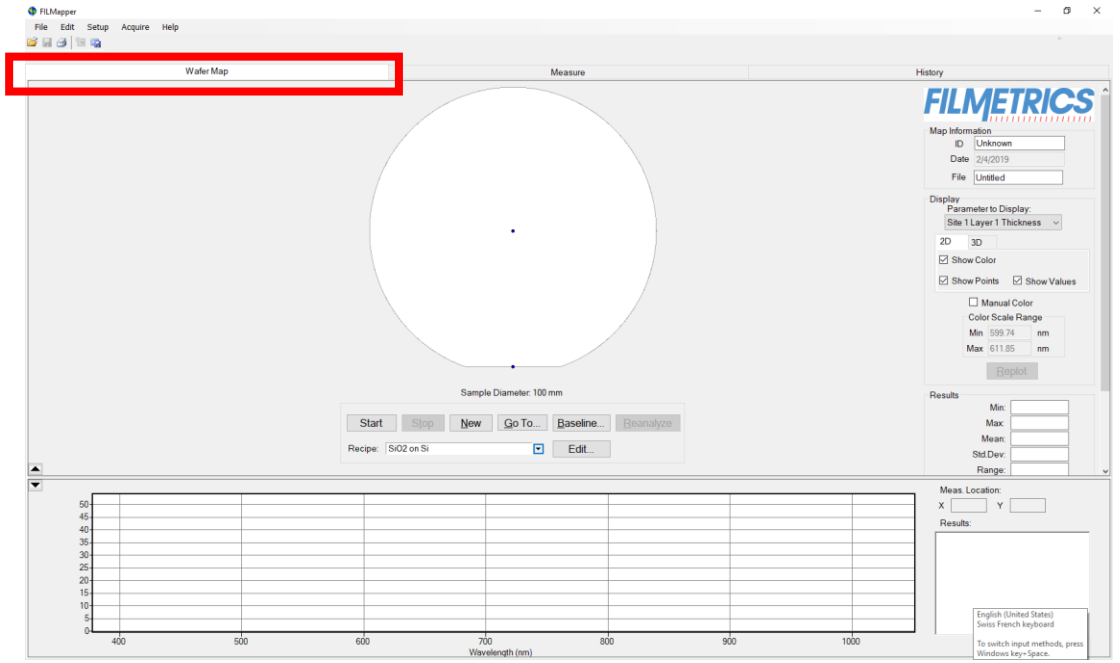


Tool usually always ON

Start the **FILMapper** software

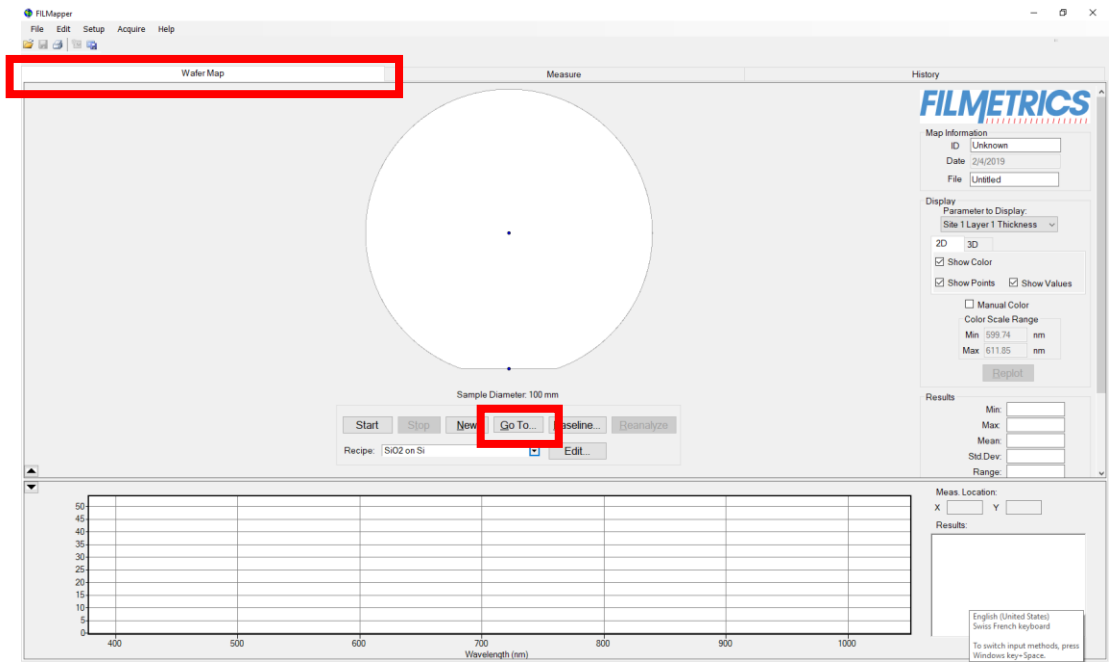


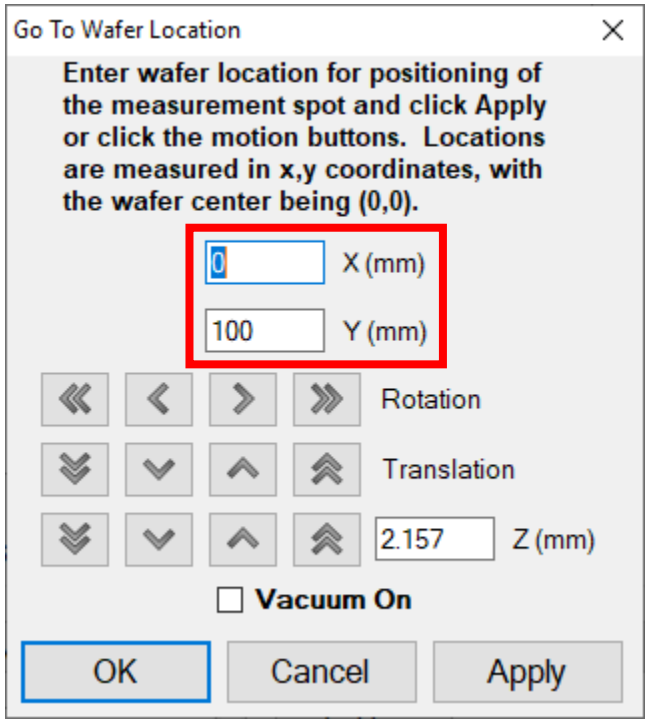




Stage initializes without warnings:
KEEP HANDS AWAY!

Move the stage to **Load** position

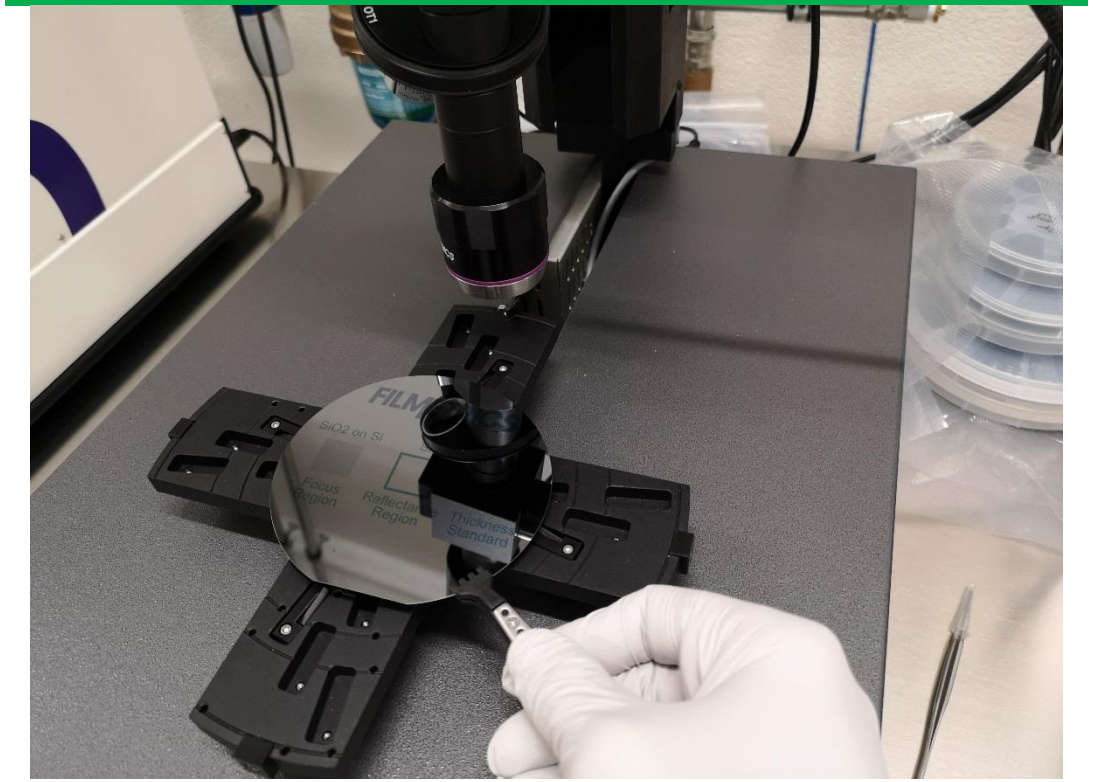




RISK OF DAMAGING THE OPTICS:
Do not load with stage under the objective!

Sample loading: good practice

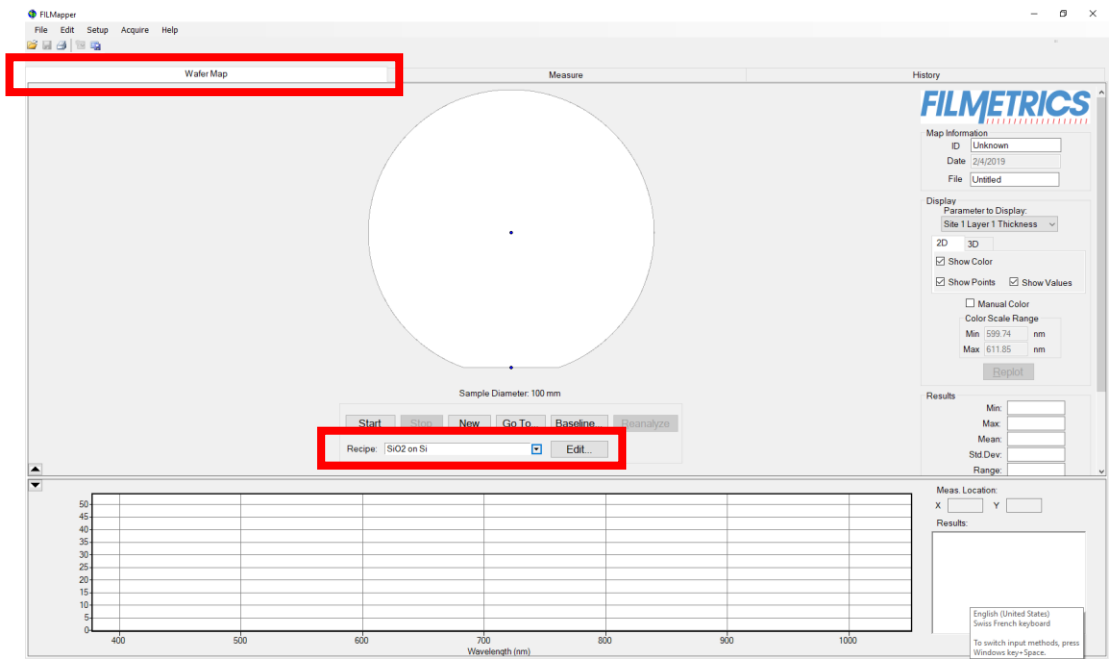
OK (stage at 0,100)



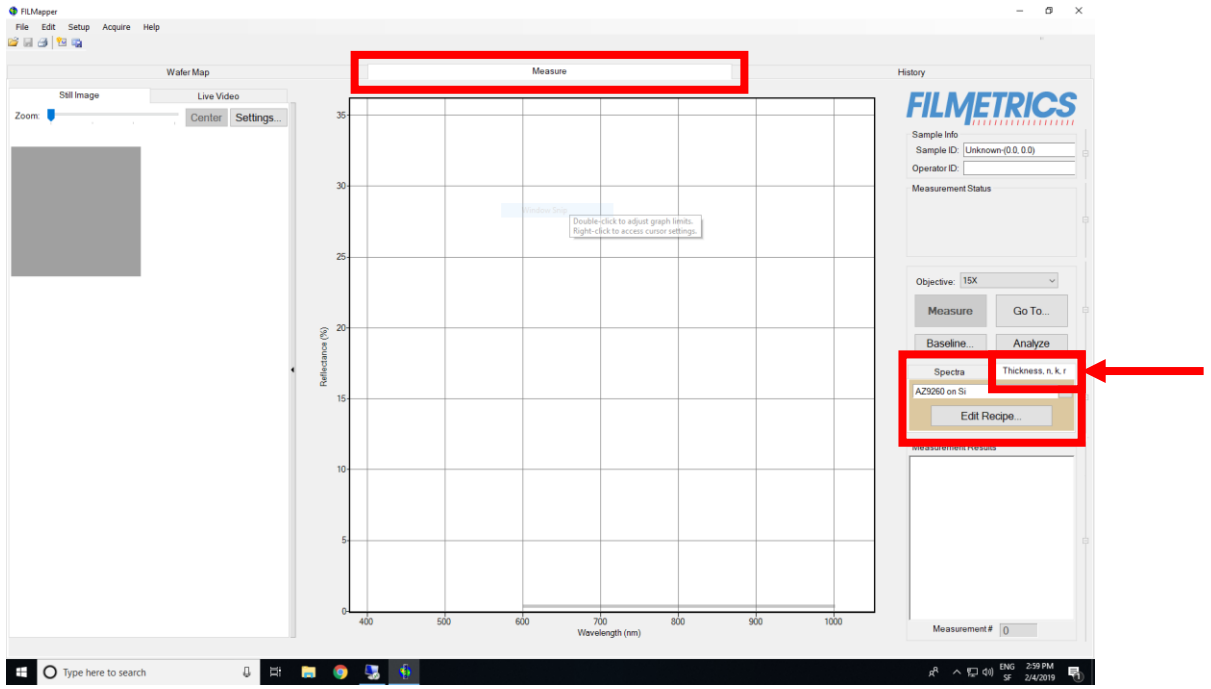
NO EXCHANGE UNDER OBJECTIVE!

Choose a **Recipe** and **Edit** it

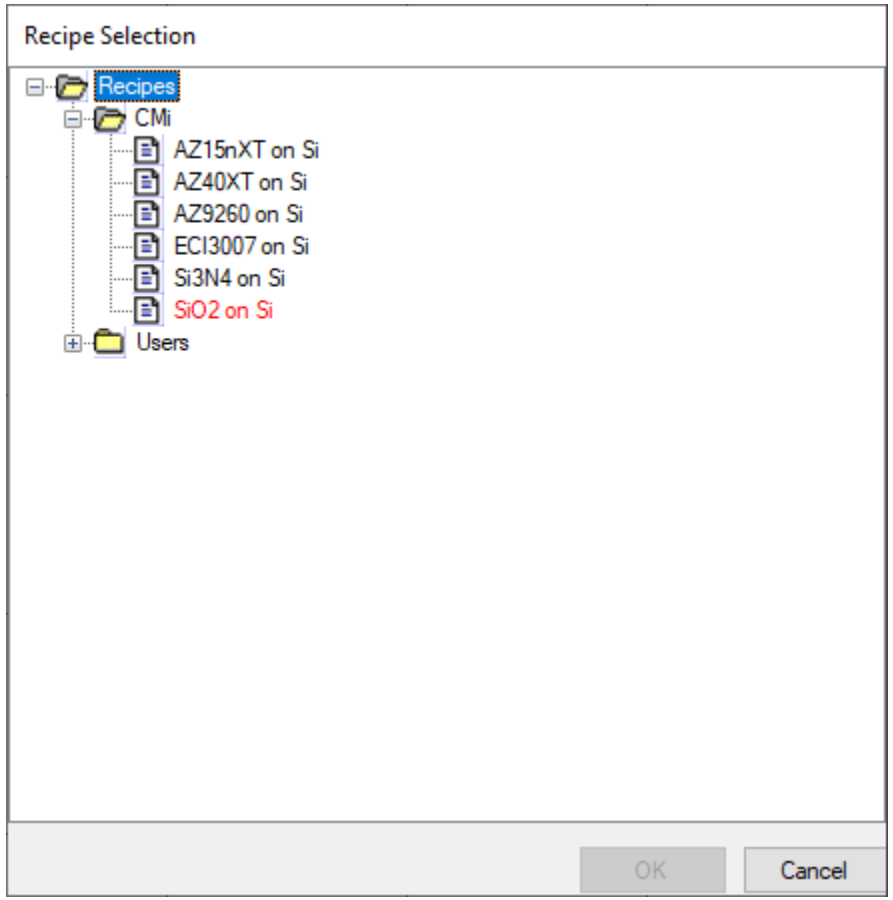
From Wafer Map tab:



From Measurement tab:
(Under Thickness, n, k, r)

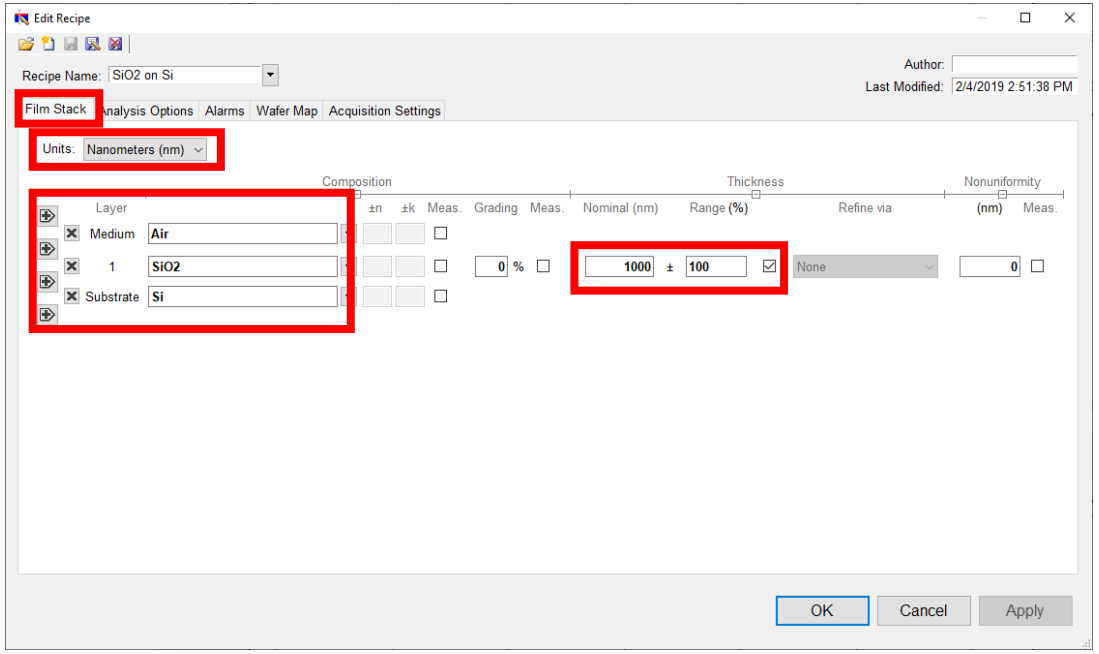


Pick a **Recipe**



- **CMi** folder: standard recipes (DO NOT MODIFY)
- **Users** folder: custom recipes

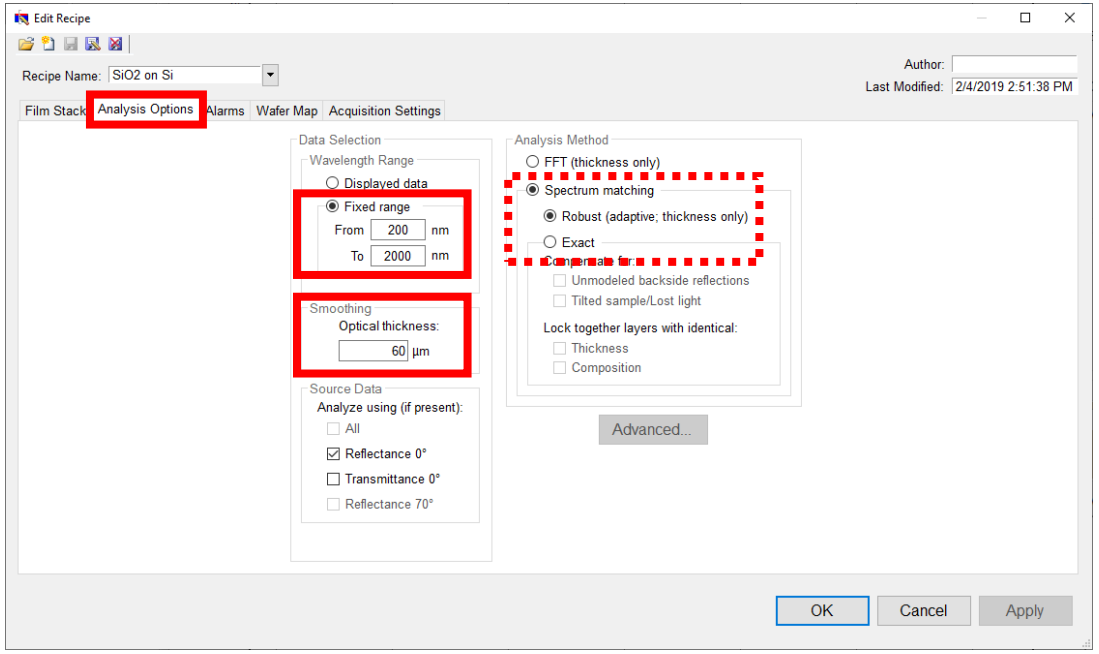
Define the stack (**Film Stack** tab)



- 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

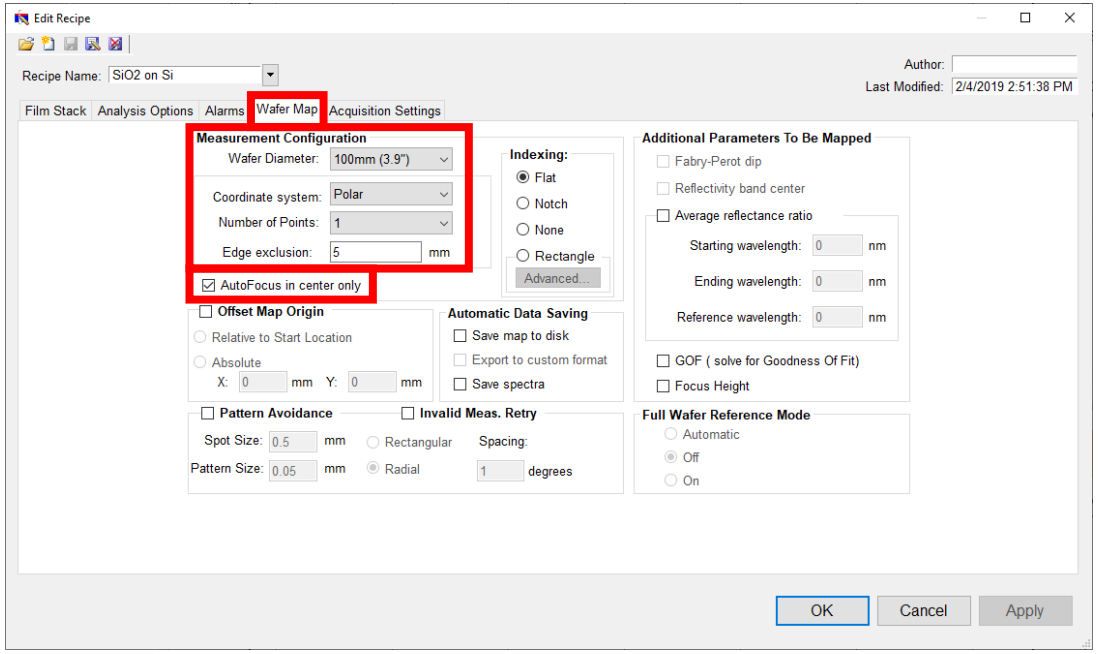
Specify Analysis Options



- 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

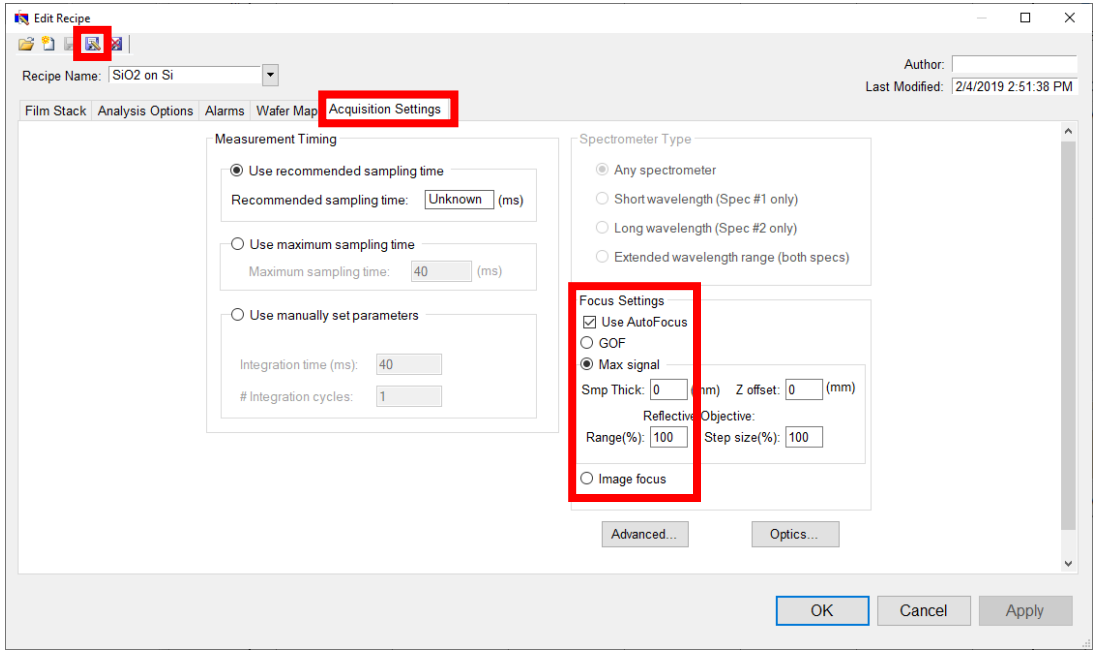


- Modify **measurement configuration** (sample size, number of points, exclusion, …)
- OK to limit **autofocus in center** for the sake of speed

-> Move to Acquisition Settings

Advanced options (including Deskew) under Wafer Map tab: Edit -> Map Pattern…

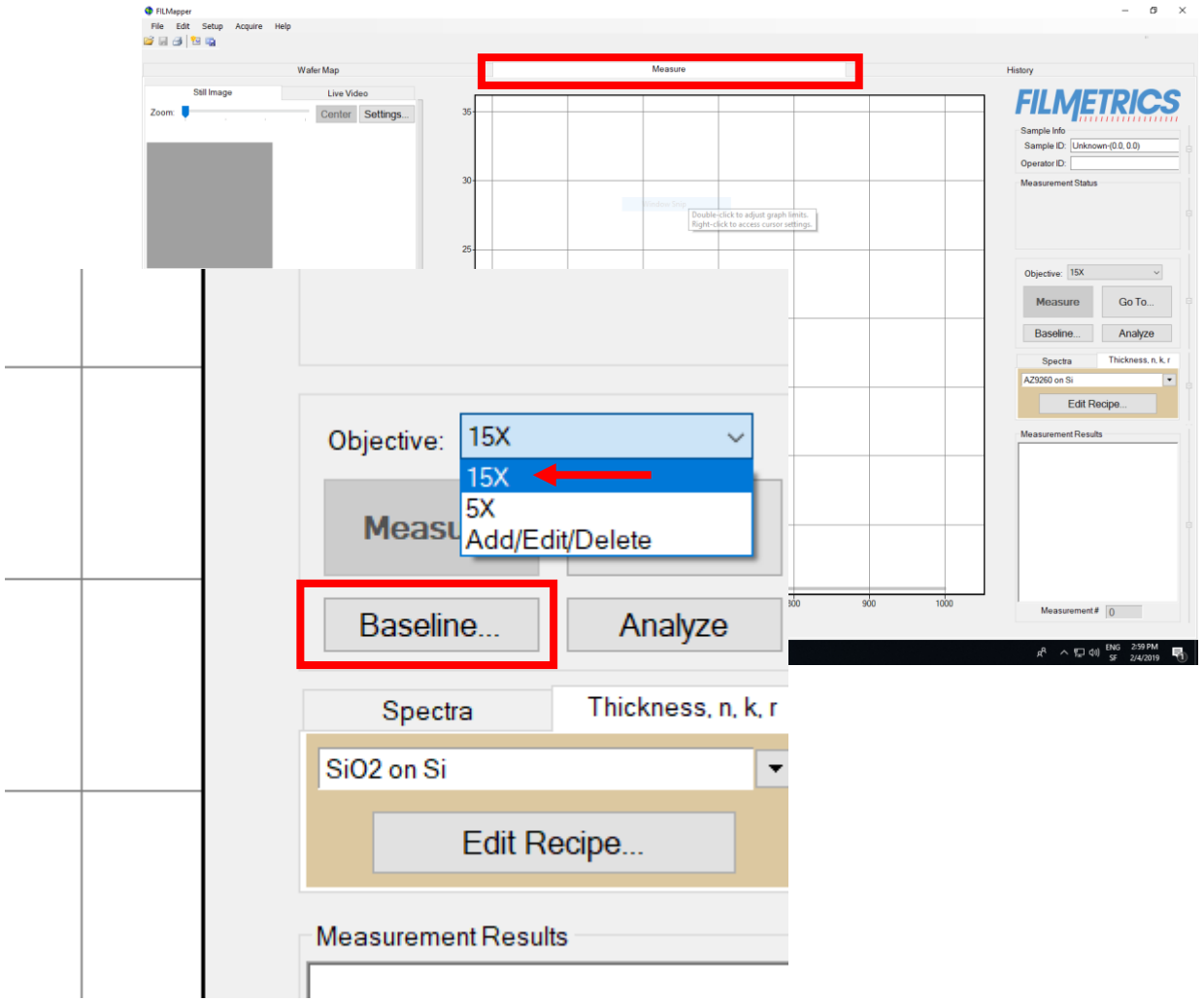
Acquisition settings



- 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)

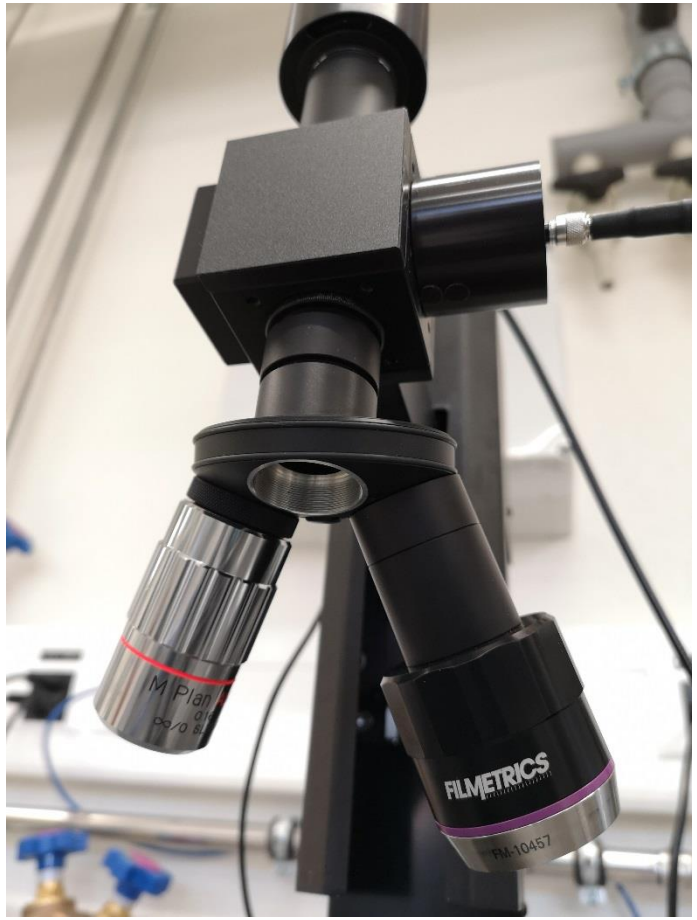
-> Acquire a Baseline (optional) and perform a Measurement

Objective and Baseline

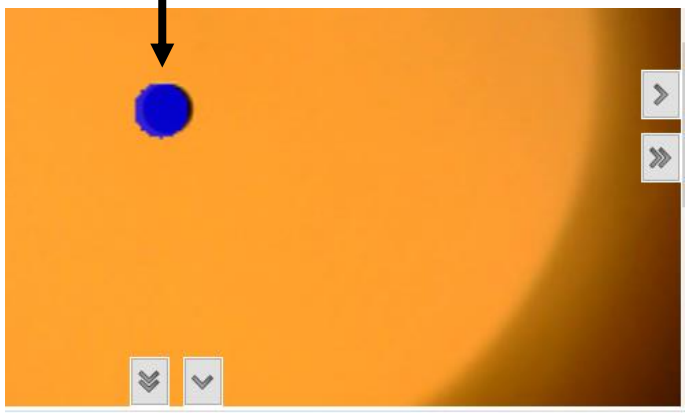


- Select the objective matching the current configuration (IMPORTANT!)
- Optional: take a Baseline measurement (lamp warm-up time ~5min)

Objectives



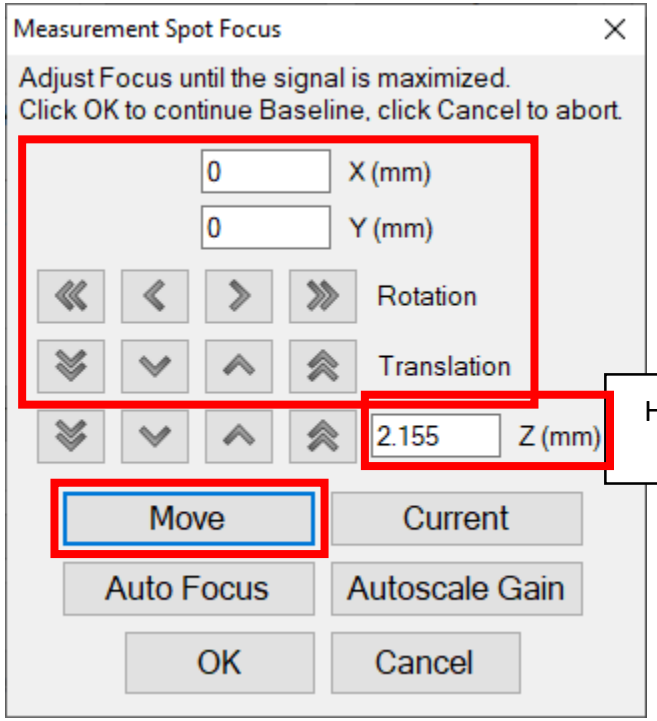
- 5x -red ring (spot size 50µm)
- 15x -violet ring (spot size 17µm)



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)



Height for best autofocus on 525µm-thick wafers

- **Loading** position is (100,0)
- Wafer **center** is (0,0)

Baseline calibration sample <u>for SiO2 on Si</u>

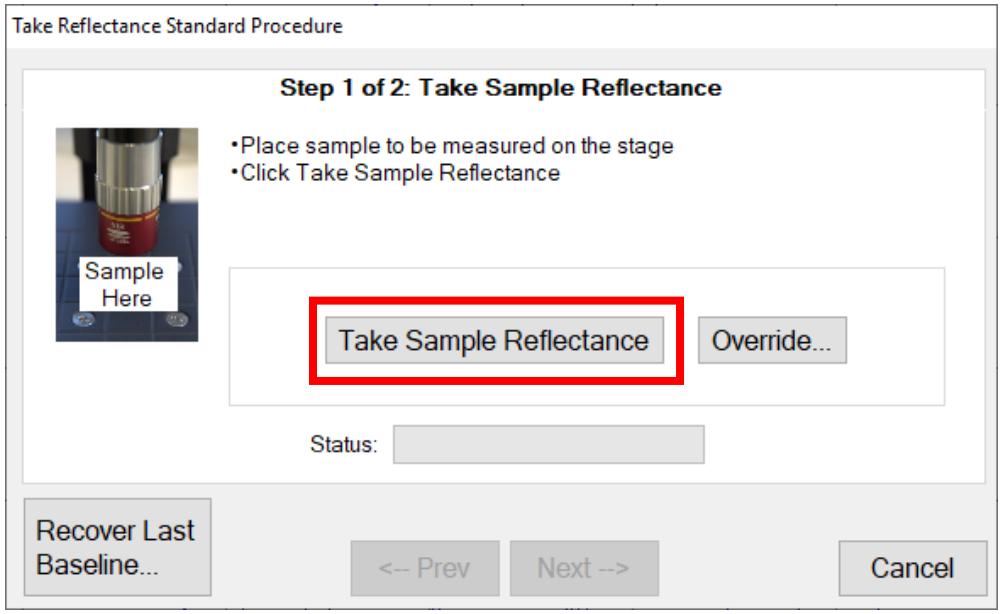
Filmetrics calibration sample:

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

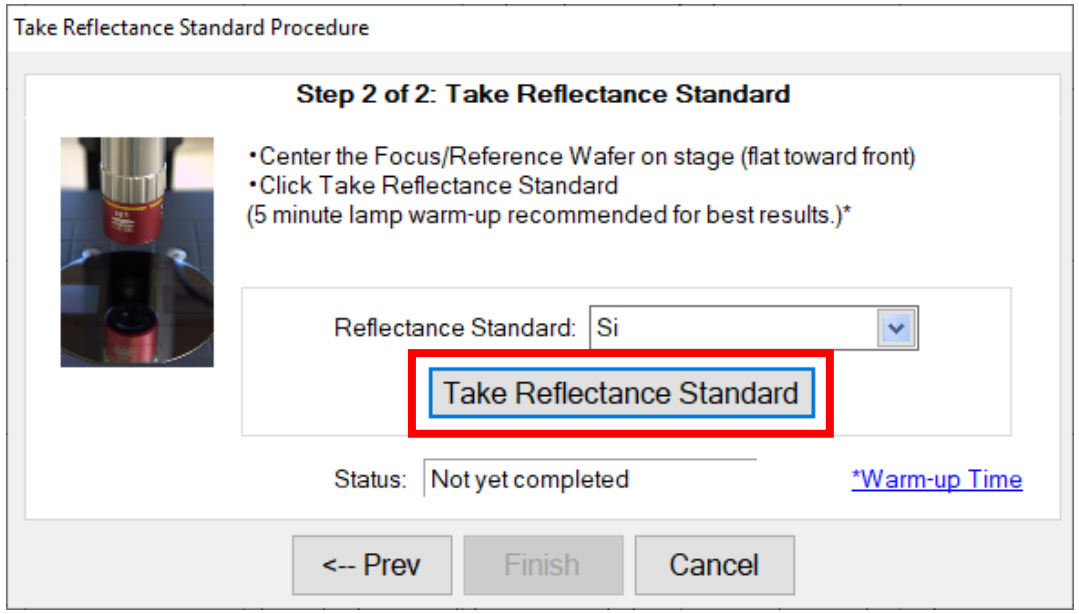
One Si wafer available for reference reflectance calibration

Baseline **steps**

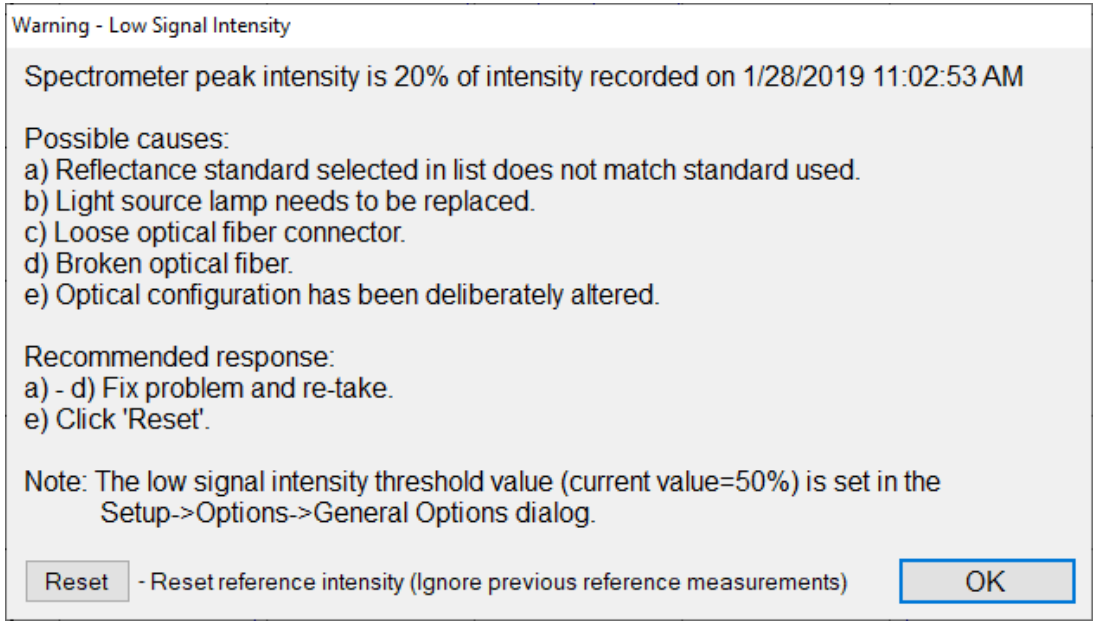
1. Sample reflectance (your wafer)



2. Reflectance standard (Si wafer)



Baseline **warning**



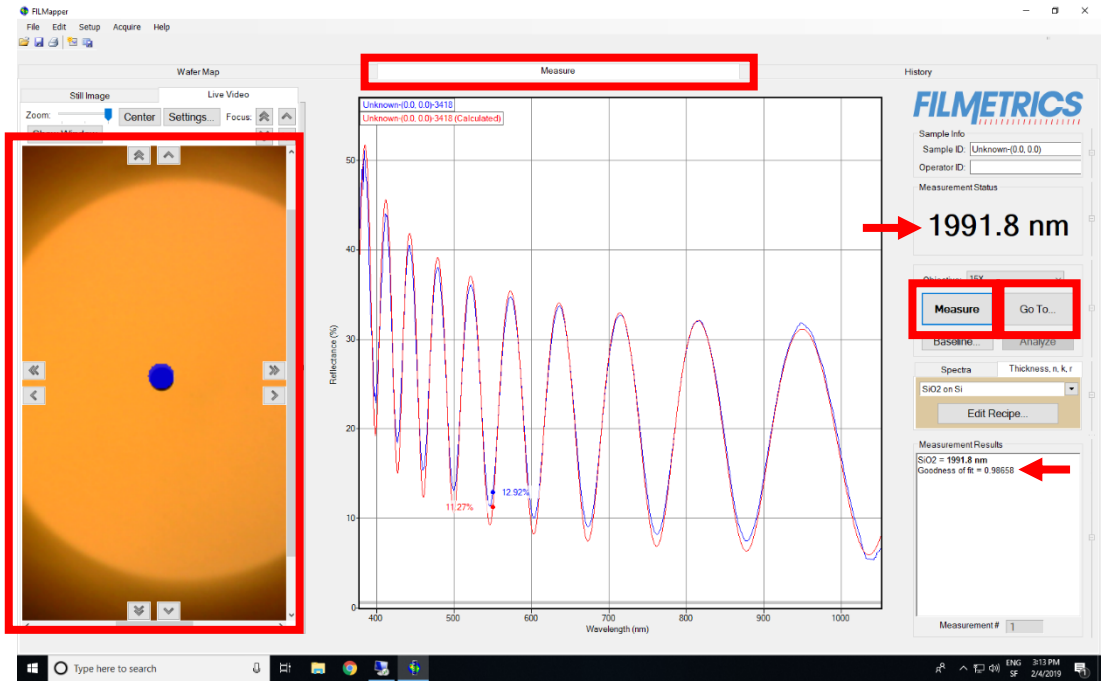
Software issues a warning in case of important **intensity difference** after new baseline

This can be due to

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

Acknowledge if it makes sense!

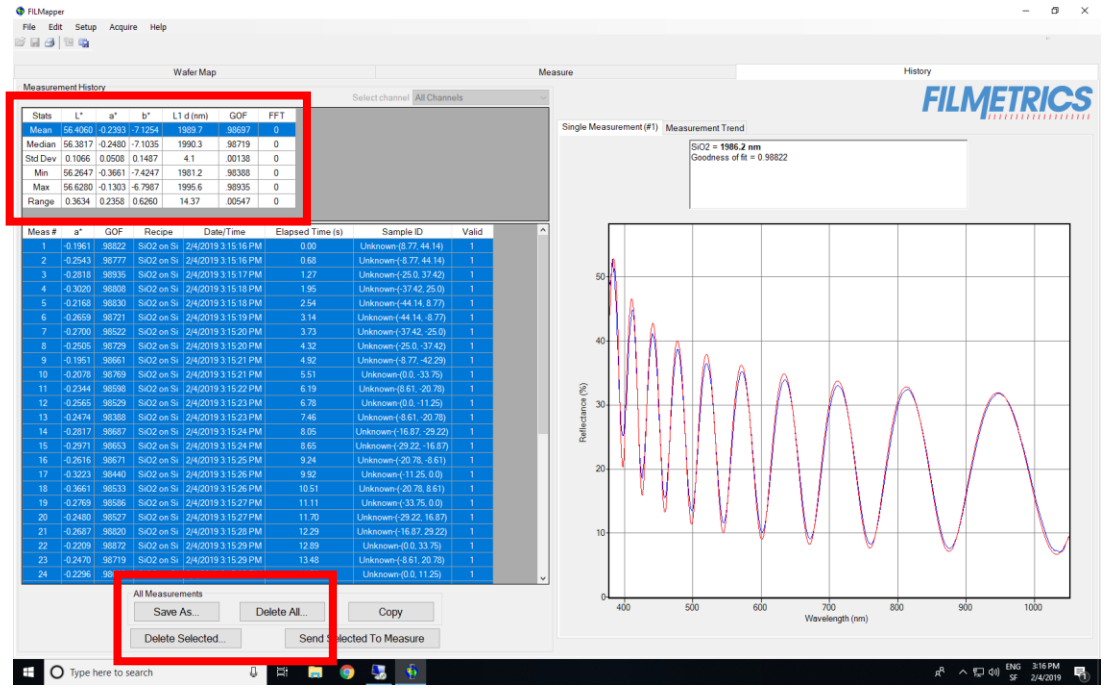
Point measurements



- **<u>Navigate</u>** to the point of interest by means of
  - camera and r/theta controls (arrows), or
  - Go To… button (wafer center: 0,0)

- **<u>Clic</u>** Measure
  Check goodness of fit (GOF)

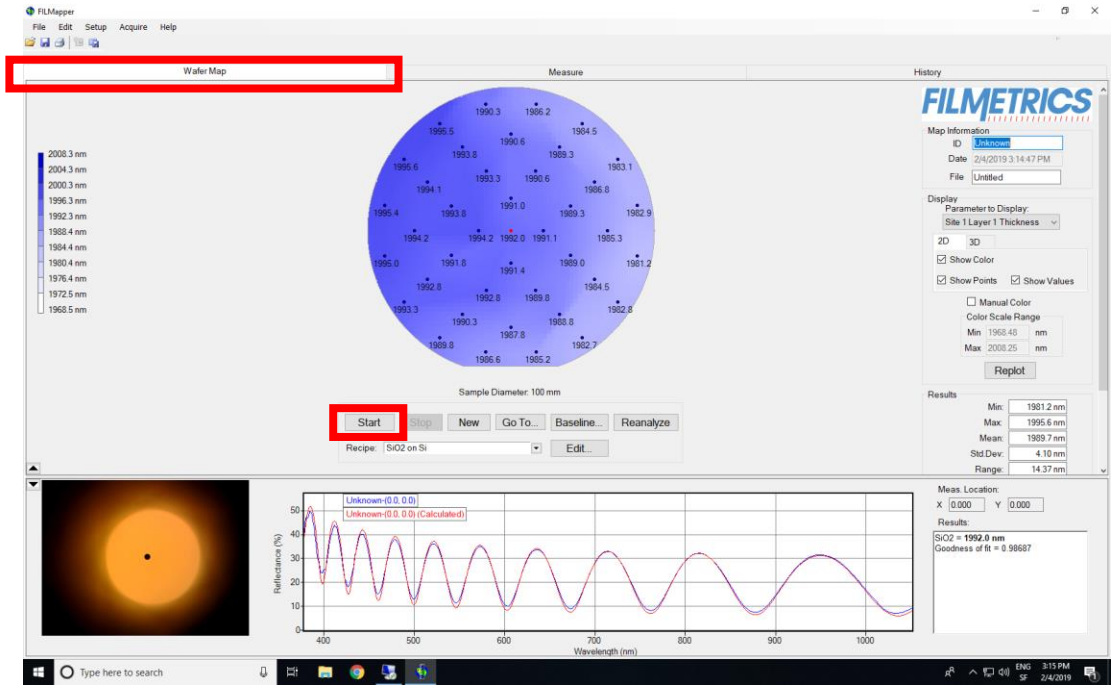
Measurement summary (History tab)



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

- **Export** to text/spreadsheet

Wafer Mapping

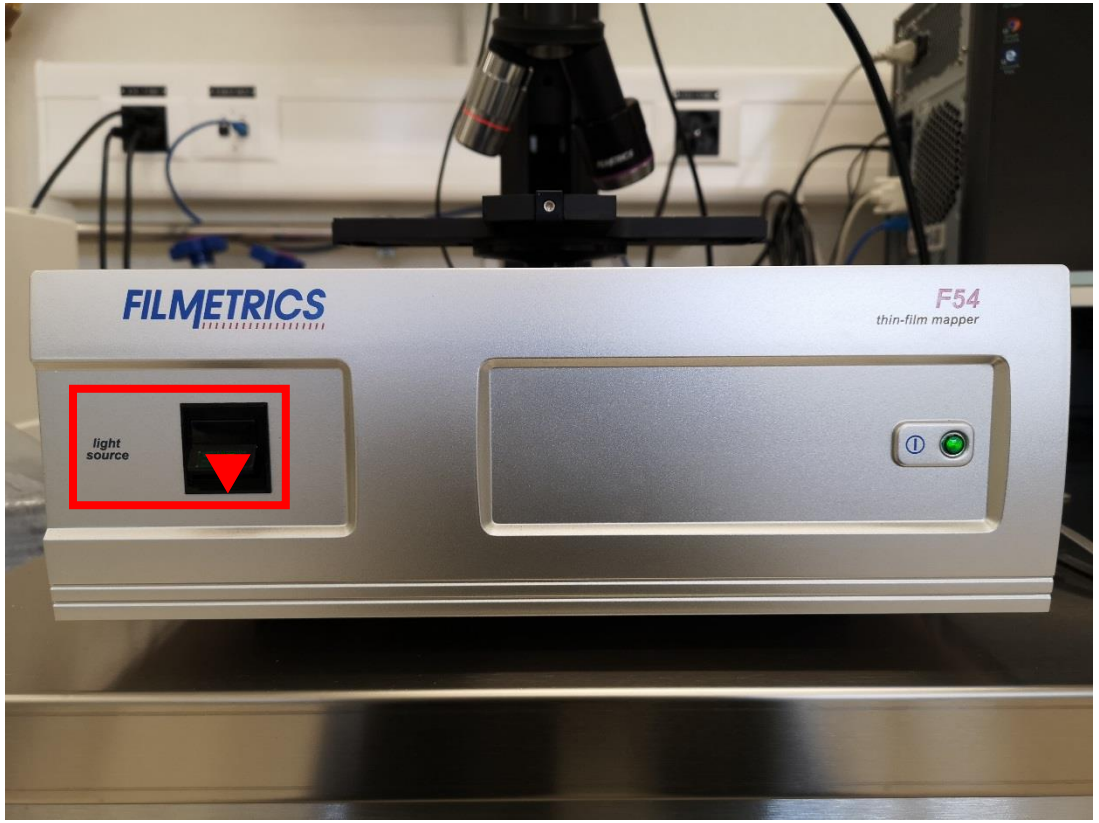


Click on Start

Interacting with the map:

- Left click: go to point
- Right click: mark as invalid/interpolate from neighbours

Turn lamp off when done!



Tool specifications

Thickness Range	~20nm -- ~40um
Accuracy	2nm or 0.2%
Precision	0.2nm
Stability	0.05nm
Wavelength range	380-1050nm
Spot size	250um aperture: 50um@5x, 17um@15x (on request) 500um aperture: 100um@5x, 33um@15x
Typical speed	5 points: 5’’ 25 points: 25’’ 56 points: 29’’