

SET-UP

1. Connect FR-pOrtable to a free USB port of your PC.
2. Launch the **FR-Monitor** program by double clicking on icon  on computer's desktop.

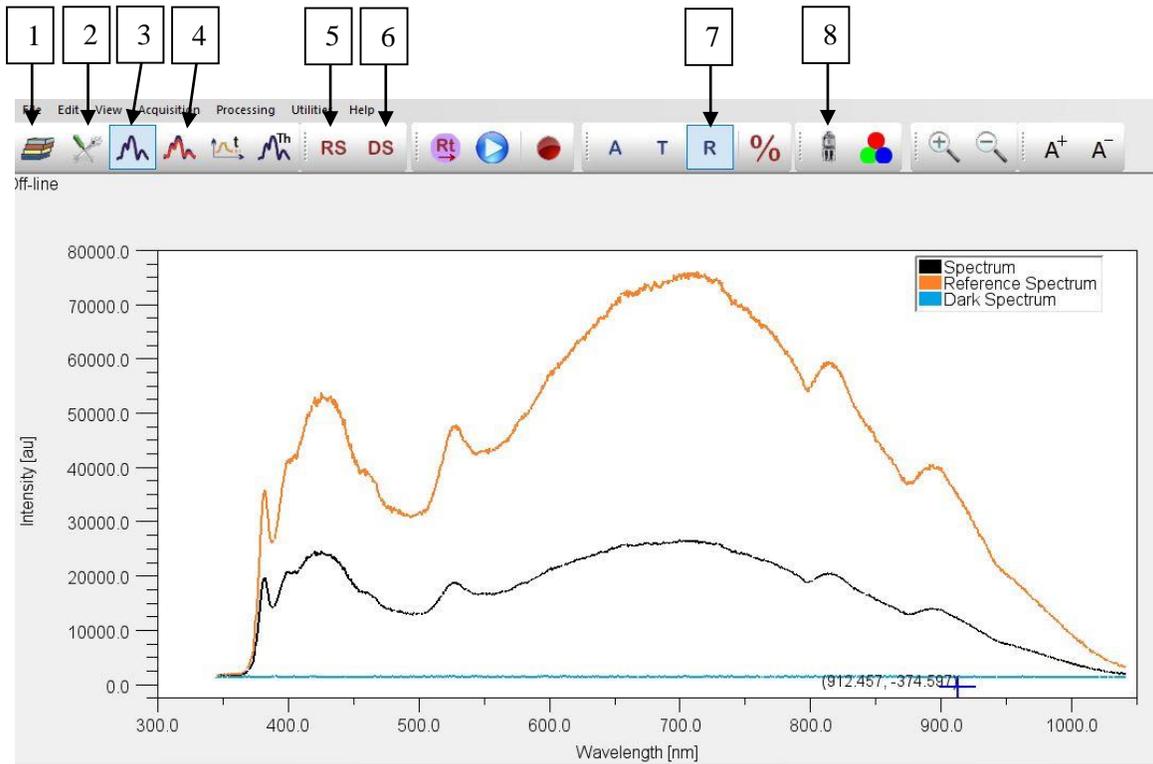


Figure 1 Real-time View of the experimental Silicon spectrum (black line), the corrected Silicon spectrum (red line) and the dark spectrum.

3. Make sure that the **Real-time View mode**  (button No 3) is activated. The spectrum seen in FR-Monitor is as analyzed by the spectrometer (a.u.) with the current acquisition parameters.
4. **Acquire the Dark spectrum** by pressing button No 5, **DS**.
5. **Turn on the light source** of FR-pOrtable by activated the lamp button  (No 8). The light should be turned-on at least 10 minutes, in order to stabilize, before taking a measurement.
6. Place the Si reference sample, labelled as “A”, under the probe. The recommended number of the intensity counts (a.u.) is around 20,000. Optimize the **height** of the probe from the sample, and the **integration time** from configuration button  (button No 2). A good starting point is: height from 7mm to 15mm and integration time from 50ms to 150ms. However it depends on the reflectivity of the sample of interest.
7. If any parameters on step 6 altered, repeat step 4.
8. **Acquire the reference spectrum** by pressing the Reference button **RS** (No 5).
9. Activate spectrometer's **calibration file** from the configuration window, by pressing button No 2, , and selecting “Silicon” as the material for reference correction.

THICKNESS MEASUREMENT:

1. Place the sample of interest under the probe.
2. Switch from “Real time view” to “Fit view” by pressing button No 4, , and make sure you operate on **Reflection mode**  (button No 7).
3. Set the materials of each layer of your sample from Layer Stack tab on toolbox using **Category** and **Material** (columns No 9 and 10, respectively). (Materials can be manually added or edited from the **Material database** , button No 1).

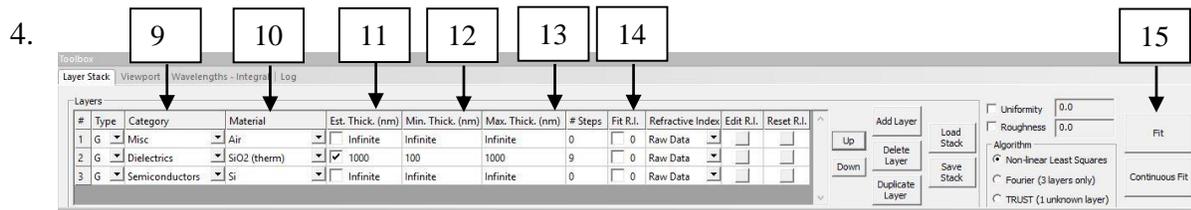


Figure 2 Layer Stack tab on Toolbox placed on the bottom of FR-Monitor (default position)

Note: The top layer of the stack (air in this case) is the environment above the sample (usually air). The bottom layer is the substrate (or air for suspended films). Both of these layers are being considered of infinite thickness.

5. Click on the checkbox of column **Est. Thickness** (No 11), to select the layers for which the thickness is going to be measured.
6. Set the **estimated minimum, maximum thickness values** and the **number of steps** (above 8 is recommended) on columns No 12, No 13 and No 14, respectively.
7. Click on the **Fit** button (No 15). The fitting process will take place. If the fitting is successful, the minima and the maxima of the calculated reflectance (the **red line** on graph) will coincide in wavelength with the minima and maxima of the measured reflectance (the **dark line** on graph). The measured film thickness and the information of the fitting process will be displayed on the right side of the main window, see figure 3.

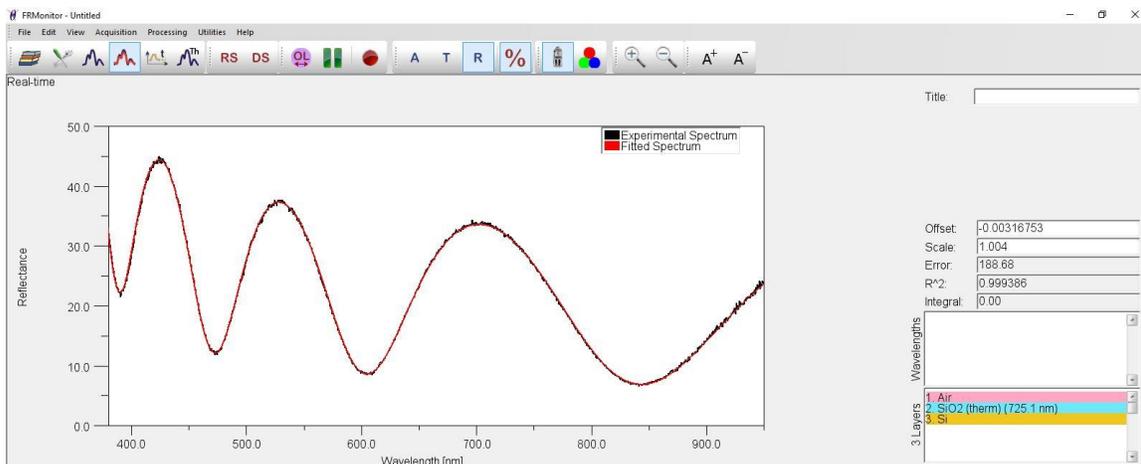


Figure 3 Experimental and fitted reflectance spectrum as seen on Fit View.