

**Issue:**

**How to measure the transmittance/reflectance in SM32Pro**

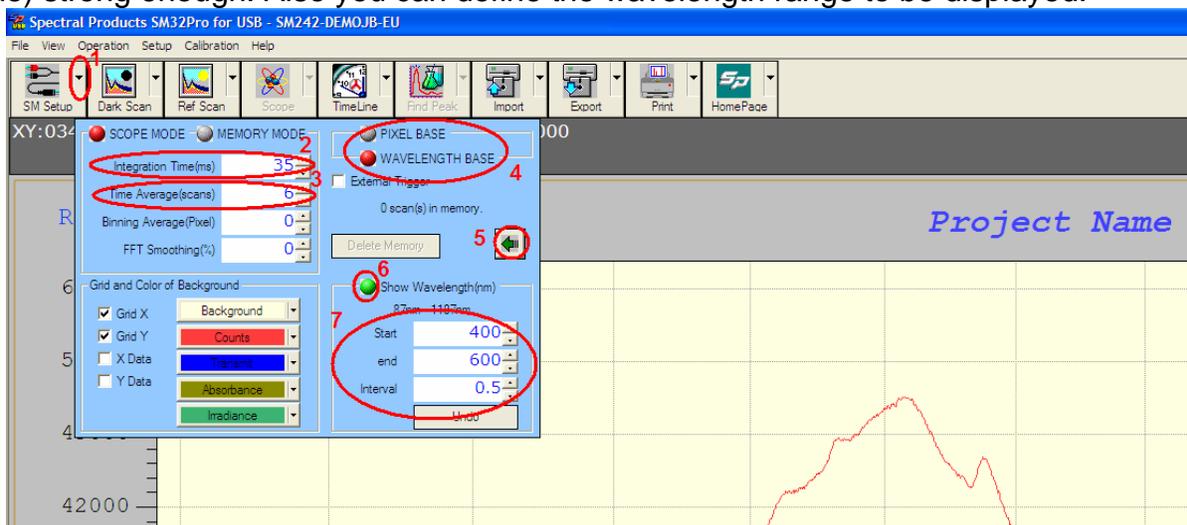
**Reason:**

The transmittance and/or reflectance measurements are all relative measurements. They require setting 0% and 100% transmittance or reflectance before measuring the sample.

**Procedure:**

**1. Setting up the measurement configuration**

This is the first step to configure the conditions of the spectrometer for the measurement. After launching the SM32Pro and turning on the light, the integration time has to be chosen properly to make the light signal on the spectral data display window (Scope mode) strong enough. Also you can define the wavelength range to be displayed.



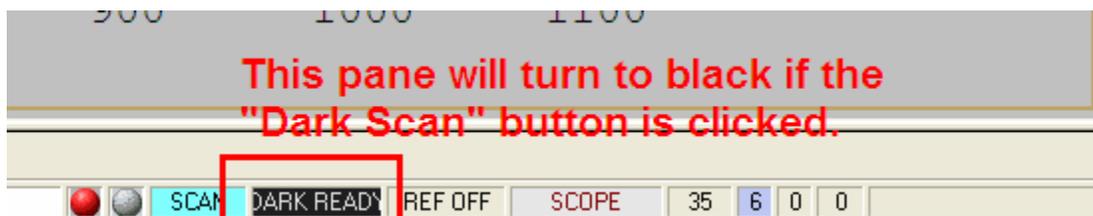
First, click the black arrow next to the “SM Setup” toolbar button. It will pop up the window as above. At there, you can change the integration time (#2) to increase the signal, the time average (#3) to make the signal more stable. If you would like to display the full spectral range that the spectrometer can show, click the ball button in front of the “Pixel Base” (#4). Or if you would like to show only a certain wavelength range, click the ball button in front of the “Wavelength Base” (#4). By clicking the green button (#5), you can show/hide the extended setting window. To set/adjust the wavelength range to be displayed, the ball button in front of the “Show Wavelength (nm)” (#6) has to be activated (just click the ball button to make it green). Then you can edit the “start” and “end” wavelength to be displayed and the interval of the range. After finishing the setting, you can close it by clicking any place other than this popped up window.

Increasing integration time is somewhat linear. So if you double to integration time, the signal will be about twice stronger but it will also increase the noise level. To make the signal stable, the “time averaging” is helpful but it will make the signal reading slow. Please refer to the software manual for the detailed explanation about other functions.

## 2. Dark Scan

The transmittance/reflectance measurements are all relative measurements. So you have to set the 0% and the 100% references. The “Dark Scan” is for setting the 0% transmittance/reflectance.

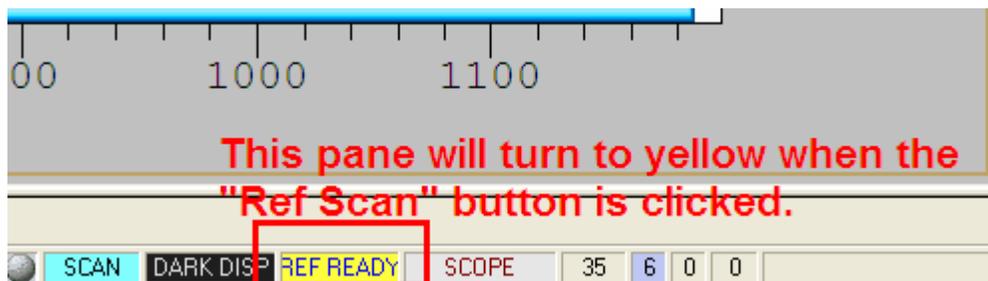
First the light input has to be blocked. You can turn the light off but it will take a little time to warm up the light source to get the stable output so blocking light is more preferable in general. After blocking the light, just click the “Dark Scan” toolbar button (not the black arrow but the main button). If you’re using our sample holder, AT-SHC or AT-SHF, you can put the cover plate into the slot at the center of the holder to block the light. Even with this blocking plate, some ambient light can go into the spectrometer so it is better to block the upper part of the holder with your hand or some other thing while doing the dark scan.



If you click the “Dark scan” toolbar button, the “Dark scan” indicator pane will turn to black as shown above.

## 3. Reference Scan

The reference scan is for setting the reference (mostly 100% or a certain known) transmittance/reflectance. When measuring the transmittance, it is very important to measure the relative 100% transmittance properly because the measurement of you sample will depend on how you set this reference transmittance. If you’re measuring a solid sample with our sample holder, for example, you can just do this reference scan without the sample. If you need to measure some liquid sample with a cuvette, you will have to put an empty cuvette in the sample holder and do the reference scan to get rid of the effect from the cuvette.

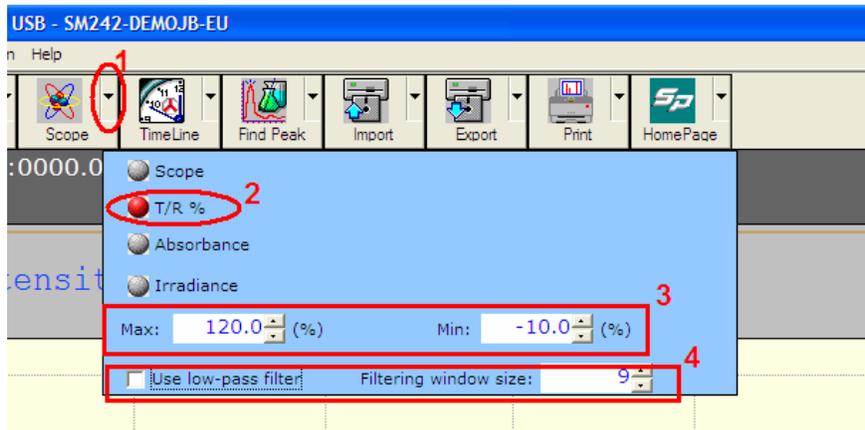


If you click the “Ref Scan” toolbar button, the “Reference scan” indicator pane will turn to yellow as shown above.

**NOTE: The detailed explanations for those functions are in the software manual.**

#### 4. Measuring samples

After setting those above, now you can measure the transmittance/reflectance of your sample.



First, you need to change the display mode to “T/R %” mode to see the Transmittance or Reflectance in percent (%). Click the black arrow next to the “Scope” toolbar button (#1). It



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will pop up the setup window as above. This button doesn't get activated at first. It is activated when you click the "Dark scan" and "Ref scan" buttons. At there, click the ball button in front of the "T/R %" (#2). The "Max" and "Min" (#3) are to set the Y-axis scale. The low-pass filter part (#4) is for making the spectral data smoother. If you use this, you will see the transmittance/reflectance curve becomes smoother with a larger filtering window size. But too large number will make the spectral data somehow deformed.

In this "T/R %" mode, the left Y-axis represents the transmittance/reflectance value of the sample in percent. The right Y-axis is just a relative value from 0 to 100 of the displayed Y-axis scale.

It is recommended to do the "Dark scan" and "Ref scan" every time before measuring any real sample to get the most accurate result. And whenever you change the integration time, you have to do the "Dark scan" and "Ref scan" again. The order to execute between the "Dark Scan" and the "Ref Scan" doesn't matter. But all have to be done under proper dark/reference conditions.