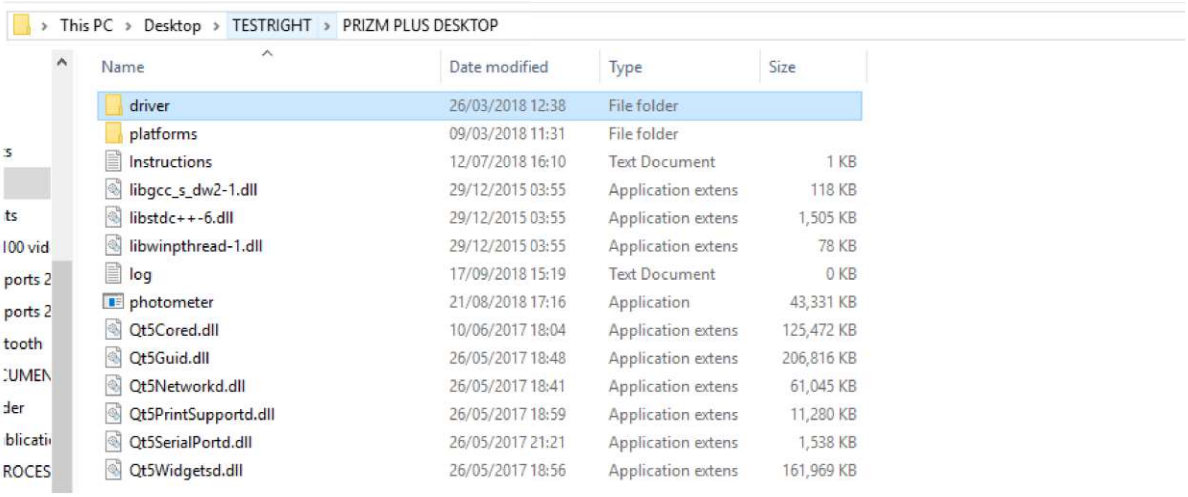
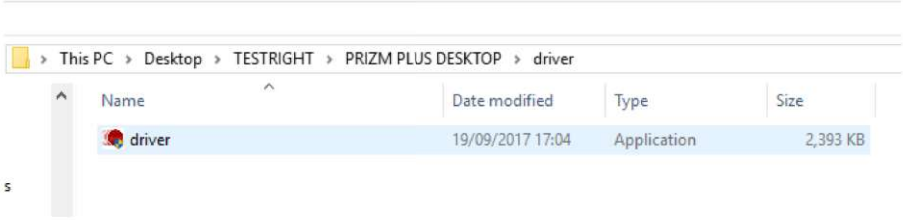
Software Installation:

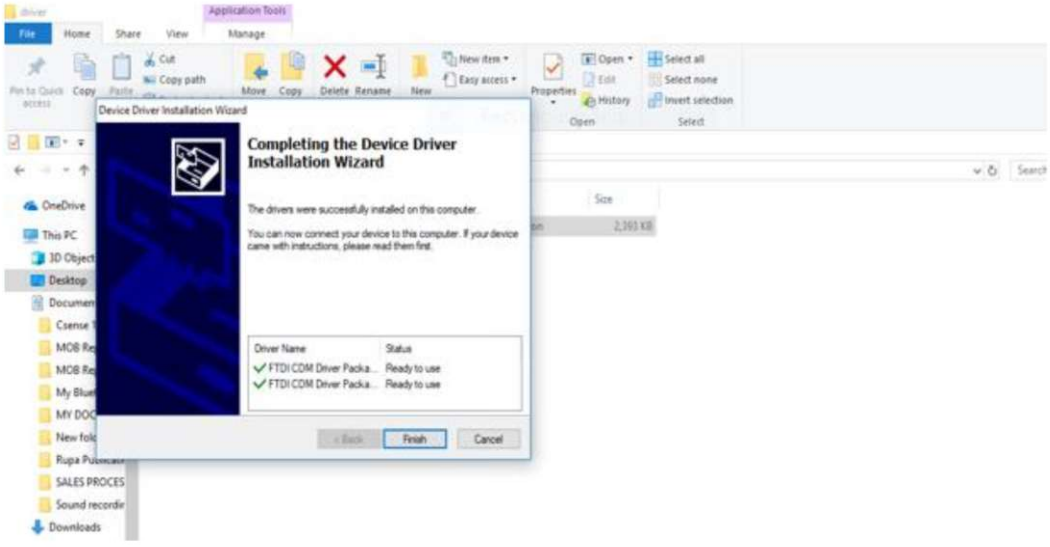
1. After successful download and opening of software, go to **'driver'** file.



2. Click on the emerging icon to install the driver for the software as shown:



3. The final step involves installation of **Device Driver Installation Wizard** by clicking on **Finish**.



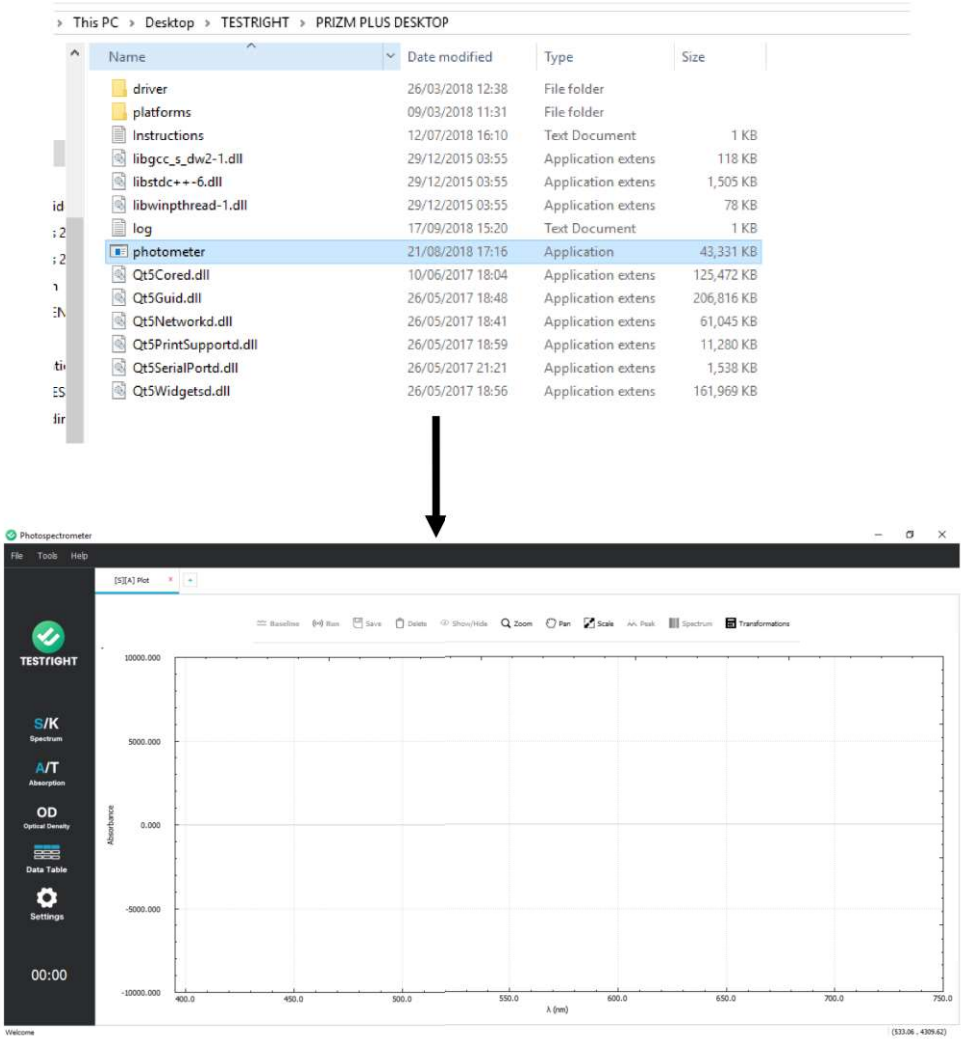
Device Installation and Functioning:

1. Connect the device to PC with the help of USB cable provided along with the photometer.

2. Once the device is powered up indicator LED glows orange in color. **A warm up time of 15 minutes must be allowed after switching on the device.** This enables machine to stablize and give consitent results.

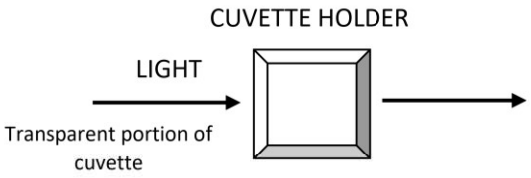
Setting the Reference:

1. Double click on **Photometer** to start the software.

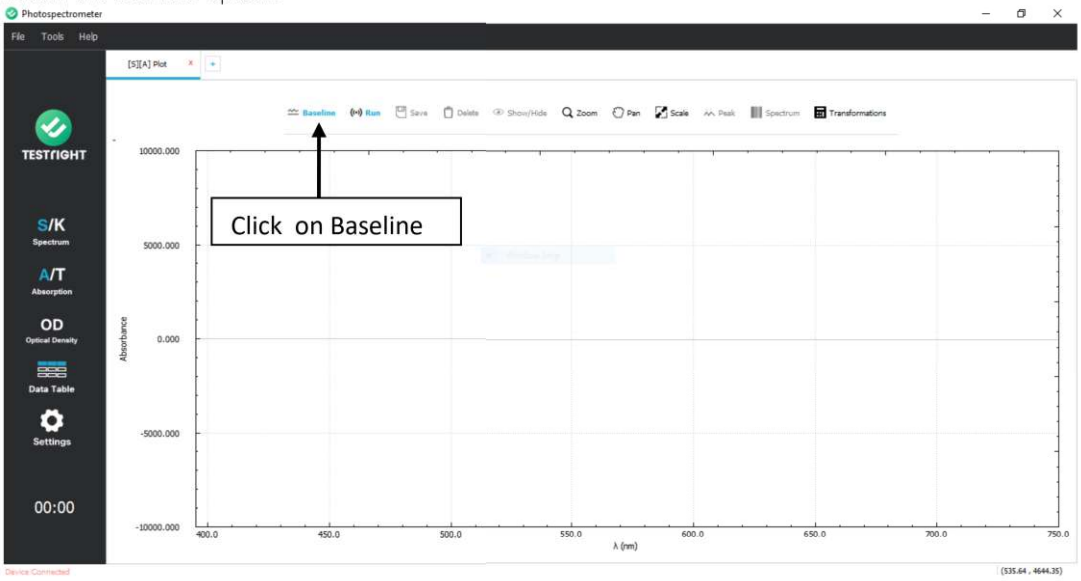


2. Check for **Device Connected** sign on the bottom left part of the software screen.

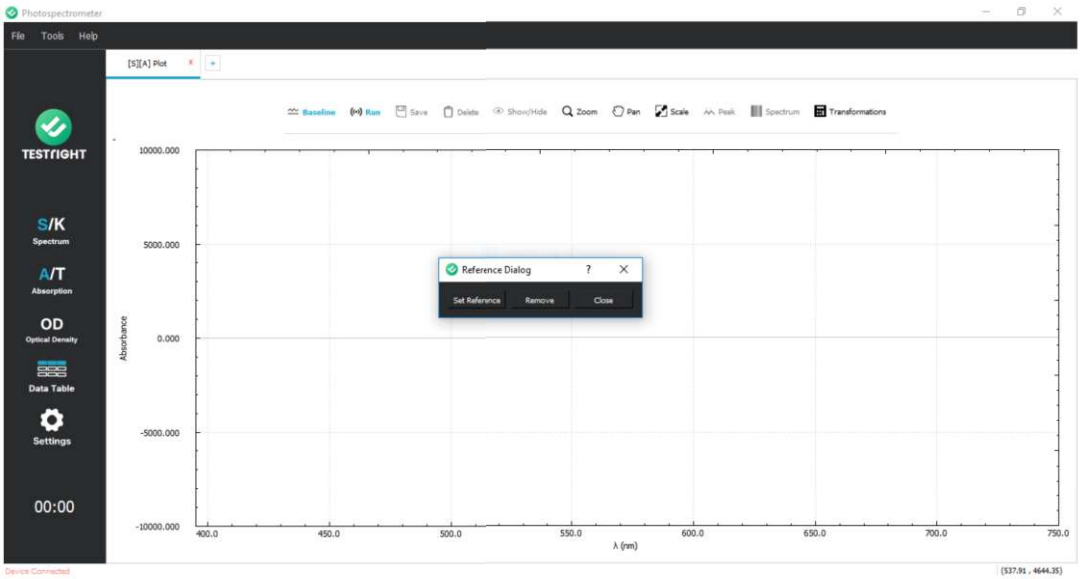
3. Take a clean, dry cuvette and rinse it with blanking solution. Next pour baseline solution up to 3/4th the level of cuvette and insert in the cuvette holder. Ensure that the transparent portion of the cuvette is placed perpendicular to the direction of light as shown:

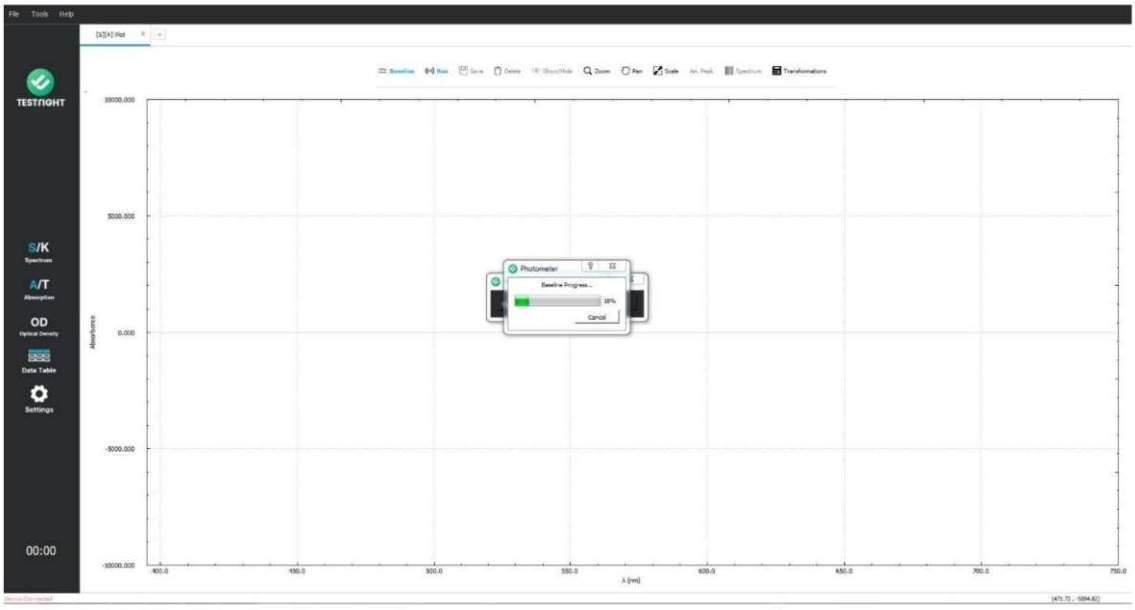


4. Click on the **Baseline** option.



4. And wait until the reference is set.



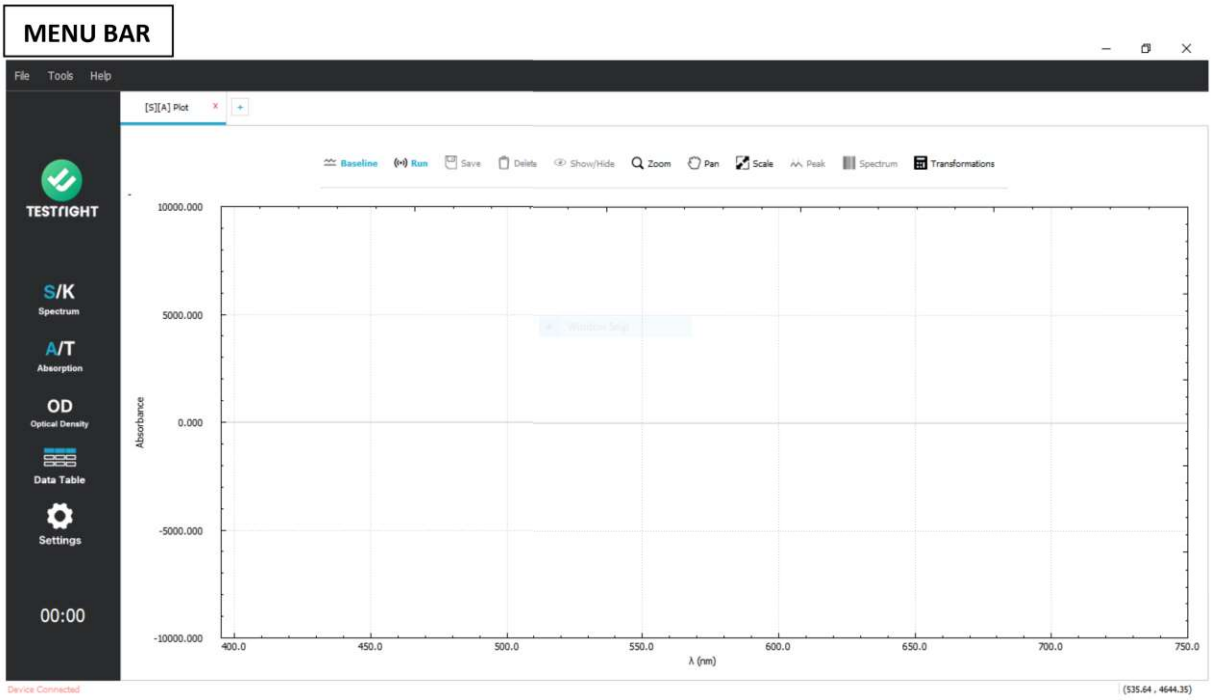


5. Then, after taking the requisite sample and selecting the preferred Mode click on Run to start with test.

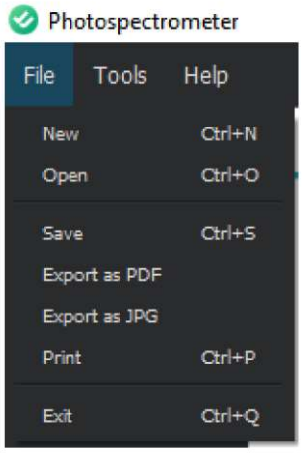
2. Software features and functioning:

The display page opens up to graph which has the Menu bar located on the left while the Task bar appears on the top of the page.

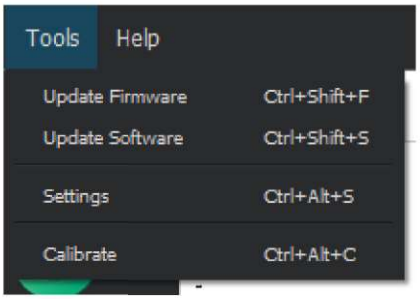
2.1 The **Menu** bar consists of the following in the first portion:



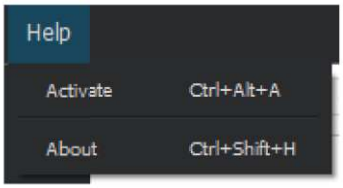
- File:
  Clicking on this button results in a drag down box where you can create new file, open previous data, save data or export data in the form of JPG or PDF. Data can also be printed. Actions can be executed either by clicking or by Ctrl + key commands as mentioned.

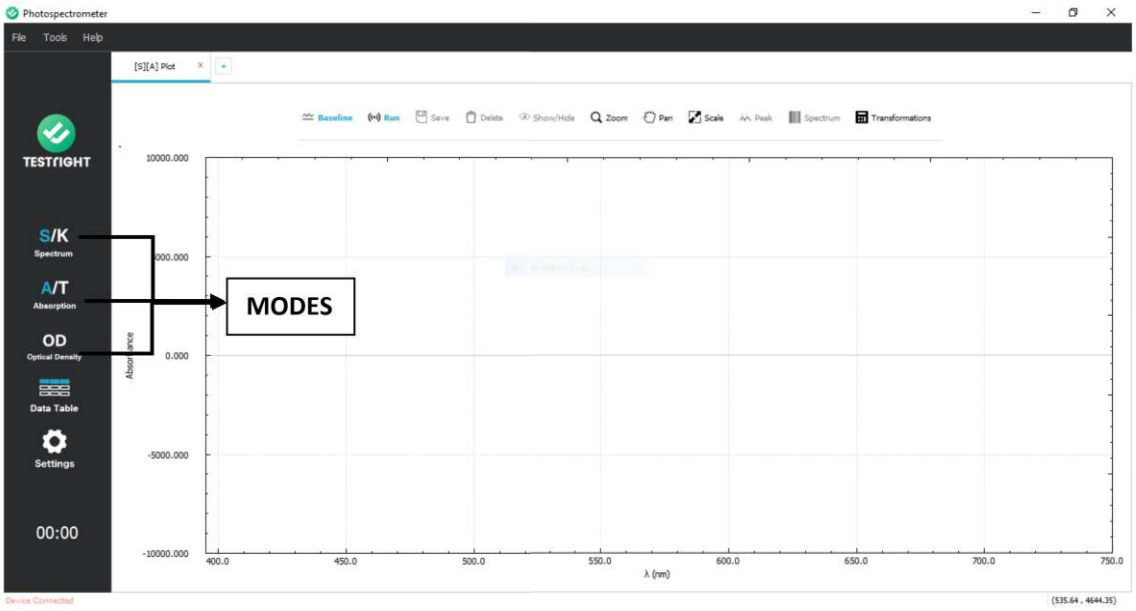


- Tools:
  This mainly contains options for updation of Software, Firmware and calibration which are locked for company purposes.



- Help:





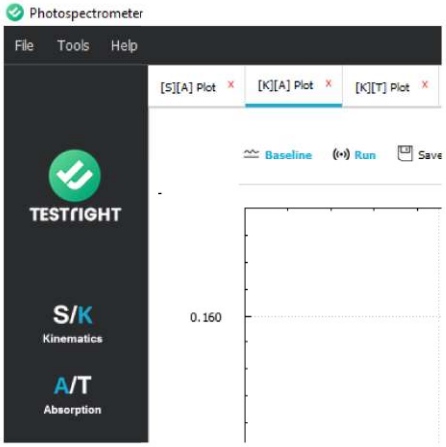
2.2 Modes: The second portion of the bar beneath TestRight logo consists of **toggle button** operative modes such as -

- **Spectrum/ Kinematics:** While Spectrum mode displays the absorbance or transmission spectra depending upon the mode activated, the Kinetics mode displays the absorbance in nm or transmission in % value corresponding to the real time reaction changes in the sample.

- **Absorption/ Transmission:** Absorption mode displays the region of spectra absorbed by the sample in nm value while in Transmission mode region of spectra transmitted by the sample is displayes in % value.

- **Optical Density:** This mode displays absorbance values within a particular wavelength range.

- Please note that **Blue colored toggle represents active mode**, for instance, here the Kinematics mode and Absorbance is blue which means they're active. The above graph name signifies the same. This is common for all modes enlisted.

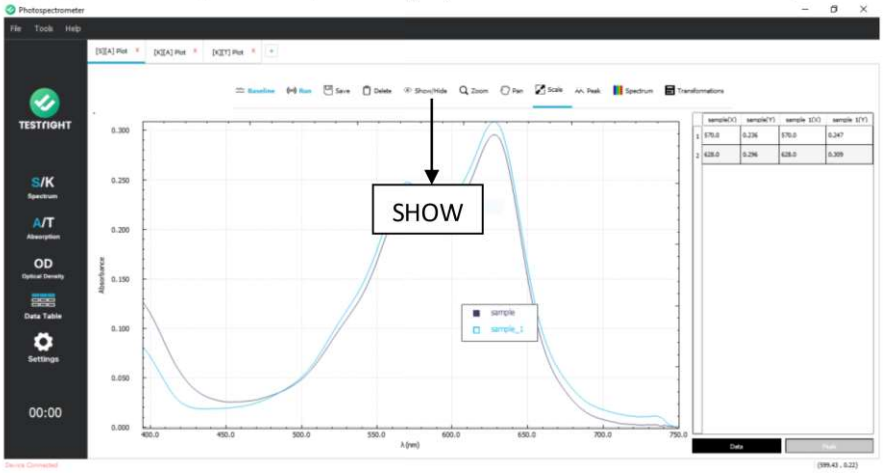


2.3 Task Bar:

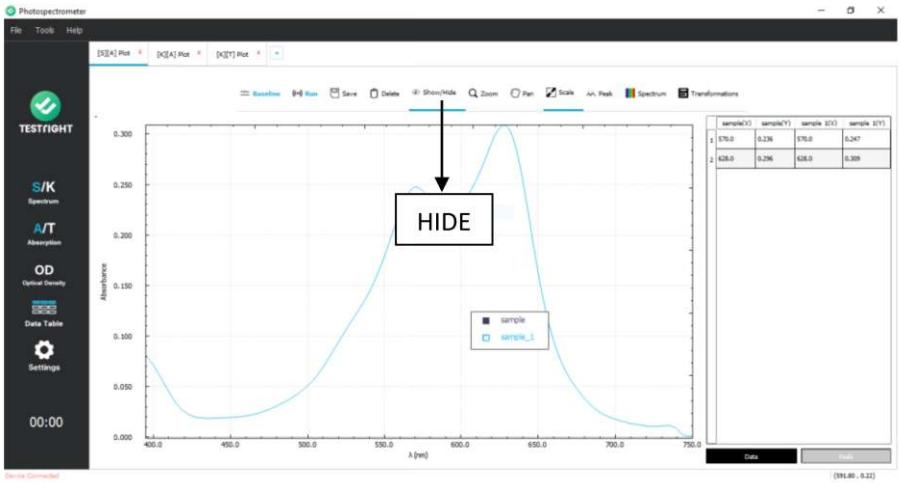
Consists of various options as depicted below –

- Baseline – helps one to set reference
- Run – helps one to obtain spectral readings
- Save – files or spectral data can be saved via this option
- Delete – Files or spectral data can be deleted if not required
- Show/ Hide – One can choose to view or hide graphs and peaks

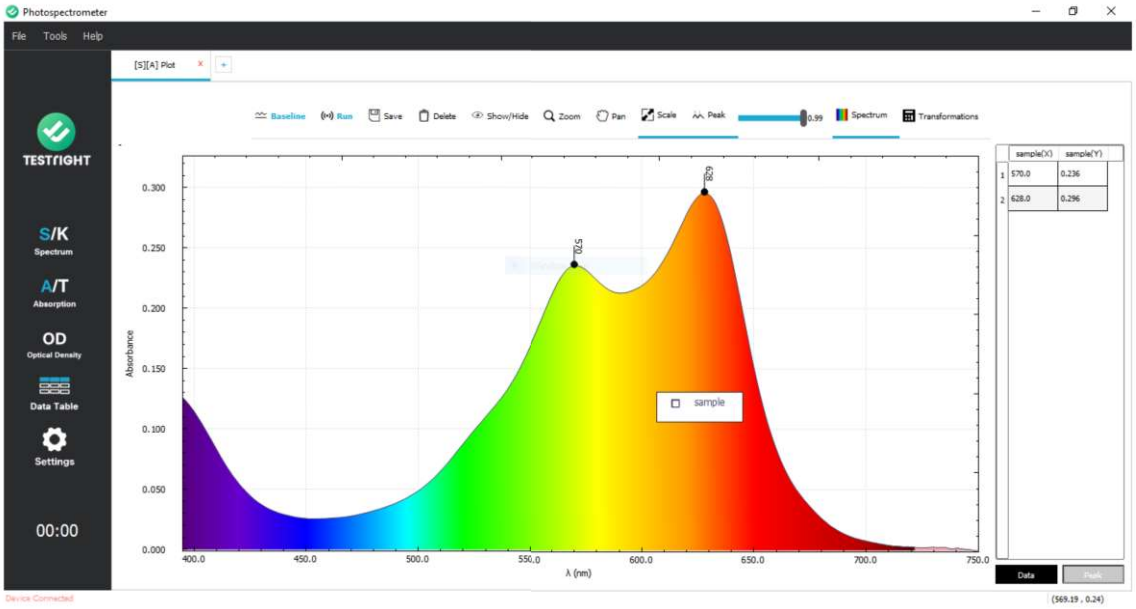
For instance, here, we can study and compare two graphs at the same time with the help of Show Button:



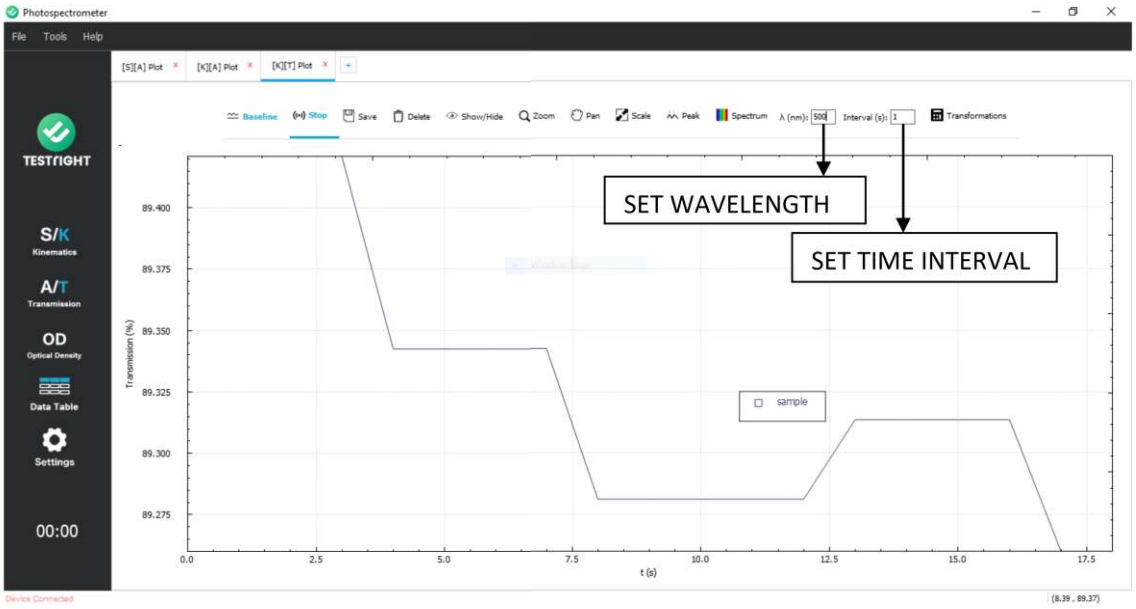
When the graph denoted as purple is selected and Hide button is clicked the screen appears as depicted below:



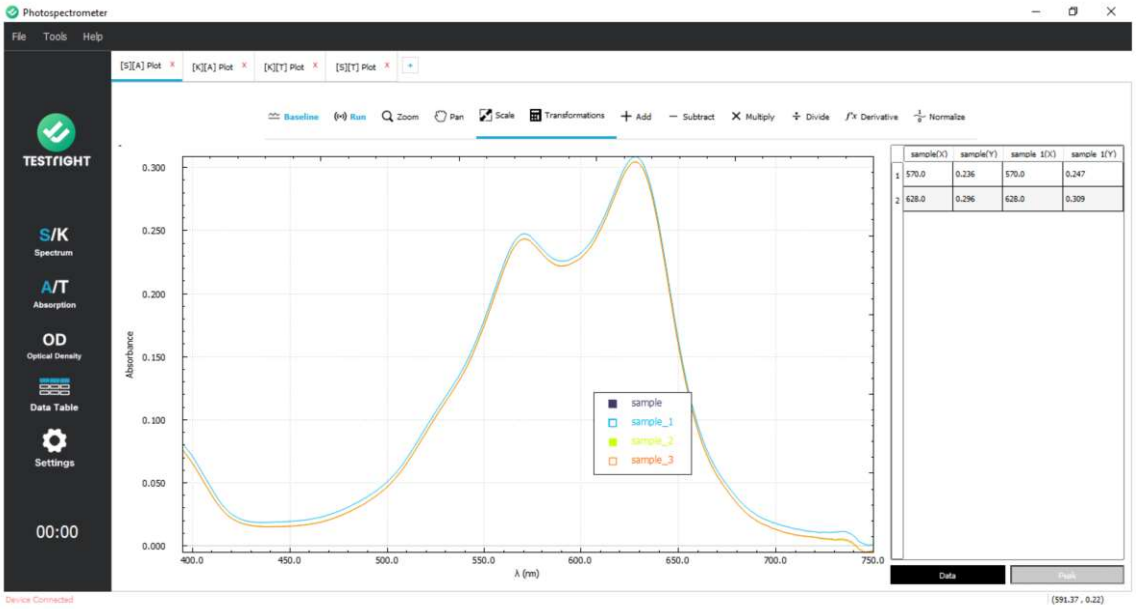
- Zoom – Use the selection window to zoom in the preferred reigon of graph.
- Pan – One can view to and fro across the graph
- Scale – Select scale option on task bar to fit the complete graph within the window.
- Spectrum - This displays the color in the visible range spectra corresponding to the wavelength:



- Wavelength – enables user to set the wavelength
- Interval – enables user to set time interval



- Transformations – this helps user to convert one particular form of data to another. One can choose options such as Add, Subtract, Multiply, Divide to operate accordingly in addition to going for Derivative and Normalization as shown below:



2.4 Graph Tab: This is an editable tab and can be set according to combinations like:

1. Absorbance vs Wavelength [S][A] – Click on Spectrum then Absorbance in the Menu bar

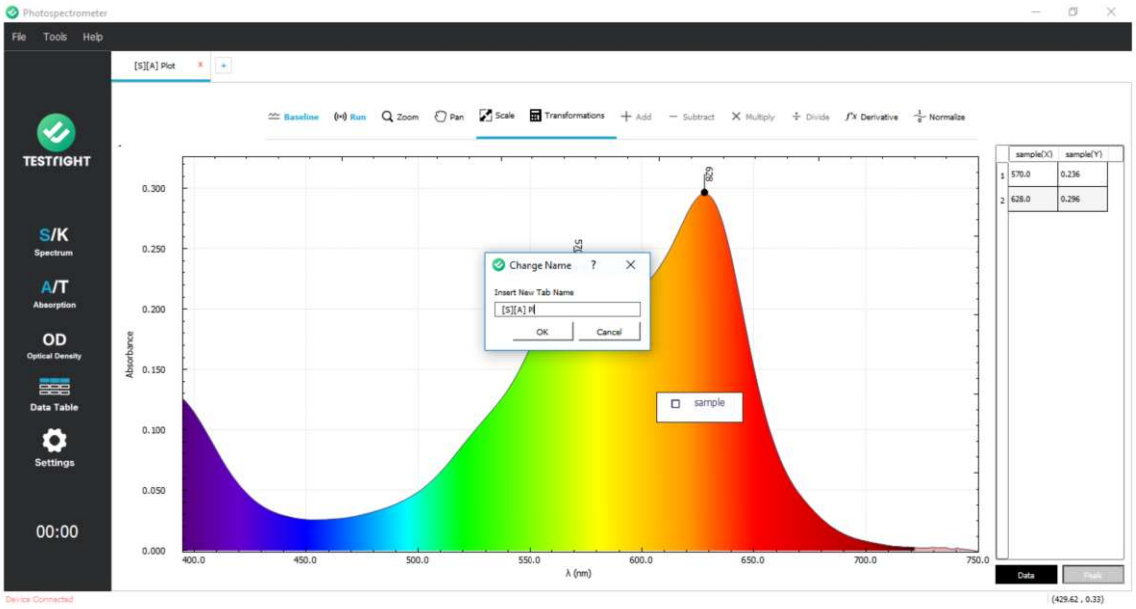
2. Wavelength vs Transmission [S][T] – Click on Spectrum followed by Transmission in the Menu bar

3. Absorbance vs Time [K][A]– Click on Kinematics and Absorbance in the Menu bar

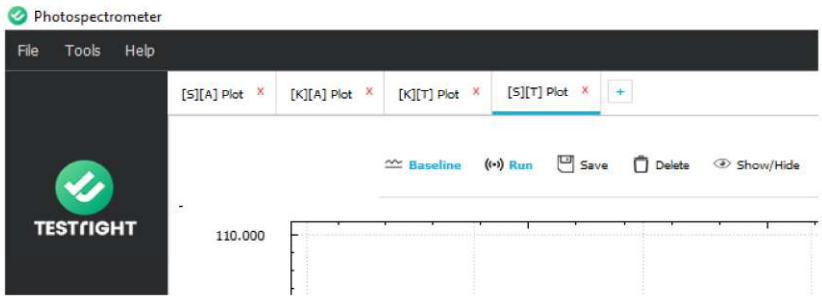
4. Transmission vs Time [K][T] – Click on Kinematics then Transmission in the Menu bar.

The following picture illuminates the know-how of the Graph Tab:

Or one can also choose an entirely different name for the spectral data and edit the Graph tab according to one's own convenience.



Multiple tabs can also be opened by clicking on the '+' sign or by typing Ctrl + N command. Various parameter combinations appear corresponding to the mode activated as shown:



2.5 Data Table:

This facilitates the user to efficiently record and monitor graph data points and peaks.

2.6 Timer:

This feature situated on the bottom most part of the Menu bar helps one to keep a track of time during experiments. For eg. If Optical Density is to be measured after every 5 minutes one can set the timer for 5 minutes and perform the test with ease.

3. Settings:

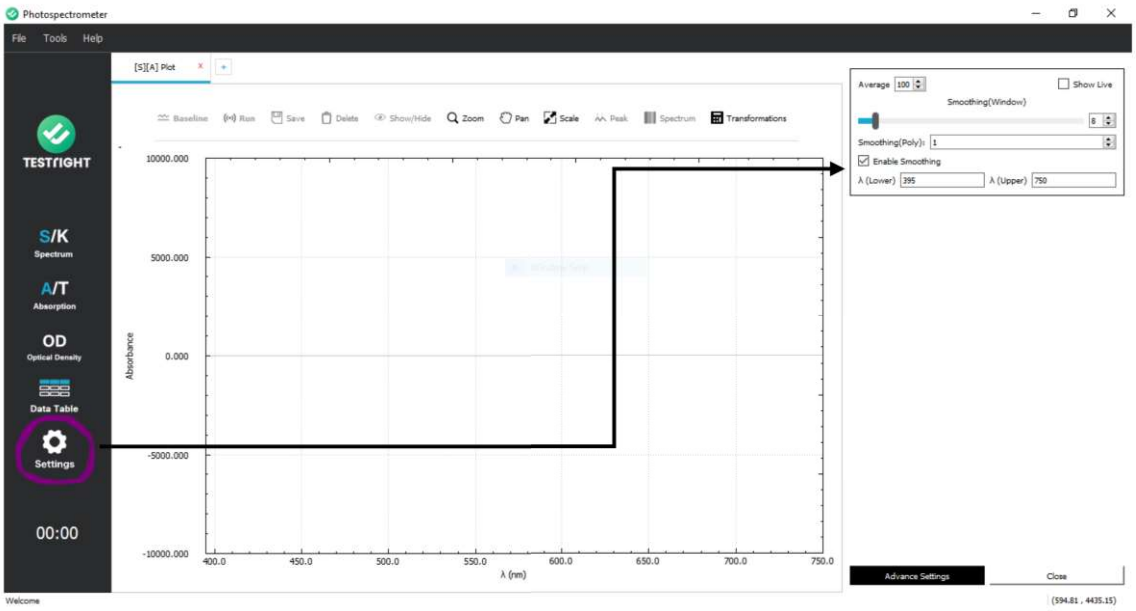
3.1 Average:

The first button in the software settings is the Average which determines the no. of readings which will be taken by your spectrophotometer internally and averaged (to reduce random noise). It has a 1 to 100-point range. An average of 10 means, the device takes 10 scans and displays their average. High averages would result in lower noise level but would take longer time to process.

3.2 Smoothing:

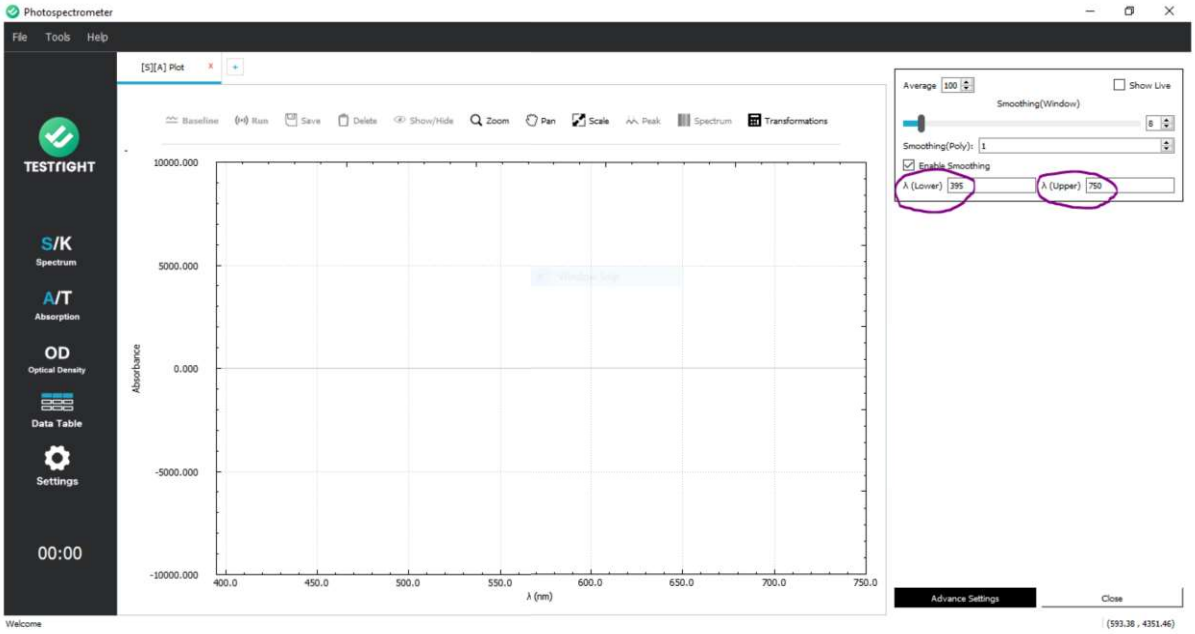
Smoothing removes the little spikes from the graph (due to noise) and makes it more comprehensive. In some cases, smoothing may wipe off some of your signal, so use this option carefully. As a rule of thumb, increasing the smoothing window should lead to a smoother graph.

In smoothing, the data points are modified with moving averages thereby cancelling effects of random variations. This naturally leads to a smoother signal and a slower step response to signal changes. As long as the true underlying signal is actually smooth, then the true signal will not be much distorted by smoothing, but the high frequency noise will be reduced. Our smoothing uses ***Savitzky-Golay*** filter. This generally enhances the graphical representation of the data by removal of unwanted or unnecessary peaks &fluctuations in the readings. It comes in 2 forms – Window as well as Poly smoothing. Both have a range from 1 to 100 that can be adjusted accordingly.



3.3 Wavelength:

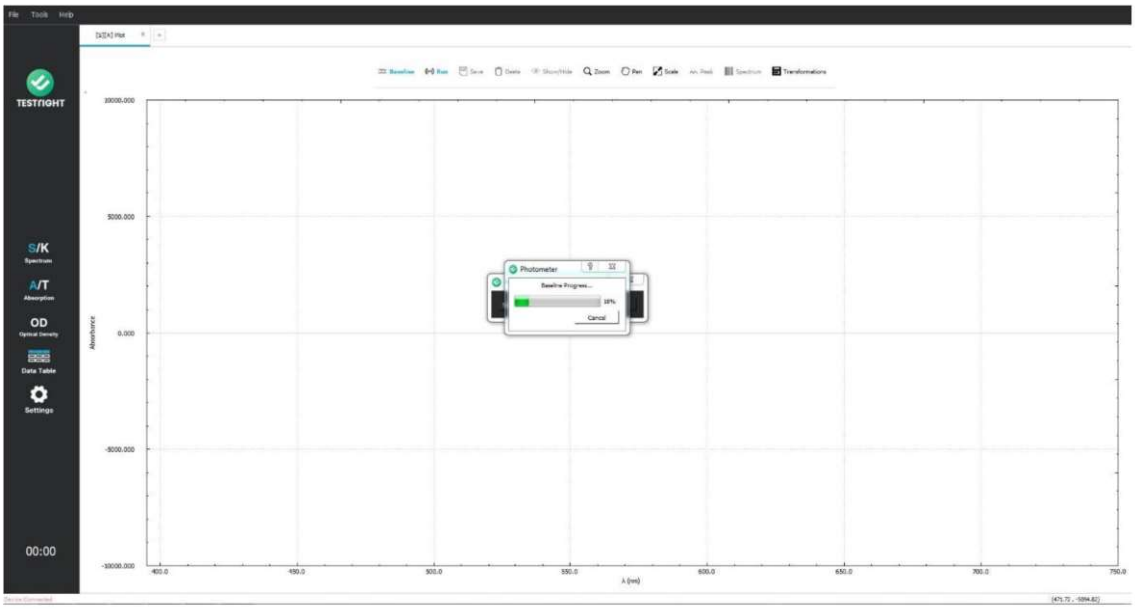
This is to set the minimum to maximum range of wavelength required to run the test. In this case 395nm to 750nm.



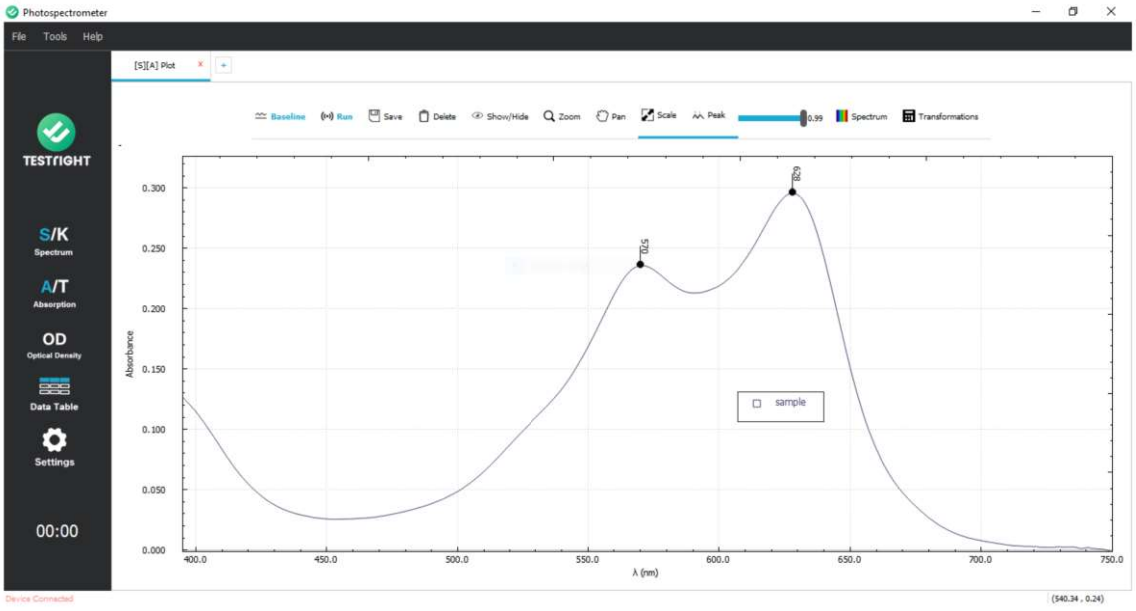
4. Data Interpretation and Monitoring:

After the Reference is set one can take help of this section to select requisite modes for testing.

4.1 Absorbance vs Wavelength [S][A] – Click on Spectrum then Absorbance in the Menu bar for mode activation. Next, click on **Run** on the task bar to start the test.

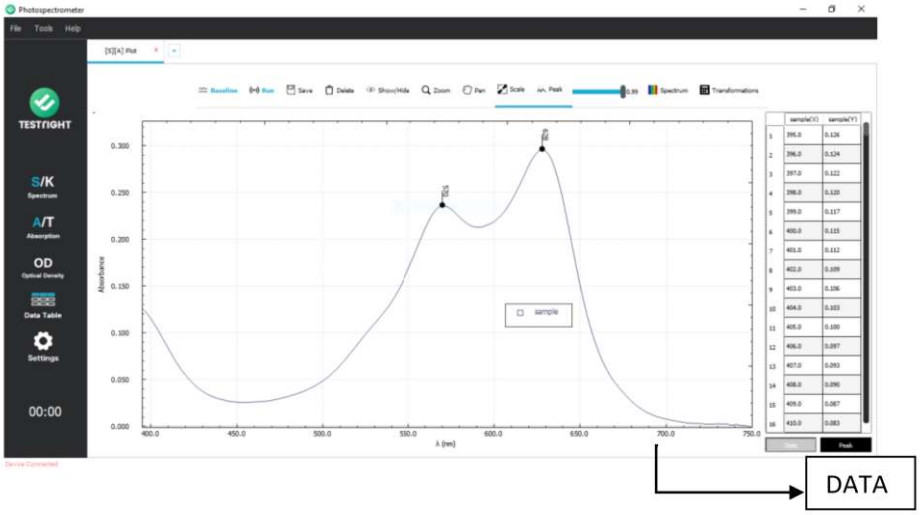


The resultant graph is acquired. One can select **Peak and toggle it up to 100%** to display all peaks in the spectral data:

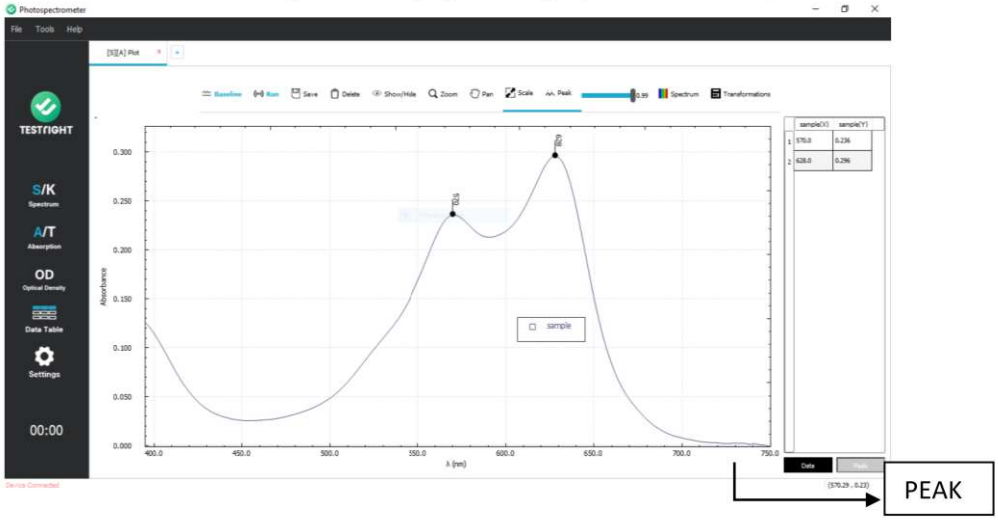


Here, the X-axis represents Absorbance and the Y-axis represents the Wavelength (nm).

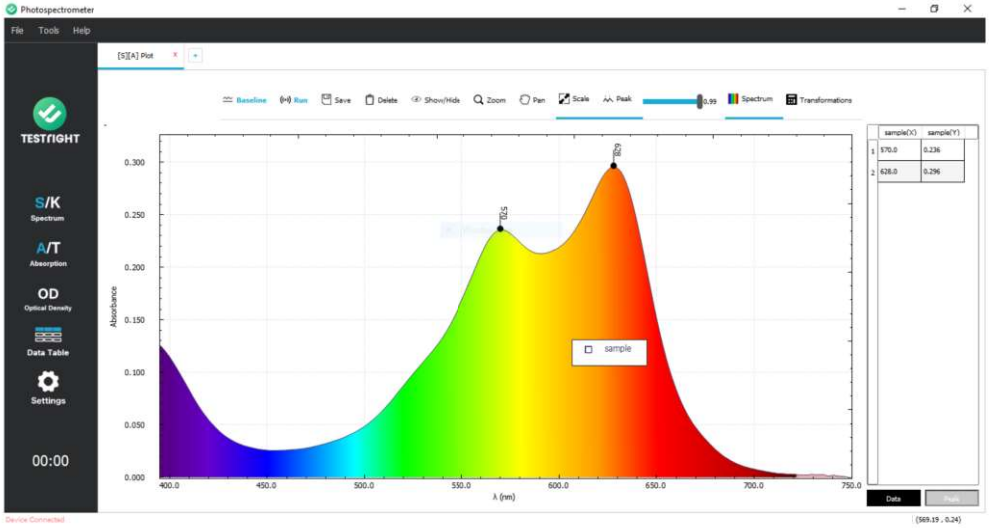
Clicking on **Data Table** on the Menu bar leads to a **Legend bar** on the right-hand side of the screen, where you can select **Data** option and view the recorded observations.



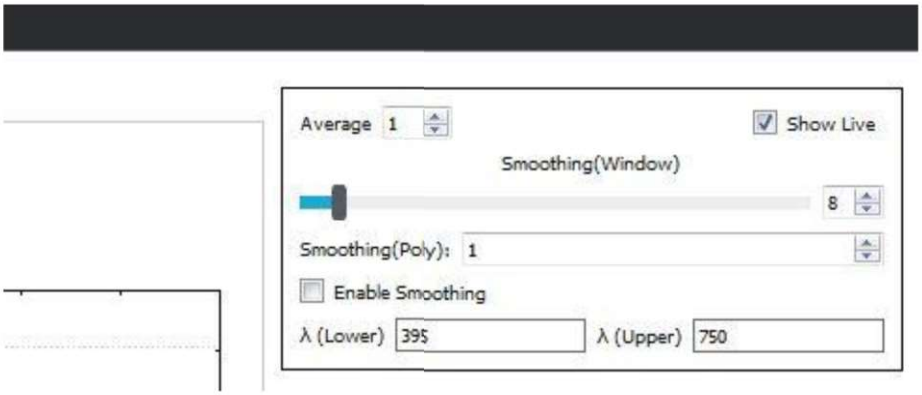
Selecting Peak on the bottom of the legend bar displays the major peaks within the spectral data.



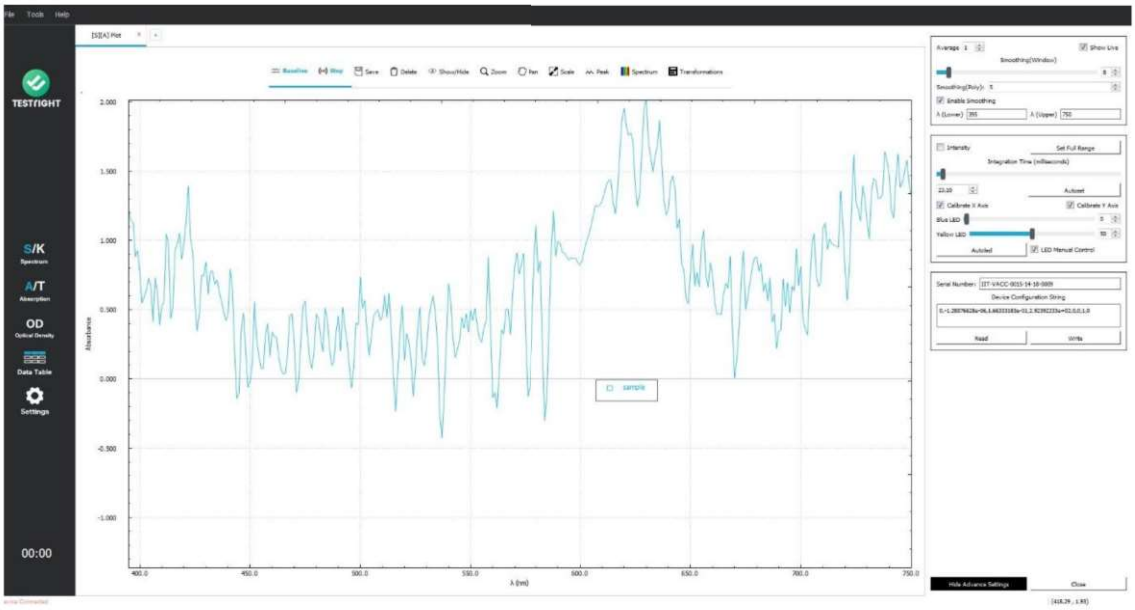
Selecting Spectrum from the Task bar displays the region from the wavelength absorbed by the sample:



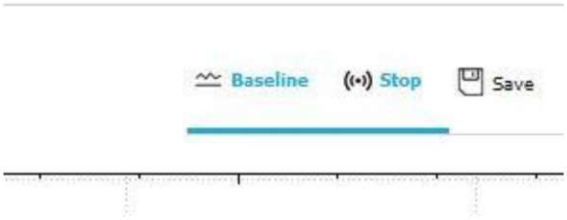
The **Show Live** mode on Settings enables one to record results continuously.



The resultant graph appears as shown:



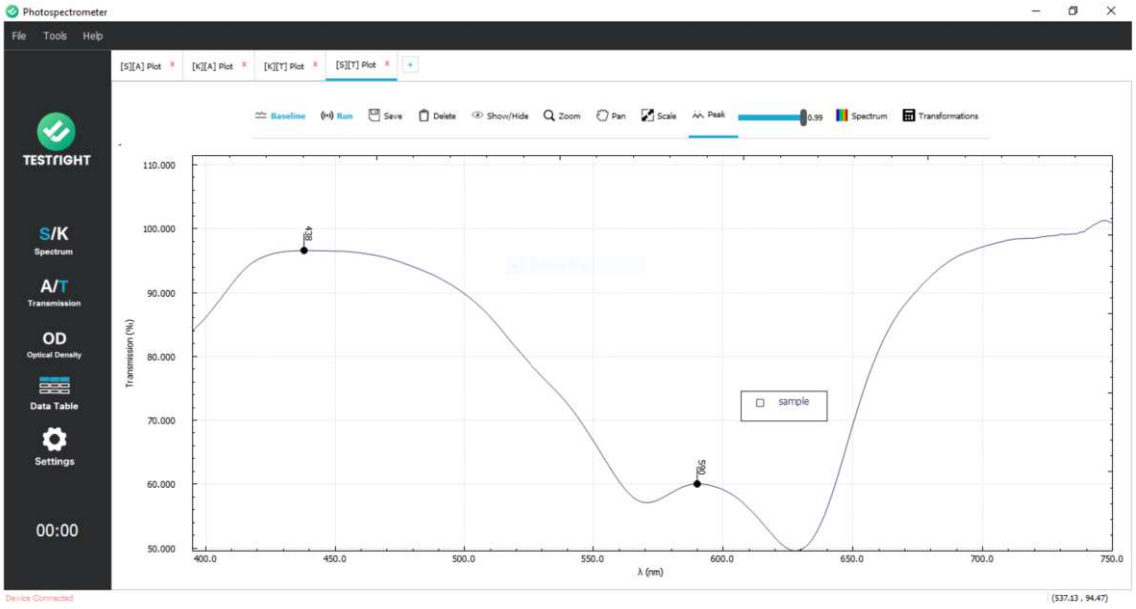
Click on **Stop** button on the task bar to end the test.



The same procedure stands common for upcoming modes.

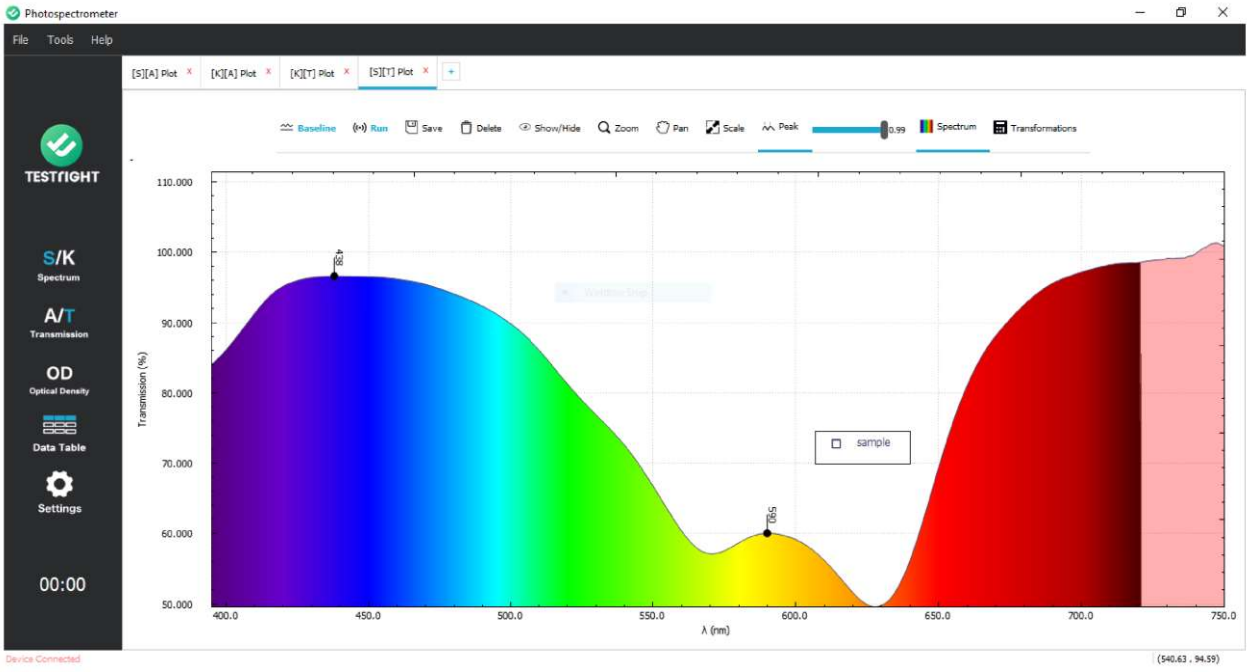
4.2 Wavelength vs Transmission [S][T] – Activate Spectrum followed by Transmission mode as explained before, in the Menu bar. Next, click on **Run** to start the test.

The graph shows Peak set at 100%

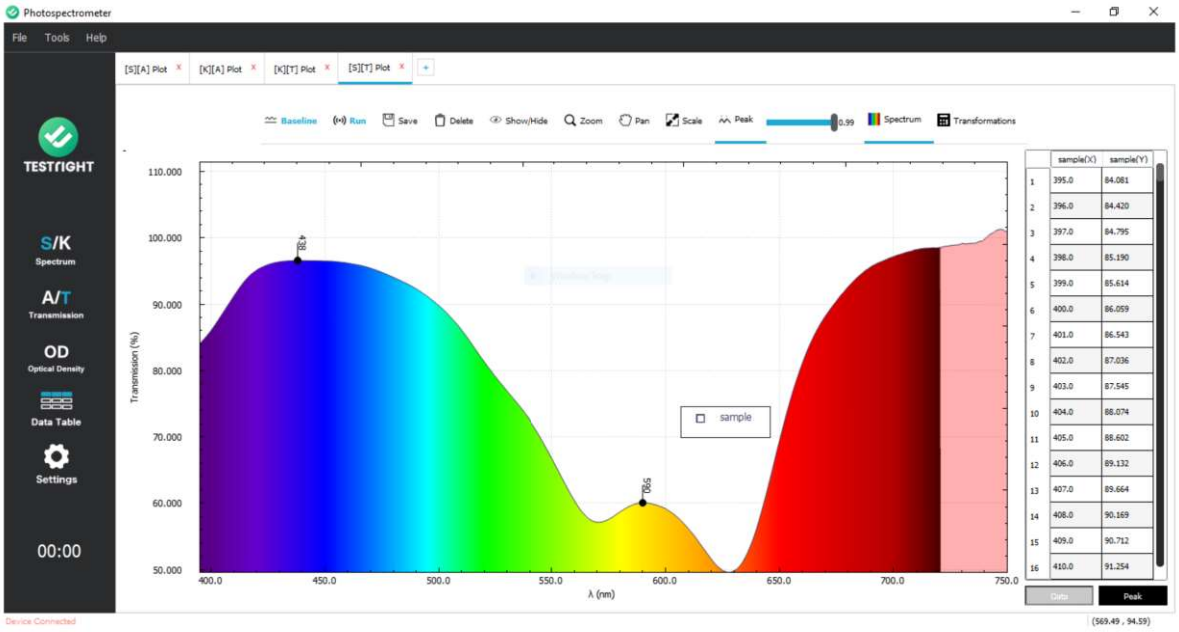


Here, the X-axis represents Transmission (%) and the Y-axis represents the Wavelength (nm).

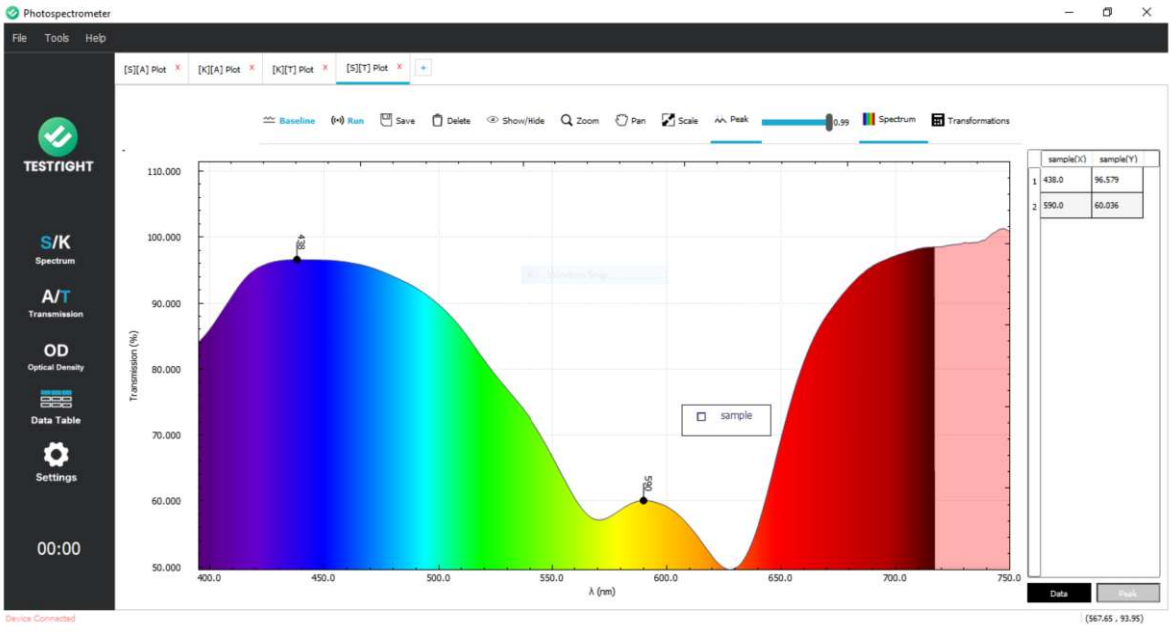
When one clicks on Spectrum the following graph appears:



Next data reperesentation is possible by selecting Data table and clicking on Data option from the legend bar on the right.

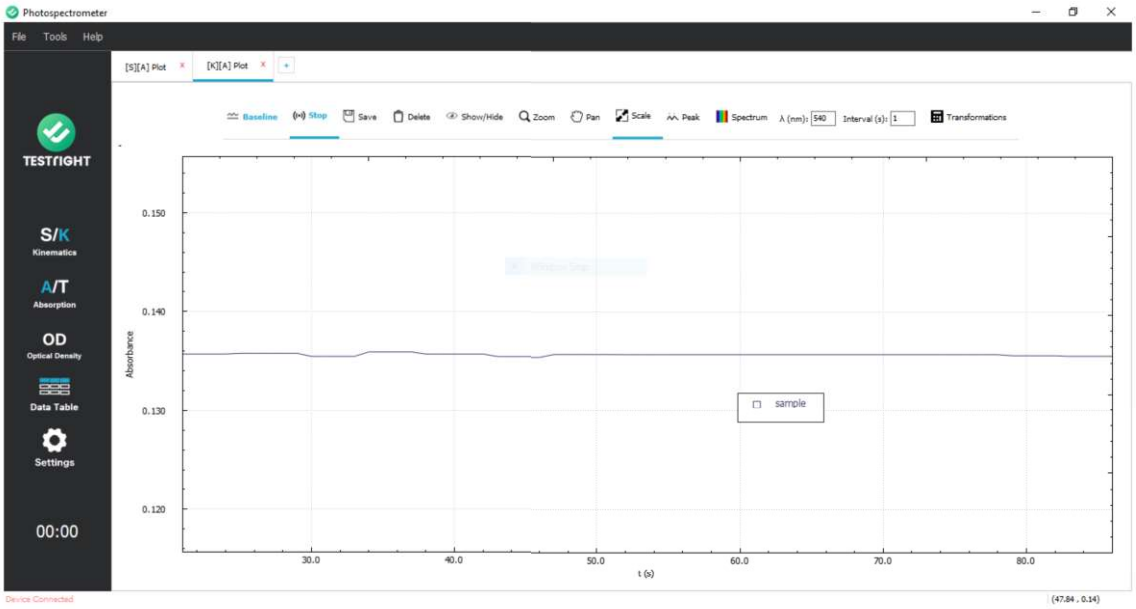


Similarly, peaks are displayed by clicking on Peak on the legend bar.



4.3 Absorbance vs Time [K][A] – Click on Kinematics and Absorbance in the Menu bar. Next, set the wavelength required for testing as well as time interval to record real time reaction changes in the sample. One can set wavelength and smoothing parameters required. Click on Run to start the test.

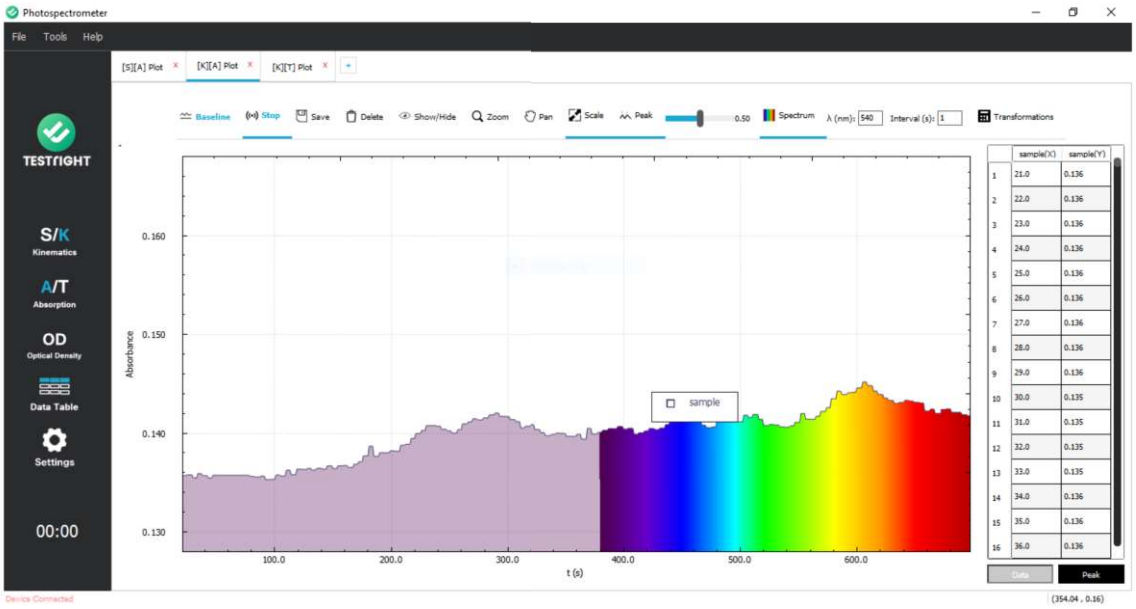
The results are as depicted. One can clearly observe that the graphs moves according to the set time interval i.e real time reaction changes within the solution is being recorded.



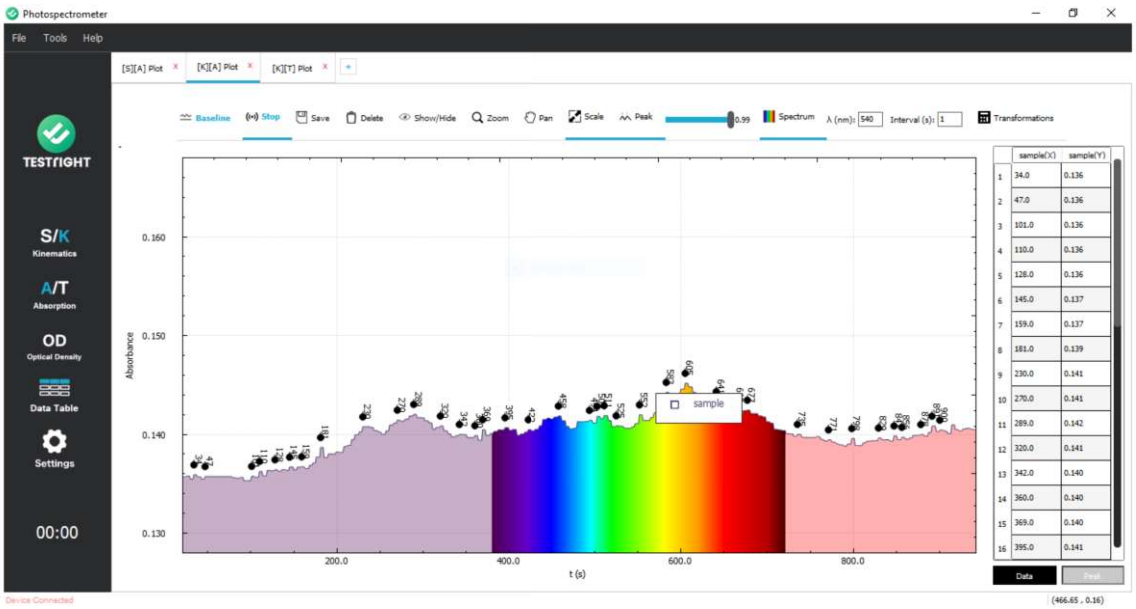
Here, the X-axis represents Absorbance and the Y-axis represents the Time (s).

While selecting Spectrum the resultant graph is as depicted:

As mentioned before one can view the Data table:

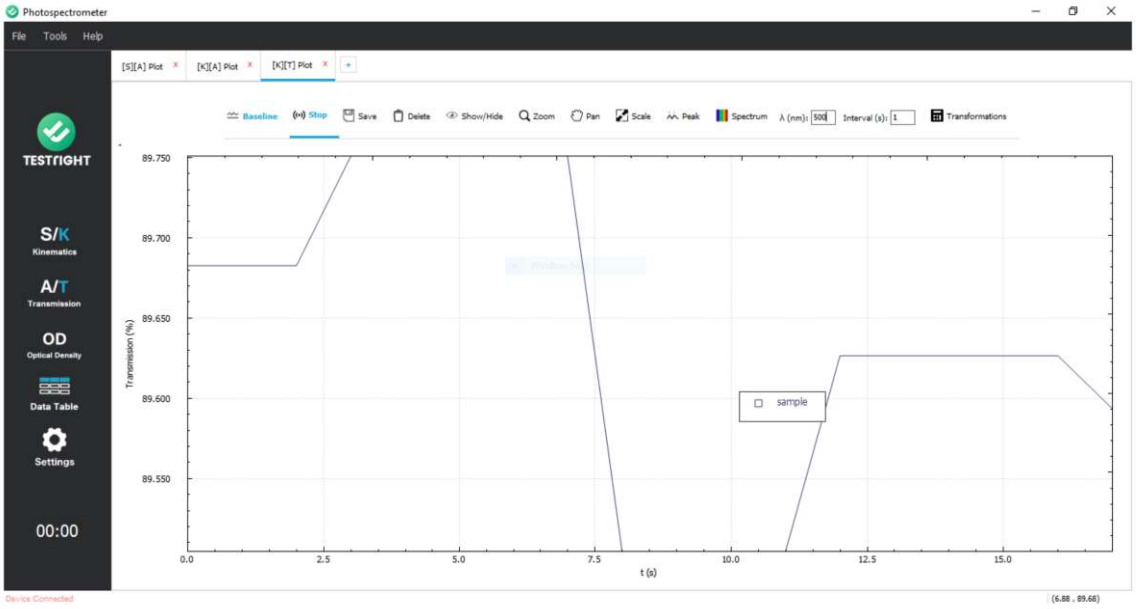


View peaks by clicking on Peak. Toggle is set at 100%.



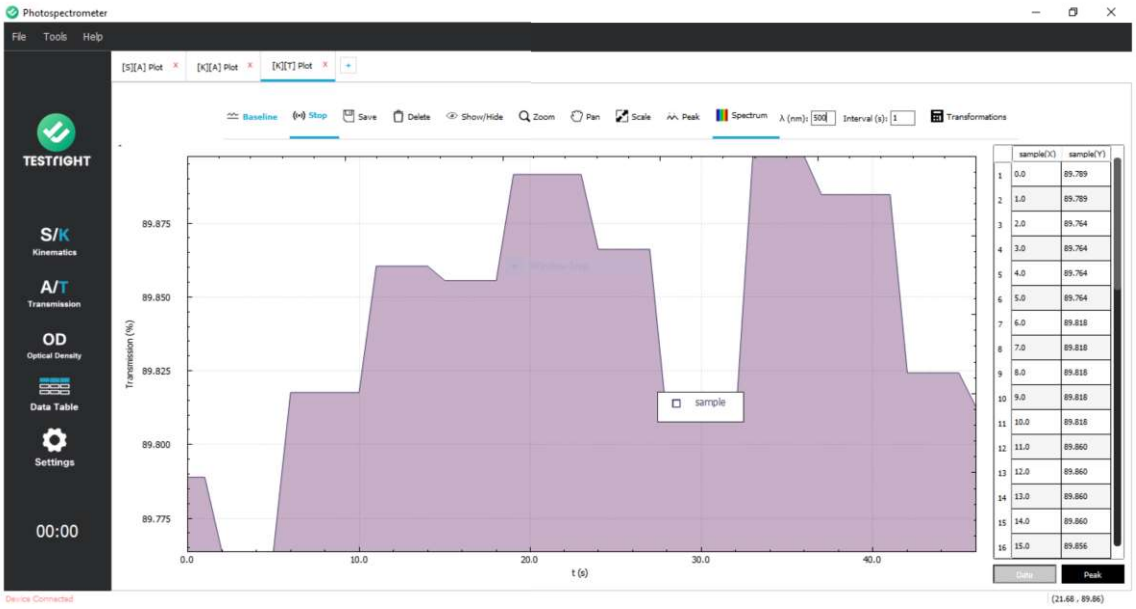
4.4 Transmission vs Time [K][T] – After the Kinematics and Transmission mode is selected from the Menu bar, set the wavelength and time interval as shown below. Next, click on **Run** to start the test.

Graph representing real time kinetics:



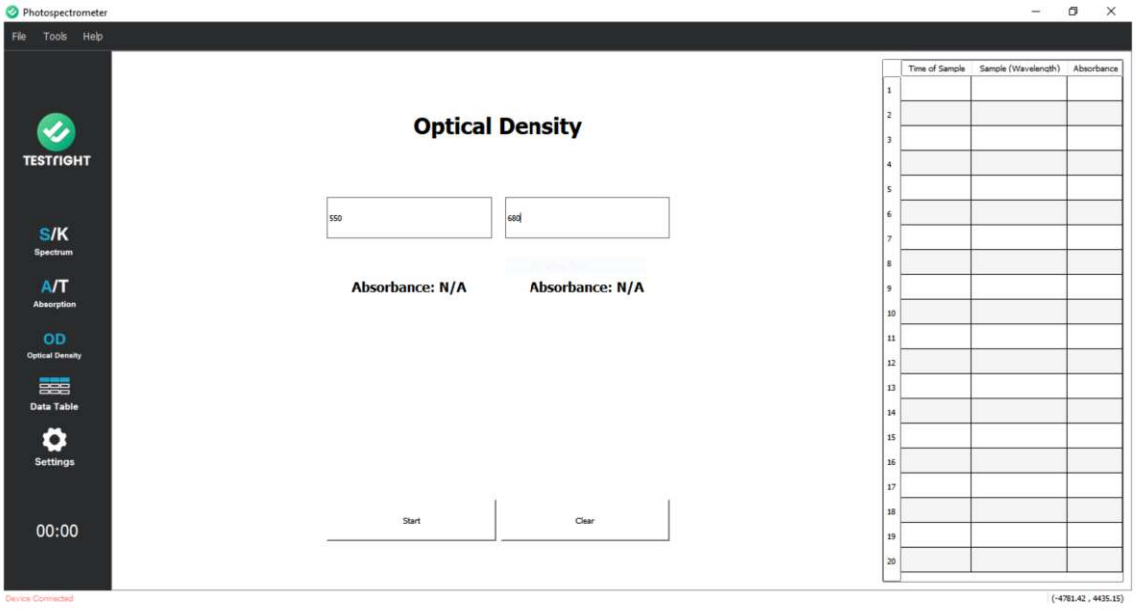
Here, the X-axis represents Transmission (%) and the Y-axis represents the Time (s).

Graph with spectrum:

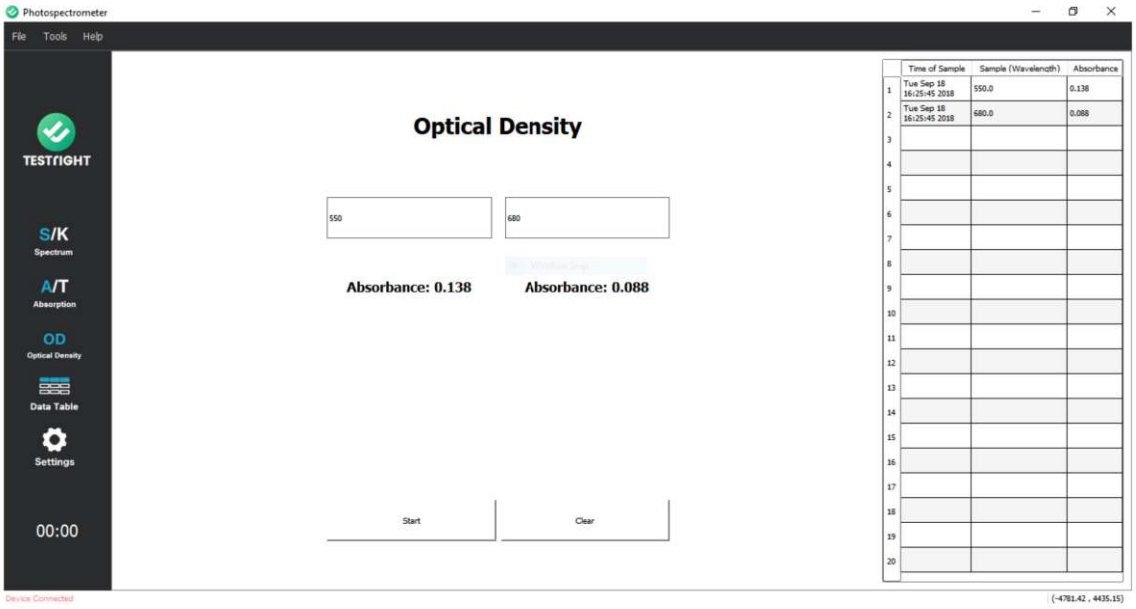


Graph with peaks:

4.5 Optical Density – Set the wavelength range required and click on Start. Wait for the results to be displayed.



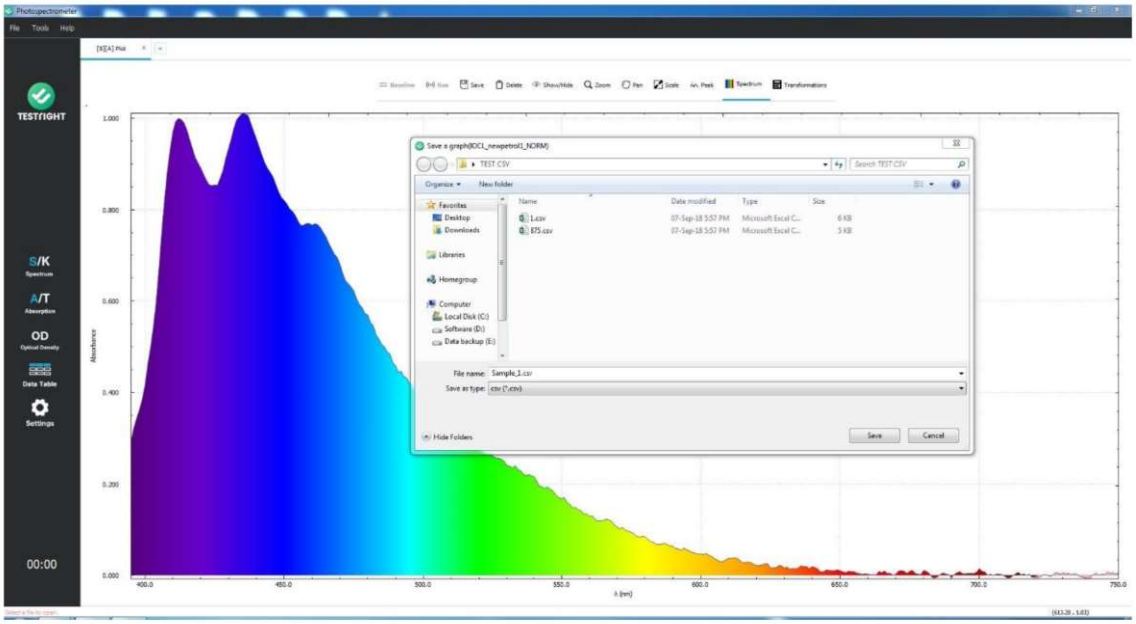
Results displayed are as follows:



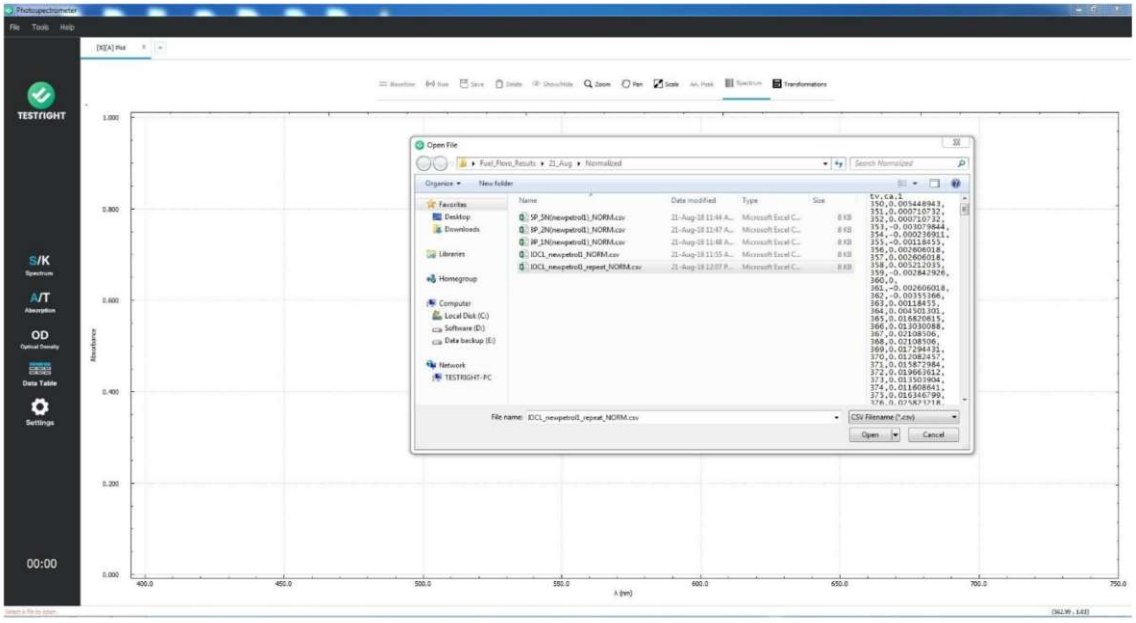
Thus, absorbance corresponding to the wavelength is presented in the form of a table on on the legend bar on the right.

5. Saving and Opening the Data:

Data can be saved by clicking on the Save button. They are saved in CSV format.

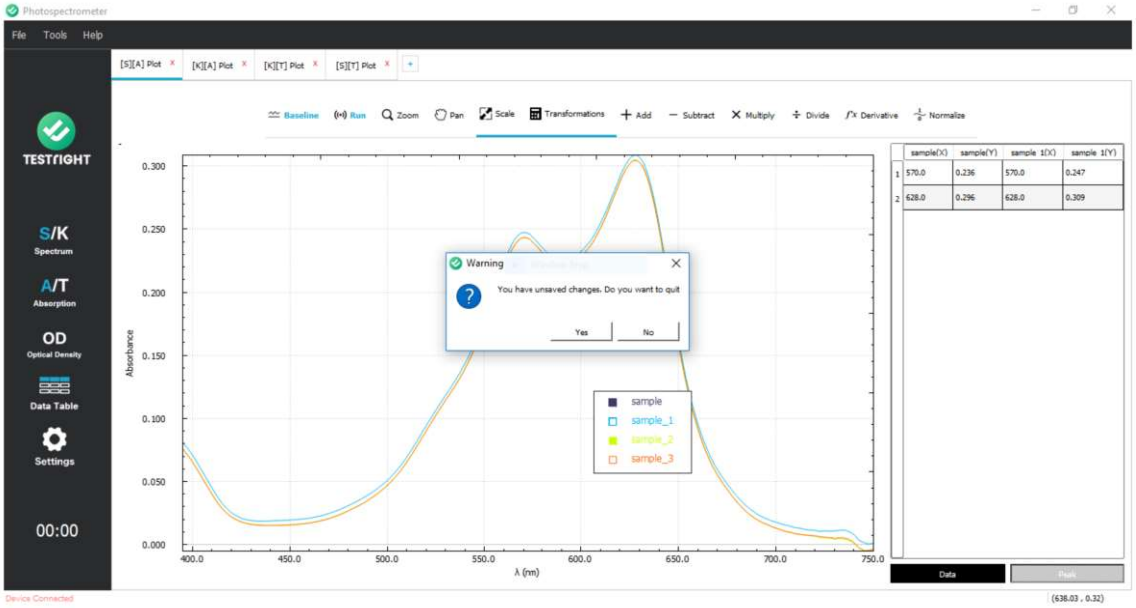


Previous files or spectral data can be opened by going to File on the menu bar and clicking on **Open or by Ctrl + O key command:**



6. Shut down:

To close the software, click on the Cross mark on the right-edge of the software window. While shutting down a pop-up appears on screen confirming to save all data. One can choose accordingly and proceed with shut-down. Once the software is closed disconnect the device from the PC.



Thank you for placing your trust in us.
For any details or queries contact :

TestRight
4th Floor, Synergy Building,
IIT Delhi Campus,
New Delhi - 110016