



Quick Start Guide

for

NIR-M-T1 / NIR-M-T11

Feb. 8, 2022



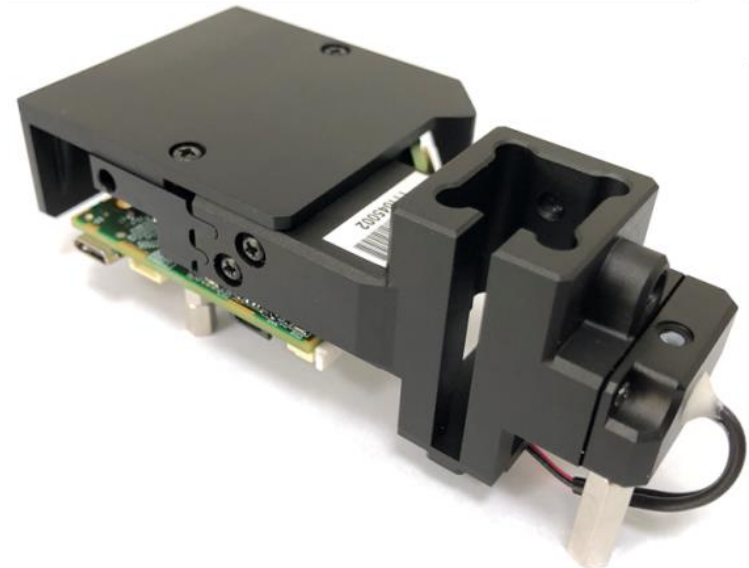
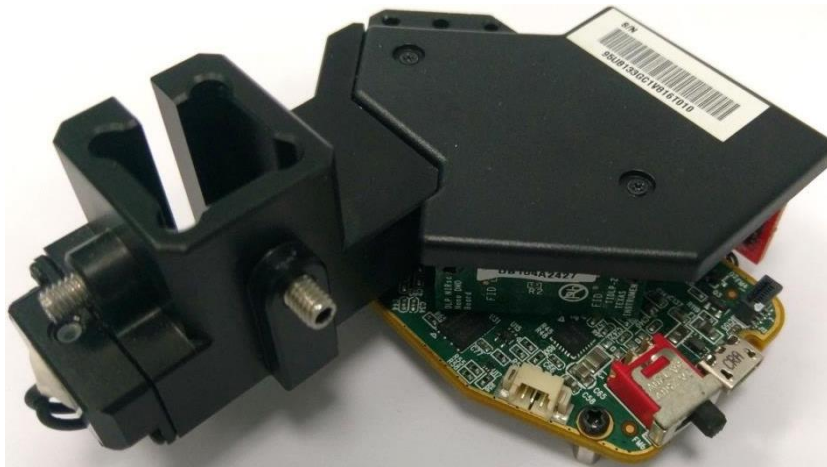
Responsibility Innovation Superiority Entrepreneurship

Specification

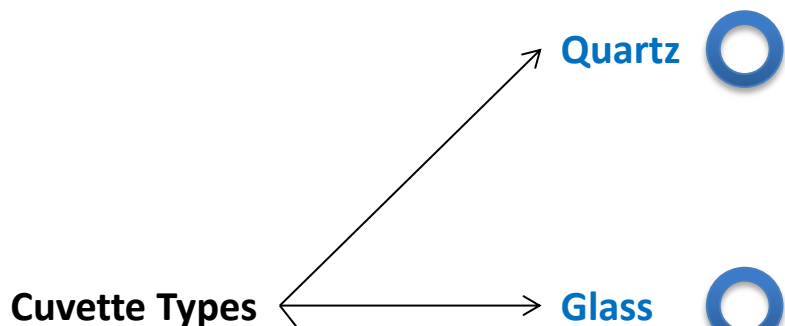
Model	NIR-M-T1	NIR-M-T11
Size	91.8mm * 76mm * 41.2mm	96mm * 48mm * 38.2mm
Weight	<106g	<100g
Sampling method	Transmission	
Cuvette holder	Path length=10mm, Z-dimension=4.75mm	Path length=10mm, Z-dimension=15mm
Wavelength range	900-1700nm	1350-2150nm
Wavelength accuracy	< +/- 1nm typical (verified with RM-NIR)	
Resolution (FWHM)	Typical 10nm, Maximum 12nm	12nm @ 1530nm LD
SNR	> 5000:1 in 1s scan	
Slit width	25um	
Dispersing element	Plane grating	
Wavelength selector	TI DMD DLP2010NIR, 854x480 pixels	
Pixel to wavelength	1.17nm/pixel in average	
Scan capability	Linear/Hadamard/Slew scan	
Scan pattern	Programmable, up to 624 patterns	
Detector	Single element 1mm InGaAs detector Equivalent to 128 pixels (scan pattern=6px, no overlapping) Equivalent to 256 pixels (scan pattern=6px, with overlapping)	
Exposure time	0.635ms~60.960ms	
ADC	24-bit	
Measurement time	Depends on scan configuration	
Connectivity	USB, UART, BLE (optional)	
Wireless scan	via BLE (optional)	
APP	iOS, Android	
Data format	CSV/ DAT/ JDX	
Illumination source	One integrated halogen tungsten lamp, 0,7W *1	
Power	USB (500mA@5V)	

What's inside the box

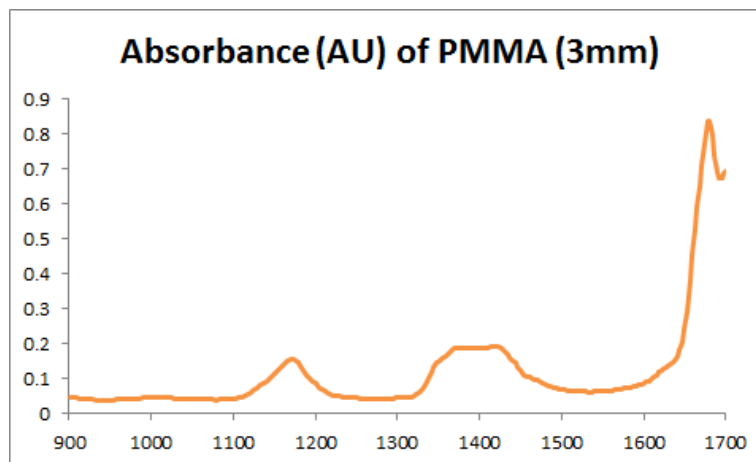
- NIR-M-T module (x1) with cuvette holder and light source
- Ball plungers (x3) for cuvette alignment
- Allen wrench (x1) for ball plunger adjustment



Cuvette Types

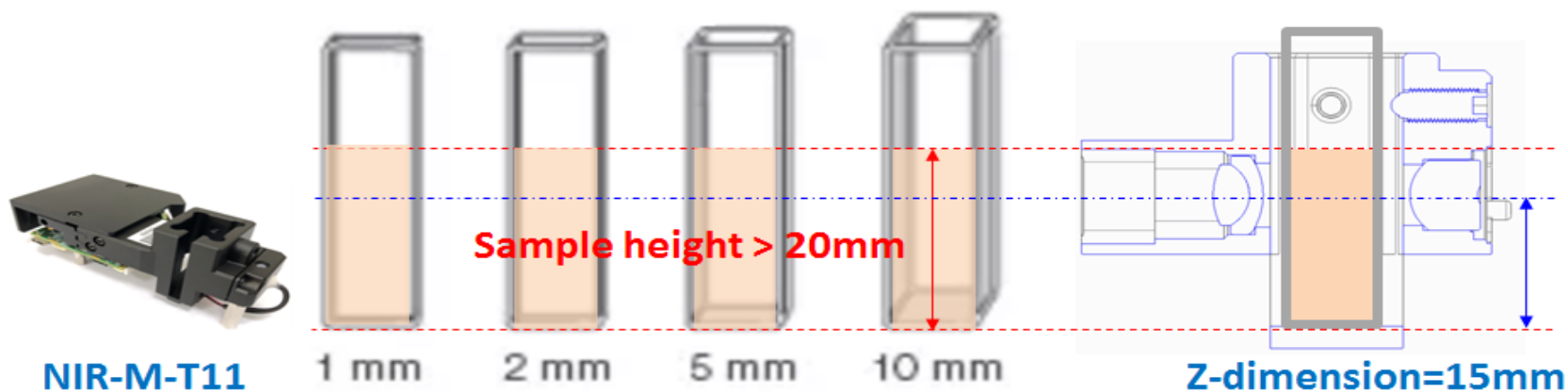
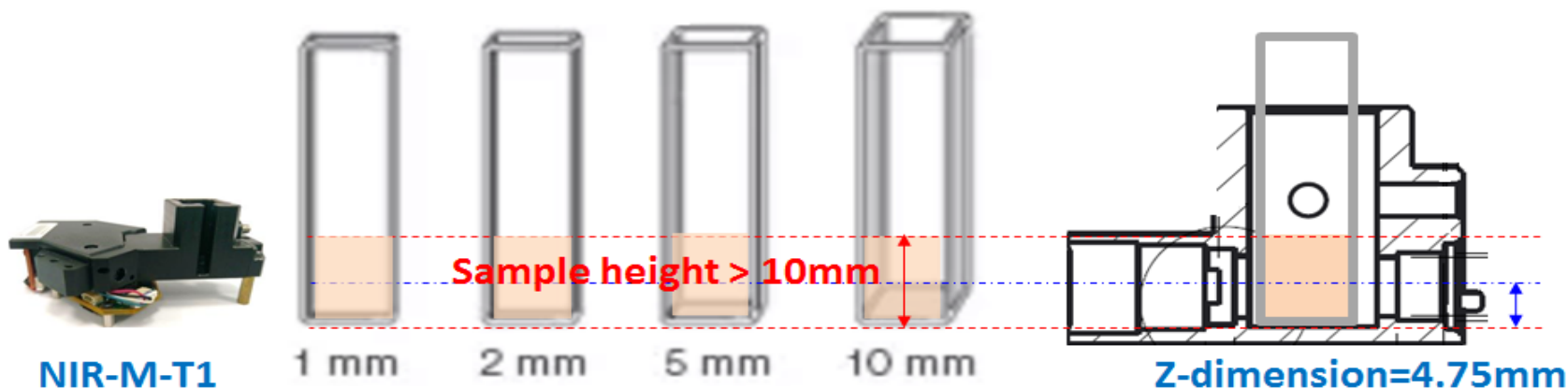


Plastic (Not recommended for NIR) 



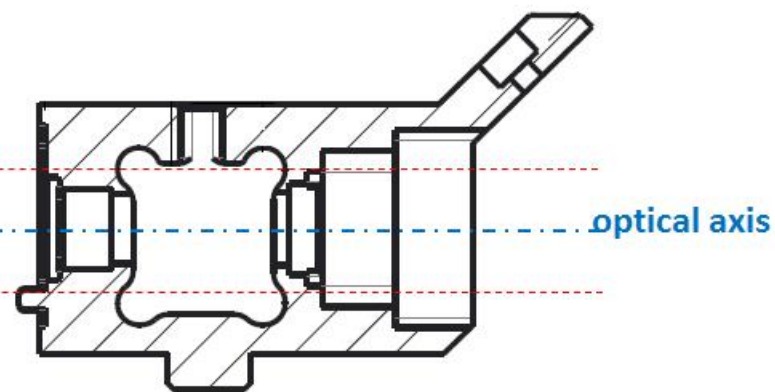
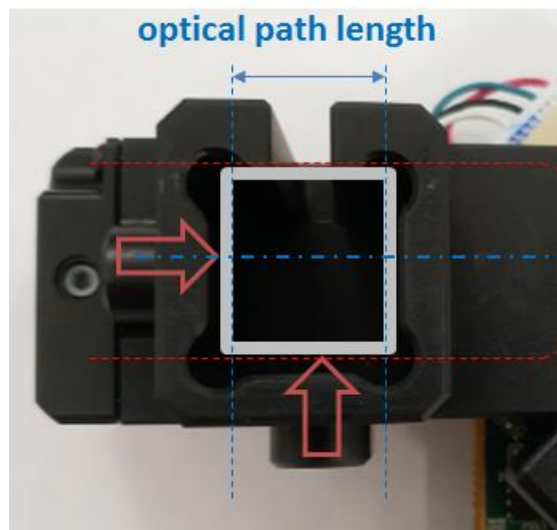
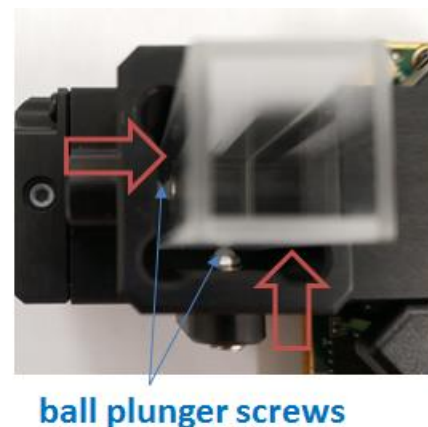
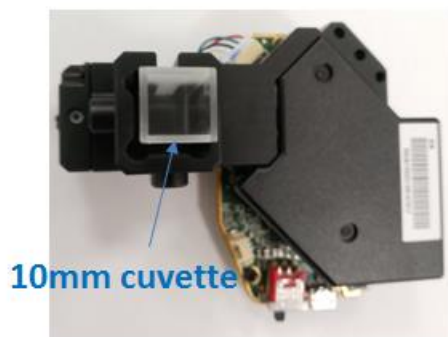
Z-dimension & Sample Height

- Please load **enough samples** in the cuvette for measurement.



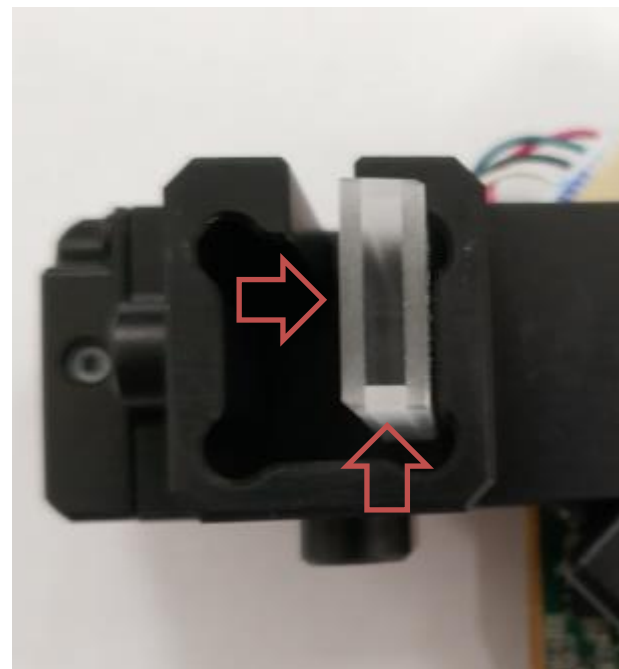
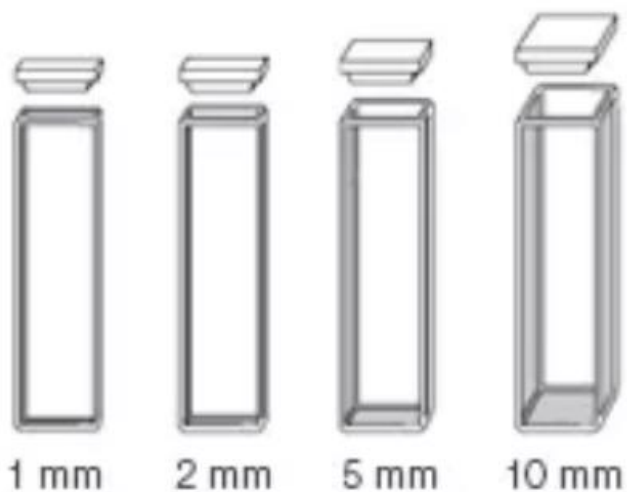
Alignment of Standard Cuvette

- Please use the Allen wrench to adjust the ball plunger screws until the ball end contacts the cuvette and starts to compress, **do not over tighten the ball plunger screws.**



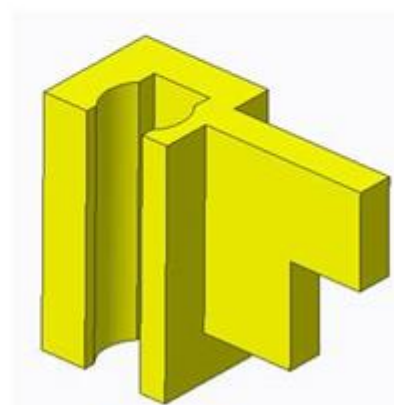
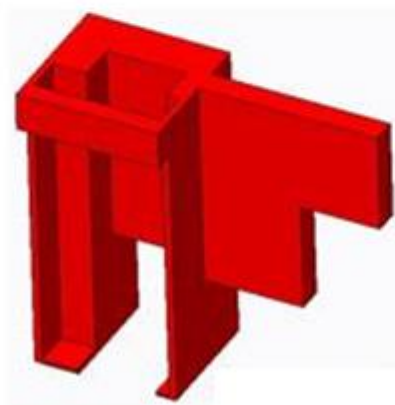
Alignment of Short Path Length Cuvette

- You may consider using different cuvette with shorter path length, for example, 1mm, 2mm or 5mm. Please **use a proper spacer to adjust the fit of the cuvette.**



Adapter of Vial & Short Path Length Cuvette

- Please contact ISC for CAD file of adapter



Perform a Scan Job (Take T1 as an Example)

- Please set up scan configuration, for example, **Column 1 (default)**.

Scan Setting | **Scan Config** | Saved Scans

Local Scan Configs

Device Scan Configs

Column 1

Hadamard 1

Set Device Boot-Up Config

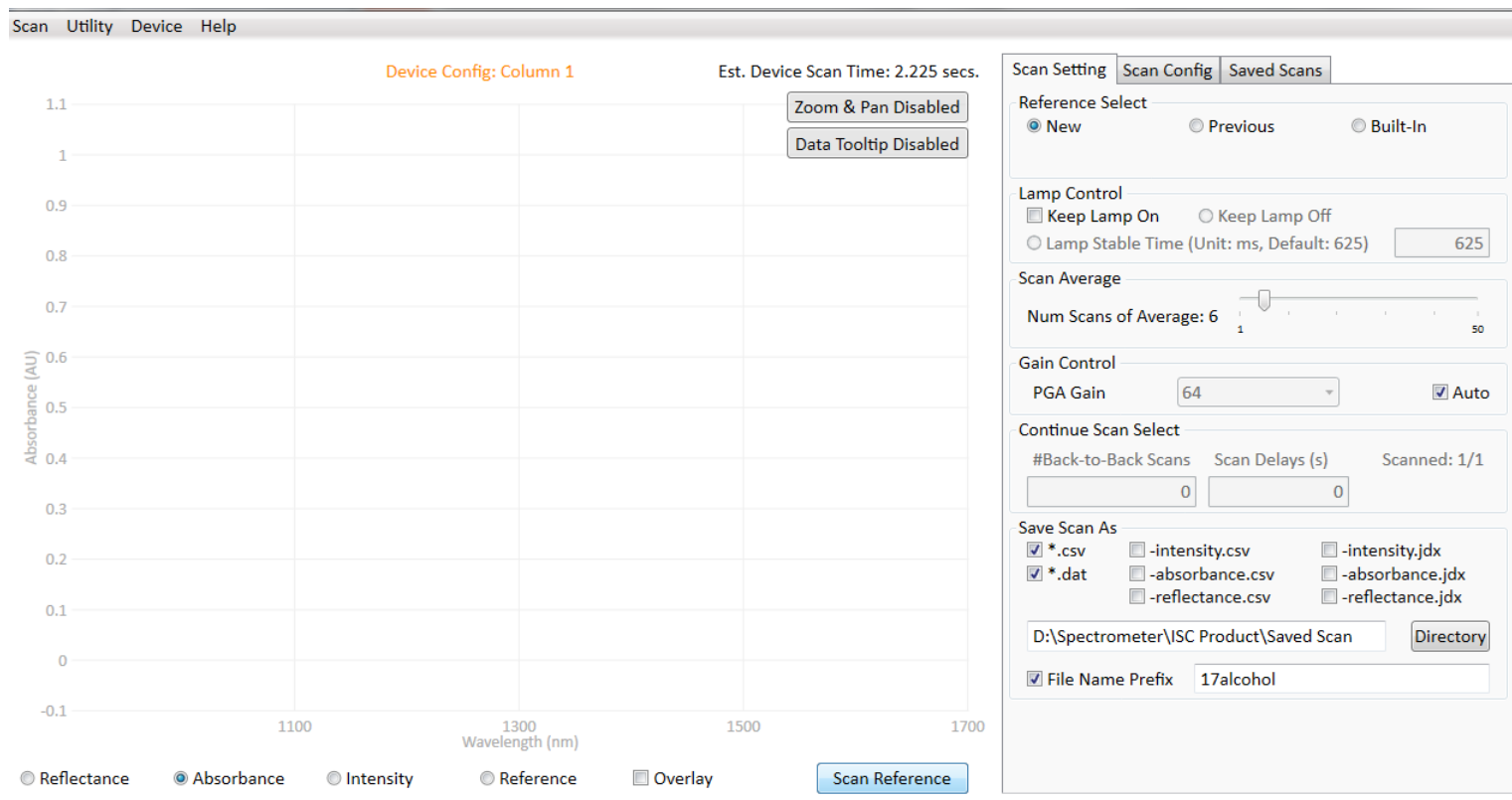
Details

Name	Column 1				Num Scans to Avg.	6
Num Sections	1	1	2	3	4	5
Scan Type	Col ▾	Col ▾	Col ▾	Col ▾	Col ▾	Col ▾
Spectral Range Start (nm)	900					
Spectral Range End (nm)	1700					
Width (nm)	7.03 ▾	8.2 ▾	8.2 ▾	8.2 ▾	8.2 ▾	8.2 ▾
Exposure Time (ms)	0.635 ▾	0.635 ▾	0.635 ▾	0.635 ▾	0.635 ▾	0.635 ▾
Dig. Resolution	228					
Total Ptn. Used: 228/624 228/352						

New
Edit
Delete
Save
Cancel

Perform a Scan Job (Take T1 as an Example)

- Please scan an **empty cuvette** to obtain a **reference signal**.



The screenshot shows the InnoSpectra software interface. The main window displays a plot of Absorbance (AU) versus Wavelength (nm). The plot is currently blank, with the y-axis ranging from -0.1 to 1.1 and the x-axis ranging from 1100 to 1700 nm. The plot area includes a grid and two disabled buttons: "Zoom & Pan Disabled" and "Data Tooltip Disabled".

At the top of the plot area, it says "Device Config: Column 1" and "Est. Device Scan Time: 2.225 secs.". Below the plot, there are radio buttons for "Reflectance", "Absorbance", "Intensity", and "Reference", and a checkbox for "Overlay". The "Absorbance" radio button is selected.

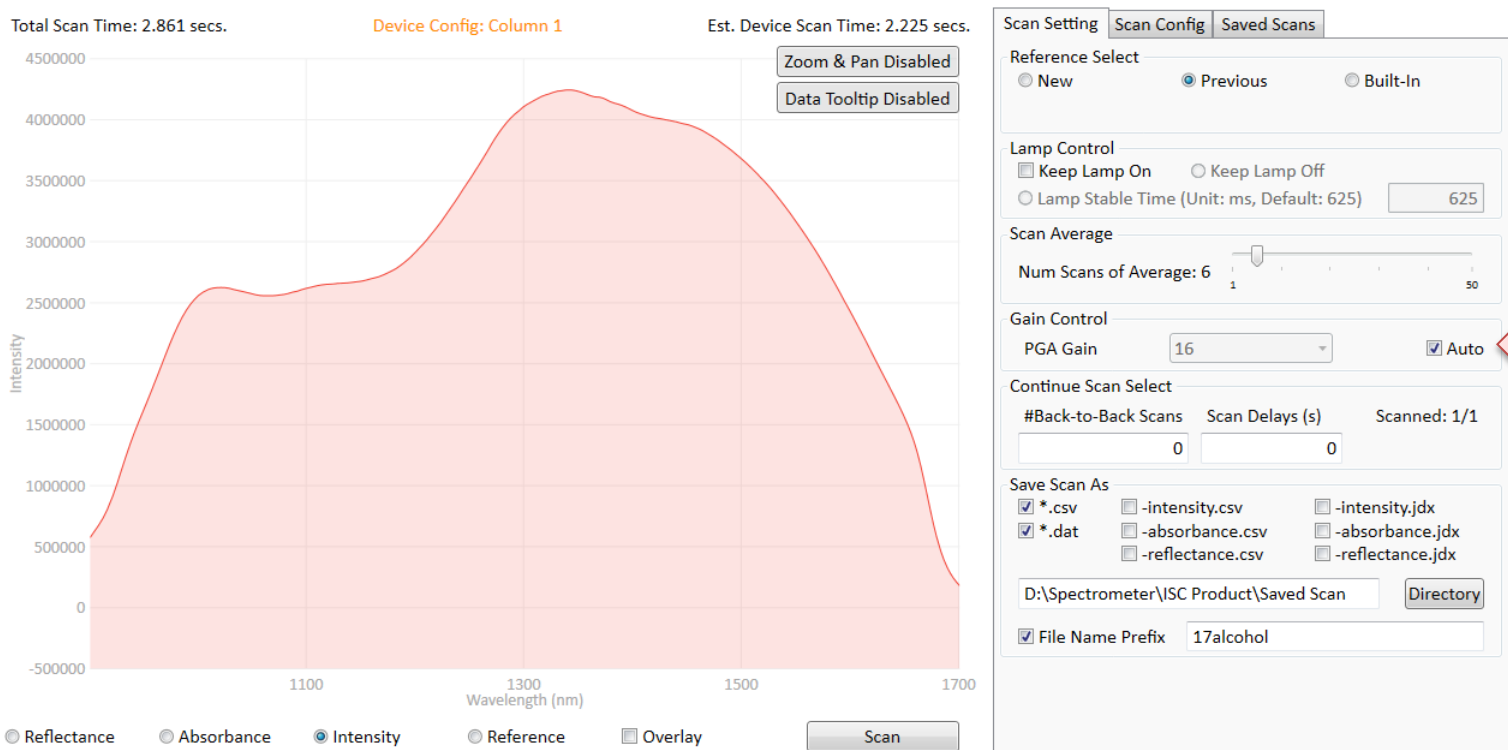
On the right side, there is a "Scan Setting" panel with several sections:

- Reference Select:** Radio buttons for "New" (selected), "Previous", and "Built-In".
- Lamp Control:** Checkboxes for "Keep Lamp On" and "Keep Lamp Off" (selected), and a "Lamp Stable Time (Unit: ms, Default: 625)" field set to 625.
- Scan Average:** A slider for "Num Scans of Average" set to 6, with a range from 1 to 50.
- Gain Control:** A "PGA Gain" dropdown set to 64 and a checked "Auto" checkbox.
- Continue Scan Select:** Fields for "#Back-to-Back Scans" (0) and "Scan Delays (s)" (0), with "Scanned: 1/1" displayed.
- Save Scan As:** Checkboxes for file formats: *.csv, *.dat, -intensity.csv, -absorbance.csv, -reflectance.csv, -intensity.jdx, -absorbance.jdx, and -reflectance.jdx. A "Directory" field is set to "D:\Spectrometer\ISC Product\Saved Scan".
- File Name Prefix:** A field set to "17alcohol".

At the bottom of the settings panel, there is a blue button labeled "Scan Reference". A large red arrow points upwards towards this button.

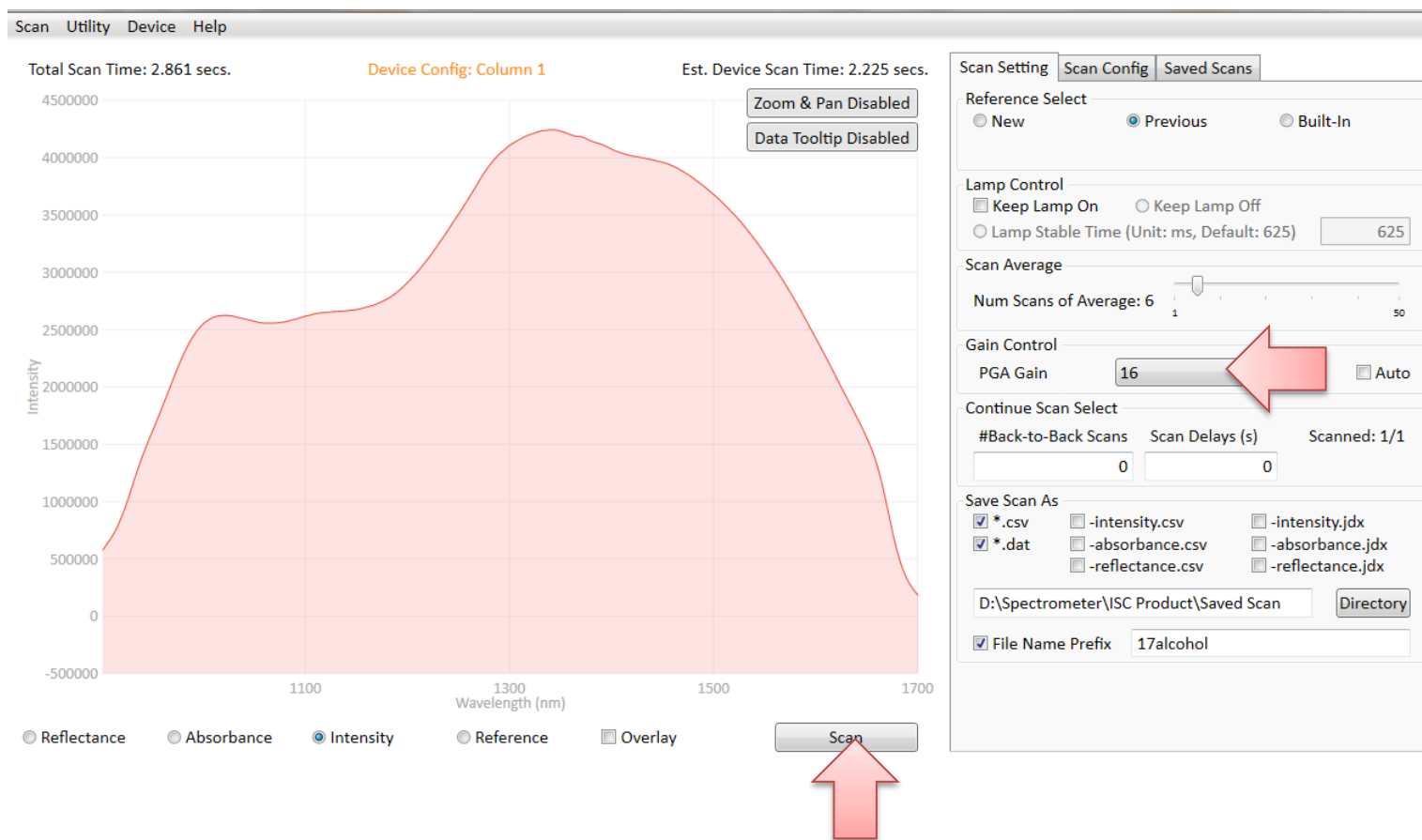
Perform a Scan Job (Take T1 as an Example)

- A reference signal is scanned and displayed as below. In this case, we select **Auto PGA**, the software determines PGA=16 for this empty cuvette in “Column 1” configuration.



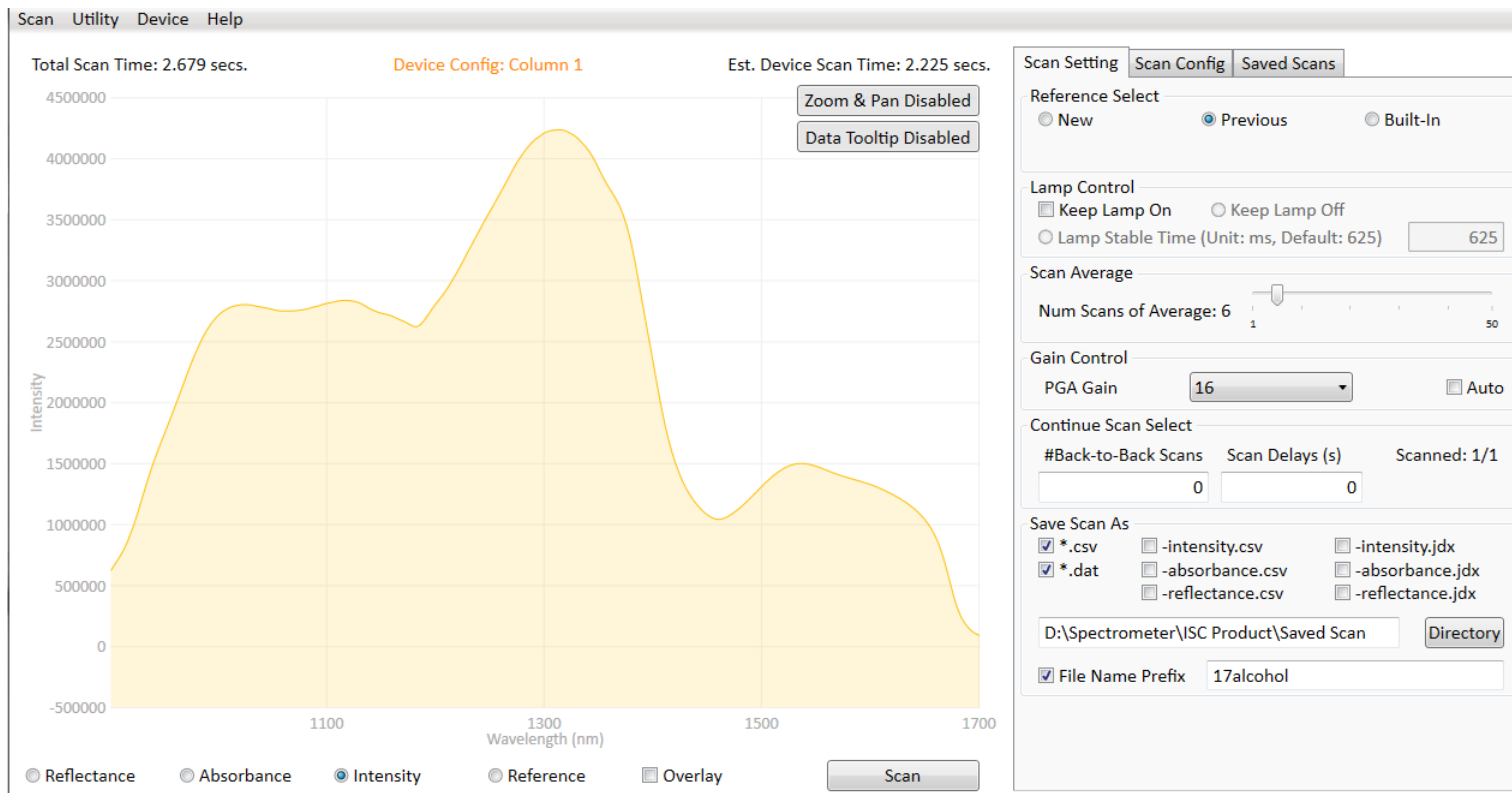
Perform a Scan Job (Take T1 as an Example)

- To perform a sample signal scan, you can disable “Auto PGA” and **fix the PGA to 16**. This will ensure both sample and reference signals with **same PGA gain**.



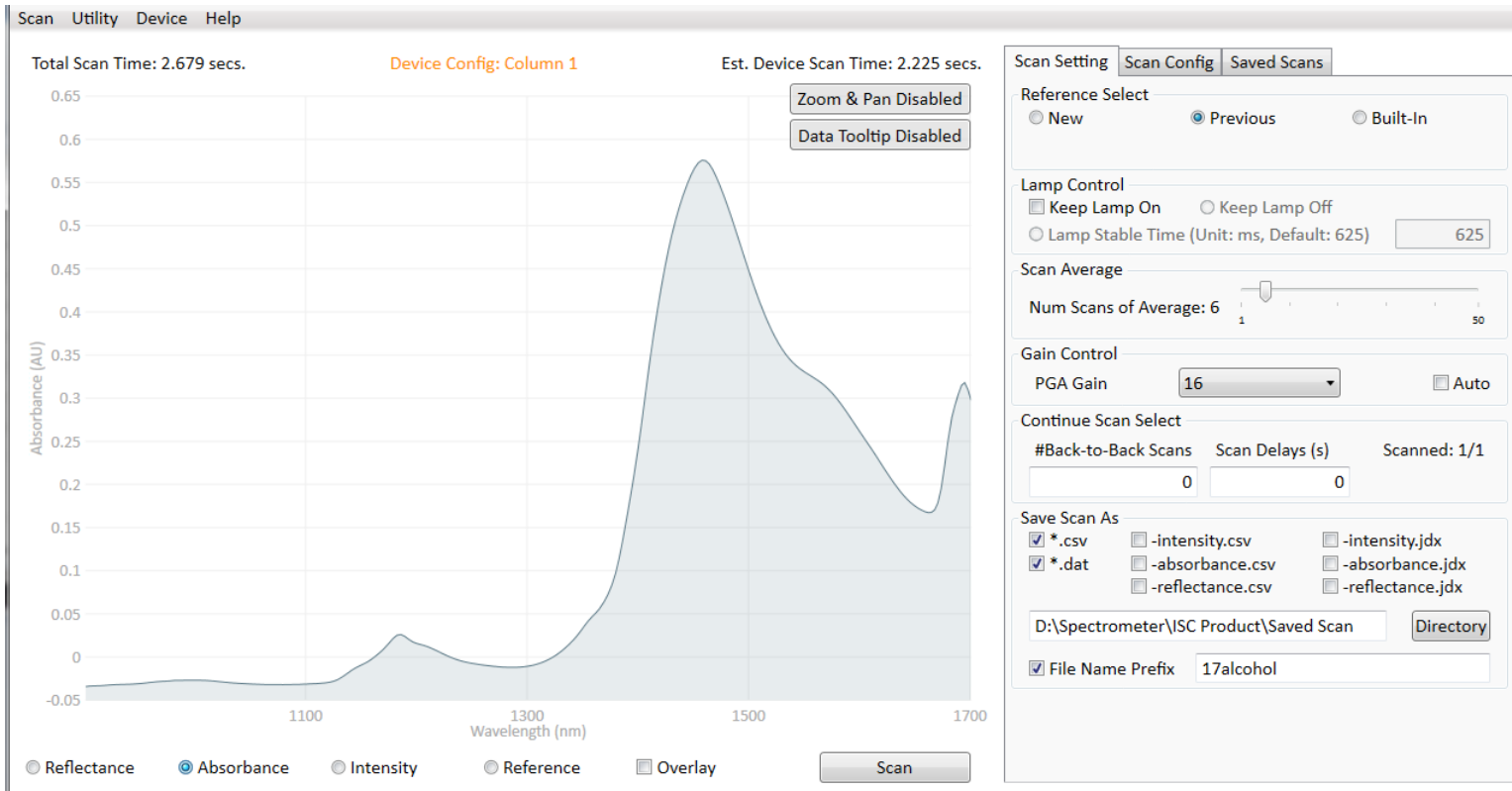
Perform a Scan Job (Take T1 as an Example)

- The sample signal is captured and displayed as below.



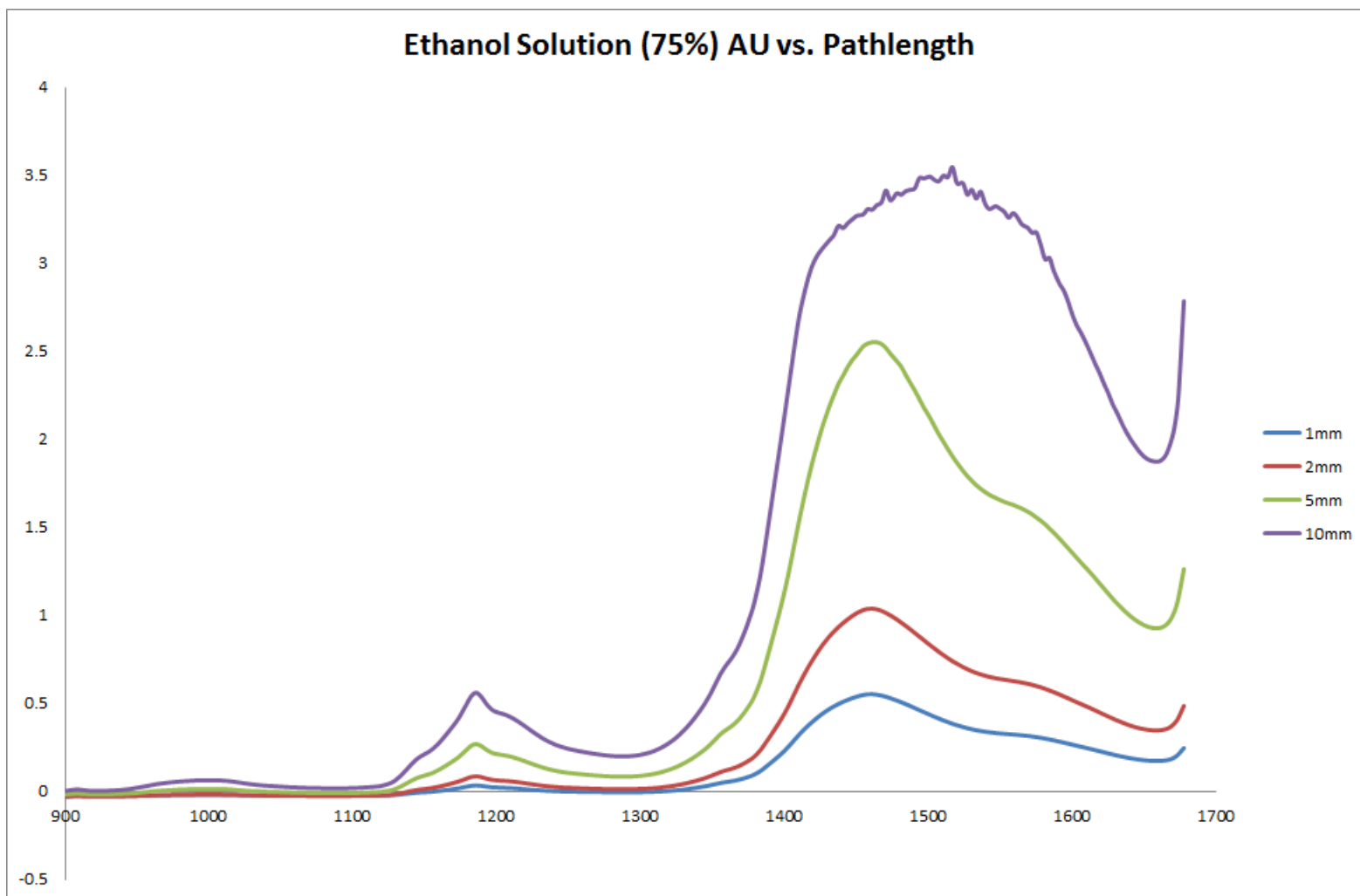
Perform a Scan Job (Take T1 as an Example)

- The absorbance of this sample is calculated and displayed as below.



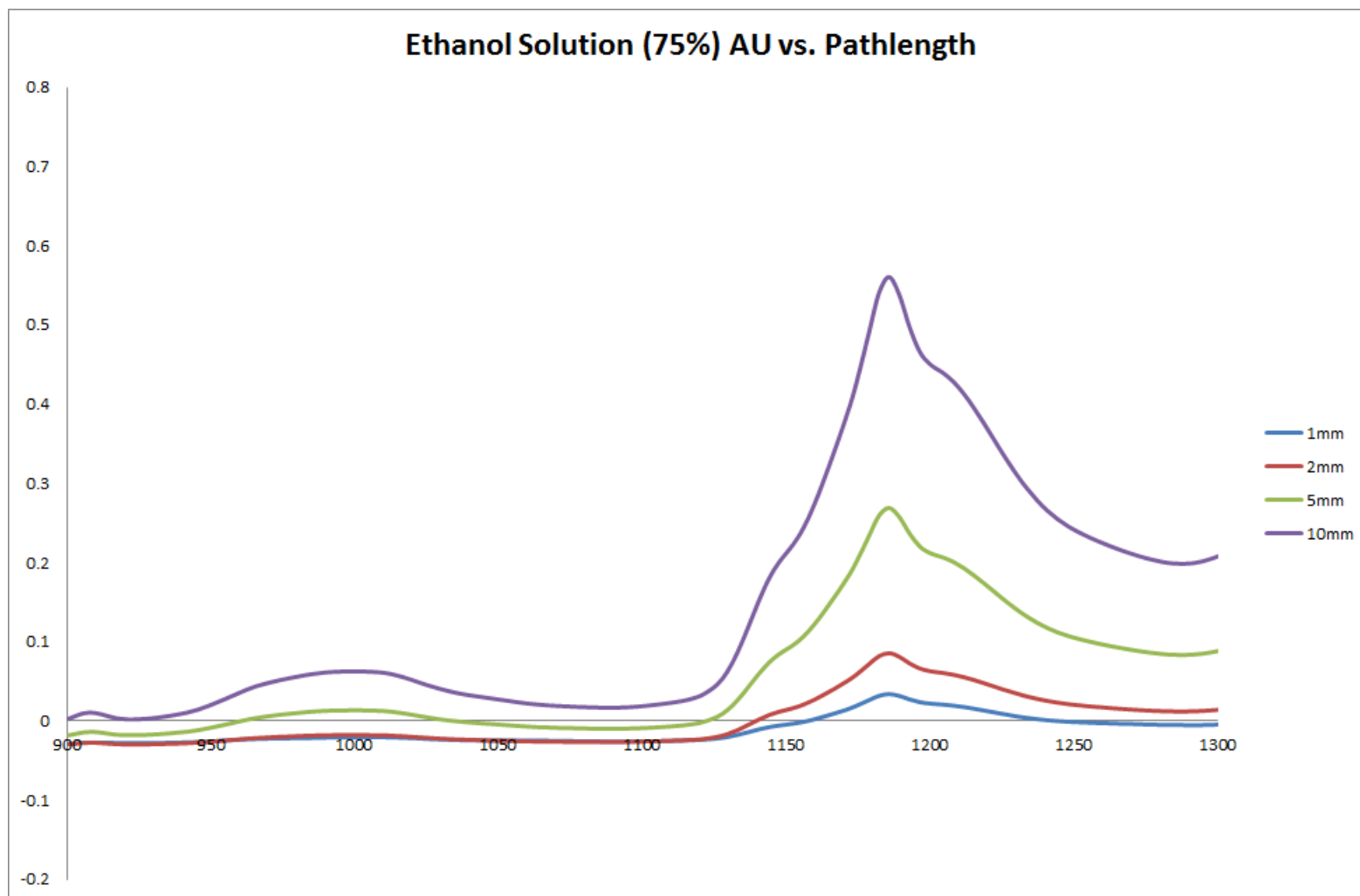
Example: Scan Ethanol Solution (75%) with T1

- The absorbance of ethanol solution in different path length is displayed as below.



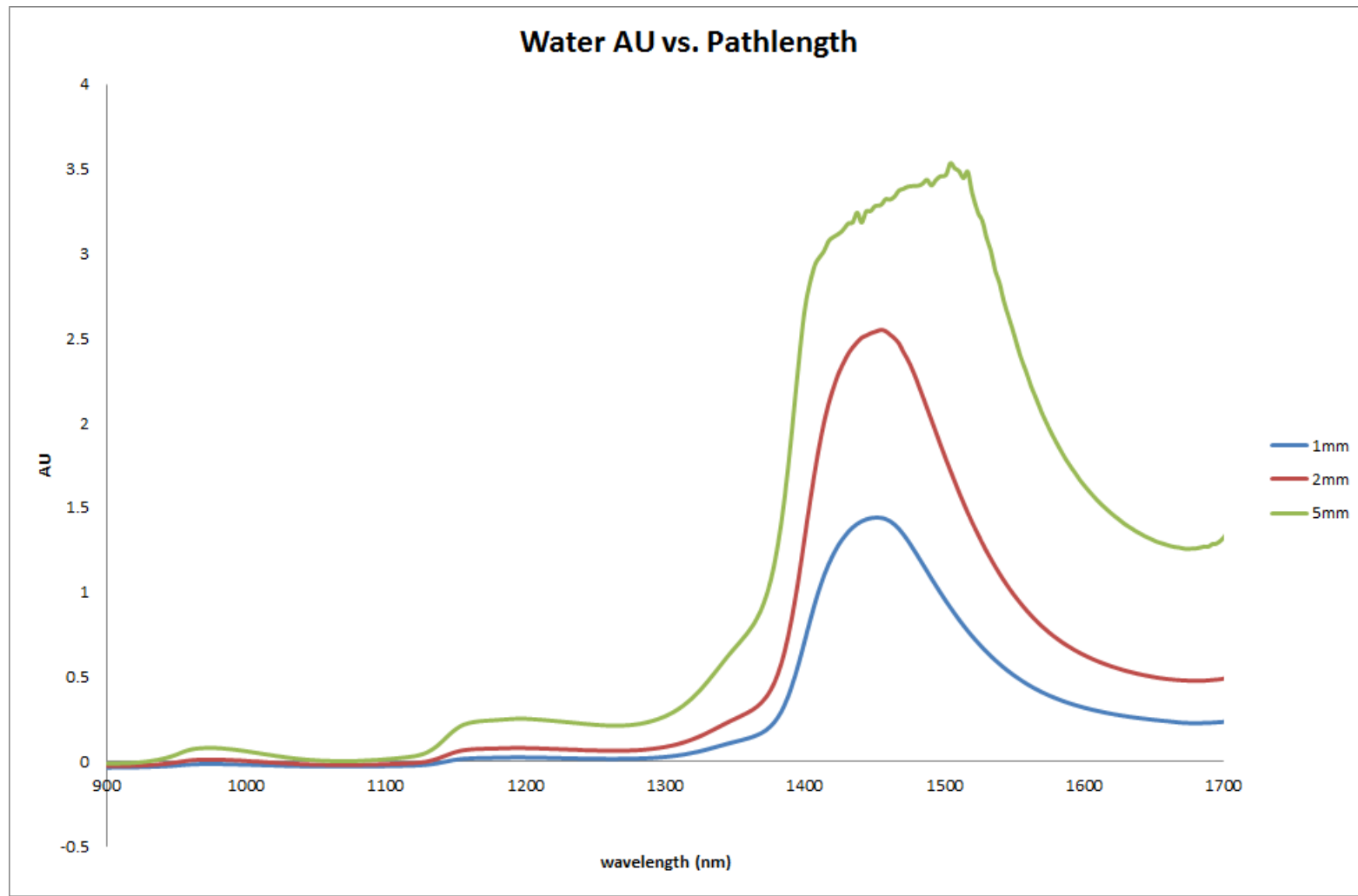
Example: Scan Ethanol Solution (75%) with T1

- The absorbance of ethanol solution in different path length is displayed as below.



Example: Scan Water with T1

- The absorbance of water in different path length is displayed as below.



Example: Scan Soy Milk with T11

- Soy milk and dairy milk are generally opaque, white or off-white in color, and are strong scattering materials. If you plan to measure milk in transmissive mode, you need to apply a very short path length. Here is an example of the absorbance of soy milk measured using 100um path length.



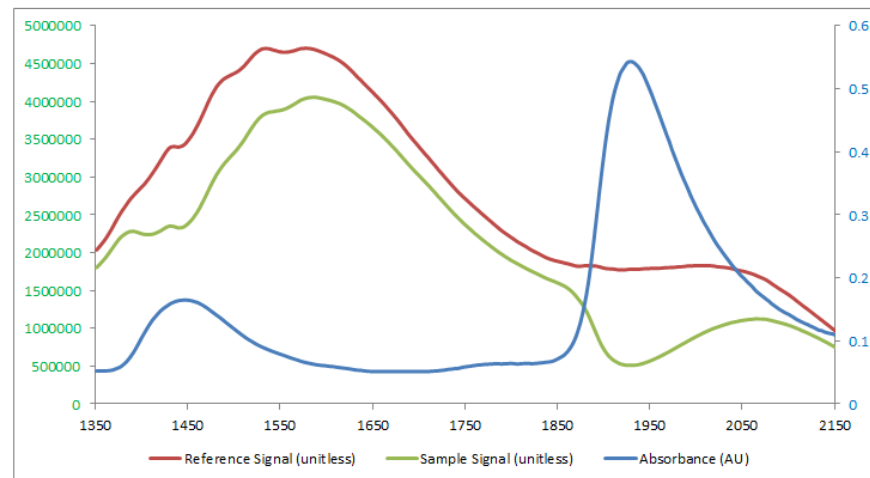
Soy milk (per 100ml)
Protein: 6g
Fat: 3.2g
Carbohydrates: 7.8g

NIR-M-T11

Demountable cuvette:
Light Path=100um

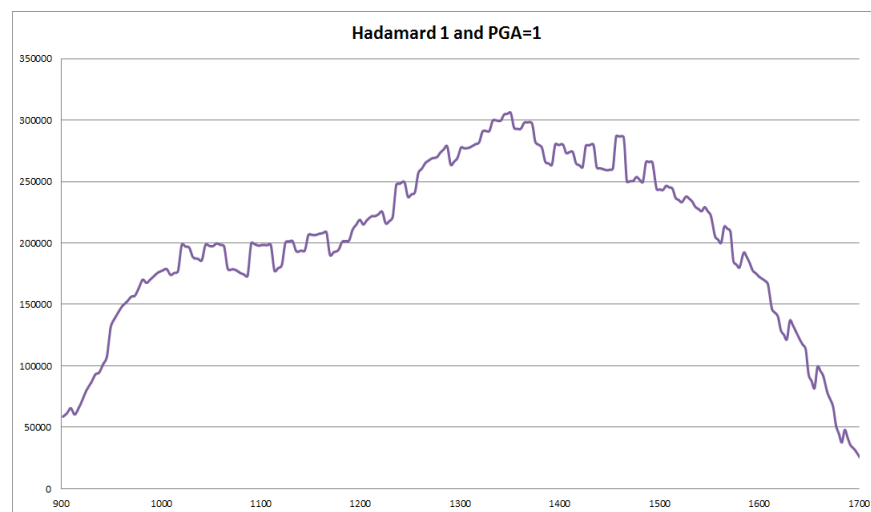
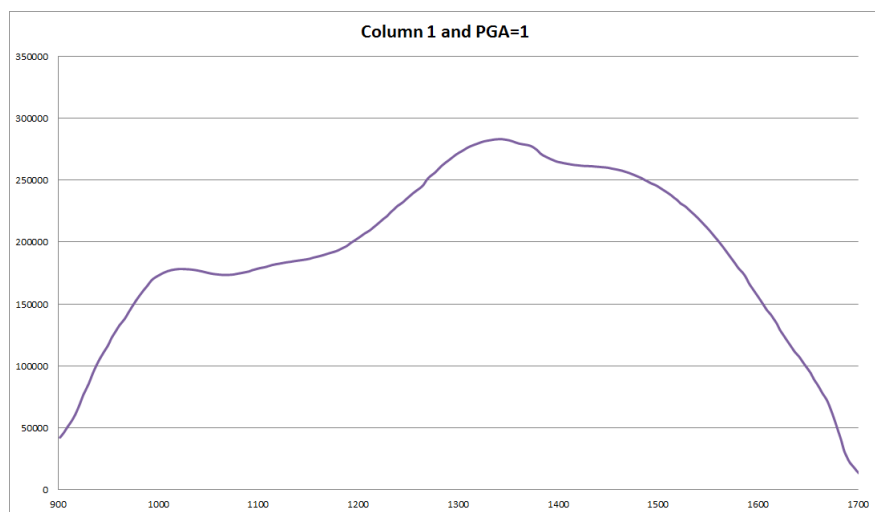
Details	
Name	Column 1
Num Scans to Avg.	6
Num Sections	1
Scan Type	Col
Spectral Range Start	1350
Spectral Range End	2150
Width (nm)	7.03
Exposure Time (ms)	0.635
Dig. Resolution	228

- Scan Config: Column 1 has been good enough to maintain spectral quality.
- Reference Signal: Empty cuvette (air).



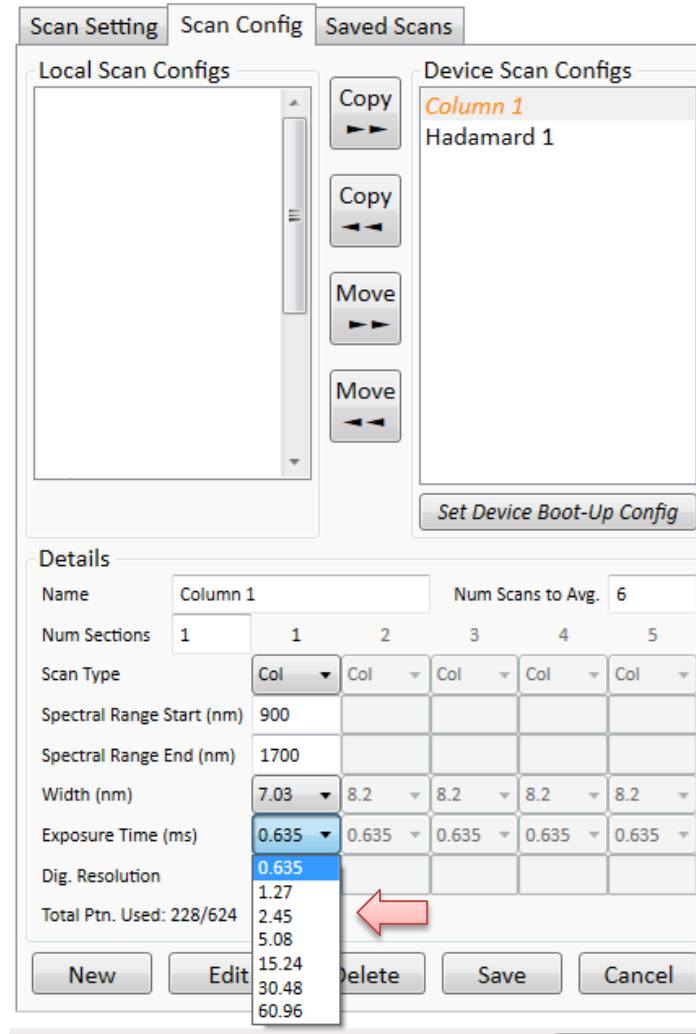
Column Mode vs. Hadamard Mode

- With NIR-M-T, we **do not suggest using the Hadamard mode** because it is very possible to cause reference signal saturation even when $PGA=1$. **Once signal is saturated, the absorbance calculation will never be correct.**



SNR Enhancement (Take T1 as an Example)

- In **Column mode**, you can also **increase the exposure time to improve SNR**.



The screenshot shows the 'Scan Setting' tab with 'Scan Config' selected. It features two panels: 'Local Scan Configs' (empty) and 'Device Scan Configs' (containing 'Column 1' and 'Hadamard 1'). Below these is a 'Details' section with a table for 'Column 1' and a dropdown menu for 'Exposure Time (ms)'.

Name	Column 1					Num Scans to Avg.	
Num Sections	1	1	2	3	4	5	6
Scan Type	Col	Col	Col	Col	Col	Col	Col
Spectral Range Start (nm)	900						
Spectral Range End (nm)	1700						
Width (nm)	7.03	8.2	8.2	8.2	8.2	8.2	
Exposure Time (ms)	0.635	0.635	0.635	0.635	0.635	0.635	
Dig. Resolution	0.635						
Total Ptn. Used: 228/624	1.27						
	2.45						
	5.08						
	15.24						
	30.48						
	60.96						

Thank You

