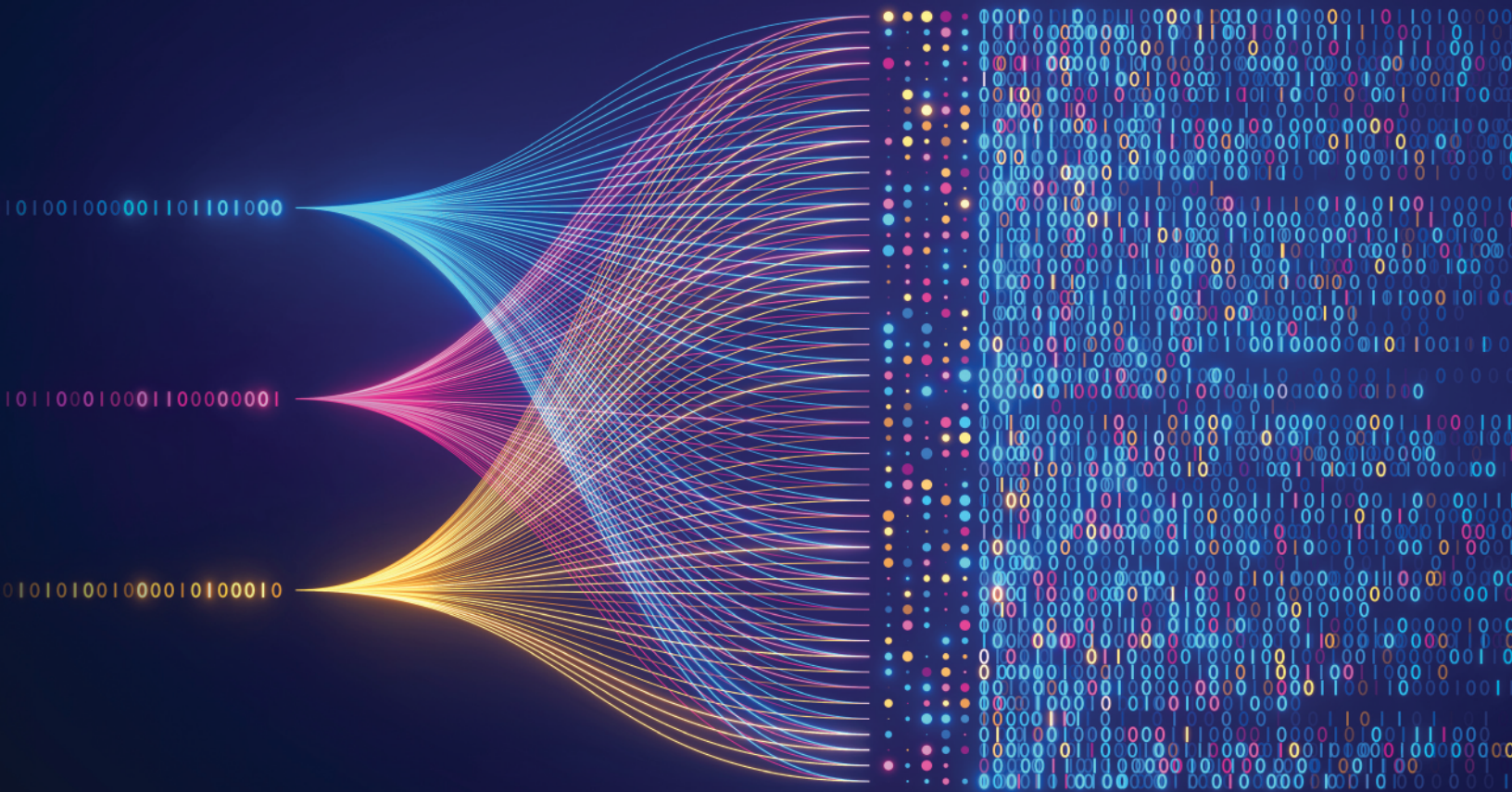


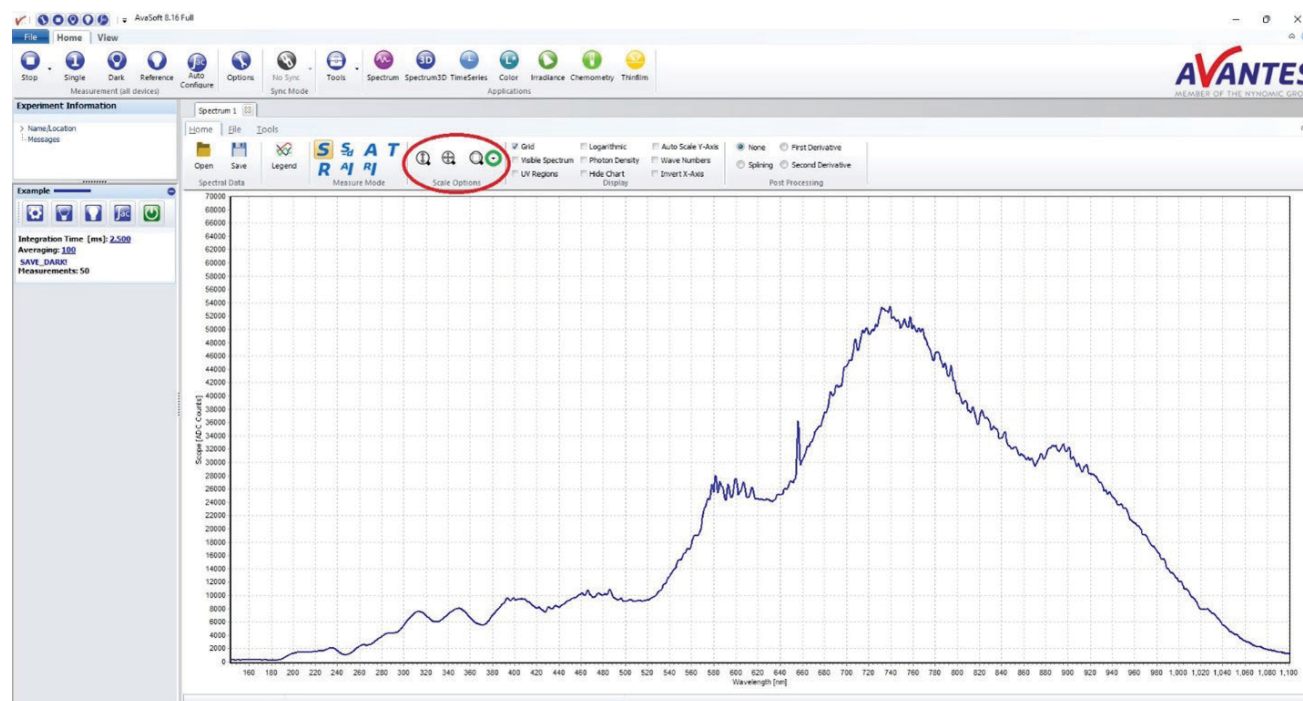
SPECTRAL TIPS AND TECHNIQUES: USING SPECTRUM TOOLS IN AVASOFT 8: SCALING, DISPLAY, AND POST-PROCESSING



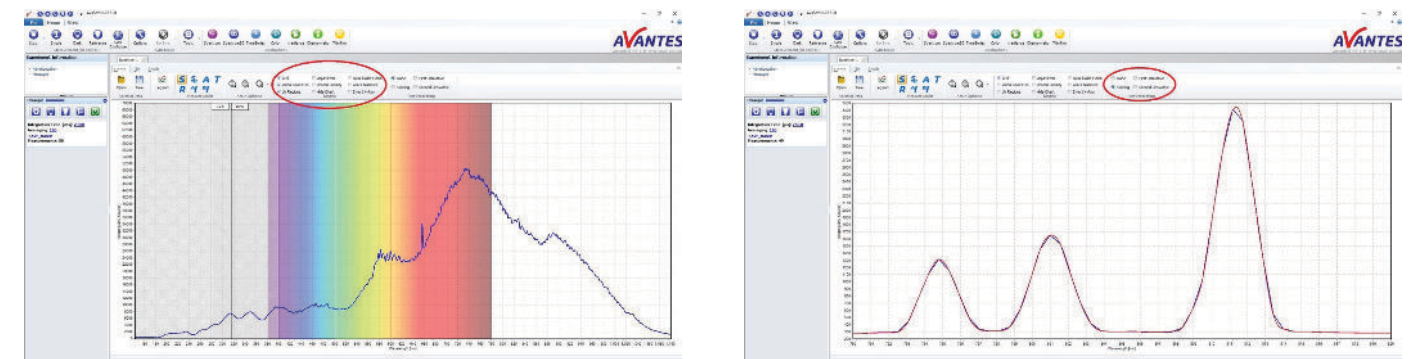
INTRODUCTION AND STEPS

Many users of AvaSoft 8 are aware of the different measurement modes and modules available in the software, such as absorbance and irradiance measurement modes and TimeSeries and Color modules. Just within the standard Spectrum module, however, are many useful tools for analyzing data. Whether it is changing the scale of data to focus on a specific part of a spectrum, highlighting specific spectral regions to give context to wavelength values, converting data to values more commonly used in a certain scientific field, or performing minor post-processing on data, the standard Spectrum module contains plenty of helpful tools beyond reporting ADC Counts at each pixel. Below is a short guide covering the scaling, display, and post-processing tools available in the Spectrum module in AvaSoft 8.

The scaling tools are located in the Scaling Options box at the top-middle portion of the Spectrum window (circled in red below). The leftmost button that shows up-and-down arrows in a magnifying glass is the Auto Scale Y-Axis button. This will adjust the scale of the y-axis to fit all data points at the time it is clicked with little extra range. This tool is ideal for measurements that typically have much smaller magnitudes than the full 70000 count range of the default graph, such as laser-induced breakdown spectroscopy. The middle button that shows arrows going up-and-down and left-and-right inside a magnifying glass is the Graphic Reset button. As the name implies, this button simply resets the graph scaling to the default size (i.e., the wavelength range of the spectrometer as the domain, and -200 to 70000 counts as the range). The rightmost button that shows a dotted square in a magnifying glass is the Preset Scale button. This tool will automatically adjust the graph to a user-defined scale. The scale can be adjusted by clicking the arrow to the right of the Preset Scale button (circled in green below) and clicking "Edit". This will open a small window to adjust the minimum and maximum values for the wavelength and Y-axis. Clicking OK will save the scaling options to the button, and the user-defined scale can now be set every time the button is clicked. The "Save Current Scale" option in the Preset Scale dropdown will overwrite the user-defined scale with the current scale of the graph. Similar scaling options can be accessed by clicking and dragging the mouse to make boxes on the graph. If the user clicks and drags making a box going from left to right, the graph will zoom into the region of the box. If the user clicks and drags making a box going from right to left, the graph will reset to the default scale.



The display tools are located in the box labeled "Display" just to the right of the Scale Options (circled in red below). The Grid tool is enabled by default and places dotted lines on the graph to create a grid. The Visible Spectrum tool adds the visible color spectrum from 380-780 nm (shown enabled below), which is useful to give a reference for where a measured wavelength is located in comparison to visible wavelengths the human eye is more familiar with. The UV regions tool provides a similar function but for the UVA (315-400 nm) and UVB (280-315 nm) ultraviolet regions, though these regions are only distinguished with grey diagonal lines (shown enabled below). The UVC region (100-280 nm) is also shown but is not labeled. The Logarithmic tool simply changes the Y-axis scale from linear to logarithmic, which provides scaling closer to what might be seen in absorbance, or reflectance measurements. The Photon Density tool is only applicable to the Absolute Irradiance measurement mode and changes the Y-axis from Intensity [$\mu\text{W}/(\text{cm}^2)/\text{nm}$] to Photon Counts [$\mu\text{Mol}/\text{s}/\text{m}^2/\text{nm}$]. The Hide Chart tool disables the graphic display, which can optimize the speed of the software for high-acquisition applications. Auto Scale Y-Axis sets the software to adjust the scale to fit all data points with little extra range for each new measurement. This can be helpful to always see details of measurements in real time but can cause confusion with a constantly changing Y-axis. The Wave Numbers tool changes the X-axis from Wavelength [nm] to Wavenumber [cm^{-1}]. This value was used in early spectroscopy and is still commonly used in many fields such as [Raman spectroscopy](#) and [infrared spectroscopy](#). The Invert X-Axis tool flips the orientation of the X-axis, which can be useful when comparing between wavelength and wave number data. Additionally, wave number data will often be reported in this orientation to match wavelength measurements.



The post-processing tools are located in the box labeled "Post-Processing" to the right of the Display tools (circled in red below). Only one of these tools can be active at a time. By default, the "None" button will be selected. The Splining button will generate a cubic spline from the data (shown as the red curve below; the raw data is shown as the blue line). In simple terms, a spline is a smooth, continuous function that passes through every data point while minimizing the internal energy of the function (i.e., minimizing the integral of the curve). Because this tool uses every data point of a measurement, these values are not changed and the curve is not applied to saved data. This function can be especially useful when trying to determine the exact location of peak wavelengths. In some instances, a peak may be located between where two pixels are defined and the peak location will default to the pixel with higher counts. Splining will create a smooth curve and reveal the true peak location, as shown below. As stated previously, splining will not be applied to saved data, so care must be taken to record true peak locations while splining is active. The First Derivative and Second Derivative buttons take the first and second derivative of the spectral data, respectively. Because the measured data is not a smooth, continuous function, these post-processing tools are often limited in their utility unless further post-processing, such as smoothing, is performed.

With these steps complete, the scaling, display, and post-processing tools can be utilized in the Spectrum module. Please reach out to our support team at support@avantes.com for further explanation or troubleshooting options.

SUPPORT & ADVICE

Providing high-quality equipment is only part of what we do. The other equally important factor is the high level of service we deliver. Our organization includes various services to provide you with the best support and advice:

Feasibility studies

Our sales engineers perform free feasibility studies to find your most ideal measurement setup.

Support team

Our support team never sleeps and provides you with the best possible service.

Demo program

Our demo program allows you to try our products for free to ensure that you find the perfect solution.

MyAvantes

Personal platform including AvaSoft software and other helpful material for you to download.

Online support

Helpful documents and tutorial videos on demand regarding to your products.

ABOUT AVANTES

We are Avantes, a leading player in the compact spectrometer industry. We operate in various industries, including (bio)medical, agriculture, semiconductor, and consumer electronics. Our instruments are found in world-class research laboratories, embedded in devices, or playing a crucial role in quality control during production.

With a long history of consulting with clients across various industries, Avantes is an **experienced partner** equipped to guide customers who want a solution tailored to their application and research needs.

Through our headquarters in the Netherlands and offices in the USA and China, our sales engineers work closely with our customers to find the most ideal measurement solution. In addition to our direct offices, Avantes has a **worldwide network** of distributors in over 35 countries ready to assist you. All of our products are made in our own production facility in the Netherlands.



Let our solutions empower your application

Scan the QR-code and discover how our solutions will empower your application. We are happy to help!



CONTACT

WE'RE HAPPY TO HELP

Curious how spectroscopy can help you reveal answers by measuring all kind of materials, in-line, at your production facility, in a lab or even in the field? Please visit our website or contact one of our technical experts, we're happy to help you.

Avantes Headquarters

Phone: +31 (0) 313 670 170

Email: info@avantes.com

Website: www.avantes.com

Avantes Inc.

Phone: +1 (303) 410 866 8

Email: infousa@avantes.com

Website: www.avantesUSA.com

Avantes China

Phone: +86 (0) 108 457 404 5

Email: info@avantes.com.cn

Website: www.avantes.cn

Follow us on social media:

