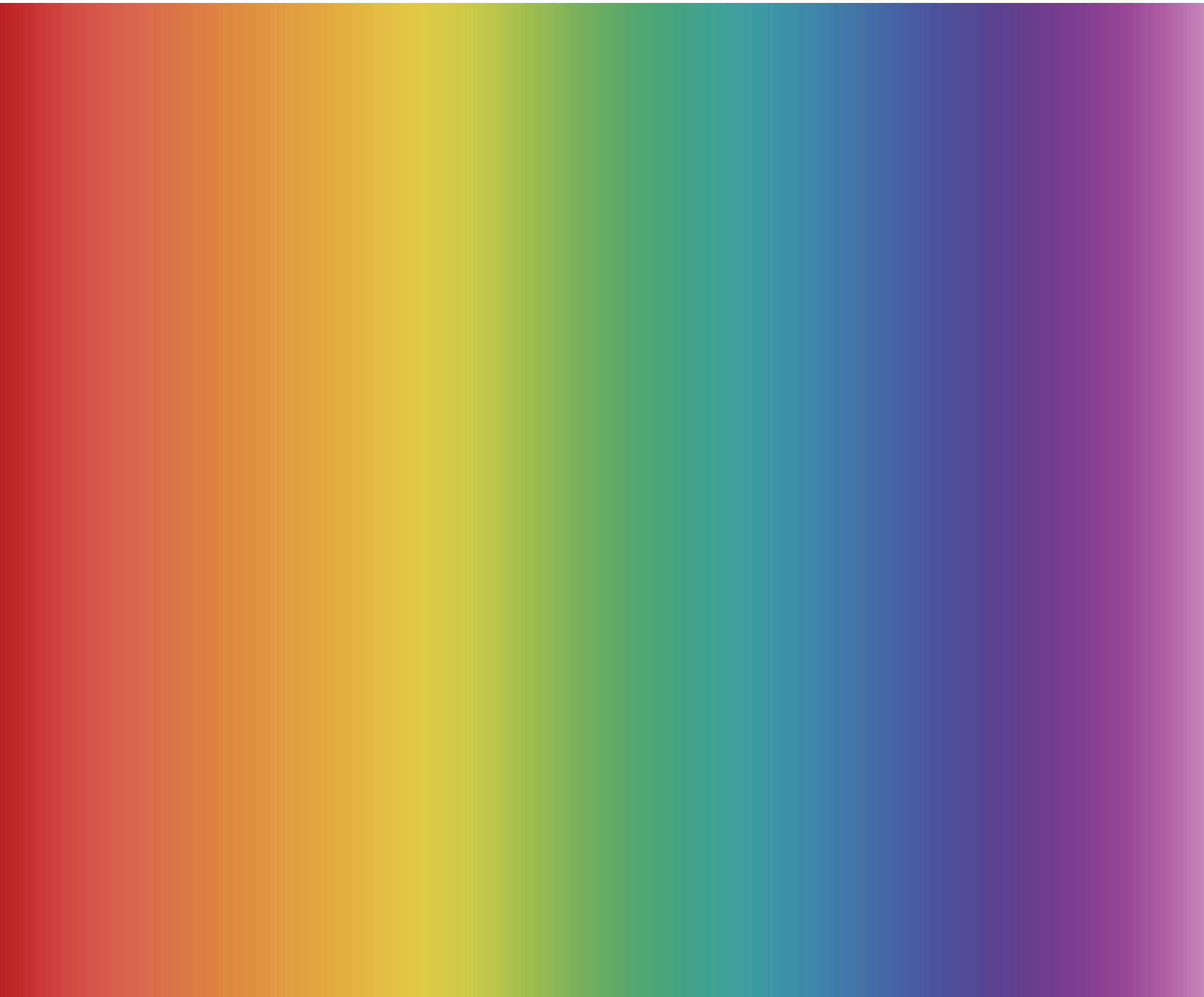
AVANTES
MEMBER OF THE NYNOMIC GROUP

SPECTRAL TIPS AND TECHNIQUES:

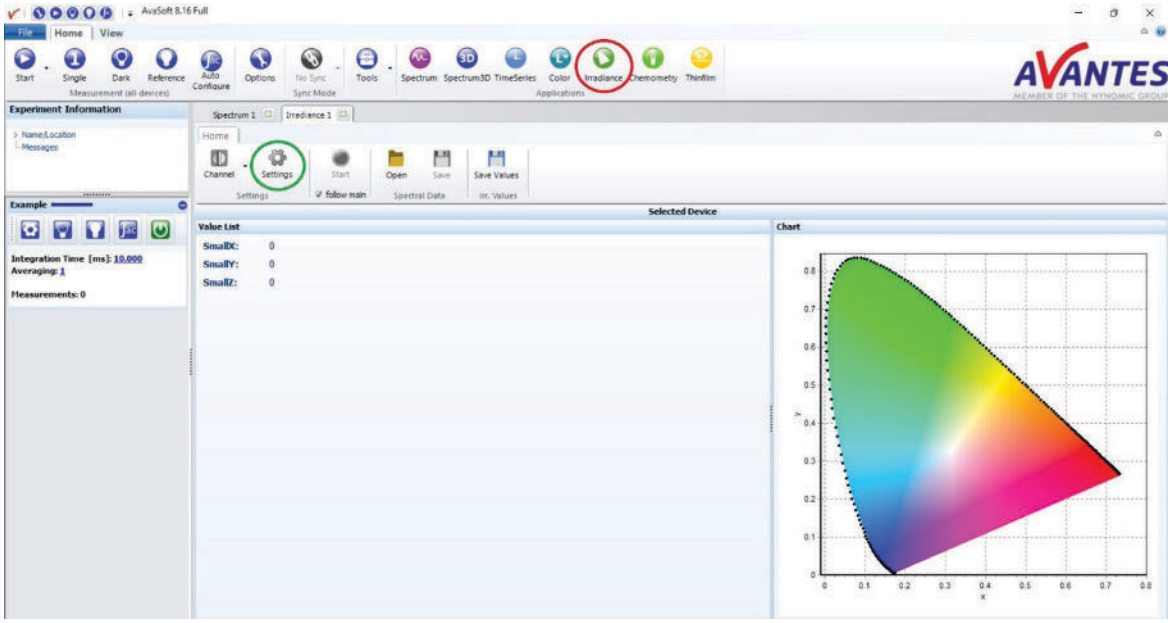
COLORIMETRY: USING THE IRRADIANCE MODULE IN AVASOFT 8



INTRODUCTION AND STEPS

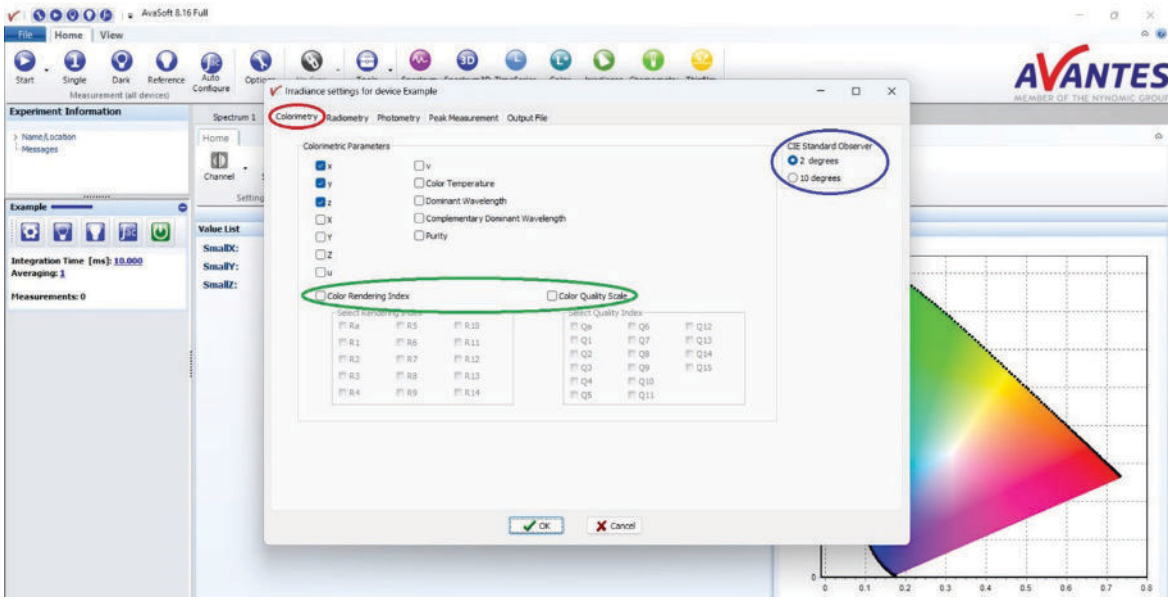
Many users of AvaSoft 8 and our spectrometers work in the broad field of irradiance measurements. Our spectrometers can be calibrated to measure quantitative values for irradiance intensity in terms of µW/cm^2/nm or photon counts as µMol/s/m^2/nm. Beyond this, our software can measure and record a multitude of colorimetric, photometric, and radiometric values in our Irradiance module. These quantities can be essential in industries such as LED manufacturing. Below is a short guide covering the measurable colorimetry parameters available in the Irradiance module in AvaSoft 8. Future guides will cover additional measurement parameters available within this module.

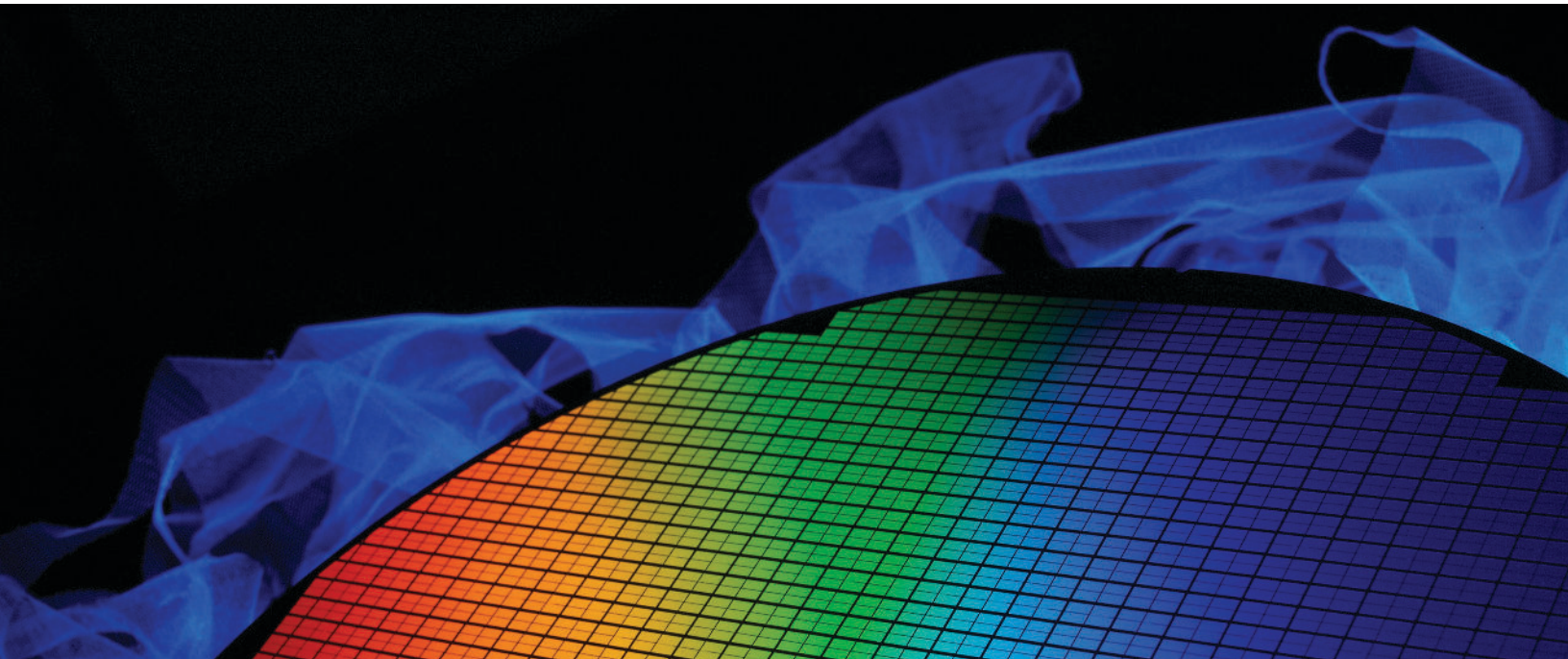
The Irradiance module is accessed by clicking the Irradiance button at the top of the window (circled in red below). This will open a new tab labeled "Irradiance 1". By default, the irradiance values x and y (listed as SmallX and SmallY) will populate the value list in the middle section of the window. On the right side of the window, a chromaticity graph with respect to x and y is displayed based on the CIE 1931 color space. To access the irradiance settings to add values to the Value List, click the Settings button (circled in green below). This will open a smaller settings window.



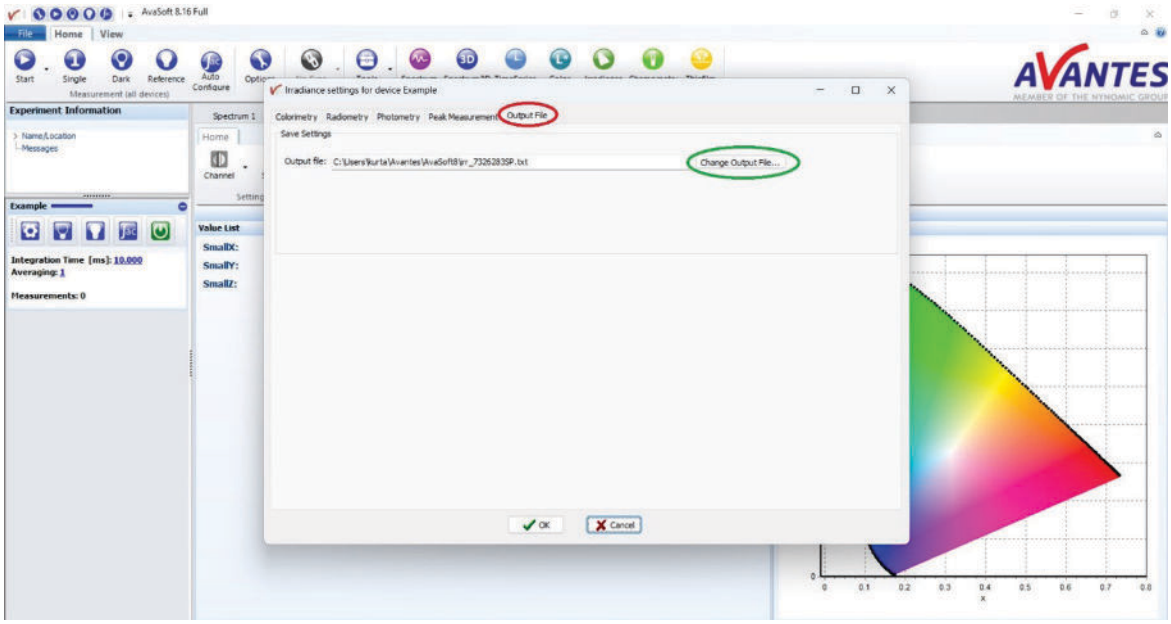
The irradiance settings will open on the Colorimetry tab (circled in red below). This tab features all of the available values and parameters that can be quantified and measured in AvaSoft. The x, y, and z values (listed in the Value List as SmallX, SmallY, and SmallZ) are chromaticity coordinates, while the X, Y, and Z values (listed in the Value List as BigX, BigY, and BigZ) are tristimulus values. Both of these metrics are defined based on the CIE 1931 color space. The u and v values are chromaticity coordinates based off the CIE 1960 color space. The definition was updated in the CIE 1976 color space, commonly abbreviated CIE-LUV, but this update simply involves multiplying the 1960 v value by 1.5. Conversions between the older x and y values and the newer u and v values can also be done easily. Color temperature is a value reported in Kelvin that describes the color of a visible light source by comparing it to an idealized reference that is opaque and non-reflective. Dominant wavelength, complementary dominant wavelength, and purity are all used in LED measurements. Dominant wavelength is different from standard peak wavelength. Where peak wavelength would just be the wavelength with the largest magnitude as measured by a photodetector or spectrometer, the dominant wavelength is the single wavelength of an LED that is perceived by the human eye. The complementary dominant wavelength is used when the dominant wavelength is indeterminate. Purity defines how monochromatic the measured sample is.

Below the previously mentioned parameters are two larger subsets of parameters categorized into two groups: Color Rendering Index and Color Quality Scale (circled in green below). The coloring rendering index, or CRI, is the measure of a light source's ability to accurately reveal the colors of objects in comparison to a standard light source or natural light. R1-R14 are all test color samples (also commonly listed as TSC01-TSC14), with Ra being an average value of R1-R8. Examples of these test color samples are R1 being a "light greyish red" with RGB values of (242, 185, 158) or R6 being a "light blue" with RGB values of (134, 240, 96). Color Quality Scale (CQS) is a similar metric used to quantify accurate color representation, though it aimed to overcome some issues inherent in CRI. Among these, CQS uses the updated and more uniform color space CIELAB, compared to the CIE 1960 color space used in CRI. Additionally, CQS uses higher saturation samples and does not penalize against increases in color saturation. Q1-Q15 are all CQS color samples based on the Munsell color system, with Qa being an average of all 15 samples. Lastly, there are two options for the CIE Standard Observer, either 2 degrees or 10 degrees (circled in blue below). These values define the angle of the field of view for sample measurements, with 2 degrees being the standard defined in the CIE 1931 color scale and 10 degrees being the standard for the CIE 1960 color scale and later. While the 10-degree observer angle was found to more accurately represent the field of view for the cones in the human visual system, the 2-degree observer angle is quite similar and is still used for many industry product specifications, so both angles are available in AvaSoft.

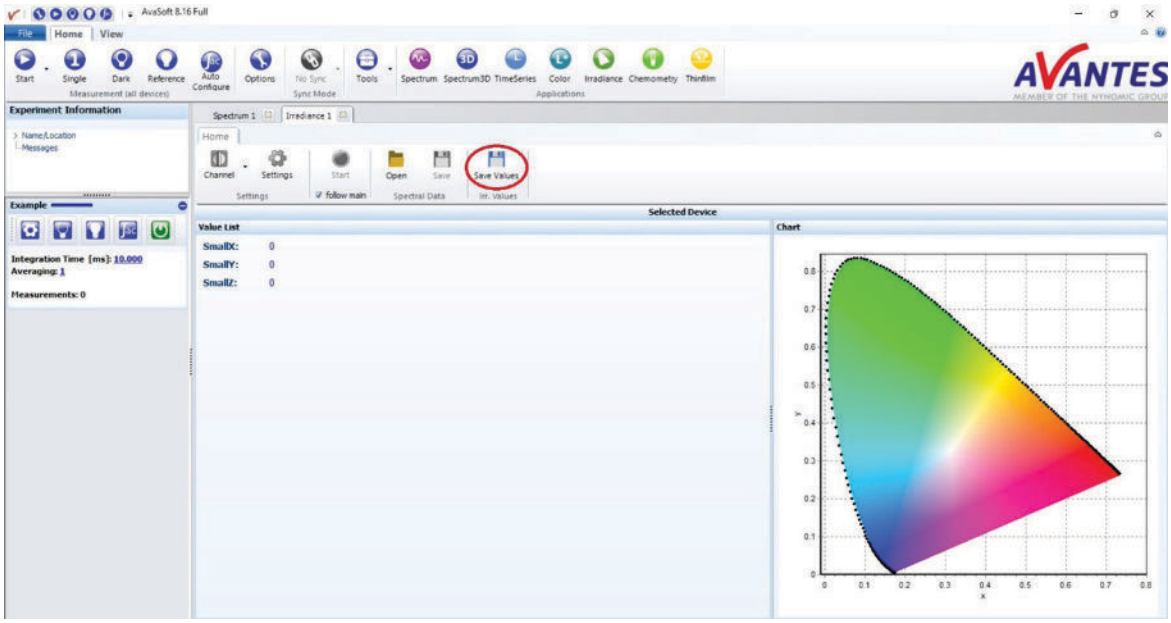




The selected colorimetry values can be measured in real time and saved to a text file. To name the text file and set the save location, click the Output File tab in the irradiance settings (circled in red below). The name and location can be set either in the text box or by clicking “Change Output File…” (circled in green below).



Once the file name and location are set, a data set can be saved while measurements are taken by clicking the “Save Values” button (circled in red below). This will save the data set at the time the button is clicked and notate the data set with a time stamp in the text file.



With these steps complete, the Irradiance module in AvaSoft can be utilized to measure and record a wide variety of colorimetry values.

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!

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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.

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