

BROCHURE
**SPECTROSCOPY
CONFIGURATIONS**
FOR LIFE SCIENCES





SOLUTIONS FOR LIFE SCIENCES

Avantes instruments and accessories have been used successfully in a multitude of life science applications. Spectrometers and photonics sensors have been used for years in applications such as blood gas analysis and oximetry but they are now being deployed into a variety of new applications thanks to the developments in the fields of biophotonics and proteomics. Fiber based spectrometers offer a variety of advantages over traditional instruments including:

- **Size/portability:** enabling integration into handheld devices
- **Value:** instrument often have a superior price/performance ratio
- **Micro-sampling:** by using fiber optics
- **Speed:** micro spectrometers support sampling at KHz rates and up
- **Non-invasive/non-contact sampling**

This brochure provides information on common configurations used in life science applications. Avantes offers many possible configurations for life sciences, this brochure only lists a few common configurations so we advise you to speak with one of our knowledgeable sales team members to learn more about the right configuration for your application.

Avantes is not a manufacturer of integrated turnkey solutions, rather a component supplier for life science.

MICROFLUIDICS CONFIGURATION FOR FLUORESCENCE

For protein and similar biological medium measurements sample volumes are often constrained requiring the use of microfluidics for measurements. Avantes offers a variety of micro-fluidic and probe options to facilitate such measurements. Figures 1 & 2 below show a typical set up for microfluidics measurements.



Figure 1: Microfluidic fluorescence set up with AvaSpec ULS2048CL-EVO



Spectrometer
[AvaSpec-ULS2048CL-EVO](#) with replaceable slit technology (200-1100 nm)



Light Source
[Avalight-XE](#) pulsed xenon light source



Fiber Optics
[FC-UVIR600-1-MS](#) 600 micron core broadband fiber optic cables

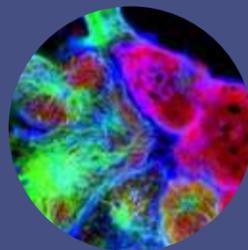


Flowcell-FL-Uitem
Microfluidic fluorescence flow cell with SMA connectors fluid coupling for 1/8" or 1/16" tubing

FLUORESCENCE APPLICATIONS



Diffuse Reflectance



Fluorescence



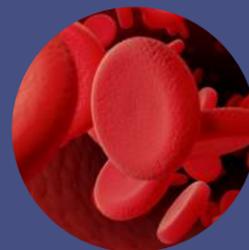
Microfluidics



Blood Gas Analysis



Endoscopy



Blood Perfusion

MICROFLUIDICS CONFIGURATION FOR ABSORBANCE



Spectrometer
[AvaSpec-Mini2048CL](#) – Miniature UV/VIS OEM spectrometer module (200-1100 nm)



Light Source
Avalight-XE-Mini - Miniature OEM pulsed xenon light source



Fiber Optics
[FC-UVIR600-1-MS](#) – 600 micron core broadband fiber optic



Flowcell-Z-10-PEEK
Microfluidic absorbance/transmission flow cell with SMA connectors fluid coupling for 1/8" or 1/16" tubing – Available in various pathlengths from 0.5-10 mm



Figure 2: Microfluidic absorbance Setup with AvaSpec Mini

ADDITIONAL CUSTOMIZATION OPTIONS

Beyond the configurations shown in figures 1 and 2, AvaSpec instrument lines include higher performance spectrometers for measurements of lower limits of detection with a higher signal-to-noise performance.

The [AvaSpec-ULS2048X64-EVO](#) and [AvaSpec-1024X58-HSC-EVO](#) from our SensLine product family provide superior performance for more demanding applications. As an alternative to the flow cell configurations, Avantes offers microfluidic dip probes for similar applications.

Fluorescence measurements may also be performed with probe configurations such as the [FCR-UVIR200/600-2-IND](#) probe.

Such probe-based fluorescence may require the use of band pass and long pass filters, which allow for the separation of excitation from emission wavelengths. Avantes direct attached (FH-DA) and in-line filter holders (FH-INL), or an LED excitation source.

DIFFUSE REFLECTANCE

Diffuse reflection is the technique of choice for surface and sub-surface dermal measurements. This technique allows for the measurement of reflection and absorption in the visible and near-infrared for the characterization of color and identification of abnormalities, such as lesions or masses.

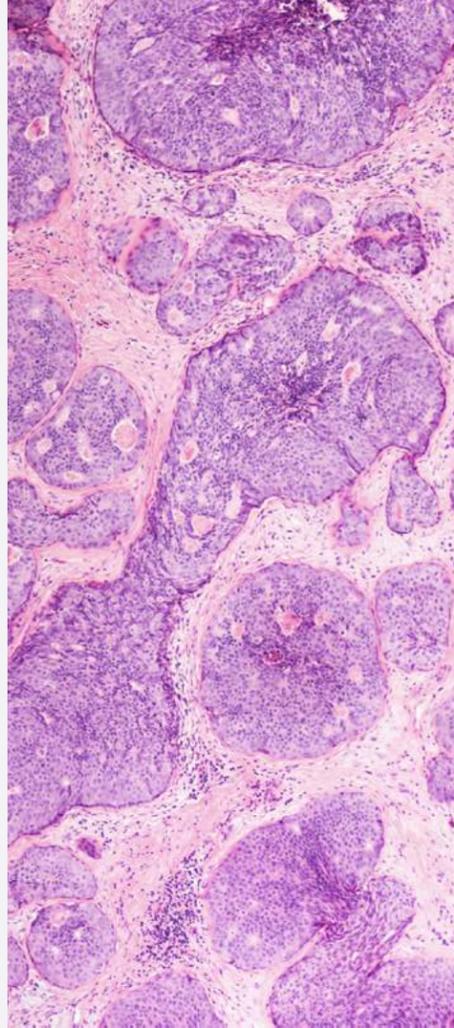
Diffuse reflection can be performed ex-vivo on skin lesions or in-vivo during a biopsy or endoscopy and yields rich information about the tissues being analyzed. Combined with a near-infrared detector, the technique can provide a deeper penetration to 1 cm below the surface.

Avantes solutions for diffuse reflection typically consist of a spectrometer, either a reflection probe or an integrating sphere, and an light source.

In the image below an optional configuration is shown.

More information about diffuse reflectance?

Click [here](#) to read more about diffuse reflectance at the bottom of the page.



PROBE TIP OPTIONS



MICROFLUIDIC DIP PROBE:

1.5 mm OD tip
various pathlength available



FLUORESCENCE PROBE:

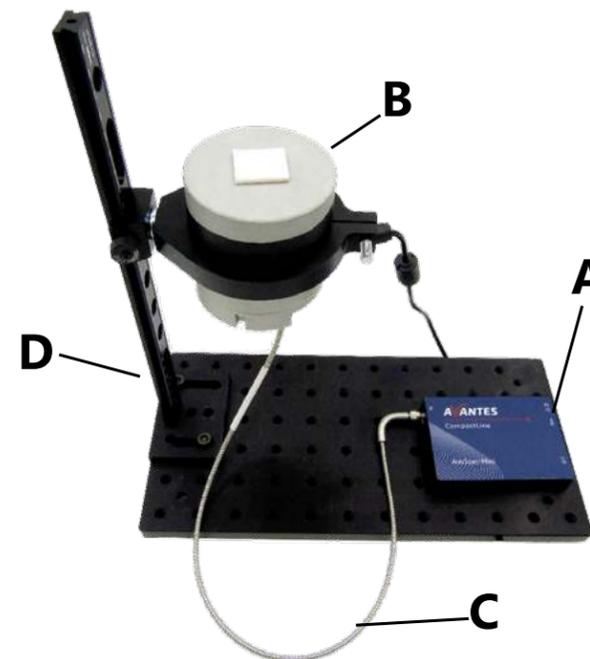
[FCR-UVIR200/600-2-IND](#)
Industrial Fluorescence probe

More probe options?

Click [here](#) to discover all our fiber optic probes and cables.

INSTRUMENT DETAILS

Diffuse reflectance configuration with AvaSpec-Mini and Avasphere-50-LS-HAL, shown with tissue phantom sample over integrating sphere port.



A. Spectrometer - [AvaSpec-Mini2048CL](#)
Compact UV/VIS spectrometer (200-1100 nm)
Also in NIR configuration (900-1700 nm)



B. Light Source - [Avasphere-50-LS-HAL](#)
Integrated light source
50 mm integrating sphere



C. Fiber Optic - [FC-UVIR600-1-MS](#)
600 micron core broadband
fiber optic cable



D. Accessory - [TR-Stage-US](#)
Transmission stage
Optional integrating sphere holder

DIFFUSE REFLECTANCE PROBE BASED CONFIGURATION

Probe configurations for diffuse reflection are available with various options, including small tip diameters, side-firing configurations, right angle tips, or 45-degree angle tips with integrated windows such as our FCR-7UVIR200-2-45-ME. All probe configurations prevent the need for external light sources, and our AvaLight line can cover your needs. We also offer a variety of custom fiber optic probes with configurations to meet every application requirements you should have. Systems for in situ fluorescence measurement can also be configured with similar probe configurations and the additional bandpass filters to control excitation/emission

REFLECTION/TRANSMISSION CONFIGURATION



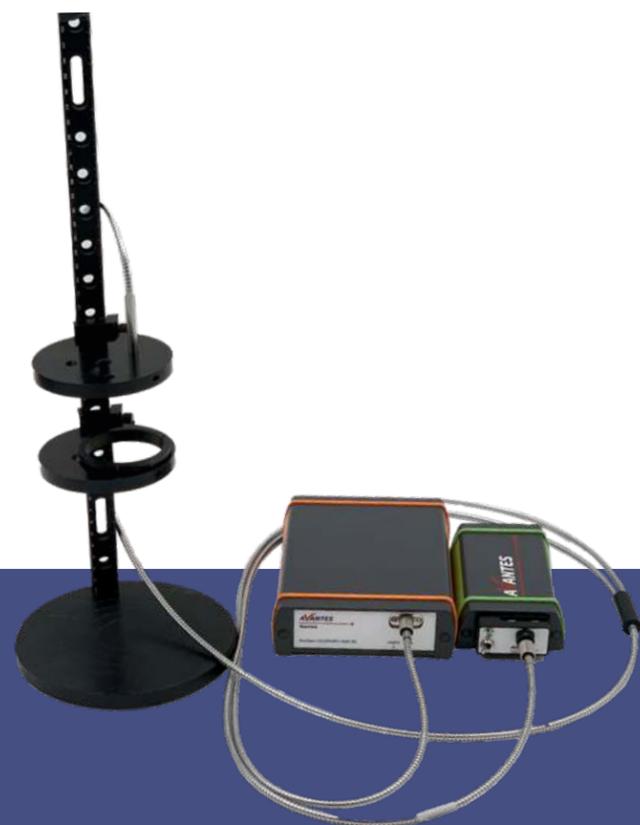
Spectrometer - [AvaSpec-ULS2048CL-EVO](#)
UV/VIS spectrometer (200-1100 nm)



Light Source - [AvaLight-HAL-S-Mini](#)
Tungsten halogen



Accessory - [TR-Stage-US](#)
Transmission/reflectance stage



PROBE OPTIONS



FCR-7UVIR400-2-ME :
Standard fiber optic probe
0.7 mm outside diameter



FCR-7UVIR200-2-45-BX:
Side firing reflection probe
45 degree window

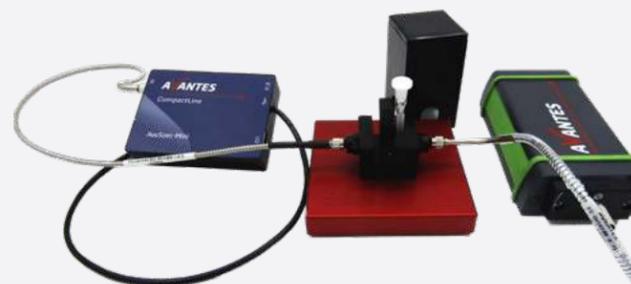
More probe options?

Click [here](#) to discover all our fiber optic probes and cables.

ABSORBANCE CONFIGURATIONS

Most life science applications begin their measurement at an experimental level. Here is where a cuvette cell comes in. We offer a variety of configurations to support researchers performing cuvette measurements of biological samples. Cuvette measurements provide a stable, well-controlled means of measuring samples while controlling variables such as path length, sample geometry, referencing, and temperature.

CUVETTE CELL MEASUREMENT SYSTEM WITH 1 MM CUVETTE CELL



Spectrometer - [AvaSpec-Mini2048CL](#)
Compact UV/VIS spectrometer (200-1100 nm)
Also in NIR configuration (900-1700 nm)



Light Source - [AvaLight-DHc](#)
Deuterium halogen
Compact source



Fiber Optic - [FC-UVIR600-1-MS](#)
600 micron core broadband
Fiber optic cable



Accessory - [CUV-UV/VIS](#)
Cuvette cell holder
Accessories

For biological samples, temperature control can be of critical importance. For this reason, we offer a temperature control cuvette cell holder capable of operating from -30° to 105° C. Probe-based absorbance measurements featuring so-called dip probes are also facilitated within our instrument platform.

TEMPERATURE CONTROLLED CUVETTE CELL MEASUREMENT SYSTEM 1 CM



Spectrometer - [Avaspec-ULS2048x64-EVO](#)
UV/VIS/NIR spectrometer
(200-1100 nm)



Light Source - [AvaLight-DHc](#)
Deuterium halogen
Compact source



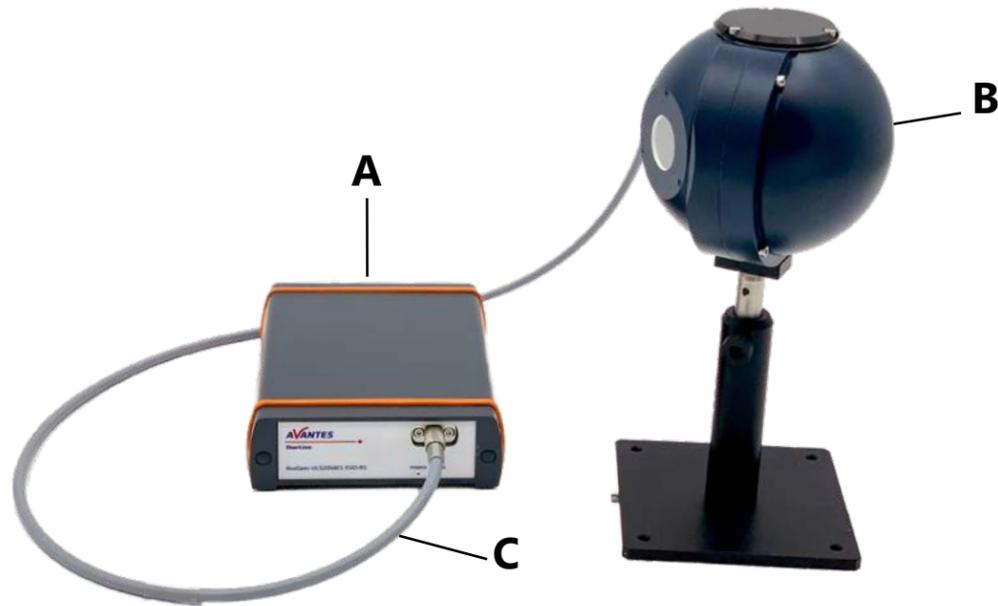
Accessory - [CUV-UV/VIS-TC](#)
Cuvette cel holder
Temperature controlled

Additional Information on Probes

Probe configurations for diffuse reflection are also possible and include a variety of options including micro-tip probes (as low as 0.7 mm OD), 45 degree angle tipped probes, side firing probes and more.

IRRADIANCE CONFIGURATIONS

Many life science applications require radiometric characterization of light sources directly or probes attached to light sources to assess the dosing of light being emitted with each test. Avantes spectrometers can be configured into spectroradiometer systems that can quantitatively measure light sources such as on-chip LEDs, probe tips, etc. The image below demonstrates a configuration with an AvaSpec spectrometer and 100mm integrating sphere.



INSTRUMENT DETAILS

Radiometry configuration with spectrometer and integrating sphere.



Spectrometer - [AvaSpec-ULS2048CL-EVO](#)

UV/VIS spectrometer
200-1100 nm



Light Source - [Avasphere-IRRAD-100](#)

Large Integrating Sphere
100 mm



Fiber Optic - [FC-UVIR600-1-MS](#)

600 micron core broadband
Fiber optic cable



Irradiance calibration - [IRRAD-CAL-UV/VIS](#)

NIST traceable irradiance calibration
200-1100 nm

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 specializations to provide you with the best service and advice:

Feasibility studies

Our sales engineers perform feasibility studies to find the right solution.

Support team

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

Demo program

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

MyAvantes

Personal platform where you'll find AvaSoft Software and other material.

Online support

Helpful documents and tutorial videos for extra help with your products.



ABOUT AVANTES

Avantes is the leading innovator in the development of fiber-optic spectroscopy instruments and systems with nearly 30 years of experience developing customer-defined configurations.

With a long history of consulting with clients across diverse industries and applications, **Avantes is an experienced partner, equipped to guide customers who want a solution tailored to their application and research needs.** By building world-class spectrometers and providing second-to-none customer service, Avantes offers customers the peace of mind that the Avantes solutions they purchase will meet, and exceed, their expectations.

Through our headquarters in Apeldoorn, the Netherlands and offices in the USA and China, our sales engineers work closely with our customers to recommend the optimal measurement solution. In addition to our direct offices, **Avantes has a worldwide network of distributors in over 35 countries who are ready to assist you.** Our production team, which is located at our headquarters in the Netherlands, is dedicated to quality workmanship and has a relentless drive to exceed customer expectations.

Curious how spectroscopy can help you reveal answers by measuring all kind of materials in-line at your production facility, in a lab or in the field? **Please contact one of our technical experts, 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.

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