

BROCHURE  
**SPECTROSCOPY IN  
THE MEDICAL MARKET**



# SPECTROSCOPY IN THE MEDICAL MARKET

Health is a key part of our lives as human beings. We live longer and healthier due to better health care, treatments, and medicine which come from years of research and innovation. Medical researchers, pharmaceutical manufacturers and medical device manufacturers, frequently utilize spectroscopy techniques for clinical and research processes.

Our instruments are used in numerous (bio)medical and life sciences applications. In this brochure we dive deeper into some of these applications to give a better understanding of the endless possibilities of spectroscopy.

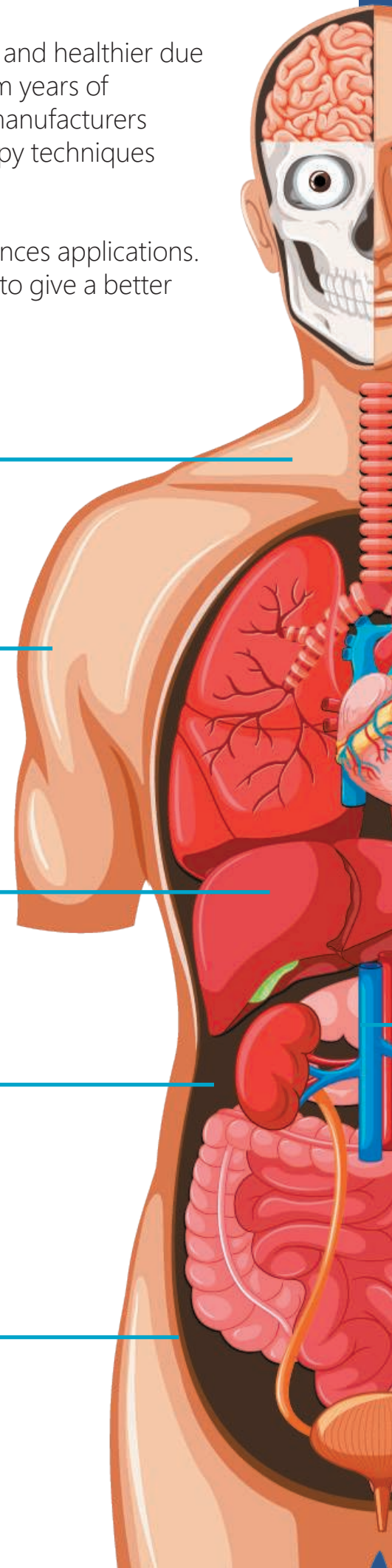
**Skin Analysis**

**Treatment of  
Osteoarthritis**

**Cancer Detection  
& Identification**

**Radiation Therapy**

**Protein Detection  
& Identification**





● Analysis of Medicine

● Dentistry

● Diabetes Diagnoses and Monitoring

● Measure Heart Rate & Saturation

● Blood Perfusion

● Endoscopy

## **(BIO)MEDICAL EBOOK**

Scan the QR-code to download our **free medical eBook** and read all detailed application notes.



# APPLICATION EXAMPLES

## Smart biopsy - Endoscopy

During a traditional endoscopy procedure, spectroscopic measurements can be added in order to provide richer details to the clinician. Today, the concept of a smart biopsy or endoscopy may refer to the use of a biopsy or endoscopy procedure to extract deeper information from invasive procedures, which may aid in diagnostic processes. The biopsy of the future seeks to develop a rapid and minimally-invasive diagnostic tool that can reduce the number of unnecessary invasive biopsies and improve early detection and treatment of various diseases. Smart biopsies and endoscopies may combine tissue reflection or fluorescence measurements within the hardware used to perform these procedures.



## Measure blood gas parameters

Co-oximetry is a spectrophotometric methodology that employs Beer-Lambert law absorption principles to measure blood gas parameters. This analysis is typically conducted using the visible light wavelength range (380-780 nm). The blood gas parameters which can be measured by co-oximetry include total hemoglobin (tHb), oxyhemoglobin (O<sub>2</sub>Hb), deoxyhemoglobin (HHb), methemoglobin (MetHb), carboxyhemoglobin (COHb), and bilirubin (tBil). Oxygen saturation in the blood can also be measured by co-oximetry, and this method is preferable to the use of SO<sub>2</sub>c, also known as calculated oxygen saturation.



## Dermal reflection

Reflection measurements on the skin and internal tissues can reveal a great deal of information that can aid in the diagnosis of conditions. One example of such measurement is detecting advanced glycogen end products (AGEs) in patients using a dermal autofluorescence measurement. Deep tissue reflection may also be measured in the near-infrared (800-1100 nm) to determine the effectiveness of radiation therapy at reducing cancerous masses. Ultraviolet and visible fluorescence may also be used to detect cancerous tissues.



# FEATURED PRODUCT

## High-speed and -sensitivity spectrometer

Fiber optics are critical to the extraction of spectroscopic information during the procedure. Typically requiring high-speed and high-sensitivity sampling, this application's demands are challenging. Avantes has successfully used our **AvaSpec-HS2048XL-EVO** to support smart bio-psy applications. This spectrometer offers high-sensitivity detection with high-speed sampling capabilities. The high-sensitivity 0.22 numerical aperture optical bench is combined with sophisticated electronics that facilitate sample acquisition in just a few milliseconds.

Scan the QR-code to read more about the **AvaSpec-HS2048XL-EVO**



## Ultra-low stray light spectrometer

Our AvaSpec ultra-low stray light (ULS) spectrometers are ideal for medical co-oximetry measurements. Stray light can introduce undesirable errors into measurements, and there are few applications where error reduction is more critical than co-oximetry. Our ULS design provides critical thermal and mechanical stability, providing this application's crucial wavelength stability. The most commonly used instrument for this application is the **AvaSpec-ULS2048CL-EVO**.

Scan the QR-code to read more about the **AvaSpec-ULS2048CL-EVO**



## High-speed spectrometer in UV and NIR wavelength range

We offer a number of high-sensitivity, low stray light instruments for medical and biomedical detection. The **AvaSpec-ULS2048XL-EVO** back-thinned CCD operates over the range from 200-1160 nm. It features large monolithic pixels with exceptional efficiency in the UV and NIR range. With an electronic shutter, integration times are as low as 2 microseconds. Fiber-optic sampling facilitates the non-invasive measurement of small areas. All our instruments are available as laboratory instruments in single-channel housing or multi-channel 'rackmount' housings as well as OEM modules.

Scan the QR-code to read more about the **AvaSpec-ULS2048XL-EVO**





## ABOUT AVANTES

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

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. 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 who are ready to assist you. All of our products are made in our own production facility in the Netherlands.

Curious how our solutions can empower your application? Visit our website or contact our technical support. We are happy to help you!

Visit [www.avantes.com/contact](http://www.avantes.com/contact) or scan the QR-code to contact us directly.



## SPECTROMETERS

Since spectroscopy is used for numerous applications, we have defined our spectrometers in different lines:



### CompactLine

- Compact
- Easy integration
- CMOS detector
- 2048 or 4096 detector
- 200-1100 nm
- NIR-version available
- 900-1750 nm
- USB powered



### StarLine

- High-performance
- General applications
- Stray light rejection
- 2048 or 4096 detector
- 200-1100 nm
- High resolution
- Improved sensitivity
- USB powered



### SensLine

- High-sensitivity
- Demanding applications
- Low noise
- Ultra-high resolution
- 200-1160 nm
- Stray light rejection
- High stability
- Thermo cooled



### NIRLine

- High-performance
- Cooled & uncooled
- Cooling to -25 °C
- For harsh environments
- 900-1750 nm
- Enhanced stability
- Low noise
- Compact option available

Visit [www.avantes.com/products](http://www.avantes.com/products) to see all available products.

# PRODUCT PORTFOLIO

Beside spectrometers, we offer a wide range of products to complete your measurement setup.

## Light Sources

Avantes' light source options include deuterium, tungsten halogen, and LED for spectral ranges from 190nm – 2500 nm. The AvaLight line consists of several calibration sources for irradiance and spectral line calibrations. All light sources are fiber optic coupled with SMA connectors.

## Fiber Optics

We offer an extensive line of fiber optic cables, bundles, and probes. Our in-house production facility manufactures fiber optics for deep UV, UV/VIS, and VIS/NIR applications using high-quality silica fibers. Custom configurations for fiberoptic reflection, absorption, and fluorescence probes are always negotiable.

## Software

AvaSoft software is a 32 and 64-bit compatible application-oriented software package that enables complete control over our spectrometers. Application-specific software solutions are available. Our in-house engineers can work with customers to support standard and custom application needs (DDL).

## Accessories

We offer a wide range of fiber optic coupled sampling accessories such as cuvette holders, integrating spheres, filters, filter holders, and flow cells. In addition, Avantes offers a variety of fiber optic accessories, including collimating lenses, cosine correctors, and vacuum feedthroughs.

# 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 free feasibility studies to find your most ideal measurement setup.

## Support team

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

## Demo program

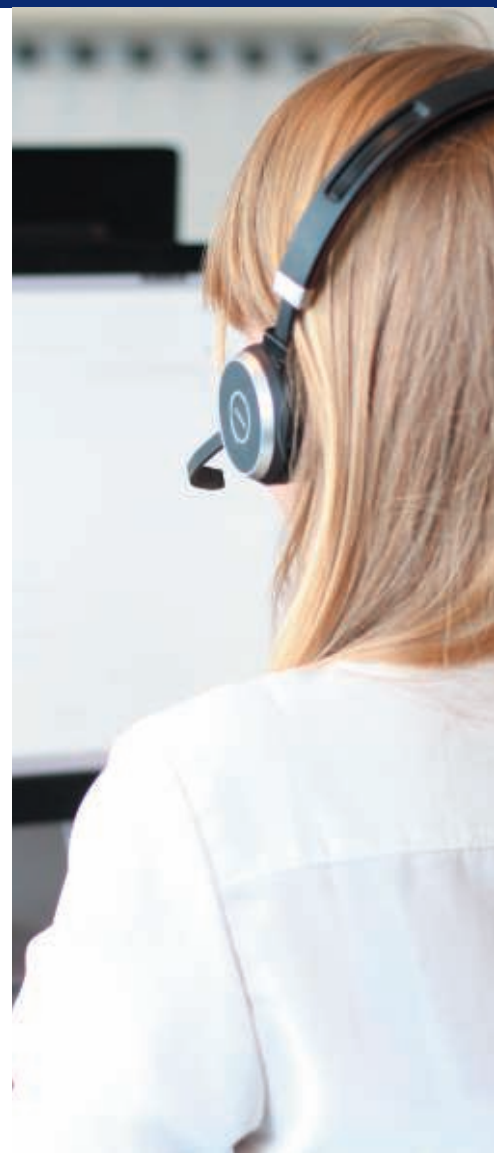
Our demo program allows you to try our products for free to ensure you find the perfect solution.

## MyAvantes

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

## Online support

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



## CONTACT

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# 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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