

BROCHURE

SPECTROSCOPY IN CHEMICAL MARKETS



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In the dynamic realm of chemical processes, spectroscopy emerges as a powerful tool, providing invaluable insights across various applications. Chemical reactions, ranging from vital cellular processes to the intricacies of photosynthesis, are pivotal components shaping our world. The ability to delve into these reactions with precision and depth sets spectroscopy apart as a transformative tool for researchers and industry professionals.

Spectroscopy offers unparalleled precision, enabling real-time monitoring of chemical reactions across industries. From pharmaceuticals to biotechnology, its versatility and streamlined analysis process save time and drive innovation. Avantes' spectroscopic solutions empower you to navigate the complexities of chemical applications with confidence, unlocking new frontiers in research and production.

In this brochure, we dive into various applications, techniques, and matching spectroscopic solutions Avantes has to offer.

Contamination Concentrations

Analysis of Polymers for Quality Control

Atmospheric Chemistry & Humidity detection

Transient Absorption Spectroscopy

UV-vis-NIR Spectro-electrochemistry

Analysis of Conjugated Organic Compounds

Moisture Content Analysis

Impurity detection

Change Monitoring Molecular Bonds

Analysis of Intermolecular Interactions

Material Identification & Science

Chemical Identification

CHEMICAL EBOOK

Click below to download our **free Chemistry eBook** and read all detailed application notes.



APPLICATION EXAMPLES

Raman

Raman spectroscopy stands at the forefront of modern analytical techniques, offering unparalleled capabilities in monitoring chemical reactions. This versatile technology proves invaluable for various applications in chemistry, including product identification, reaction monitoring, and remote sensing. Raman serves as a powerful analytical tool, providing molecular fingerprinting for material identification and enabling precise monitoring of changes in molecular bond structure. Whether detecting state changes, stresses, or strains, Raman spectroscopy offers unmatched insights into the dynamic nature of chemical processes.

Fluorescence

Fluorescence spectroscopy is a vital tool in investigating the behavior of chemical compounds. This electromagnetic spectroscopy technique analyzes a sample's fluorescence, induced by exciting the electrons within certain molecules with a beam of light, leading to the emission of visible light. While commonly associated with biological applications, such as the study of chlorophyll and carotenoids, fluorescence spectroscopy finds versatile utility across various fields. In addition to its biological relevance, fluorescence spectroscopy plays a crucial role in biochemical applications, including the diagnosis of malignancies, and environmental studies. Its ability to provide sensitive and selective measurements makes it an asset in analyzing complex chemical systems and understanding their behavior at the molecular level.

Near-Infrared (NIR)

Near-Infrared (NIR) spectroscopy, operating within the electromagnetic spectrum between 700 to 2500 nm, offers an analytical method for diverse applications. Widely utilized across food, agricultural, pharmaceutical, healthcare, and chemical industries, NIR spectroscopy enables rapid and non-destructive analysis of chemical compositions. In NIR spectroscopy, samples rich in chemical compounds selectively absorb energy from NIR light, leading to variations in reflected light intensity at specific wavelengths. By correlating these variations with chemical concentration differences, NIR provides insights into sample composition and quality. Its versatility and efficiency make it a great tool for process control, quality assurance, and research across various sectors.

FEATURED PRODUCT

High Resolution and High Sensitivity Spectrometer

The [AvaSpec-HERO](#) is built around our High-Sensitivity, Compact (HSC), 100mm optical bench offering a NA of 0.13 and a cooled, back-thinned detector (1024×58 pixels). Electronics-wise, it uses our AS7010 board, which includes a high-performance analog-to-digital converter with excellent noise performance and the ability of high-speed communication through USB 3.0 and Ethernet. Balancing sensitivity and resolution, it allows extended integration times in low-light scenarios while ensuring flawless signal-to-noise performance, all delivered via cutting-edge communication standards. A real hero to your application!

Customizable Performance and High Precision Spectrometer

The [VARIUS™ Spectrometer](#) ensures accuracy and reliability for diverse applications, seamlessly integrating with AvaSoft software and crosslink solutions for enhanced versatility. Available in standard and industrial (OEM) variations, VARIUS™ offers a choice of 2048 or 4096-pixel detectors and features high-speed data transfer via USB3 and Gigabit Ethernet. With its customizable performance the VARIUS™ enables quick analysis of a wide range of samples and measurements, providing valuable insights for your research or application needs.

Optimal Resolution and Sensitivity NIR Spectrometer

Experience enhanced sensitivity, reduced weight, and compact size with our NIR spectrometers. The [AvaSpec-NIR256/512-2.5-HSC-EVO](#) series, based on a 100mm optical bench with an NA of 0.13, offers an optimal balance between resolution and sensitivity. Featuring 256 or 512 pixel InGaAs detectors and available in multiple configurations, these instruments are versatile and perfect for a wide range of applications, including grain, corn, wheat, soy, polymer measurements, medical uses, process monitoring, and more.



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

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 (DLL).

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.

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 to see all available products

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

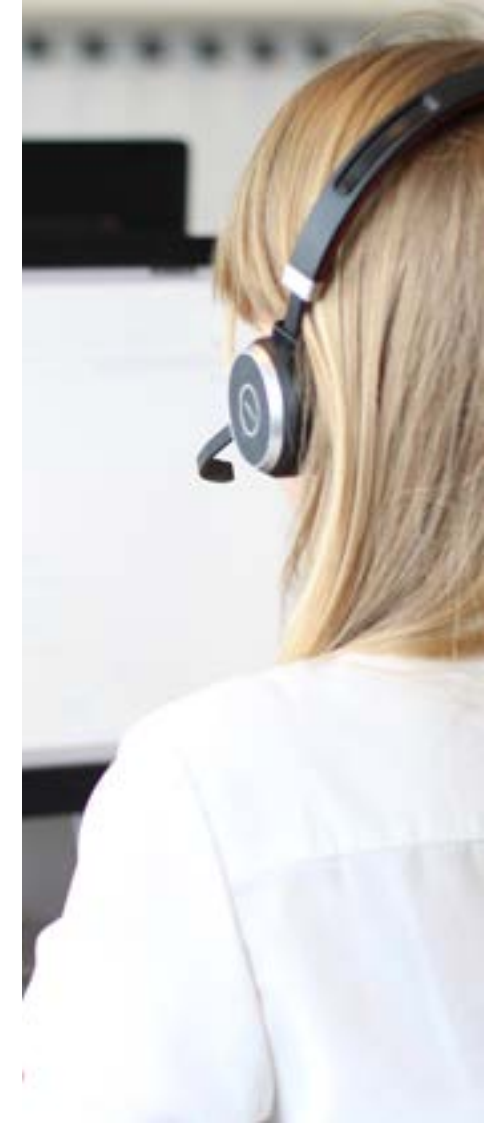
Our demo program allows you to try our products for free to ensure you find the perfect solution.

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

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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