



Educational Systems

Equipment, software, curriculum & experiments



Smart | Innovative | Flexible | Solvers

Who is Ocean Optics

Ocean Optics is recognised as the inventor of miniature spectrometers and is one of the world's foremost manufacturers of solutions for optical sensing - fundamental methods of measuring and interpreting the interaction of light with matter.

With locations in the United States, Asia and Europe, Ocean Optics has delivered more than 120,000 spectrometers worldwide since 1992.

European customers are supported through our two facilities ensuring local engineering and application support capabilities.

Ocean Optics' extensive line of complementary technologies includes chemical sensors, analytical instrumentation, optical fibres, thin films and optics.

Ocean Optics is part of the Halma (LSE: HLMA) group of safety and detection companies.

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Lab Equipment and Software for Chemistry, Physics and Biology Labs

Ocean Optics offers a full line of education-friendly spectrometers, accessories and instructional resources that take students and teachers beyond the limits of conventional technology and into the possibilities of the future.

The Ocean Optics line of educational products includes real life and application-based spectroscopy curricula for laboratory and science education.

What's more, the new generation of electro-optic instruments is computer based, easily networked and transparently integrated with scientific and business-oriented software products.

Moreover, by investing in Ocean Optics equipment for your teaching lab or educational applications, you are tapping into the collective power of 120,000+ spectrometers' worth of applications know-how.

This catalogue will provide you some insight on the possibilities that Ocean Optics offers you and your students.

Happy Teaching!



Students using Ocean Optics Spectrometers will have a comprehensive introduction into the world of optical sensing, which will be valuable throughout their future careers.

A popular experiment in physics and chemistry is the electrical pickle experiment; an elemental emission test where the students are looking at the sodium emission lines.



Red Tide for the Chemistry Lab

The USB650-VIS-NIR packages a high-tech built-in light source, a USB650 Spectrometer, a holder for 1-cm cuvettes and high-speed electronics into a complete system with a remarkably small footprint.

The USB650-VIS-NIR provides real-time, PC-based spectroscopy and captures full spectra from 350 to 1000 nm in only 25 milliseconds.

Direct-attach Light Source

The USB650-VIS-NIR uses the USB-ISS-VIS combination sample holder (1-cm cuvette) and violet LED-boosted tungsten light source for measuring relative absorbance. The light source boosts signal in the blue range and provides over 45,000 hours of use.

Features

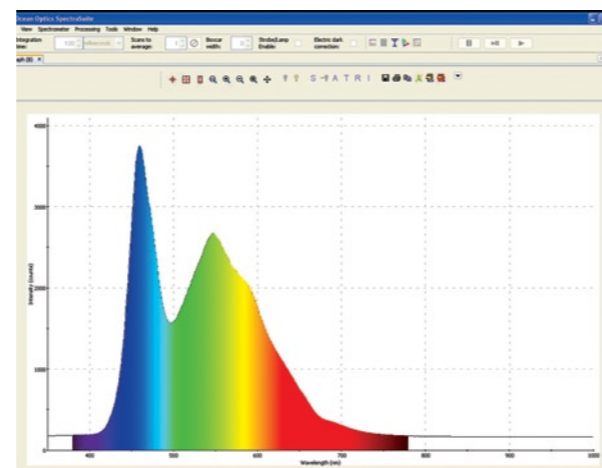
- » Fully integrated, preconfigured system
- » 350 to 1000 nm range
- » 2.0 nm optical resolution (FWHM)
- » See changes as small as 0.1 Absorbance Units
- » Small-footprint system ideal for the laboratory and the classroom
- » Direct-attach deuterium tungsten/violet LED light source and sample holder
- » USB 2.0 interface for fast, hassle-free spectrometer-to-PC connection



Plug-and-Play Operation

The USB650-VIS-NIR interfaces to a PC, PLC or other embedded controllers via USB 2.0 serial port. When using the serial port, the system requires a single 5-volt power supply (not included).

Data unique to each spectrometer is programmed internally; our spectrometer operating software reads these values for easy setup and hot swapping among PCs.



Absorbance Spectrum

Red Tide for Biology Studies

The Red Tide USB650-UV-VIS Spectrometer is a low-cost, small-footprint lab spectrometer that's ideal as a general-purpose instrument for budget conscious teaching and research labs. The Red Tide has a wavelength range of 200-850 nm and utilizes a detector with 650 active pixels. That is 650 data points in one full spectrum, or one data point per nanometer. Configured with a 25 μ m entrance slit, the Red Tide offers ~2.0 nm optical resolution (FWHM).

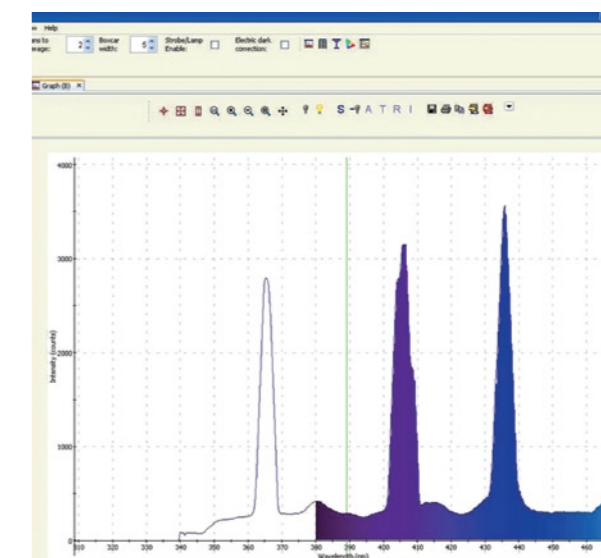


Direct-attach Light Source

The USB650-UV-VIS features the USB-ISS-UV-VIS combination sample holder and deuterium tungsten light source (200-1100 nm). This sampling system holds standard 1-cm cuvettes for easy-to-perform absorbance measurements. The USB650-UV-VIS allows you to control both the intensity of the tungsten bulb and the shutter via software. The USB650-UV-VIS requires an external power supply (included).

Plug-and-Play Operation

The USB650-UV-VIS interfaces to a PC, PLC or other embedded controllers via USB 2.0 serial port. When using the serial port, the system requires a single 5-volt power supply (not included). Data unique to the USB650-UV-VIS is programmed internally; our spectrometer operating software reads these values for easy setup and hot swapping among PCs.



Enzyme Assay

Features

- » Fully integrated, preconfigured system
- » 350 to 1000 nm range
- » 2.0 nm optical resolution (FWHM)
- » See changes as small as 0.1 Absorbance Units
- » Small-footprint system ideal for the laboratory and the classroom
- » Direct-attach deuterium tungsten light source and sample holder
- » USB 2.0 interface for fast, hassle-free spectrometer-to-PC connection

Red Tide for Physics Studies

The Red Tide USB650 Spectrometer is a low-cost, small-footprint lab spectrometer that's ideal as a general-purpose instrument for budget-conscious teaching and research labs. The Red Tide has a wavelength range of 350-1000 nm, and utilizes a detector with 650 active pixels. That is 650 data points in one full spectrum, or one data point per nanometer. Configured with a 25 μm entrance slit, the Red Tide offers ~ 2.0 nm optical resolution (FWHM).

Features

- » Fibre optic entry gets you where the light is
- » Sharp line spectra at 1 nm per pixel
- » Detect Fraunhofer lines in sunlight
- » Super fast spectra collection
- » High sensitivity for low level light such as flames and spectrum tubes
- » Use live spectra in your teaching
- » Detect infrared and near UV sources



Cross-platform Spectrometer Softwareloggers

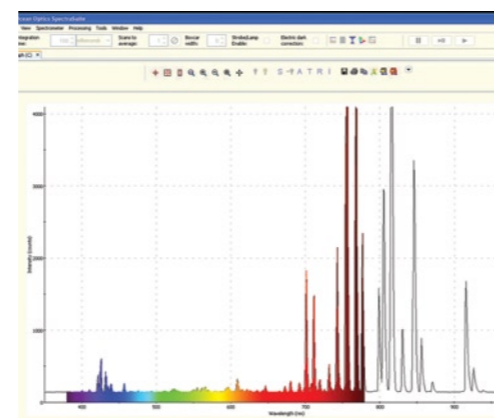
Red Tide operates via SpectraSuite Spectroscopy Operating Software, the first spectroscopy software to run in Macintosh, Linux and Windows. The Chemistry module for SpectraSuite includes features specifically designed for educational use, such as a Beer's Law calculator for absorbance experiments. The Red Tide also works with our educational distributors' software.

Flexible Platform, Convenient Interface

The Red Tide is a preconfigured, off-the-shelf spectrometer with optical bench options (such as grating and entrance slit size) are already selected. The Red Tide can be used with various Ocean Optics spectrometer accessories, light sources and sampling optics, to create application-specific systems for various absorbance, reflection and emission applications. With its small footprint (89.1 mm x 63.3 mm), convenient USB interface and integration times as fast as 3 milliseconds, the Red Tide is a great tool for basic lab measurements.

Operable with PCs or Dataloggers

The Red Tide interfaces to PCs via its USB port, which streamlines start-up and supports hot swapping of the spectrometer. What's more, the Red Tide interfaces to Pasco's Xplorer GLX, a unique combination of datalogger and lab analysis tool that eliminates the need for a PC. The Red Tide also works with Vernier's Logger Pro Software.



Argon Tube Spectrum

Advanced Spectroscopy

For those experiments that require higher data resolution, Ocean Optics offers our CHEM4-series Spectrophotometers. These PC-based systems are designed for chemistry professors, teachers and others who use spectroscopy as a teaching tool.

These fully integrated, high resolution systems utilize 3648 active pixels to achieve 1 data point every 0.2 nm. Configured with a 25 μm entrance slit, the CHEM4 series offers a 1.5 nm FWHM optical resolution.



CHEMUSB4-UV-VIS

The CHEMUSB4-UV-VIS system consists of a USB4000 Spectrometer, deuterium tungsten halogen light source, 1-cm cuvette holder, high-speed electronics and operating software.

Wavelength range: 210-880 nm
Software: SpectraSuite



CHEMUSB4-VIS-NIR

The CHEMUSB4-VIS-NIR system consists of a USB4000 Spectrometer, integrated light source (tungsten bulb with violet LEDs), 1-cm cuvette holder and high-speed electronics. Used with SpectraSuite, the CHEMUSB4-VIS-NIR provides real-time, PC-based spectroscopy and captures full spectra in only 25 milliseconds using 3648 data points.

Wavelength range: 370-985 nm
Software: SpectraSuite



Accessories

The widest Range of Accessories

Ocean Optics is the most versatile supplier of optical fibres and accessories for spectroscopy. With so many fibres and accessories to choose from, you can meet the demand of a variety of experiments.

Optical Fibres, Fibre Probes & Flame Loops

Premium-grade Optical Fibre Assemblies

Our Premium-grade Optical Fibre Assemblies are durable, high-quality assemblies that consistently deliver uniform results with minimal signal variance. These 2-meter assemblies are available in a wide variety of off-the-shelf configurations or can be customized per your specifications. With every Premium-grade order, you receive a Quality Control Report that includes both the serial number and transmission curve of the assembly.

Premium-grade Assemblies have a silicone-coated steel monocoil jacketing with a Nomex braid for superior strain relief and protection. Assemblies are terminated with precision SMA 905 Connectors with extra-long ferrules for easy manipulation.

Laboratory-grade Assemblies

Our Laboratory-grade Optical Fibre Assemblies offer high quality at an affordable price. These off-the-shelf assemblies include assemblies at various lengths, solarisation-resistant assemblies, and bifurcated and splitter assemblies. We terminate Laboratory-grade Assemblies with standard SMA 905 Connectors. Our standard Laboratory-grade Assemblies act as both illumination and read fibres and connect easily to Ocean Optics spectrometers, light sources and sampling accessories.

Reflection / Backscattering Probes

R-series Fibre Optic Reflection Probes couple to our spectrometers and light sources to create small-footprint optical-sensing systems for measuring reflection and fluorescence from solid surfaces, or backscattering and fluorescence in liquids and powders. Reflection probes can be optimized for the UV/VIS (250-800 nm) or VIS/NIR (400-2100 nm), or a combination of both ranges.

FL-400 Flame-resistant Fibre Probe

The FL-400 is a heat-resistant fibre optic probe that couples to Ocean Optics miniature fibre optic spectrometers to measure in situ emission spectra of samples such as dissolved metals and high-temperature plasmas. The FL-400 Flame-resistant Fibre Probe consists of a high-temperature 400 µm gold-jacketed UV-VIS optical fibre in an 8-inch-long nickel sleeve. The probe is connected with a splice bushing to a standard SMA-terminated patch cord, which couples to the spectrometer to measure emission spectra.



CVD-UV and CVD-VIS Disposable Cuvettes

The latest technology plastic CVD-UV Cuvettes work in the UV range--transmitting light between 220-900 nm, while the CVD-VIS Cuvettes transmit light from 350-900 nm and are suited for use in VIS applications. Both cuvette types have a 1-cm path length and can be used with any Ocean Optics 1-cm cuvette holders.



Disposable Cuvette Benefits

- » Disposability prevents cross-contamination risk
- » No cleaning is required
- » Cuvettes are highly resistant to chemicals. The plastic disposable cuvettes can be used with most polar organic solvents, as well as acids and bases
- » The mould cavity number is used to group plastic cuvettes at production time; this helps to ensure the lowest cuvette-to-cuvette variation in extinction coefficient
- » Recessed windows prevent scratching of the optical pathway

We've Got You Covered

We offer cuvette covers made specifically for our line of disposable cuvettes. Available in 100-unit quantities, these covers fit securely onto the disposable cuvette to provide a seal that protects against sample spillage if the cuvette is dropped or tipped over.



Experiments & Workshops Made for Your Lab

An Introduction to the Spectroscopy Lab is a handy reference tool for introducing Ocean Optics to the modern teaching lab. Included are experiments and sample lab exercises for our spectrometers and data loggers by Vernier Software & Technology and PASCO Scientific.

Here are some samples of featured exercises:

- » Absorbance of Light vs. Concentration (Beer's Law)
- » Spectrophotometric pH Determination Using Bromocresol Green
- » Determination of an Equilibrium Constant
- » Kinetics of Crystal Violet Bleaching

Spectroscopy 101 Workshop Manual - Using Ocean Optics Spectrometers is a guide for use with Ocean Optics SpectraSuite Software and Vernier Logger Pro 3 Software and contains the same great lab exercises as An Introduction to the Spectroscopy Lab.

Spectroscopy 101 Workshop Manual - A Guide to Spectroscopic Studies in Biology & Life Sciences is the biology edition and contains exercises to study bacteria growth, protein extraction and assay, and enzyme activity in citrate synthase. DNA in genetically modified corn is also studied. An appendix is included to teach students how to take an absorbance measurement using a USB Spectrometer with SpectraSuite software.

Applications in Spectroscopy - 10 Real World Spectroscopy Labs for Real World Students is a lab book for spectroscopy students filled with 10 experiments to help the student explore the exciting world of spectroscopy in real-world applications.

The experiments include the following:

- » Beer's Law of Potassium Permanganate
- » Introduction to Reaction Rates
- » Investigating the Atomic Spectrum of Hydrogen
- » The Determination of the PKA of an Indicator Solution
- » The KSP of Copper Tartrate
- » Spectrophotometric Analysis of a Buffer Solution
- » Beer's Law Analysis of Erythrosine B
- » Spectrophotometric Characterization of Spice Extracts
- » Determining the Manganese Concentration in a Steel Sample
- » Investigating the Absorbance Spectra of Iodine



We've Taken the Guesswork Out

For your convenience, Ocean Optics has put together several laboratory kits, each containing the right mix of curricula and products to get your lab up and running quickly. The following kits are available:

EDU-CHEMPACK - made especially for Chemistry labs, includes the following:

- » USB-650-VIS-NIR Spectrometer
- » SpectraSuite software
- » Applications in Spectroscopy curriculum on CD

EDU-PHYSPACK - made especially for Physics labs, includes the following:

- » USB-650 Spectrometer
- » P400-2-VIS/NIR fibre
- » SpectraSuite software
- » Applications in Spectroscopy curriculum on CD

EDU-PCPACK - made especially for combination labs, includes the following:

- » USB-650-VIS-NIR Spectrometer
- » Fibre
- » SpectraSuite software
- » Applications in Spectroscopy curriculum on CD



Bringing Answers to Light

Ocean Optics is a diversified electro-optics technology company and a global leader in solutions for optical sensing – fundamental methods of measuring and interpreting the interaction of light with matter.

With locations in the United States, Europe and China, the company serves a wide range of markets and enabled diverse applications in medical and biological research, environmental monitoring, life science, science education, and process and quality control.

Our extensive line of complementary technologies includes spectrometers, optical sensors, metrology instrumentation, light sources, sampling accessories, fibres and probes.

Recognized as the inventor of miniature fibre optic spectroscopy, we've sold more than 120,000 spectrometers worldwide since 1989. Ocean Optics is part of the Halma Group of safety and detection companies, a United Kingdom-based multinational corporation.

Ocean Optics EMEA Europe, Middle East & Africa



Regional Headquarters
Maybachstrasse 11
73760 Ostfildern
Germany

T: +49 711 34 16 96-0
F: +49 711 34 16 96-85
info@oceanoptics.eu
www.oceanoptics.eu

Sales & Support Centre
Geograaf 24
6921 EW Duiven
The Netherlands

T: +31 26 3190500
F: +31 26 3190505
info@oceanoptics.eu
www.oceanoptics.eu

Local Sales Support
United Kingdom: + 44 186 526 3180
Austria: + 43 226 220 673

Your local distributor:

