



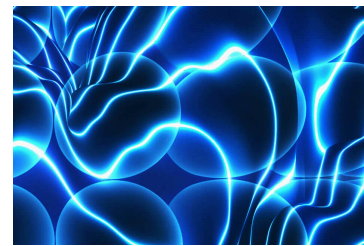
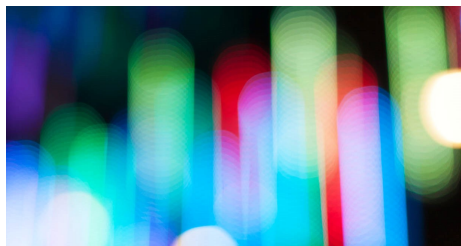
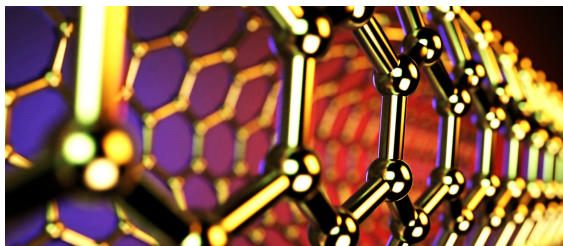
Quantum Design

ITALY

from scientists **to** scientists

PRODUCT GUIDE

Scientific instruments for academia and industry



INTRODUCTION

In the fast evolving world of scientific research it is important to have access to the latest and most advanced instrumentation. As a researcher you need to be aware of what tools are available to assist in your work. One look through our product guide will give you an insight into some of the most sophisticated instruments available in the market today.



About us

For over 50 years we have been one of the **leading European distributors of high-tech instrumentation for scientific, academic and industrial research**: our product range comprises optics, components, and high technology systems for many different sectors as nanotechnology, material characterization, cryogenics, spectroscopy and imaging, and stand out for quality and reliability. Thanks to our technical expertise and knowledge of market needs, we select the best global suppliers for product quality and level of assistance. We can guarantee qualified assistance both before the sale, when thanks to the technical preparation of our team we help the customer to identify the best solution for its specific application, and in post-sales: we offer constant technical-scientific assistance over time and extremely fast answers, our goal is always full customer satisfaction. This can only work when all partners are on an equal level. Our motto is thus: **“from scientists to scientists”**. In line with this aspiration, all our sales and service employees have a scientific or engineering degree.

Magnetism

MCS Series: Modular Characterization Systems	5
Magnetic Characterization – SQUID VSM	6
Magnetic Characterization – Conventional VSM	7
Characterization of thin films & nanostructures	8
Magnetic field characterization	9

Materials Science

Micro/Nanoparticles Characterization	10
Spatially Resolved DLS	11
Hall Effect Measurements	12
Spectroscopic Ellipsometers	13
Single Crystals Growth	14
Laser Interferometers and Optical Profilers	15
Electron transport characterization tools	16
Nanoindenters	17
Direct Write Photolithography	18
Thin films: stress characterization and coating	19
Material Optical Properties Characterization	19
Material Characterization Systems – PPMS	20
Probe Stations	21
Spin Coaters	22
Langmuir-Blodgett Troughs and Surface Tensiometers	22
Gas Mixers	2

Spectroscopy

Spectroradiometric characterization	24-25
Spectrographs and Detectors	26
Light Sources & Monochromators	27
Hyperspectral Imaging	28
Spectroscopic Ellipsometers	29
X-ray Absorption Spectroscopy	30
Confocal Raman Microscopes	31
High Performance Raman Analyzers	31

Microscopy

Chroma Filters	32
All-in-one SEM+AFM correlative platform	33
The AFSEM – AFM in-situ SEM	34
In Situ TEM techniques	35
EDX and XRF integrations for SEM	36
X-ray Microscopy & micro-Computed Tomography	37
Micro X-ray Fluorescence	38
Confocal Raman and Correlative Microscopes	39
Atomic Force Microscopes (AFMs)	40
Temperature stages, plates & wafer chucks	41

Imaging

Hyperspectral Imaging	42
Scientific Cameras for Imaging	43
Ultra high-speed imaging systems	44
Industrial Cameras	44
Infrared Imaging Cameras	45
X-ray Fluorescence Imaging	46
X-ray Tomography Imaging	47
X-ray and high-energy particle detectors	48

Cryogenics

Level Metering and components for Cryogenics	49
Low temperatures control and monitoring	50
Cryostats and Cryomagnets	51
Cryogenics for Q/I and Microscopy	52
Cryomagnet for Q/I and Microscopy	53
Helium recovery and liquefaction	54

Optics

Cleaning solution: optics, metals, plastics, sensors and cameras	55
Filters, Optics and Optomechanics	56
Motion Control Devices and Systems	57
Polarizers and Beamsplitters UV-IR	58
X-Ray Products	58

Light & Lasers

Light Measurement Systems	59
Light Sources, Monochromators and Solar Simulators	60
Lasers and LED light sources	61
Optical Metrology Systems	62
Picosecond and Femtosecond Fiber Lasers	63
Laser Beam Shaping Solutions	64

Life Sciences

Surface Plasmon Resonance (SPR) & SPR Microscopy	65
In-vivo Tomography	66
Optical tweezers	66

Products for Industry

Products for Industry	67
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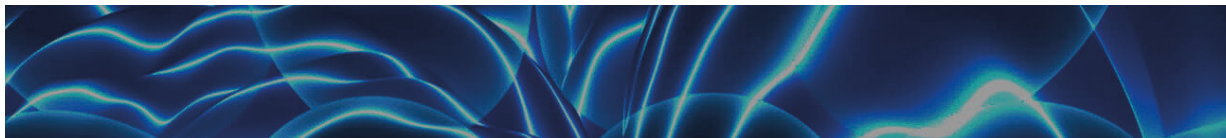
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MAGNETISM



MCS Series: Modular Characterization Systems

Build your material characterization research platform as your needs change



MeasureReady™ MCS-EMP

The MCS (Modular Characterisation System) is a versatile platform for the material characterisation with focus on electric measurements.

The multi-purpose MCS-EMP electromagnet platform provides all of the essential components required for automated, variable field experiments.

Each MCS-EMP builds on a 4-inch or 7-inch electromagnet with pole caps, magnet base, and pedestal. Magnets feature ExactGAP™ precision-settable sample gaps. 2-inch pole caps are standard on the 4-inch MCS-EMP and convertible 4-inch/2-inch caps are standard on the 7-inch MCS-EMP. Optical access is optional.

MeasureLINK-MCS software facilitates field control, temperature control, measurement sequencing, and integration functions.

MeasureLINK™-MCS software

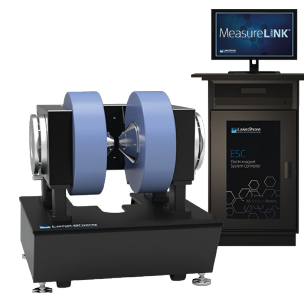
This flexible software allows the user to monitor the real-time performance of the MCS system and to construct measurement sequences from a set of predefined controls.

Typical applications

- Electro-transport
- Magneto-transport
- Customer-build measurements

Features

- Variable magnetic fields up to 3 T
- Low-noise 4-quadrant power supply
- Automated Hall measurement system
- Temperature stage
- Open design for custom experiments
- More measurements options to come



Magnetic Characterization – SQUID VSM

Ultimate sensitivity and speed for magnetic properties of your samples



MPMS3: Magnetic property measurement system

Providing users with the sensitivity of a SQUID magnetometer, VSM speed and the choice of multiple measurement modes, the MPMS3 offers new levels of performance in magnetic research.

The MPMS3 incorporates major advances in data acquisition, automated controls offering $\leq 10^{-8}$ emu sensitivity.

Take advantage of the ultimate performance in field and temperature control:

- 1.8 K to 400 K range with:
 - 30 K/min (300 K to 10 K stable in 15 min., typical)
 - 10 K/min (10 K to 1.8 K stable in 5 min., typical)
- Field Uniformity: 0.01% over 4 cm
- Field Charging Rate: 4 to 700 Oe/sec
- Field Charging Resolution: 0.33 Oe

Features

- Cryogen-free with EverCool re-condensing dewar
- SQUID sensitivity
- Multiple measurement modes: VSM and traditional MPMS DC scan
- Temperature range: 1.8 – 400 K 7 Tesla magnet

Measurement Options:

Magnetometry

- VSM and VSM oven (up to 1000K)
- Ultra-low field capability
- SQUID AC susceptibility measurement
- Magneto-optic measurements
- Horizontal rotator

Electro-Transport

- AC Resistance
- Hall Effect & Van der Pauw
- I-V
- Differential Resistance
- DC Resistivity

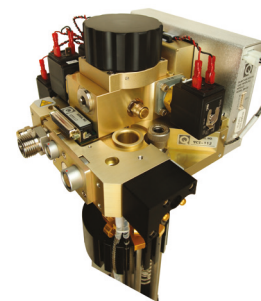
High pressure for Magnetometry

Compatible with

1. Traditional DC Scan
2. AC Susceptibility (<10 Hz)

Environmental Options

Helium-3 Refrigerator Option: continuous operation down to 0.5 K



Magnetic Characterization – Conventional VSM

Highest performance and convenience in your research in magnetometry



8600 Series: Vibrating Sample Magnetometers from Lake Shore

The 8600 Series vibrating sample magnetometer raises the bar for magnetometer performance and convenience.

The entire 8600 Series system has been reimagined with a focus on clean, ergonomic design that simplifies the researcher's interaction with the system. A motorized head brings the sample to a comfortable height for easy, one-handed exchange of the QuickLIGHTM sample rods. These VSMs combine high sensitivity (15 nemu), rapid measurement speed (10 ms/pt), and simple operation for more accurate measurements, faster.

Measurement speed is key

A complete change in the acquisition architecture permits an unprecedented data rate with exceptional, built-in noise suppression.

The 8600 Series is capable of continuous 10 ms/point acquisition (100 points per second). A complete -2 T to +2 T hysteresis loop with 3,000 measurement points can be completed in less than 30 s.

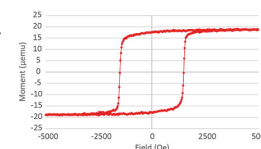
Optimized for FORC data acquisition

The 8600 Series VSM has been specifically designed to execute FORC measurements quickly and easily, and with high precision. 10,000-point FORCs can be completed in minutes.

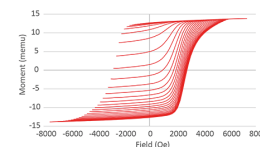
Proven FORC data acquisition protocols are built into the standard 8600 Series VSM system software and are very easy to set up, run, and modify. FORC data sets, once acquired, are readily exported for analysis using FORCinel* or similar third-party tools to render distribution plots of interaction and switching fields.

Applications

- Natural magnets (rocks, sediments, etc.)
- Nanoscale wires, particles, nano-crystalline alloys, etc.
- Magnetic semiconductors
- Ferrofluids
- Magnetic thin films and multi-layers
- Ferrites and permanent magnets, including rare-earth materials
- Magnetocaloric effect materials



1 min 25 s hysteresis loop at 100 ms/point for a 20 μm CoPt thin film



4 min 32 s measurement of 46 FORCs for a 14 μemu magnetic stripe

Characterization of thin films & nanostructures

Kerr Effect and Ferromagnetic Resonance Spectroscopy

Ferromagnetic resonance spectroscopy: The PhaseFMR from NanOsc

The ferromagnetic resonance of a magnetic thin film allows to derive its fundamental properties useful for many magnetic and spintronic applications.

The instrument offers an affordable, plug-and-play, and easy to use solution for magnetodynamic measurements.

NanOsc developed also two CryoFMR versions to perform measurement at low temperature with Montana Instruments Cryostation and Quantum Design PPMS.

Measurements

- Saturation magnetization (M_s)
- Gyromagnetic ratio ($\gamma/2\pi$)
- Anisotropy (Hk)
- Intrinsic damping (α)
- Inhomogeneous broadening (ΔH)

Applications

High-frequency magnetic and spintronic application, such as:

- hard drive read-heads
- MRAM
- spin torque MRAM and oscillators

NanOsc



Kerr Effect magnetic measurements: Durham Magneto Optics NanoMOKE3®

Sensitive to longitudinal, transverse and polar magneto optical Kerr effects, NanoMOKE3® is ideally suited to measure the magnetic properties of thin magnetic films and magnetic nanostructures.

NanoMOKE3® is a new generation of ultra-high sensitivity magnetooptical magnetometer and Kerr microscope.

NanoMOKE3® offers high performance laser magnetometry and video-rate Kerr microscopy in a single machine.

NanoMOKE3® is suitable also for low temperature measurements.

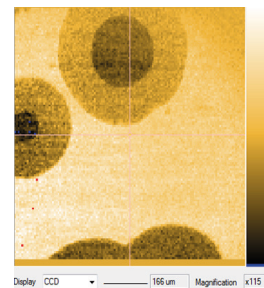
Features

- Combines Kerr magnetometry and microscopy
- Ultra-high sensitivity
- Highly focused laser spot
- Real time magnetic domains imaging

Applications

- Magnetic nanotechnology
- MRAM
- Patterned magnetic media
- Spintronics/magneto-electronics
- GMR/TMR
- Thin films magnetism

Durham Magneto Optics Ltd



Magnetic field characterization

Lake Shore Cryotronics: instruments and sensors for magnetic field measurements

Gaussmeters and Teslameters

Gauss- and Teslameters can measure both DC and AC magnetic fields and control DC fields. The Lake Shore systems offer single-axis and multi-axis measurements and are ideally suited for both industrial and scientific research applications.

In model F71 and F41 TruZero™ technology eliminates the need to re-zero probes. Moreover, temperature and field compensation built in to produce field readings with great accuracy over a wide range of operating conditions.

Easy operations with uncluttered touchscreen.

Fluxmeter

The Fluxmeter Model 480 is an advanced tool designed primarily for use in industrial and measurement systems settings.

The Model 480 is used to detect magnetization, for magnet testing and sorting and as the main component in BH loop or hysteresis measurement system applications.

The Model 480 fluxmeter is compatible with most sensing coils and fixtures.

Hall probes for gaussmeters and teslameters

Axial, transverse, multi-axis and tangential Hall probes are offered for the measurement of magnetic flux density.

You can choose from a wide range of lengths and thicknesses. There are also probes available for cryogenic applications.

Hall (magnetic) sensors

Lake Shore offers a range of Hall sensors for various applications.

These sensors, beyond the application of simple magnetic presence detection such as those used in encoders, contactless switches, and electronic compasses, are useful for field measurement applications where field value, direction and polarity are of interest.

Due to the directional nature of magnetic fields, the positioning and orientation of the sensor are critical for accurate measurements so Lake Shore sensors are offered in a range of package types to simplify the process of mounting a sensor in just the right location.

Helmholtz coils

Used as magnetic field standard when coupled with a precision current generator or magnetic moment measurement tool when coupled to fluxmeter Model 480





MATERIALS SCIENCE

Micro/Nanoparticles Characterization

Size analyzers

CPS Instruments particle size analyzers and calibration standards

The disc centrifuge is a high resolution particle sizer, measuring the size of particles in the range of 5 nm to 100 μm . The system offers highest resolution, high accuracy and repeatability as well as a wide dynamic range.

The CPS disc centrifuge measures particle size distributions using sedimentation, a well known and reliable method of particle size analysis. Particles settle in a fluid under a gravitational field according to Stokes Law. Sedimentation velocity increases as the square of the particle diameter, so particles that differ in size by only a few percent settle at significantly different rates.

This is why sedimentation is the preferred method to measure the particle size with high resolution and accuracy.

DC 12000 - with 12000 rotations per minute maximal (recommended for measurements of particles down to 40 nm).

DC 18000 - with 18000 rotations per minute maximal (recommended for measurements of particles down to 20 nm).

DC 24000 UHR - with 24000 rotations per minute maximal (recommended for measurements of particles down to 3 nm).

Features

- Particle size 5 nm to 100 μm
- Based on sedimentation
- Maximum speed of rotation is 24000 rpm
- Measures in all kind of liquids
- Measures also floating particles which do not sediment

CPS INSTRUMENTS 



Spatially Resolved DLS

The first in-line particles size analyser ever

NanoFlowSizer SR-DLS

InProcess LSP has created the NanoFlowSizer, the first instrument ever capable of carrying out particle size analysis directly on the production line.

Dynamic Light Scattering (DLS) is widely used to measure the size of suspended particles. However, due to the dependence on the use of standard optics, DLS can only be performed on highly dilute and static suspensions, for example precluding the possibility of real-time (in-line) monitoring of their production processes.

This problem is completely solved by the NanoFlowSizer, which allows to spatially resolve the fluctuations of the backscattered light from the suspensions.

This tool evolves the concept of DLS into Spatially Resolved Dynamic Light Scattering (SR-DLS), a technique that combines low coherence interferometry (LCI) with traditional Dynamic Light Scattering, guaranteeing in-line characterizations and therefore in real time directly on concentrated suspensions without the need to dilute the sample, even during flow. The NanoFlowSizer also meets PAT requirements and it can be fully integrated into production workflows.

Measurement modes

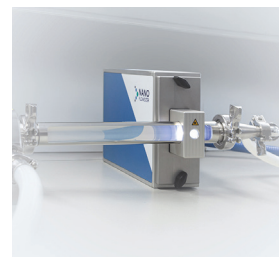
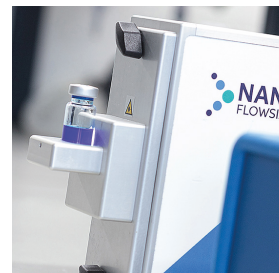
- SR-DLS analysis
- Inline DLS analysis
- OnLine DLS analysis
- At-Line DLS analysis
- Off-Line DLS analysis
- Static DLS analysis

Key benefits

- Real time in-line analysis
- Meets PAT requirements
- No sample dilution needed
- Analysis on turbid samples
- Analysis on highly concentrated
- Non-destructive analysis
- Flow measurements up to 300l/h
- Highly modular design

Applications

- Nanoparticles size measurements
- Vaccines
- Nanomedicine
- Foods engineering
- Coatings
- Inks and paints
- Cosmetics
- Industrial processes control



Hall Effect Measurements

A full set of systems and components for Hall effect measurements

Your style Hall Measurements.

Lake Shore Cryotronics offers a complete set of full and tabletop systems and components for Hall Effect based measurements.

MeasureReady™ M91 FastHall™

The MeasureReady M91 is a revolutionary, all-in-one Hall analysis instrument that delivers significantly higher levels of precision, speed, and convenience.

Featuring Lake Shore's patented new FastHall measurement technique, the M91 eliminates the need to switch the polarity of the applied magnetic field during the measurement allowing faster and more accurate measurements, especially in high fields or with very low mobility materials.

Couple it with the **MeasureReady™ FastHall™ Station**, an integrated, high-precision tabletop measurement system for simplified Hall measurements and less experimental setup.

Lake Shore 8400 Serie

Based on electromagnetic platform, the 8400 Series can be used with both DC and AC field Hall measurement methodologies to facilitate the broadest range of research applications.

The system includes fully integrated instrumentation, a magnet and power supply, optional temperature options plus software that dramatically helps you increase your research productivity and provides results that you can trust.

DC Hall System with Cryogenic Probe Station

The ideal solution for a number of applied physics, electrical engineering, materials research and product R&D applications.

Measure electronic and magneto-transport properties of novel materials.

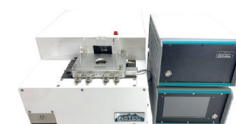
MeasureLINK™ software

Software for coordinating and automating characterization systems.

High temperature Hall Measurements.

Instec offers a fully customizable range of products designed for Hall effect measurements at low and high temperature.

Based on PMH series of non-magnetic miniature probe stations, the H8200 automatic tabletop Hall Measurement System allows precise characterization in -190/600°C temperature range and up to 6 independent micropositioning arms.



Spectroscopic Ellipsometers

For thin films characterization

J.A. Woollam is one of the main market leaders in Spectroscopic Ellipsometry

The ellipsometers cover the widest wavelength range from 140 nm to 33 μm or can capture data simultaneously from all wavelengths in a fraction of a second.

M-2000 - For fast ellipsometry

The M-2000 ellipsometer combines highly accurate 'rotating compensator ellipsometer' (RCE) technology with fast CCD detection to collect data from the UV to the NIR spectrum in a fraction of a second. It is available as ex-situ and in-situ setup.

RC2 - The next generation of ellipsometry

The RC2 is the first spectroscopic ellipsometer with the dual rotating compensators technology. Measures the complete spectrum (from 193 to 2500 nm) in 1/3 of a second, even advanced data types like all the 16 elements of the Mueller matrix.

alpha 2.0 - Entry level ellipsometer

The alpha 2.0 is a fast, low-cost system for measuring film thickness and optical constants within the visible spectrum.

theta-SE - The fast mapping solution

The theta-SE is a push-button ellipsometer equipped with 300 mm sample mapping for characterizing thin film uniformity at very high speed.

VASE - The ultimate research ellipsometer

VASE is the most accurate and versatile ellipsometer for research on all types of materials: semiconductors, dielectrics, polymers, metals and multi-layers. It combines high accuracy and precision with a wide spectral range from 193 to 4000 nm.

iSE - Cost-efficient in situ SE

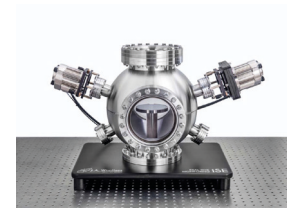
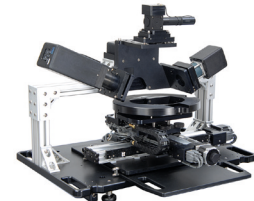
The iSE is an in-situ spectroscopic ellipsometer developed for real-time monitoring of thin film processing in the spectral range from 400 to 1000nm.

IR-VASE - Infrared ellipsometer up to 33 μm

The IR-VASE is the first and only spectroscopic ellipsometer to cover the spectral range from 1.7 to 33 μm .

Film properties measured

- Film thickness and Refractive index
- Interfacial mixing/grading
- Chemical composition
- Crystallinity, Anisotropy, Uniformity



Single Crystals Growth

Floating zone and Czochralski method furnaces



Quantum Design Furnaces

IR Image Floating Zone Furnace

This high-performance, compact infrared (IR) furnace offers unsurpassed performance in a convenient, stand-alone design.

The floating zone (FZ) method is effective for a wide class of materials.

The IR furnace works with closed-cycle water cooling and does not require external water supply.

Features

- Stand-alone design
- 2100°C in Floating Zone region
- No external cooling requirements
- 2 or 4 mirrors designs available

Laser based Floating Zone Furnace

The 1 kW and 2 kW laser furnace for single crystal fabrication is based on a design and developed in close cooperation with the RIKEN Center for Emergent Matter Science under the leadership of Yoshio Kaneko.

5 lasers guarantee a high uniformity power density in the melting zone. The laser profile has been optimized to reduce thermal stress during the crystal growth process.

In addition, the system includes an integrated temperature sensor for real-time temperature monitoring.

Temperatures up to 3000 °C can be reached and thus also materials with a very high vapor pressure, a narrow temperature range of the melt, a high thermal conductivity coefficient and incongruent melts can be melted.

Features

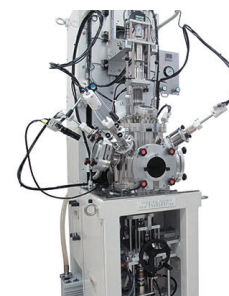
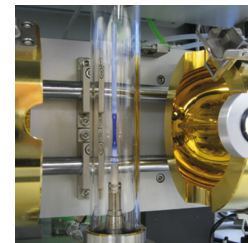
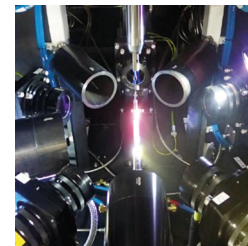
- FZ temp range: 400°C - 3000°C
- Temp reproducibility: $\pm 1^\circ\text{C}$
- Speed: 0.1/200 mm (mm/hr); 0.1-40 rpm
- FZ region pressure: 1×10^{-4} torr to 10 bar

GES Corporation Tetra Arc Furnace

Single crystal growth using the Czochralski method: high-melting-point polycrystalline material in an oxygen- and moisture-free atmosphere.

Features

- Melting temperature up to 3000 °C
- Four electric arcs
- High vacuum system (5×10^{-6} Torr)
- Uniformly distributed high-temperature region
- Chamber vacuum reached in < 1hr



Laser Interferometers and Optical Profilers

For non-contact surface Metrology

4D Technology

An Onto Innovation Subsidiary

4D Technology is a leader in innovative metrology products for measuring surface quality and surface defects on precision surfaces, as well as the surface and wavefront quality of optics.

PhaseCam Twyman-Green Interferometers

PhaseCam dynamic Twyman-Green laser interferometers provide high resolution measurements despite vibration and air turbulence. With acquisition speeds down to 30 μ s and robust acquisition and analysis software, PhaseCam interferometers are the industry choice for measuring surface shape of large focal optics and aspheres.

AccuFiz Fizeau Laser Interferometers

Fizeau interferometers offer high performances in optical metrology and high versatility in measuring flat and curved optical components. Operating with the Temporal Phase Shifting Interferometry acquisition mode, 4D AccuFiz interferometers produce accurate, repeatable interferometric measurements of surface shape, radius of curvature and transmitted wavefront quality.

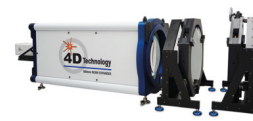
Optional, vibration-insensitive Dynamic mode enables measurements under almost any environmental condition, without vibration isolation.

InSpec Surface Gauge

The 4D InSpec is the first handheld, precision metrology system for non-contact surface defect measurement. With micrometer-level resolution, 4D InSpec instantly quantifies defects such as pits, scratches, nicks, dents and bumps, and measures features such as edge break, radii and rivet depth from 5 μ m to 9 mm deep/tall. The 4D InSpec can also be mounted on a robotic arm for fully automated measurements.

NanoCam HD Optical Profiler

The NanoCam HD dynamic profiler measures surface roughness on small to meter scale coated and uncoated optics, as well as precision metals, plastics and other polished specular surfaces. The NanoCam HD can be positioned on large parts by hand or mounted on a gantry or robotic arm to measure with sub-A level precision. Because the acquisition time is so short, the NanoCam HD can measure despite vibration.



Electron transport characterization tools

Source and measure for electron transport in materials and electrochemistry

Quantum Design offers a great variety of instruments for control, sourcing and characterization of electron transport. Different levels of accuracy are available and every instrument is dedicated to a specific application:

- Material characterization
- Very low resistance measurements
- Energy storage & conversion systems
- Corrosion monitoring & prevention
- Sensor development & calibration
- Electrochemistry & Photoelectrochemistry

Lake Shore Cryotronics

Model 372 AC-Resistance bridge is designed for precise, accurate, low noise, low excitation power AC resistance measurements.

By using alternating current (AC) measurement in tandem with a specially designed internal lockin amplifier, the Model 372 is able to extract very small measurement signals from background noise.

M81 Synchronous Source Measure System is designed to eliminate the complexity of multiple function-specific instrumentation setups, combining the convenience of DC and AC sourcing with DC and AC. This extremely low-noise simultaneous source and measure system ensures inherently synchronized measurements from up to 3 source/measure channels per half-rack instrument for a range of material and device research applications.

Potentiostats/Galvanostats

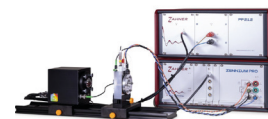
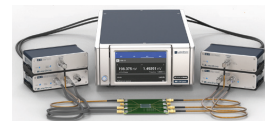
Admiral Instruments

Potentiostats/Galvanostats Research-Grade precision, intuitive and fast software, best quality/price ratio, compact and customizable. EIS and multi-channel configurations. Admiral Instruments offers new concept potentiostats/galvanostats equipped with modern, intuitive and fast license free software for data acquisition and analysis for fully automated measurement in electrochemistry.

Zahner-Elektrik

High quality systems for electrochemical and photoelectrochemical measurements. ZAHNER instruments are highly esteemed for their peerless resolution, artifacts-free stability, modularity, and high performance in the following fields:

- EIS: Electrochemical Impedance Spectroscopy
- Fuel Cells and Electrolysers
- High-Power applications
- Loads for Batteries/Solar Cell
- Corrosion Monitoring & Modelling
- IMP5 & IMVS measurements



Nanoindenters

Comprehensive nanomechanical testing platforms

Micro Materials Ltd. provides innovative, versatile nanomechanical test instruments, and responds to customer application developments and market requirements.

Today's nanoindenters offer more than nanoindentation. They also enable nano and micro-tribological measurement methods like scratch tests and are universal platforms for complex mechanical material characterizations.

NanoTest Vantage

The NanoTest Vantage nanoindenter is a comprehensive nanomechanical testing platform which provides a variety of different techniques and environmental options to simulate true service conditions and contact mechanics.

The modularity of the system allows the combination of all the measurement modules and customizing the system to specific applications.

Among the many environmental options, the high-temperature capability stands out the most.

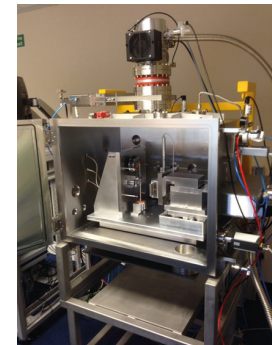
Supported techniques include:

- Nanoindentation (both quasi-static and dynamic)
- Nano and micro impact and nano-fatigue
- Nano and micro scratch and nano-wear
- Nano-fretting

NanoTest Xtreme – vacuum nanoindenter

The NanoTest Xtreme is the first commercially available vacuum nanoindenter with a unique temperature range. It is intended to perform high-temperature nanoindentation in very demanding applications, when the suppression of the oxidation of both sample and indenter material are crucial.

Measurable temperatures range from -40 °C up to 1000 °C, so materials can actually be tested at their real service temperatures. This is crucial to determine the performance of coatings used in unlubricated cutting applications.



Direct Write Photolithography

Highest performances, ultra-automated, modular LED writer

MicroWriter ML Family

The Microwriters are a serie of modular direct LED writers for maskless photolithography. Forget the chromium-glass mask and experience the comfort of direct write: feel free of prototyping, test exotic designs or simply fail a design at no cost.

MicroWriter ML family is a full set a compact, high-performance, direct-write optical lithography machines designed to offer unprecedented value for money in a small laboratory footprint.

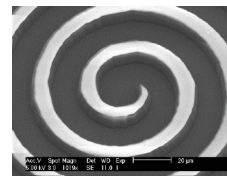
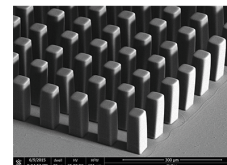
Sitting on its own vibration-isolation optical table, its only service requirement is a standard power socket.

A temperature-compensated light-excluding enclosure with safety interlock allows it to be used equally well in an open laboratory environment or in a clean room. Easy to use Windows® based software means most exposures can be set up and launched with just a few mouse clicks.

Up to four different minimum feature sizes can be selected automatically via software. This allows non-critical parts of the exposure to be performed rapidly while retaining high resolution writing for critical parts.

Features

- Integrated optical surface profilometer tool
- Automated wafer inspection tool
- Backside alignment camera for aligning double-polished wafers
- 1 or 2 exposing wavelengths
- Fully automated: no manual intervention required for a multi resolution exposures
- XY interferometer with 1nm resolution for precise motion control
- Autofocus system using yellow light and with real-time surface tracking laser – no minimum wafer size
- High quality infinite conjugate optical microscope objective
- Grey scale exposure mode for 3D patterning
- Software API for external interfacing and control
- Multiple wafer / chip handling, allowing different exposure patterns and alignment coordinates to be supplied for multiple wafers or chips on the chuck. Used for exposing multiple users' samples overnight.



Thin films: stress characterization and coating

Industry standard for mass production and research facilities

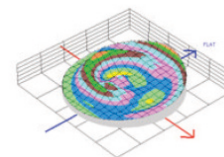
FLX Flexus thin film stress measurement systems

Toho FLX thin film stress measurement systems allow the determination of stresses and the linear expansion coefficient of thin and thick films on silicon wafers and other substrate materials.

Working with KLA-Tencor's patented "Dual Wavelength" technology, systems of the FLX series accurately determine and analyze surface stresses caused by deposited thin films.

Features

- Available temperature range from -65°C up to 500°C
- Patented dual wavelength technology for optimal signal readout
- Calculation of coefficient of thermal expansion and biaxial modulus
- 3D mapping of sample deflection/stress distribution
- Sample sizes from 25 mm up to 300 mm possible



Material Optical Properties Characterization

Probing a wide range of products and materials

Research grade solutions to probe a wide range of products and materials over the UV-vis-NIR.

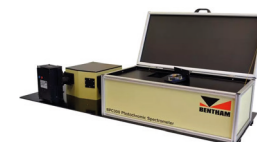
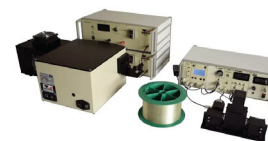
- In Vitro Sunscreen Spectrophotometer
- High Performance Fluorometer
- Photochromic Lens Spectrophotometer
- Fibre Spectral Attenuation Spectrometer
- Universal measurement Spectrophotometer

Measurements

- Spectral total/direct/diffuse transmittance
- Spectral total/direct/diffuse reflectance
- Excitation/emission spectra
- Quantum yield
- PL emission

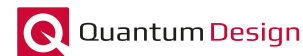
Standards

- ISO/EN 8980-3/ISO/EN 12312-
- ANSI Z80.3A5/NZS 106
- IEC/EN 60793-1-10/IEC/EN 60793-1-4
- ISO 24443A5/NZS 2604 FDA 201



Material Characterization Systems – PPMS

Fully automated, multi technique cryo-magnetic measurement systems



PPMS platforms

PPMS family represents a unique concept in laboratory equipment: an open architecture, variable temperature-field systems designed to perform a variety of automated measurements. Any PPMS platform can be used with specifically designed measurement options or easily adapted to integrate into your existing experimental setup.

Sample environment controls include magnetic fields up to $\pm 16\text{T}$ and a temperature range of $50\text{mK} - 1000\text{K}$.

Their advanced extendable design combines many features in one instrument to make the PPMSs the most advanced and versatile cryo-magnetic measurement systems.

Environmental Options

- Dilution Fridge: 50m
- Adiabatic Demagnetization Fridge: 100m
- 3He Fridge: 500m
- Oven: 1000
- Magnetic Field: up to $\pm 16\text{ Tesl}$

Measurement Options

Thermal Measurements

- Heat Capacit
- Thermal Transpor

Magnetometry

- Vibrating Sample Magnetomer
- FOR
- Torque Magnetometr
- AC Susceptibilit
- Ultra Low Fiel
- Magneto-Optic

Thermal Expansion

- Dilatomete

Electro-Transport

- DC Resistivit
- Electrical Transpor
- Horizontal and Vertical Rotator
- Multi-Function Prob

Scanning Probe Microscopy

- AFM/MF
- Scanning Hall Probe Microscop
- Confocal Microscop

Spectroscopy

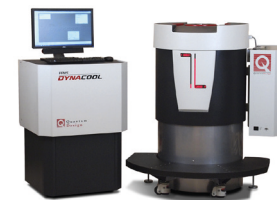
- Raman & Luminescenc
- Ferromagnetic Resonanc

Optics

- Optical Multi-Function Prob
- Optix integrated breadboar
- Magneto-Optic

High Pressure cells

- for Magnetometr
- for Electrical Measurement



Probe Stations

Electro-optical measurements in variable magnetic field and temperature



The broadest range on the market!

Lake Shore Cryotronics stations are suited for electrical, microwave, THz and optical measurements with various magnets and cryostats options.

Thanks to Lake Shore unparalleled thermal management you can forget the annoying deviation of DUT temperature respect to sample stage.

Features

- Base temperature down to 1.6 K
- High temperature to 675 K
- Magnetic field: vertical, horizontal, vectorial
- Electro- and Superconducting Magnets
- Cryogen-free and wet (Helium & Nitrogen) designs
- HV and UHV sample chamber
- Vast choice of sample holders
- Probes for any need: DC to 67GHz
- Parametric probes:
 - Wafer-level capacitance-voltage (or C-V) measurements
- Quasi-Kelvin measurement kit
- Fiber optics
- Fully customizable

High Temperature Systems

Instec's Probe Systems offer an integrated solution to perform electrical measurements over a wide temperature range.

Turn your existing inspection microscope to a precision temp-controlled semiconductor testing and qualification station.

Table top and standard probe stations come with:

- Up to 12 micropositioning XYZ arm
- -190°C to 1000°
- 12" sample spac
- Vacuum and gas atmospher
- 100fA current leakag

Applications

- MOSFETs
- Organic Electronics
- Quantum Dots
- Solar Cells
- MEMS
- Carbon Nanotubes
- Graphene & Graphene Oxide
- Superconducting Photon Detector
- Thermal Electric Measurements
- Metal-Insulator-Semiconductor structures



Spin Coaters

Designed for laboratory application

Spin coaters are ideal tools for the preparation of thin and ultra-thin films for a variety of applications, especially for spectroscopic analysis (optical, IR, x-ray, dielectrical, etc.).

KL Spin Coaters

The spin coaters of the KL series are designed for routine applications and are available in different versions with maximum idling speeds up to 13.500 rpm.

FR10KPA Series from CalCTec

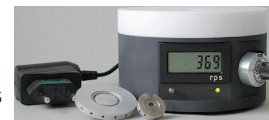
Fully automatic spin coaters featuring robust

design with stainless steel and stainless steel bowl of 26 cm Ø.

Heated rotational tables (chucks) which allow precise temperature control from RT to 200°C during spinning are available.

Features

- Great variety of spin coaters
- Idling speed up to 13500 rpm
- Passive or active vacuum hold-down
- Built-in speed programs or software control



Langmuir-Blodgett Troughs and Surface Tensiometers

Turning surface science into modern, high performance technology

Langmuir-Blodgett Troughs

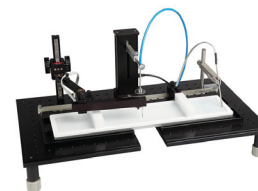
The Kibron MicroTrough G series comprises three modern instruments, ranging from small to large.

The core technology in the Kibron Langmuir Blodgett (LB) Troughs is the proprietary sensor (0.2 microgram resolution), which allows detection of surface pressure and measurement of compression isotherms with a very high sensitivity, (0,01 mN/m) which yields excellent reproducibility.

Surface tensiometers

A tensiometer measures the surface tension of a liquid or the interfacial tension between two immiscible liquids.

The Kibron Aqua Pi/Plus (& Ez-Pi plus) range offers to the users a family of compact, high performance force based surface / Interfacial tensiometers for lab or field use in almost every industry from waste water monitoring to foods & oils & Chrome plating baths to inks & coatings



Gas Mixers

Compact and flexible solutions for accurate gas mixing

MCQ Instruments: Gas mixers

Providing users with an automated feedback system, better accuracy and repeatability, MCQ Instruments offers compact and intuitive solution for gas mixing.

A whole gas mixing laboratory in a box, MCQ Gas Blenders are calibrated devices easy to integrate.

Features

- Intuitive, quick and flexible
- High accuracy: 1,0% of the set point
- High repeatability: 0,10% of the rdg
- Up to 6 inputs dry, pure gases on a single device
- To a minimum of 0 – 200 mL/min of flow rate
- Fast response: from 50 ms

Options

MCQ offers many models tailored on applications and ready to use. From nano to high flows, even with pressure controllers.

Each channel is calibrated on a gas of your choice: N₂, O₂, CO₂, CH₄, Air, He, H₂ and others on request with possibilities to include aggressive gases.

Applications

Cell culture

1. Cell culture studies
2. Live cell imaging
3. In Vitro studies

Life sciences and Pharma

1. Hypoxia & Anoxia
2. Hypercapnia or Hyperoxia
3. Organ perfusion system
4. Hemoglobin Study
5. Ecmo and fetal studies

Materials science

1. Gas sensor calibration
2. Gas reduction, dilution and control
3. Chemical vapour deposition
4. Mass and Photoacoustic Spectroscopy
5. Fuel cell and solar cell
6. Carbon nanotubes development
7. Sintered ceramic materials

Others

1. Food and Beverage
2. Modified Atmosphere Packaging
3. CA MAP Fumigation



SPECTROSCOPY



Spectroradiometric characterization

From research broadband portable to industrial spectroradiometers

Spectral Evolution

Spectral Evolution designs, manufactures and services high resolution and high sensitivity, full range UV-VIS-NIR spectroradiometers and spectrometers. These instruments are used worldwide for many lab and field assignments due to their reliable, robust, rugged yet lightweight design and user-friendly features.

The best combination of high resolution and high sensitivity resulting in the most precise field portable instruments available on the market.

Spectral Evolution uses only photodiode arrays and fixed grating systems to avoid the use of light-robbing fiber optics. This increases system sensitivity and overall reliability since there are no moving gratings to drift or malfunction,

ensuring your system won't break down during your mission critical work.

Spectral Evolution Spectrometer and Spectroradiometers are small and lightweight (3.5kg or less) yet rugged for everyday use. Portable systems are powered with lightweight high capacity lithium ion batteries and can be operated in stand-alone fashion or with small handheld mobile computers to keep your travel load as light as possible.

Applications

- Remote Sensing
- Geology
- Solar cells and panels
- Radiometric calibration transfer



Spectroradiometric characterization

From research broadband portable to industrial spectroradiometers

ITPhotonics

A line of multifunction spectrophotometers, with industrial design, compact and innovative, designed for a variety of uses as portable, laboratory instruments and for simple integration into industrial processes. Their operation is based on the interaction of a light source with the molecules and with the chemical bonds that characterize the matrix to be analyzed, thus performing both quantitative and qualitative measurements.

Applications

- Agricultural, Agri-Food, Feed
- Chemometrics
- Solids and Liquids
- Biogas Plants And Bioenergy Producers
- QC in field, online and offline



International Light Technologies

International Light Technologies (ILT) has been a leader in developing light measurement systems for over 50 years. Since we introduced the first light meter in 1965, our team of mechanical, electrical, and optical engineers have delivered accurate and reliable light measurement systems that are trusted by organizations of all types and sizes.

Applications

- Anti-Microbial & UVC Disinfection
- Endoscope & Fiber Optic Testing
- Flash Measurement
- LED Measurement & Testing
- Low Light Level Measurement
- Optical Radiation Hazard
- Photometry
- Photoresist



InternationalLight

Part of Ocean Insight



Spectrographs and Detectors

For Modular Spectroscopy



ANDOR

Andor Technology provides spectrographs and cooled detectors for a wide range of spectroscopy applications. Spectroscopy Systems come pre-aligned and pre-calibrated for easy operation.

Spectrographs

Kymera & Shamrock Series

The Kymera and Shamrock spectrographs are based on the Czerny-Turner optical design. The USB2 interface allows full control of the motorized components such as the multi-grating turret, the exit/entrance slits and the optional filter wheel. These motorized spectrographs are available with the following focal lengths: 193, 328, 500 and 750 mm. The Shamrock 163 is a compact and rigid 163 mm spectrograph in crossed Czerny-Turner configuration comprising an exchangeable grating with manual control. The Kymera spectrographs feature Adaptive Focus and grating turret with eXpress™ RFID technology.

Mechelle 5000

The Echelle spectrograph with patented optical design provides the simultaneous recording of a wide wavelength range from 200 – 975 nm in one acquisition with a spectral resolution of $\lambda/\Delta\lambda = 5000$.

Mechelle 5000 has no moving components and provides extremely low cross-talk and maximum resolution.

Spectroscopy Detectors

CCD detectors

The Newton, iDus and iVac CCD detectors are designed with the lowest noise and highest quantum efficiencies. Different sensor formats are available to optimize the detector in the specific application.

Newton EMCCD detectors

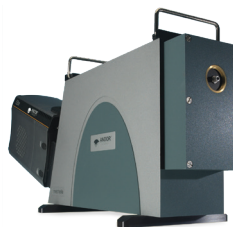
For ultra-sensitive spectroscopy applications, Andor offers Newton EMCCD cameras with USB2 interface. The EMCCD sensor is placed in a sealed vacuum chamber so that temperatures down to -100 °C are achieved with thermo-electrical cooling.

iStar ICCD & sCMOS detectors

The iStar ICCD and iStar sCMOS are characterized by fast gate electronics and high-quality image intensifiers. The image intensifier acts as an ultra-fast optical shutter for exposure times of a few nanoseconds for time-resolved applications.

iDus InGaAs detectors

Andor offers InGaAs detectors based on the iDus platform and photo diode array (PDA) with 512 or 1024 pixels suited for NIR spectroscopy up to 1700 or 2200 nm.



Light Sources & Monochromators

Broad selection of components for Spectroscopy

Broadband Light Sources and accessories

We have a comprehensive catalogues of light sources and accessories for a variety of scientific applications:

- Xenon (Xe), Mercury (Hg) and Mercury-Xenon
- Hg(Xe) arc source
- Quartz Tungsten Halogen (QTH) source
- Dual emitter light source
- Uniform source
- Spectral line lamp
- Fibres, lenses, filter holders, shutters, beam turners

Tuneable light sources

Plug-and-play wavelength agile monochromatic tuneable light sources, application ready:

- Continuously tuneable high power monochromatic source (280-1100nm)
- Easy to use through front panel interface or over USB 2.0
- Plug-and-play functionality
- Compact design

Monochromators

We offer three Czerny-Turner style monochromators:

- 150 mm focal length single monochromator with a dual-grating turret
- 300 mm focal length single monochromator with a triple-grating turret
- 600 mm focal length double monochromator with two triple-grating turrets

Detectors

A selection of detectors to suit all signal levels and spectral ranges encountered in spectroradiometry and spectrophotometry, from 200nm to 30µm.

Calibration Standard

- Source, detector and material standard
- Traceable to National Metrology Institute
- Minimise measurement uncertainty
- Re-calibration reminder program



Hyperspectral Imaging

Specim: full range of products from the pioneers of Hyperspectral Imaging



A global leader in hyperspectral imaging

Specim products are chosen by numerous research groups, including world recognized centers, installed and operated in laboratories in field, in drones and in large scale remote sensing airplanes.

Hyperspectral imaging combines high-resolution spectroscopy with digital imaging.

Specim spectral cameras, components and systems cover the full spectral range from visible to LWIR.

Spectrographs

Specim's imaging spectrographs offer excellent spectral and optical performances for integration in your systems: keystone, smile and other aberrations kept in subpixel range.

Cameras

Based on Specim's spectrograph, full HSI cameras integrate a large variety of high performance sensors to adapt to any application: from the highest performance required by the most demanding research applications (like in geology and remote sensing) to the first truly portable push-broom camera to use in the field, to the most advanced ultra light cameras for drones.

Systems

The HSI ability to collect simultaneously imaging and spectral data makes this techniques the choice for chemical imaging applications and for analysis of drill cores and other geological samples: if you are interested in these applications, take advantage of the turn key Sisu systems from Specim.

Research applications

- Pharma
- Food
- Vegetation
- Cultural Heritage
- Environmental & Earth Science
- Airborne:
- Aircraft & drones
- Geology
- Mineralogy
- Mining
- Oil
- Precision Farming
- Medical



Spectroscopic Ellipsometers

For thin films characterization

J.A. Woollam is one of the main market leaders in Spectroscopic Ellipsometry

The ellipsometers cover the widest wavelength range from 140 nm to 33 μm or can capture data simultaneously from all wavelengths in a fraction of a second.

M-2000 - For fast ellipsometry

The M-2000 ellipsometer combines highly accurate 'rotating compensator ellipsometer' (RCE) technology with fast CCD detection to collect data from the UV to the NIR spectrum in a fraction of a second. It is available as ex-situ and in-situ setup.

RC2 - The next generation of ellipsometry

The RC2 is the first spectroscopic ellipsometer with the dual rotating compensators technology. Measures the complete spectrum (from 193 to 2500 nm) in 1/3 of a second, even advanced data types like all the 16 elements of the Mueller matrix.

alpha 2.0 - Entry level ellipsometer

The alpha 2.0 is a fast, low-cost system for measuring film thickness and optical constants within the visible spectrum.

theta-SE - The fast mapping solution

The theta-SE is a push-button ellipsometer equipped with 300 mm sample mapping for characterizing thin film uniformity at very high speed.

VASE - The ultimate research ellipsometer

VASE is the most accurate and versatile ellipsometer for research on all types of materials: semiconductors, dielectrics, polymers, metals and multi-layers. It combines high accuracy and precision with a wide spectral range from 193 to 4000 nm.

iSE - Cost-efficient in situ SE

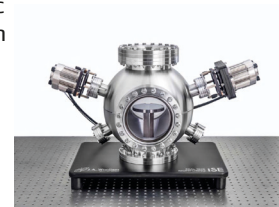
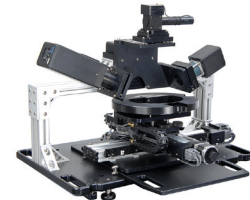
The iSE is an in-situ spectroscopic ellipsometer developed for real-time monitoring of thin film processing in the spectral range from 400 to 1000 nm.

IR-VASE - Infrared ellipsometer up to 33 μm

The IR-VASE is the first and only spectroscopic ellipsometer to cover the spectral range from 1.7 to 33 μm .

Film properties measured

- Film thickness and Refractive index
- Interfacial mixing/grading
- Chemical composition
- Crystallinity, Anisotropy, Uniformity



X-ray Absorption Spectroscopy

Laboratory XAS systems with synchrotron beamline performances



X-ray Absorption Spectroscopy (XAS)

XAS is a chemical state analysis technique used for research in a broad range of disciplines. This technique is based on the measurements of transmitted X-rays (even coupled with fluorescence) through an irradiated sample as a function of incrementing X-ray energies. XAS can be analyzed in two different regions (i.e., absorption regimes):

High-energy XAS system - at energies nearest to the absorption edge (~100 eV around the edge). This region exhibits sharp resonance peaks. XANES measurements give information about local atomic states, such as oxidation states and symmetry.

Extended fine structure (EXAFS) - at energies after the XANES region and up to 1000 eV or greater than the absorption edge. This region shows gentle oscillations caused by scattering of the ejected electrons by surroundings atoms. EXAFS measurements give information about neighboring atoms, including inter-atomical distances and coordination number.

Low-energy XAS system:

Sigray QuantumLeap V210

- 1.7 kV to 10 keV X-ray energy range, enabling low-Z samples analysis
- Optimized design for low-Z samples with vacuum enclosure

High-energy XAS system:

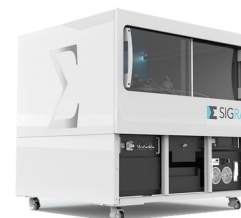
Sigray QuantumLeap H2000

- 4.5 kV to 25 keV X-ray energy range, enabling transition metals to lanthanides analysis
- Fluorescence mode for high-Z and/or low concentration samples

Both QuantumLeap systems support high-throughput XANES at 0.5 eV and EXAFS up to 5 eV resolution with the possibility of customized in-situ and/or in-operando measurements cells.

Applications

- Analytical chemistry
- Batteries and fuel cells
- Catalysis
- Electron structure
- Nanoparticles



Confocal Raman Microscopes

Confocal Raman Imaging with unprecedented performance in speed, sensitivity, and resolution

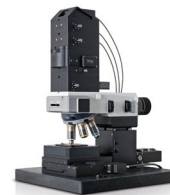
Alpha300 R – Confocal Raman Imaging

Recognized as the state-of-the-art imaging system, the ongoing development keeps the WITec's Raman microscope alpha300 R at the forefront of the technology and sets the benchmark in terms of flexibility, sensitivity, speed and performance.

The flexibility of the alpha300 R series allows the system to adapt to all requirements and to evolve to meet new or expanded needs.

Features

- Identification and visualization of the distribution of chemical compounds
- Analysis of crystallinity and material stress properties
- Lateral, diffraction-limited spatial resolution down to ~200 nm
- Correlative imaging options readily available (i.e. AFM, SNOM, SEM, TERS)



High Performance Raman Analyzers

Ultimate sensitivity and speed for chemical characterization

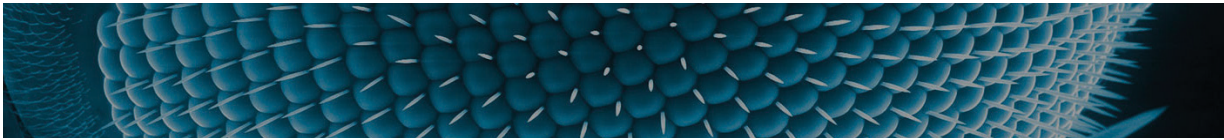
EnSpectr R532

EnSpectr R532® is a unique instrument that combines the advantage of a portable probe system with the performance of a highly specified laboratory instrument. It performs identification of substances through walls of sealed bags, transparent bottles, vials, and ampoules. Results are displayed within seconds and can be accessed via an intuitive user interface.

Features

- Superior sensitivity and low noise
- Non-contact real-time identification
- Precisely tailored to customer's requirements
- Fast and trustworthy results
- Portable device
- Easy to use





MICROSCOPY

Chroma Filters

Fluorescence, Spectroscopy, Colorimetry, Raman, Astronomy & Machine Vision Filters



High Transmission filters & sets

Chroma offers sputter/hard coated optical filters characterized by high transmissions, for applications such as fluorescence, raman, multiphoton, astronomy and machine vision.

Complete Optical Filter Sets for fluorescence, Raman and Astronomy applications are available.

Chroma offers also many filters accessories, like microscope cubes, sliders, rings and diagnostic slides, designed to meet your fluorescence microscopy needs.

Features

- Single- and multi-band dichroic beam splitters for a wide variety of dies
- Single- and multi-band excitation and emission filters for a wide variety of dies
- Laser line, excitation and clean-up filters for all kind of standard lasers
- Single- and multi-band fluorescence filter sets consisting of excitation- emission dichroic filter for a wide variety of dies
- Custom and OEM Filter Design



All-in-one SEM+AFM correlative platform

FusionScope



FusionScope compact correlative platform

FusionScope is the culmination of almost a decade of research into the area of correlative microscopy. The project started at Quantum Design with the idea of integrating our AFSEM in a single platform with a complete FE-SEM microscope. The advantage of an all-in-one platform is to have a single software and shared electronics for both SEM and AFM management; each operation is thus very intuitive and extremely simplified, even for users with no previous experience.

The SEM ensures the best imaging performance thanks to its FEG source and latest-generation detectors, while the AFM is equipped with all the classic and advanced imaging modes such as: contact, dynamic, mechanical, conductive, EMF, MFM, FIRE, etc...

Featuring an innovative shared coordinate system to automatically align AFM and SEM operations for measurements and sample positioning, within a single software interface you can easily identify your region of interest (ROI), measure your sample and combine your imaging data in real time.

FusionScope allows to switch between a sub-nanometer resolution AFM and SEM imaging with a simple click of a button to extract your desired data.

Profile View

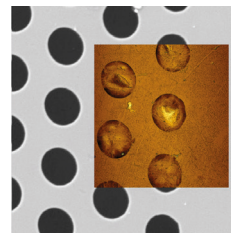
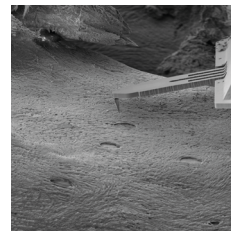
The FusionScope's innovative sample handling system enables to **observe the tip of the AFM cantilever as it carries out measurement, thanks to the 80-degree tilt** of the sample holder and AFM scan head, which share the same trunnion. This feature allows to position the AFM tip quickly and accurately over the region of interest, even on morphologically complex and difficult sample surfaces, expanding the possible AFM applications to fields unexplored by classical atomic force microscopy.

Features

- combined SEM+AFM platform
- FEG source
- Self-Sensing Cantilever
- Sub-nanometer resolution
- Shared coordinate system
- Unique and intuitive management software
- Profile View
- Reduced footprint

Applications

- Materials science
- Life science
- Analysis of conductive and magnetic materials
- Nanoindentation
- Mechanical testing
- Failure Analysis



The AFSEM – AFM in-situ SEM

Do you know your SEM can do this?

The AFSEM 1.0 and the AFSEM NANO

The AFSEM systems from Quantum Design Microscopy enables you to combine the possibilities of your SEM with the capabilities of an atomic force microscope (AFM).

The complementary capabilities of AFM and SEM allow for unique characterization possibilities of any kind of samples directly inside the host system.

The system has been engineered to maintain full SEM functionality, allowing to simultaneously operate with SEM and AFM inside the vacuum chamber.

The AFSEM is compatible and can be easily added on the most SEM and FIB/SEM on the market. Due to its unique design, the AFSEM system will not interfere with any other technique but it will add information regarding the structures and features of samples.

Imaging Modes

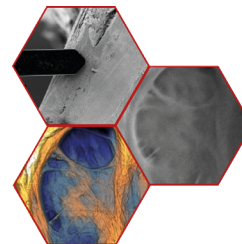
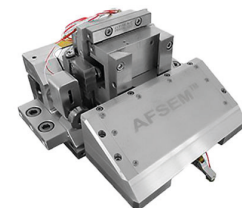
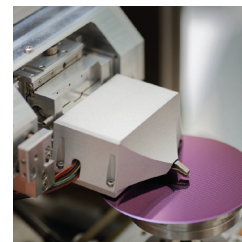
- Contact mod
- Non-Contact mod
- Tapping mod
- Phase contras
- Force volum
- Conductive mod
- EF
- MF
- Lithograph

Features

- Quantitative height measurements
- Combined SEM/AFM images
- Elasticity coefficient map and measure
- Sub-nanometer resolution

Applications

- Material science
- Life science
- Conductive analysis
- Nanoindenter
- Tensile stress test
- Failure analysis



Transmission Electron Microscopy

In Situ TEM techniques

Environmental TEM techniques

DENSsolutions develops, manufactures and markets 4 different In Situ sample holders for TEMs.

At the heart of DENSsolutions products are patented MEMS based Nano-Chips and Nano-Reactors to control the environment of the sample in the TEM thereby replicating real-life conditions inside the vacuum chamber of the latter.

The most advanced In-Situ sample holders can control biasing and heat up the samples up to 1300° C to characterize any electrically and thermally induced process with ultra-high drift stability.

Moreover, the patented nano-reactors allow also to flow liquids, gases, and mixtures of them in an extremely safe and controlled manner.

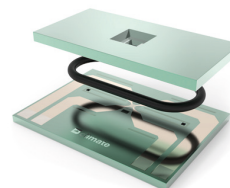
The DENSsolutions sample holders will convert your high vacuum TEM from a static imaging tool into a real-world research laboratory, enabling you to speed up your high resolutions studies in several fields such as: new catalysts or other energy-relevant materials, solar cells, batteries, nano medicine, water purifications and human health research, material and life science.

Features

- In Situ Heating
- In Situ Biasing
- In Situ Heating & Biasing in liquid environment
- In Situ Heating & Biasing in a gaseous environment
- Mass Spectrometry
- Ultra-High thermal drift control
- NO TEM performance loss
- EDX compatible
- Accurate control in mixing gases and liquids

Applications

- Material science
- Life science
- Nanotechnology
- Solar Cells
- Catalysis
- Drug delivery
- Battery materials
- Nano Medicine
- Chemistry
- Drug delivery
- Corrosion studies



EDX and XRF integrations for SEM

Add techniques to your electron microscope

Our partner iXRF, which has been in the market for more than 30 years, provides state-of-the-art EDX and XRF solutions with which you can expand the analytical capabilities of your SEM and achieve top-level performances.

The iXRF systems are compatible with all commercially available SEMs and are supplied with IRIDIUM, a unique management software with more than 60 free analysis tools, including: asbestos particle/fibre detection and counting, Gun Shot Residue, GSR and ASTM E2926, large area processing with stitching algorithms, and you can produce complete and exhaustive reports thanks to the reporting tools.

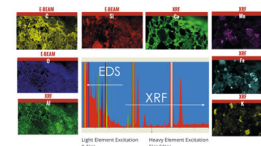
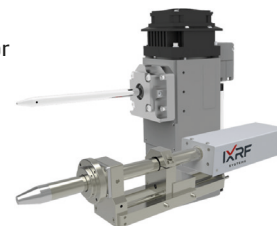
In addition, iXRF provides electronics compatible with EDXs from other suppliers, this will allow you to upgrade your system to the latest OS without the need to change the detector.

Features

- Vibration-free SDD technology
- Detectors also available for benchtop SEM
- Wide choice of window materials, even for lightweight elements
- Active areas up to 100mm²
- Spot size from 10µm up to 25mm
- Patented polycapillary optics
- Trace element detection down to 10ppm

Applications

- Chemical microanalysis
- Asbestos analysis
- Semiconductors
- Solar Cells
- Pharmaceutical sciences
- Life science
- Failure analysis
- Forensic science (Gun Shot Residue, ASTM E2926)



X-ray Microscopy & micro-Computed Tomography

Micron and sub-micron resolution for any application

Sigray: advanced 3D X-ray microscopes

Sigray's 3D X-ray microscopes offer the most unique and innovative features on the market with synchrotron-like capabilities. With innovative X-ray sources and optics, Sigray guarantees unique features:

- Spatial resolution down to sub-micron
- Patented multi-target X-ray source (optional) and optics
- Superior contrast and high-throughput
- Fully automated system

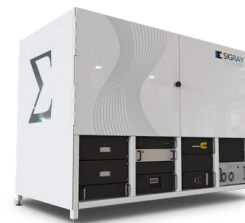
Platforms

PrismaXRM-810: high-class modular X-ray microscope

ApexXCT-150: high-throughput system optimized for PCB/wafers and semiconductors

Applications

- Materials and life science
- Batteries and metals
- Semiconductors and failure analysis
- Geosciences
- Pharmaceuticals and food



Scanco Medical: versatile 3D X-ray scanners

Scanco Medical offers a wide range of 3D X-ray scanners, ideal for the imaging of very small structures of ex-vivo and in-vivo samples. All Scanco Medical's systems are supplied with sophisticated features:

- Spatial resolution up to sub-micron
- High-end computing equipment and proprietary analysis software
- Automated sample and filter changer
- Optional in-situ stage

Platforms

μCT45 & μCT90: benchtop micro-CT systems

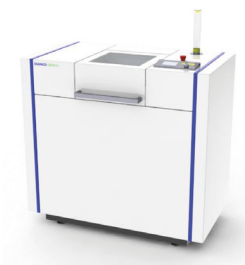
μCT50, μCT100 & μCT100HE: cabinet sub-micron or high-energy micro-CT systems

vivaCT80: system for in-vivo applications

Applications

- Materials and life science
- Mechanical and biomedical engineering
- Bone and dental research
- Geology and paleontology
- In-vivo imaging

SCANCO MEDICAL



Micro X-ray Fluorescence

High-throughput elemental mapping systems

Sigray: high-end micro-XRF mapping

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- Highest resolution mapping on the market (up to 3 μm)
- Patented multi-target X-ray source an optics
- Fully automated system
- Simultaneous detection of multiple elements with sub-ppm sensitivity

Platforms

AttoMap-200: ambient pressure and ultra-large stage travel micro-XRF system

AttoMap-310: vacuum micro-XRF system with unique X-ray source variable angle mode

Applications

- Materials and life science
- Metallomics and elemental migration
- Batteries and catalysts
- Geosciences
- Semiconductors and thin films



iXRF Systems: high-level benchtop micro-XRF mapping

Benchtop micro-XRF series developed by iXRF Systems offers a versatile solution for X-ray chemical-physical mapping of elements in the laboratory. Their unique design includes:

- Mapping resolution up to 5 μm
- Optional poli-capillary interchangeable optics sets
- Largest sample chamber on the market
- Multi-detector systems with unprecedented active area

Platforms

ATLAS-M & ATLAS-X: vacuum/ambient/He benchtop modular micro-XRF systems

Applications

- Materials and life science
- Alloys and metals
- Batteries and catalysts
- Geology and soil
- RoHS/WEEE compliance



Confocal Raman and Correlative Microscopes

Raman Imaging, Fluorescence, Luminescence, AFM, SNOM in a single system

Alpha300 R Series

WITec continually develops microscopy systems for correlative Raman imaging that fulfil three crucial tasks simultaneously: they provide the best spatial and spectral resolution along with peerless sensitivity and unmatched speed. The flexibility of the alpha300 R series allows the system to adapt to all requirements, combine different imaging techniques and to evolve to meet new or expanded needs.

Alpha300 RA

The Raman-AFM combination alpha300 RA was the first integrated Raman AFM system on the market and continues to set the standard for combined instrument configurations for correlative Raman-AFM microscopy.

With the alpha300 RA the two complementary imaging techniques are available in a single instrument without compromise and are controlled by one software suite for the highest ease-of-use and reliability.

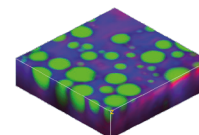
The alpha300 RA is furthermore ideally suited for TERS (high-resolution Raman) AFM measurements.

Alpha300 RAS

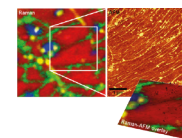
For the user with challenging experimental requirements, the alpha300 RAS facilitates confocal Raman imaging and Scanning Probe Microscopy in combination with Scanning Near-field Optical Microscopy for optical imaging with resolution beyond the diffraction limit. The combined Raman-AFM-SNOM microscope is ideally suited for high-resolution Raman imaging techniques such as nearfield-Raman imaging and TERS (high-resolution Raman).

Features

- Hyperspectral Raman image generation
- Diffraction limited lateral resolution
- Outstanding depth resolution ideally suited for 3D image generation
- Ultra-fast Raman imaging option with under one millisecond integration time per spectrum
- Ideally suited for simultaneous Raman-AFM measurements
- Ideally suited for combined techniques such as near-field Raman imaging and TERS



3D confocal Raman image of an emulsion of oil (green), alkane (magenta), and water (blue). 30 μm x 30 μm x 11.5 μm



Raman and AFM image of the same sample area on a wrinkled CVD graphene layer.

Atomic Force Microscopes (AFMs)

Comprehensive suite of AFMs from Top-Level Research to compact solutions



DriveAFM – Performance without compromise

The DriveAFM utilizes the latest technology to deliver stable, high-end performance. It was designed to fulfil the needs of top-notch research, today and in the future, key features:

- CleanDrive: stable excitation in air and liquid
- Ultra-low noise
- Direct drive: high-resolution imaging in a large scan area in one scanner
- Fully motorized system: full control via software
- Compatible with inverted microscope
- Full suite of scan modes and options

FlexAFM – The flexible research AFM

The FlexAFM is one of the most versatile and flexible AFMs ever, allowing a large variety of research applications to be handled with ease.

- Modular concept to exactly match your needs
- Compatible with inverted microscope
- Scanning capabilities in liquid and advanced measurement modes
- Suitable for any sample size

CoreAFM – The essence of AFM

The CoreAFM is the result of a smart combination of the core components of AFM to achieve maximum versatility and user-friendliness.

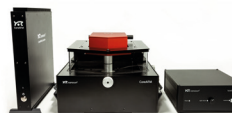
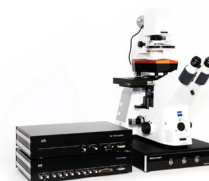
32 standard and optional modes with fully compatible add-ons make the CoreAFM the tool of choice for applications ranging from materials research to life science and electrochemistry.

Alphacen 300 – Large samples AFM

The Alphacen 300 is a tip scanning AFM for heavy and large samples. The system takes advantage of the knowledge Nanosurf developed designing custom industrial systems.

NaioAFM and NaioSTM – The leading instruments for nanoeducation

The NaioAFM and NaioSTM are the ideal instruments for nanoeducation and basic research on small samples. The all-in-one NaioAFM provides solid performance and easy handling, with a price tag and footprint that fit anyone and any place. The all-in-one NaioSTM achieves atomic resolution in minutes.



Temperature stages, plates & wafer chucks

Since 1984 thermal systems that fit every technique

Instec

Founded in 1984 by a group of physicists from the University of Colorado Boulder, Instec focused on precision thermal control for microscopy, spectroscopy and electrical probing tools.

Thermoelectric stages

Peltier devices for quick and easy control.

- -40°C to 120°
- Integrated XY sample positionin
- Upright and inverted microscope
- Spectrometers and FT-IR
- Vacuum or in-ga

Heating and cooling stages

Resistive heaters with LN2 cooling for widest temperature ranges.

- -190°C to 600°
- For IR and optical microscopy and spectroscopy
- Side loadin
- Removable XY sample positionin
- Vacuum or in-ga
- Thermal control on liquid sample

High temperatures stages

- RT to 1500°
- Sealed chamber with gas purge
- For microscopy and spectroscop

Specialty stages

- In-situ tensile force measurement
- Cryo CLE
- Side loadin
- Integrated XY sample positionin
- Vacuum and in-ga

Thermal plates

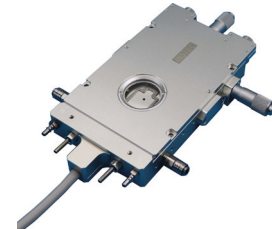
Essential for probing and characterization experiments.

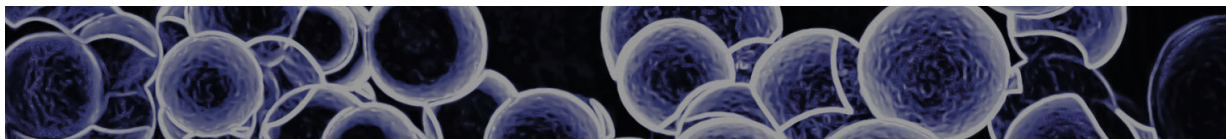
- Sampling areas up to 600mm or beyon
- -190°C to 1500°
- $\pm 0.1^\circ\text{C}$ temperature uniformity and stabilit
- Ideally suited for: AFM/SPM, Ellipsometry, Raman, etc.
- Sealed chambers with defrosting, ga purging or vacuum capability

Thermal chucks

Essential for probing, characterization, inspection and failure analysis of semiconductor wafers and devices.

- -190°C to 1500°
- $\pm 0.1^\circ\text{C}$ temperature uniformity and stabilit
- Grounded, coaxial, triaxial chuck surface
- Triaxial heaters for electrical noise reductio





IMAGING

Hyperspectral Imaging

Specim: full range of products from the pioneers of Hyperspectral Imaging

SPECIM
A Konica Minolta Company

A global leader in hyperspectral imaging ensuring your system won't break down during your mission critical work.

Spectral Evolution Spectrometer and Spectroradiometers are small and lightweight (3.5kg or less) yet rugged for everyday use.

Portable systems are powered with lightweight high capacity lithium ion batteries and can be operated in stand-alone fashion or with small handheld mobile computers to keep your travel load as light as possible.

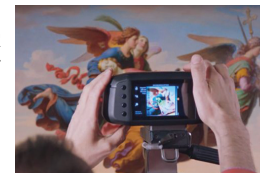
Applications

- Remote Sensing
- Geology
- Solar cells and panels
- Radiometric calibration transfer

Specim spectral cameras, components and systems cover the full spectral range using CCD and CMOS detectors in the VIS and VIS/NIR range, InGaAs cameras in the near IR, MCT detectors in the shortwave IR and InSb and microbolometers for hyperspectral imaging in the thermal IR.

Research applications

- Pharma
- Food
- Vegetation
- Cultural Heritage
- Environmental & Earth Science
- Aircraft & drones
- Geology
- Precision Farming
- Medical



Scientific Cameras for Imaging

Advanced and versatile EMCCD, CCD, ICCD and scientific CMOS cameras



iKon CCD detectors

The Andor iKon-M and iKon-L CCD camera series are designed for low-light situations when exposure time is expected to be long. The UltraVac vacuum enclosure ensures deep TE-cooling to $-100\text{ }^{\circ}\text{C}$ and reduced dark current eliminating the need for liquid nitrogen. The new iKon-XL is ideally suited for long exposures in Astronomy applications.

iXon EMCCD detectors

For ultra-sensitive imaging applications, Andor offers the EMCCD iXon Ultra cameras Series with USB interface. The sensor is placed in a sealed vacuum chamber so that temperatures down to $-100\text{ }^{\circ}\text{C}$ are achieved with TE-cooling. Backilluminated sensors are optimized for UV, VIS and NIR.

iStar ICCD detectors

The iStar ICCD/sCMOS cameras feature an image intensifier in front of the sensor that acts as an ultra-fast optical shutter for exposure times of a few nanoseconds for time-resolved applications. The iStar ICCD is characterized by TE-cooling to $-40\text{ }^{\circ}\text{C}$, USB 2.0 interface and up to 500 kHz photocathode gating rates. The innovative iStar sCMOS allows optical gating at higher frame rates than ICCD cameras.

Balor, Marana, Zyla & Neo sCMOS detectors

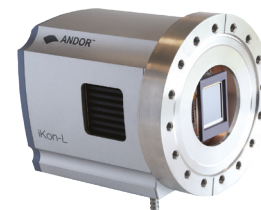
The Balor, Marana, Zyla and Neo sCMOS cameras are suitable for many applications in Physics and Astronomy. With extremely low noise and high sensitivity, they often yield a better image than EMCCD cameras, even in low-light conditions. Thanks to the vacuum enclosure, the sensors of the Marana, Neo and Balor can be cooled to industry-leading $-45\text{ }^{\circ}\text{C}$, $-40\text{ }^{\circ}\text{C}$ and $-30\text{ }^{\circ}\text{C}$, respectively, making them suitable even for very demanding applications.

The Zyla is available with 5.5 or 4.2 Mpixels sensor offering frame rates up to 100 fps.

Scientific Cameras for X-Ray Detection

Andor offers cameras for high-energy detection with direct or indirect detection methods. Cameras for Direct Detection ($<20\text{ keV}$) are vacuum compatible CCDs suitable for the direct detection of VUV, EUV light and soft X-rays.

Detector solutions for soft X-ray detection under ambient conditions uses an integrated beryllium foil window to block visible light. For high-energy applications, from 10 keV to 100 keV, Andor offers CCD or sCMOS cameras that employ scintillator screens to convert incident X-ray photons to visible radiation.



Ultra high-speed imaging systems

For short time domain imaging studies

Cordin is the world leader in ultra-high speed imaging technology.

Frame rates up to 200 million fps possible. Very short integration and inter frame times. Gated and intensified models available.

Framing camera systems

A framing camera captures an intermittent sequence of 2D images at very fast rates.

Features

- Limited number of frames at very fast rates (burst mode)
- No trade-off between speed and resolution

Streak camera systems

A streak image is like a graph of one dimension of space over time.

Features

- Rotating mirror framing cameras offer very high resolutions at excellent dynamic ranges.
- Image converter streak cameras record light transients at the fastest possible speeds.

Applications

- Impact dynamics
- Ballistic and projectile studies
- Supersonic and hypersonic flows

CORDIN
SCIENTIFIC IMAGING



Industrial Cameras

Cameras for UV/Vis, Vis/Nir and SWIR spectral ranges

Artray offers a wide range of cameras for industrial applications based on CCD/CMOS, monochrome or color, and InGaAs sensors.

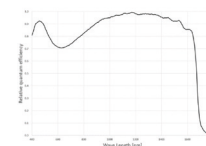
Several interface options with the control PC offer maximum integration flexibility. Sensors with different quantum efficiency curves are optimized for specific UV spectral ranges.

The ARTCAM-SWIR camera Series with spectral sensitivity up to 1700 nm or extended to 2500 nm are available with sensor format up to 1280 x 1024 pixels and equipped with optional thermo-electric cooling system.

Features

- 2D and Linear InGaAs Cameras
- Digital video output Cameras (no need for controlling PC)
- CMOS Cameras with USB2/USB3 interface and resolution up to 250 MP
- Mini Cameras based on USB2 interface
- Board Type Cameras for easy integration
- UV Cameras with sensitivity down to 200 nm
- UV/Vis/Nir Lens

ARTRAY



Infrared Imaging Cameras

IR Cameras for High End Imaging Applications

INFRAtec.

InfraTec GmbH offers a wide range of high-quality products of IR technology.

LWIR Uncooled VarioCam Camera Series The VarioCam Camera Series is based on uncooled microbolometer FPA detector with 640x480 to 1024x768 IR pixels format. The VarioCAM Head is suited for demanding stationary monitoring applications and it's based on a solid light metal housing with optional IP67 protection degree.

Features

- Stationary camera models
- Temperature range (-40÷2,000) °C
- Temperature resolution up to 0.02 K
- Motor-driven focus, automatic or manual

Applications

- Preventative maintenance
- Building thermography
- Electronics/electrical testing
- Security Applications
- Non-destructive testing

LWIR Uncooled PIR uc 605

The PIR uc 605 is a radiometric infrared camera module, based on an uncooled FPA detector with (640x480) IR pixels, that enables the entry into stationary thermal imaging for R&D and process optimization.

SWIR Cooled ImageIR Camera Series

High-resolution, radiometrically calibrated SWIR cameras from the ImageIR® series. They are suitable for temperature measurements from 300 °C and operate in the short-wave infrared range.

MWIR Cooled ImageIR Camera Series

The high-end ImageIR cameras range is based on MCT, InSb or XBN cooled FPA detector with format 320x256 to 1920x1536 IR pixels. Due to the high thermal sensitivity, fast frame rates and the snapshot readout mode, the ImageIR cameras are suited for high-end R&D, non-destructive material testing and process monitoring.

Features

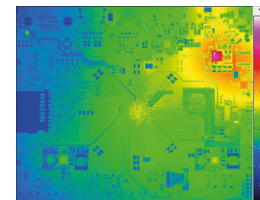
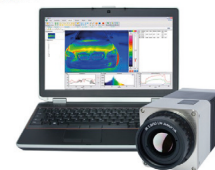
- Modular design and long-life Stirling cooler
- High spatial and thermal resolution
- Fast frame rates and high dynamic range
- 10 GigE interface
- Separate Filter & Rotating Aperture Wheel

Applications

- High-speed thermography
- Metal, ceramics and glass industry
- Additive Manufacturing and laser applications
- Thermographic Automation
- Material Testing
- Process monitoring and optimization



InfraTec



X-ray Fluorescence Imaging

High-throughput elemental micro-mapping systems

Sigray: high-end micro-XRF mapping

Sigray offers the most unique and innovative features on the market with synchrotron-like capabilities. With the best laboratory-based X-ray beamline, Sigray's micro-XRF advantages include:

- Highest resolution mapping on the market (up to 3 μm)
- Patented multi-target X-ray source and optics
- Fully automated systems
- Simultaneous detection of multiple elements with sub-ppm sensitivity

Platforms

AttoMap-200: ambient pressure and ultra-large stage travel micro-XRF system

AttoMap-310: vacuum micro-XRF system with unique X-ray source variable angle mode

Applications

- Materials and life science
- Metallomics and elemental migration
- Batteries and catalysts
- Geosciences
- Semiconductors and thin films



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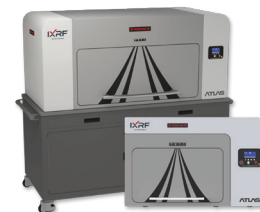
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- Optional poli-capillary interchangeable optics sets
- Largest sample chamber on the market
- Multi-detector systems with unprecedented active area

Platforms

ATLAS-M & ATLAS-X: vacuum/ambient/He benchtop modular micro-XRF systems

Applications

- Materials and life science
- Alloys and metals
- Batteries and catalysts
- Geology and soil
- RoHS/WEEE compliance



X-ray Tomography Imaging

Micro-computed tomography systems

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Platforms

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ApexXCT-150: high-throughput system optimized for PCB/wafers and semiconductors.

Applications

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- Semiconductors and failure analysis
- Geosciences
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- Automated sample and filter changers
- Optional in-situ stages

Platforms

μCT45 & μCT90: benchtop micro-CT systems;

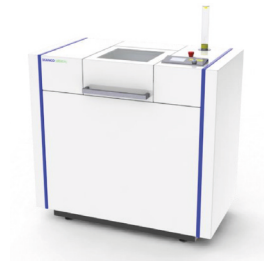
μCT50, μCT100 & μCT100HE: cabinet sub-micron or

high-energy micro-CT systems;

vivaCT80: system for in-vivo applications.

Applications

- Materials and life science
- Mechanical and biomedical engineering
- Bone and dental research
- Geology and paleontology
- In-vivo imaging



X-ray and high-energy particle detectors

High- and ultra-high-speed photon counting and imaging cameras

ADVACAM

X-ray and high-energy particle detection cameras

Based on patented CERN technology, ADVACAM cameras sense every single particle of radiation of almost any kind, including X-rays, gamma, electrons, ions, and even neutrons to revolutionize a wide range of industries, from space and material science to medicine.

Features

- Record every particle event
- Simultaneous energy, time & space detection
- Ultra-high throughput
- Easily integrable on existing instruments and/or in beamlines

Platforms

TimePIX: miniature high-speed X-ray photon counting cameras

TimePIX3: ultra-high-speed X-ray photon counting cameras

MediPIX3: high-speed array X-ray imaging cameras

ADVACAM cameras can be built with Si or CdTe sensors basing on the energy resolution and efficiency at high and low energies.

Applications

- Material science and space
- Particle tracking
- NDT (XRD, XRF, Tomography...)
- Medical physics & Radiation safety





CRYOGENICS



Level Metering and components for Cryogenics

Sensors, controllers, cryocoolers and traps for research and industry

American Magnetics: Level Metering

AMI offers a complete line of capacitance and resistance based instrumentation that allows to monitor and control the level of liquids, interfaces liquid/liquid, bulk solids and powders in a dewar. Unattended autofill systems for both laboratory and heavier-duty industrial applications are configurable.

Features

- Sensors for conductive and non-conductive liquids, cryogens, viscous media like: He, N, Ne, Xe, O₂, H, CO₂, natural gas, Ar, GPL, butane, JP4, ethylene glycol, etc.
- Safety and reliability: FM XP, I.S. & N.I. (C2x) certification
- Various output options
- Full automation
- Linear, curved, flexible sensors

Janis: cryocoolers and cold traps

One and two stages, GM e PT cryocoolers for helium free refrigeration to assemble low temperature, low-vibration equipment.

Cryogenic Cold trap systems (CCT) are primarily used in the adsorption of noble gases and supplied in a variety of customized configurations as: multiple isothermal traps in one unit or several multipurpose traps (water vapor, carbon dioxide, oxygen, helium, etc.) in the same system. The CCTs aid in the extraction of such gases from geological materials collected from volcanic hot springs, to get insight into the planetary evolution of the Earth. They are also used to adsorb various oxygen isotopes from meteorites and polar ice caps and ocean island olivines.



Low temperatures control and monitoring

Lake Shore Cryotronics: components for cryogenics



Cryogenic temperature monitors

Lake Shore monitors display the temperature from 1.4 K to over 800 K. It could be chosen from one or eight standard inputs. USB, IEEE-488 and RS-232C interfaces, relays, and analog outputs are available.

The new 240 Series offers a convenient, modular input solution for precision monitoring of cryogenic temperature sensors in large-scale applications employing distributed PLC-based control.

Temperature Probes

When special requirements on available space as well as protection of cryogenic temperature sensors are needed, sealed temperature probes are used: highly customizable, ideal for temperature measurements in fluid containers and tanks, unaffected by high pressure, industrial applications.

Cryogenic temperature monitors

Measure temperatures from <20 mK to over 1.500K. A wide selection of diodes, RTDs, thermocouples and mounting packages are available.

Sensors suitable for high radiation environment, high magnetic field, UHV and Space Applications.

Cryogenic temperature controllers

Temperature controllers and AC Resistance Bridge for cryogenic applications cover a temperature range down to 20mK and up to 1.500K.

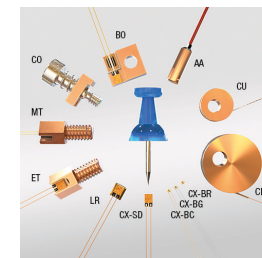
Excellent measurement performance, superior control accuracy and convenient operation in a wide range of advanced research applications, whether the need is for high accuracy with minimal thermal impact or precise temperature control in high magnetic fields or dependable measurement in radiation environments.

Features

- Up to 17 channels
- Compatible with any Lake Shore Cryotronics temperature sensor
- Patented noise reduction input circuitry for ultra-low temperature (ULT) applications

Cryogenic Accessories

- Cryogenic wires and cables
- Solder, epoxy and grease



Cryostats and Cryomagnets

Cryogenics for research, characterization and industrial applications



environment by ❄️ JANIS

Lake Shore Cryotronics – environment by Janis

In 2020 Janis Research Company, founded 1961, was acquired by Lake Shore Cryotronics to become a leader provider of cryogenic and material characterization solutions for low-temperature research, offering the largest choice of cryostats and cryomagnets in the market for general and specific applications as Mossbauer, Neutron scattering, UHV, ESR, NMR, Microscopy, FTIR, ARPES and much more.

Cryogen free systems

- Continuous Closed Cycle Cryostat
 - 1.5 K - 4 K - 10 K base temperature
 - Sample in vacuum or exchange gas
 - Low vibration design
 - Custom Engineering
- Variable temperature Superconducting
- Magnet System
- Cryogenic Cold Trap
- Detector Cooling System

Recirculating Gas Coolers: save your Helium!

Turn your old, quite, flow cryostat in a cryogen free system while maintaining the lowest vibration level only a wet system can offer adding the new Recirculating Gas Coolers.

Wet systems – Helium and Nitrogen cooling

- Continuous flow cryostat system
 - Sample in vacuum or in vapo
- Reservoir variable temperature cryostat
 - Sample in exchange gas or in flowing vapo
- Superconducting Magnet System
- Liquid Helium Research Dewar
- Detector cooling system

Characterization systems: CryoComplete™

Everything you need to start making temperature-dependent, low-level electrical measurements!

Industry-leading measurement electronics promote low-level DC measurements and three full channels of lock-in AC capability.

Best of all, CryoComplete is designed from top to bottom, using cryogenic best practices, to deliver end-to-end system specifications.

Get a full optimized system composed of:

- Cryostat with Temperature control
- PC with MeasureLINK
- MeasureReady® M81-SSM synchronous source and measure system for ultra-low-noise AC/DC (Source + measure + lock-in)



Cryogenics for Q/I and Microscopy

Ultra low vibration, fully automated, cryogen free, optical cryostats

MONTANA INSTRUMENTS
COLD SCIENCE MADE SIMPLE

Montana Instruments

The Montana Instruments cryostats has been establishing as standard for sophisticated optical experiments. Extremely low vibrations at the sample allow challenging applications such as microscopy, cavities and opto-mechanics.

The system can be freely placed on the optical table just as any other optical component. That makes it easy to enhance an existing setup by the cryostat.

Free-space optical access via 5 viewports provides high flexibility.

The M/I Cryostats can be precisely tailored to individual requirements by an enormous set of options. DC, RF, fibers or gas feedthroughs can be installed together with options for magnetic field and high NA microscopy. Many different housing styles and sample holders are available. That saves money and time when setting up the experiment in the lab. M/I cryostats are the most flexible systems in the market.

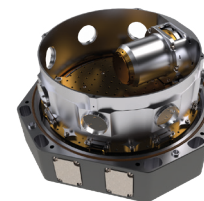
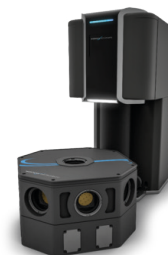
Operation is fully automated, including vacuum pump out, cooldown, temperature stabilization at setpoint, warm-up and purge with dry nitrogen to keep the system surfaces, sample and optics clean.

The cryostats symmetric design compensates for thermal contraction, minimizing the drift.

The CRYO-OPTIC® products integrate an optical objective into the sample space of the Cryostation for ultra-stable, high-quality high NA imaging at low temperatures. The revolutionary design of the Cryo-Optic eliminates the alignment and drift challenges associated with using high performance optics in a cryogenic setup.

Cryostation® Magneto-Optic Module adds up to a 0.7T magnetic field to the cryogenic sample space while maintaining side and overhead optical access.

Agile Temperature Sample Mount (ATSM) provides the highest level of positional stability for step-static and dynamic temperature changes while improving the speed to each set point: ramp your temperature in minutes!



Cryomagnet for Q/I and Microscopy

7T split magnet, ultra low vibration, tabletop optical 1.7K cryostat



Innovative design, R&D100 2018 winner

The OptiCool by Quantum Design is a new magneto-optical cryostat based on the innovative design of the 3.8 inch bore, split-coil, conical magnet, offering fields perpendicular to the optical table up to ± 7 tesla. Seven side optical ports and one top optical port allow for optical access to your sample from a wide array of directions.

The OptiCool optical cryostat is a cryogen-free system with automated software to control temperature and magnetic field.

Sample Pods

The OptiCool's Sample Pod provides a place to build and customize your experiment on the bench. The Sample Pod easily plugs into the prewired temperature control column. Having multiple experiments arranged on multiple pods allows you to switch experimental hardware quickly. Sample Pods are available in various configuration to fit your experimental needs.

Wiring

The OptiCool can be custom configured with three different types of wiring assemblies. Each cryostat can have up to 5 wiring assemblies preinstalled.

Each sample wiring assembly contains eight twisted pairs for a total of 16 wires. Four 4-pin connectors are presented on the pod to make contact to your sample.

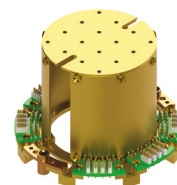
The RF coax wiring assembly contains four coaxial cables capable of carrying high frequency signals up to 20 GHz.

Positioning

OptiCool cryostat can be configured with a piezobased nanopositioning stack to move your sample in situ.

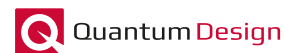
Optics

Quantum Design offers a field-compatible Zeiss 100x LD EC Epiplan-Neofluar, infinity-corrected objective. With a 0.75 NA and a free working distance of 2 mm between your sample and the cold shield aperture, the optics are maintained in vacuum at room temperature to provide the optimal environment to take full advantage of this objective's high performance design.



Helium recovery and liquefaction

Fully automated Helium Recycling Systems for laboratories and facilities



The Next Generation of Helium Recycling

Quantum Design's liquefiers and helium recovery systems allow you to recycle the helium gas currently being lost from the normal boil off and helium transfers of your cryogenic instruments. Whether you have a large laboratory or small, with many cryogen-using instruments or just one, Quantum Design has a helium recycling option perfectly suited for you. Helium Recycling Systems can be individually configured for a variety of laboratory sizes and types. All recycling systems have fully integrated components with most functions being automated or very easily operated.

And you will also be doing your part to conserve a precious natural resource which is vital to scientific research and medical treatment.

Helium Liquefiers

The helium liquefiers can easily be operated in any laboratory. A touch-screen panel allows easy control of the automated system. The system can use both helium gas from a high-pressure cylinder and recycled gas from a cryogenic experiment.

- Easy-to-Use: fully automated operation
- Portable Liquefiers for Easy Transfer
- Up to 250 Liter Capacity

- High Liquefaction Rates: >35L/Da
- Variable Speed Compressor
- Self-Cleaning: Uninterrupted Service
- Modular Design: expand as you need

Helium gas purifier ATP30

Purifiers are used to remove impurities like oxygen, nitrogen, water, hydrocarbons and oils from the helium gas, freezing them at cryogenic temperatures.

The cooling power is provided by a cryocooler (Advance Technology Purifier or ATP).

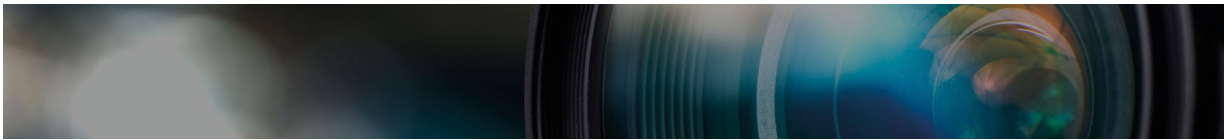
Features

- Freeze out impurities
- Entry quality < 1% impurities
- Helium purity > 99,999%
- Easy operation

Helium recovery and liquefaction plants

Depending on the amount of helium to be recovered and storage conditions, we offer direct recovery for a stand-alone cryostat, e.g. MEG system, and Medium and High Pressure recovery plants for several cryogenic instruments or entire institutes.





OPTICS



Cleaning solution: optics, metals, plastics, sensors and cameras

Photonic Cleaning First Contact™ Polymer

A next-generation cleaning technology that allows researchers and professionals to clean optics without any risk of scratching precision surfaces or optical thin films.

Applicable with a brush, a pipette or by spray deposition, It is a strip coating, safe and easy to use. Cleans and protects precision surfaces during use, assembly, shipping and storage without leaving residue.

The liquid solution of First Contact, once dried, forms a flexible and resilient film of low adhesion that peels off easily without tearing.

Functionality

- Clean off contaminants and nano-particulates
- Remove fingerprints (skin oils), leave no residue
- Remove residue from treatments using other products or chemicals.
- Leave optical thin films intact on optics mirrors, gratings.
- Physically protect optics from airborne contaminants and accidental contact.

Applications

- Astronomy
- Telescopes, Refractors, SCT, Dobs.
- Large Observatories
- High Powered Laser Optics
- Phase Masks/Gratings
- LIGO
- Forensic Fingerprinting
- CCD and CMOS sensor
- silicon wafer, zeroudr substrate, zinc selenide

Cleaning and protection

First Contact™ provides a thin film to oxygen, sulfur compounds, water (not immersion) and water vapor. This tough, elastic film prevents abrasion damage and eliminates the possibility of sensitive surfaces being scratched or dirty.

Safety

First Contact™ is safe on all glass and metals (including silica): Si, Ge, NaCl, KBr, KRS-5 etc. and all polar inorganic crystals, including non-linear optical crystals such as BBO coated. It is safe on all coatings including reflective, anti-reflective and most “first surface” type reticles and mirrors.

**First Contact™
Polymer**

RFCAST



Filters, Optics and Optomechanics

High quality products with large possibility of customization

Filters & Optics

High precision lenses, mirrors, prisms, filters, objectives, windows, optical assembly and other types of optical elements.

We offer a variety of options so that you can select the best-suited optic type for your application.

Applications

- Astronomy
- Raman
- Spectroscopy
- Laser
- Industry & Machine vision
- Non-destructive tests
- Medical & Biomedical
- Fluorescence & Colorimetry

Optical coatings & Surface relief microstructures

We understand the importance of high performance and stable optical coatings: over one hundred Standard AR coating, UV, visible and IR semi-custom or custom coating are available.

Moreover, many unique and useful optical functions can be realized by the fabrication of nanometer scale structures in the surface of a window or optic that can guarantee hydrophobic surface and reflected light level as low as 0.01%.

Optomechanics

Optomechanical elements are the interface between the optical components in your setup and the working surface.

- Mirror, lens and optical mount
- Cages and rail
- Posts and base
- Vacuum compatible component

Manual stages & Motion control

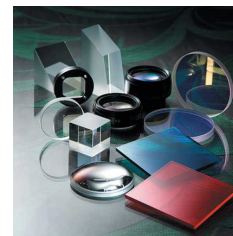
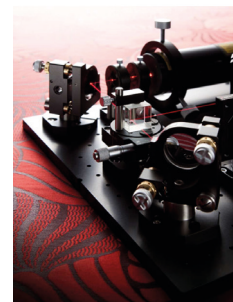
Manual stages are designed to provide precise, high-resolution travel over any combination of the six linear degrees of freedom. The offering includes:

- Linear stage
- Rotation stage
- Goniometer

Additionally, they are also available in materials vacuum compatible. Custom inquiries are welcome.

Optical Tables

We offer honeycomb tabletops with a matrix of threaded holes on the surface and a vibration isolation system – Rigid or Pneumatic.



Motion Control Devices and Systems

For high precision positioning applications

Zaber: Simplifying Motion Control

Zaber Technologies designs and manufactures precision motion control products suitable for a wide range of tasks. Zaber's extensive line of computer controlled motorized linear slides, miniature linear actuators, rotary stages, optical mounts, goniometers, microscope stages and many other devices, make automating submicron positioning applications quick, easy and affordable.

Solutions with encoder position feedback with slip/stall detection and automatic recovery and linear stages with flexible stainless steel dust cover are also available.

All motorized Zaber devices can be controlled by software or by the optional Zaber joystick. Most models offer a control knob integrated in the built-in stepper motor controller as well. Zaber software is easy to use and automatically recognizes all your devices and allows you to communicate with each one and to set up automated routines.

Zaber software is available in many popular languages including LabVIEW, Visual Basic, C#, and C/C++, Python, Arduino, MetaMorph and μ Manager

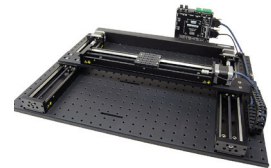
Features

- Solutions for high load, high speed and long travel requirements
- Built-in or external controller options
- Stepper and linear drive motors design
- Several Zaber devices can be daisy-chained and controlled from a single serial port
- Motor encoder, linear encoder and dust cover options
- Belt-driven linear stages for rapidly positioning of lighter loads over long distances

Applications

- Systems integration
- Testing of sensors and antenna positioning
- Vacuum-compatible motorized devices (down to 10^{-6} mbar)
- Motorizing microscope stage
- Gantry and multi-axis systems
- Optical alignment and calibration

ZABER



Polarizers and Beamsplitters UV-IR

Wire-grid and broadband polarizers

Moxtek® polarizers & beam splitters are the preferred choice for many applications that demand performance, wide angle of incidence, and temperature durability. Moxtek® broadband products are built using state-of-the-art nano-scale patterning technology this allows high brightness and contrast uniformity.

Features

- Uniform Transmission & Reflection
- High Transmission, High Contrast
- Wavelength and AOI Independent
- Wide Angle of Incidence
- High Temperature Durability

Applications

- Space and Astronomy
- Security
- Medical



X-Ray Products

Compact, lightweight, durable x-ray components for a wide range of applications

Sources

Moxtek offers Digital X-ray sources that are Spectroscopically identical primarily for XRF and XRD markets, as well as imaging applications. Available with multiple options for target material and energies.

Detectors

Si-PIN x-ray detectors are used for a variety of demanding energy dispersive x-ray fluorescence industrial and scientific applications. XPIN® detectors are optimized to provide maximum resolution, count rate, energy absorption, and peak-to-background

Windows

Made using the technology of super thin film, can be used in a wide range of applications including SEM and TEM detectors for microanalysis and traditional XRF.

Applications

- Environmental Analysis
- Medical
- Quality Assurance





LIGHT & LASERS



Light Measurement Systems

Calibrated equipment for measuring a variety of light sources

Radiometers/Photometers

Most advanced hand-held light meters, optometers, photometer, dataloggers, lux meters, chroma meters in the market today.

Spectroradiometers

All spectroradiometers are provided with the ILT SpectraLight III software which can be used to measure irradiance/illuminance, photopic/ radiometric power, radiance/luminance, PAR, CCT, etc

Applications

- Anti-Microbial & UVC Disinfection
- LED measurement & Testing
- Low Light Level Measurement
- Optical Radiation Hazard
- Photometry
- Plant Photobiology
- Radiometry
- Solar Radiation Measurement
- Flash Measurement
- Photodynamic Therapy



InternationalLight

Part of Ocean Insight



Light Sources, Monochromators and Solar Simulators

Broad selection of instruments used in light-based measurements across the UV-visible-IR

Broadband Light Sources and accessories

We have a comprehensive catalogues of light sources and accessories for a variety of scientific applications.

- Xenon (Xe), Mercury (Hg) and Mercury-X non Hg(Xe) arc sources
- Quartz Tungsten Halogen (QTH) source
- Uniform source
- Spectral line lamp
- Fibres, lenses, filter holders, shutters, beam turners

Monochromators

We offer three Czerny-Turner style monochromators:

- 150 mm focal length single monochromator with a dual-grating turret
- 300 mm focal length single monochromator with a triple-grating turret
- 600 mm focal length double monochromator with two triple-grating turrets

Tunable Light Sources

Plug-and-play wavelength agile monochromatic tuneable light sources, application ready.

Detectors

A selection of detectors to suit all signal levels and spectral ranges encountered in spectroradiometry and spectrophotometry, from 200nm to 30µm.

Calibration Standards

- Source, detector and material standard
- Traceable to National Metrology Institute
- Minimise measurement uncertainty
- Re-calibration reminder program

Solar Simulators

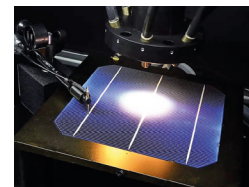
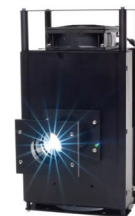
We supply a variety of solar simulators. They provide a uniform, collimated output beam with a close spectral match to sunlight.

Features

- Beam sizes from 25mm dia. to 300 x 300mm²
- Class ABA/AAA
- AM1.5G or AM0 filters available

Solar cell Characterization

We offer a variety of components for solar cell IV characterization: Silicon/GaAs references, Kelvin probes with a range of tips to suit a variety of cell contacts, variety of probe stations.



Lasers and LED light sources

Innovative laser systems for scientific and industrial applications.



QuixX® Picosecond-pulsed Diode Lasers

Versatile “two-in-one” picosecond-pulsed / CW diode lasers with ultrashort pulses down to 50 ps pulses with up to 100MHz repetition rate

TA Deepstar® – Diode Lasers with Infinite Modulation Depth

Modulated diode lasers with 100% modulation depth for scientific and OEM use

LaserNest® Desktop Diode Laser Series

Plug&play laser light source from UV to the near IR range and offer fast analogue intensity modulation with up to 3MHz and high-speed digital modulation up to 250MHz

High Power LED modules with TEC cooling and optional fibre-coupling

modulation inputs for fast analogue intensity modulation with up to 200 kilohertz and digital modulation with a switching time of < 2µs

Laser Light Engines, LED Engines and Compact Beam Combiners

compact and rugged design with the possibility to start with only one or two wavelengths initially and user-upgradeability at a later stage.

Applications

- Widefield Microscopy
- Confocal Laser Scanning Microscopy

- Lightsheet Microscopy (SPIM)
- TCSPC
- Spectroscopy
- Frequency-Domain FILM
- Flow Cytometry
- Optogenetics
- Calcium Imaging
- Forensic

Key Benefits

- Plug & Play desktop-style laser
- Fibre coupled output with M/PM, MM fibres or Liquid Light Guides
- Drivers for Metamorph, LabVIEW and Micro manager available
- Gain time and cost efficiency

Key features of the Laser Engines

- Up to 2, 4 or 6 wavelengths beam-combined and efficiently fiber coupled in compact housing
- Over 30 different wavelengths available
- Optional AOM for fast DPSS laser modulation

Key features of the LED Engines

- Long lifetime: >25,000 hours of operating time
- User replaceable 25mm standard excitation filters (bandpass filters) for each LED channel



Optical Metrology Systems

High performance instruments for optical characterization of sources, detectors and materials

Source Characterisation

Application-ready solutions designed for precise UV-vis-IR characterisation of source emission.

- **XDVC150** Visual Characterisation of Displays. High dynamic range display characterisation for ultimate accuracy
- **Enviro150/300** Solar Spectroradiometers
- **ISR300-PSL** Luminaire Blue Light Hazard Spectroradiometer
- **TanTest150** Complete Type-Testing of UV Tanning Appliances

Detector Evaluation

Precise optoelectronic testing of photo-detectors, image sensors and radiometers.

- Measurement of Triple/4 Junction PV Cell
- EQE/ IQE Testing of Photovoltaic Device

Material Optical Properties

Research grade solutions to probe a wide range of products and materials over the UV-vis-NIR.

- In Vitro UVA/SPF testing of sunscreen products
- Quantum Dot Photoluminescenc
- Photochromic Lens Testing Standards Metrics and Methodology
- Photonic Crystal Fibre Attenuatio

Applications

Spectral, spatial and temporal emission characteristics:

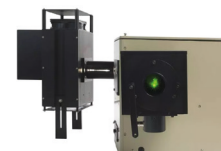
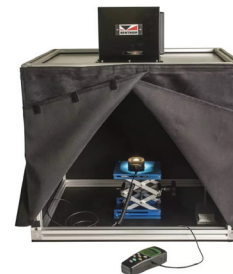
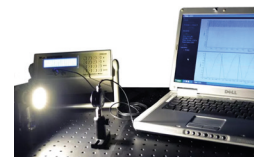
- Mid-Infrared LED Characterisation
- Supercontinuum Characterisation
- Photobiological Safety In Lighting Applications
- Evaluating The Flicker by Lighting products
- Equivalency Code For Tanning Appliance Fluorescent Ultraviolet lamps
- Photobiological Safety Testing of Image Projectors
- Type Testing of Tanning Appliances

Opto-electronic evaluation of photodetectors and image sensors:

- Go beyond PV EQE testin
- EQE Testing Beyond the Band Edg
- Measurement of 4 Junction PV Cell
- Measurement of Triple Junction PV Cell
- EQE/ IQE Testing of Photovoltaic Device

Monochromatic light probing of material optical properties:

- Photonic Crystal Fibre Attenuatio
- Quantum Dot Photoluminescenc
- In Vitro UVA testing of sunscreen product
- In Vivo SPF testing of sunscreen product
- Photochromic Lens Testing Standards Metrics and Methodology



Picosecond and Femtosecond Fiber Lasers

Compact ultrafast fiber lasers for science and industry

Alcor

Compact high-power femtosecond laser. Meets all requirements for 2-photon microscopy and manipulating and interacting with cells or tissues, offering 100 fs pulses, 920 or 1064 nm and up to 5 W average power, reduced size unique features such as GDD precompensation, fast power modulation and fiber delivery.

Altair

Compact fiber laser with high average power and pulses (<150 fs) with high stability and excellent beam quality, lower scattering, deeper penetration for multi-photon microscopy applications.

Diadem

Thanks to its high energy femtosecond pulses and its industrial features such as reduced size, high stability and air cooling, this fiber laser is suitable for 3-photon microscopy, FLIM, ophthalmology in corneal and cataract surgery and micromachining to get high ablation or processing volume combined with remarkable process quality. Adjustable pulse duration and various pulse modes such as burst or pulse-on-demand allow adaptation to a wide range of materials and processes.

Sirius

Compact, high energy hybrid picosecond lasers offer a combination of high pulse intensity and higher.

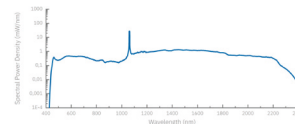
Coherence, which may benefit some applications ranging from microscopy to supercontinuum generation and material processing for semiconductors, medical devices and micromachining market.

Iceblink

Supercontinuum fiber laser covering the 450-2300 nm spectral range with over 3W of average power and superior stability (<0.5% std. dev.). It is a very versatile white light source with a world of applications in the scientific and industrial sectors, including absorption/transmission measurements for material characterization, VIS, NIR and IR spectroscopy, single molecule Spectroscopy and fluorescence excitation. Life sciences, Hyperspectral Imaging, Metrology, Microscopy (FRET, TIRF, CLSM...).

Features

- Spectral range: 450-2300nm
- Average Power: > 3W
- Pulse duration < 10ps
- Best jitter
- Best power stability
- VIS+NIR power balance



Laser Beam Shaping Solutions

CANUNDA beam shaping modules

Cailabs developed the unique technology for manipulating the shape of light, called Multi-Plane Light Conversion (MPLC) that is at the base of the CANUNDA Beam Shaping modules platform. The CANUNDA modules are designed on a fully reflective architecture that allows to support multi-KW average power and very high peak power.

CANUNDA-HP - Beam shaping platform for high-power laser

The CANUNDA-HP beam shapers are compatible with commercially available standard laser heads and optimize the performance of laser machines by allowing beam shaping of multi-KW CW lasers to improve the quality and efficiency of material processing.

Features

- Compatible with high power CW lasers up to 16 KW and more
- Wavelength: 1030 nm
- Transmission: >99%

CANUNDA-PULSE - Beam shaping platform for ultrashort pulsed lasers

The CANUNDA-PULSE Series modules enable top-hat beam shaping of ultra-short lasers

used in industrial laser micromachining processes. The CANUNDA-PULSE improves the quality of the laser beam by stabilizing it from fluctuations.

Features

- Top-hat profiles: square, circular, linear, Gaussian
- Passive beam stabilization via Mode-Cleaning function

CANUNDA-SPLIT - Beam Splitting modules for ultrashort laser

The CANUNDA-SPLIT modules allow for different beam splitting patterns to be electronically selected and it is the ideal solution for the optimization of parallel laser processing.

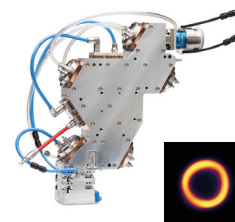
Features

- Choice of 5 different patterns or 5 different spacings with motorized selection
- Compatibility with femtosecond USP lasers

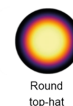
CANUNDA-AXICON- Beam Splitting modules for ultrashort laser

The CANUNDA-AXICON modules provide a highquality Bessel beam for ultrashort pulsed laser used in glass machining like glass drilling and cutting processes.

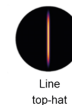
cailabs
SHAPING THE LIGHT



Square top-hat



Round top-hat

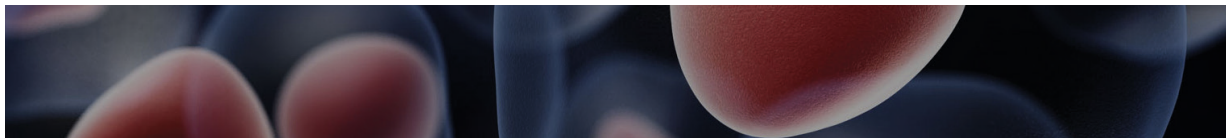


Line top-hat



Mode cleaning only





LIFE SCIENCES



Surface Plasmon Resonance (SPR) & SPR Microscopy

Label free and real-time molecular interaction analysis technology



SPR & SPRm

SPR is an optical-based method used to monitor the change of refractive index at a surface (sensor). This variation is exploited in the measurements of molecular binding kinetics and gives information about the association and dissociation constants of an analyte-ligand system. SPRm is made up by integrating optical microscopy to SPR, allowing the simultaneous measurement of phenotypical changes of the sample via bright field and binding kinetics via SPR.

Biosensing Instrument systems features

- Wide dynamic range and high sensitivity (up to 100 Da molecules)
- Measurements of kinetic constants up to a few μM^{-1}
- Slow and fast kinetic processes analysis

Platforms

BI-SPR 2500: cost-effective 3-channels system

BI-SPR 4500: patented 5-channels system

BI-SPRm 200: SPRm system for in-vitro cell studies and binding response of viruses, bacteria and nanoparticles

All the platforms are modular and support patented Biosensing Instrument analysis modules for electrochemical and vapor sensing experiments.

Applications

- Biochemistry
- Kinetic analysis
- Biomolecular interactions
- Pharmaceuticals and drugs discovery
- Toxicology



In-vivo Tomography

Micro-computed tomography for in-vivo applications

Scanco Medical: in-vivo 3D X-ray scanner

Scanco Medical's vivaCT80 is the ideal system for the imaging of very small structures of in-vivo samples, like mice and small rabbits. This is prominent in the biological research fields and comparative anatomy. Scanco Medical's vivaCT80 is supplied with sophisticated visualization software, high-end computing and other specific options to improve the in-vivo imaging quality.

vivaCT80 features

- Imaging of in-vivo structures up to 14 μm
- Gating control for animal breathing
- Live observation camera
- Optional automated filter changer

Applications

- Life science
- In-vivo imaging
- Biology and anatomy
- Bone and soft tissues research
- Veterinary

SCANCO MEDICAL



Optical tweezers

A complete turn-key laser tweezers system

Tweez 305

It combines powerful optical tweezing manipulation with microscopy techniques delivered by standard microscopes.

Key Features

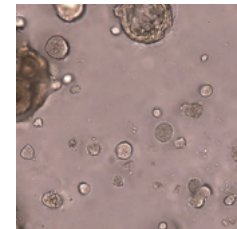
- Turn-key system for zero maintenance
- Compact design in ultra-stable unit that can simultaneously control 1000+ trapped objects.

- Precise control of complex trapping patterns
- User friendly open architecture software control system

Applications

- Cell research
- Force Measurement
- Liquid crystals
- Microfluidics
- Microrheology
- Optical landscapes
- Particle trapping and micromanipulation

aresis





PRODUCTS FOR INDUSTRY

Products for Industry

Components and systems for R&D, quality control and first-class manufacturing

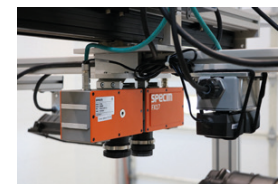
We are one of the leading European distributors of high-tech instrumentation and consumables for industry. Our product range comprises components and systems for R&D, Quality Control and first class manufacturing. We can offer several products that can be applied to many different sectors.

Applications

- Laser Manufacturing/Machining
- Precision optics manufacturing
- Machine Vision
- Industrial Integration
- Semiconductors
- Radiometry
- Metrology
- Industrial photonics
- Industrial automation
- Cryogenics and storage
- Sorting
- Photovoltaic

Typical products

- Optics and Opto-mechanic components
- Laser diode modules
- Level instrumentation
- CCD and CMOS VIS and IR cameras
- Hyperspectral cameras and systems
- Interferometer and profilometer systems
- Laser power measurement and laser beam diagnostic systems
- Laser Beam Shaping solutions
- Helium liquefiers and purifiers
- Particle size analyzers
- Motion control systems

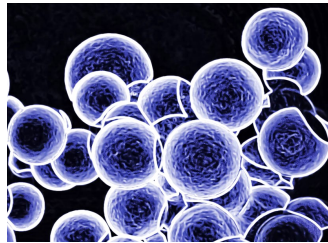




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