



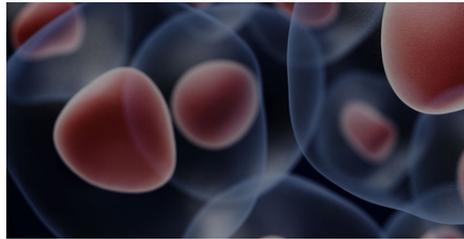
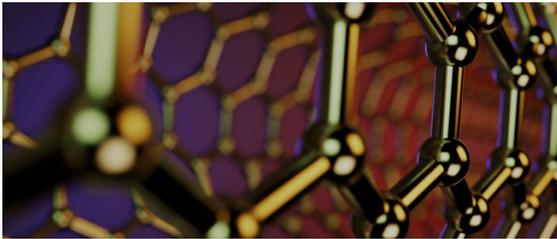
Quantum Design

ITALY

from scientists to scientists

PRODUCT GUIDE

Scientific instruments for academia and industry



Magnetism

MCS Series: Modular Characterization Systems	4
Magnetic Characterization – SQUID VSM	5
Magnetic Characterization – Conventional VSM	6
Characterization of thin films & nanostructures	7
High Frequency AC Susceptibility	8
Magnet Power Supplies	8
Magnetic field characterization	9

Materials Science

Micro/Nanoparticles Characterization	10
Hall Effect Measurements	11
Spectroscopic Ellipsometers	12
Single Crystals Growth	13
Laser Interferometers and Optical Profilers	14
Electron transport characterization tools	15
Nanoindenters	16
Direct Write Photolithography	17
X-ray Microscopy & micro-Computed Tomography	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

Spectroscopy

Spectroradiometric characterization	23-24
Spectrographs and Detectors	25
Light Sources & Monochromators	26
Spectroscopic Ellipsometers	27
Hyperspectral Imaging	28
Confocal Raman Microscopes	29
High Performance Raman Analyzers	29

Microscopy

Chroma Filters	30
The AFSEM – AFM in-situ SEM	31
Scanning Electron Microscopy	32
Transmission Electron Microscopy	33
Correlative and multi-technique EM solutions	34
Cryo Electron Microscopy samples preparation	34
Sample Preparation (Ion milling, Sputter, UV cleaner)	35
X-ray Microscopy	36
Confocal Raman and Correlative Microscopes	37
Atomic Force Microscopes (AFMs)	38

Imaging

Hyperspectral Imaging	39
Scientific Cameras for Imaging	40
Ultra high-speed imaging systems	41
PolarCam Micropolarizer Cameras	41
Infrared Imaging Cameras	42
X-ray Imaging	43

Cryogenics

Level Metering and components for Cryogenics	44
Low temperatures control and monitoring	45
Cryostats and Cryomagnets	46
Cryogenics for Quantum Information and Microscopy	47
Cryomagnet for Quantum Information and Microscopy	48
Helium recovery and liquefaction	49

Optics

Optical filters	50
Optics and Optomechanics components	51
Motion Control Devices and Systems	52
Polarizer and Beamsplitters UV-IR	53
X-Ray Products	53

Light & Lasers

Light Measurement Systems	54
Light Sources, Monochromators and Solar Simulators	55
Lasers and LED light sources	56
Optical Metrology Systems	57
Picosecond and Femtosecond Fiber Lasers	58
Laser Beam Diagnostic Systems	59
Laser Beam Shaping Solutions	60

Life Sciences

Surface Plasmon Resonance (SPR) & SPR Microscopy	61
High-throughput cellular imagers	62
Optical tweezers	62

Educational

Educational Equipment for Universities	63
--	----

Products for Industry

Products for Industry	64
-----------------------	----

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.



NORTH & SOUTH AMERICA



EUROPE



INDIA CHINA JAPAN KOREA SOUTHEAST ASIA



QUANTUM DESIGN INTERNATIONAL GROUP

WORLDWIDE DISTRIBUTION CHANNEL FOR SCIENTIFIC INSTRUMENTATION



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

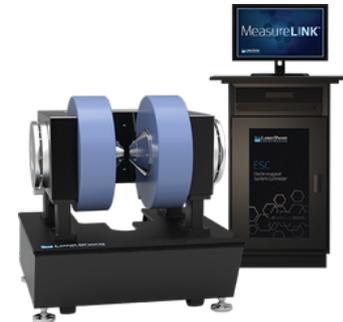
This flexible software allows the user to monitor the real-time performance of the MCS system and to construct measurement sequences from a set of predefined controls.

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

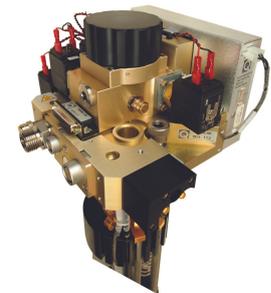
High pressure for Magnetometry

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 QuickLIGN™ 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

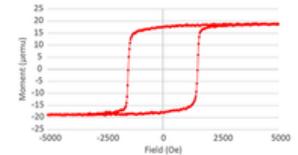
Optimized for FORC data acquisition

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.

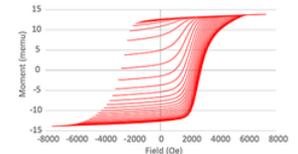
Proven FORC data acquisition protocols are built into the standard 8600 Series VSM system software and are very easy to set up, run, and modify. FORC data sets, once acquired, are readily exported for analysis using FORCinel* or similar third-party tools to render distribution plots of interaction and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



4 min 32 s measurement of 46 FORCs for a 14 memu 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 (Ms)
- 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 magneto-optical 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.

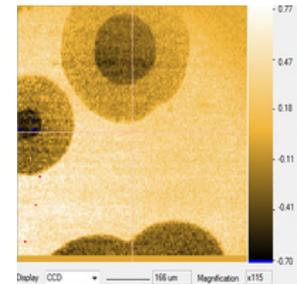
Features

- 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



High Frequency AC Susceptibility

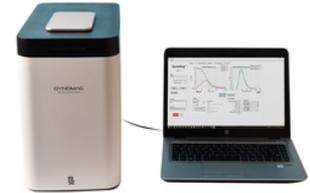
Tabletop AC susceptometer for magnetic dynamic, MNP size and much more

Dynomag AC susceptometer

The DynoMag system is a portable easy to use AC susceptometer for measuring the dynamic magnetic properties of liquids, powders and solids at room temperature: Néel and Brownian relaxation, domain-wall motion, MNP size, etc. Dynomag comes in standar frequency range, for measurement up to 500kHz, HF for measurement up to 10MHz and as a PPMS option.

Applications

- AC susceptibility (solids, powders, liquids)
- Magnetics dynamic analysis in MNPs
- Size distribution of MNPs
- Brownian and Néel relaxation
- Stability and clustering while bio-functionalizing of MNPs
- Follow the binding reactions of biomolecules to MNPs



Magnet Power Supplies

Superconducting and conventional Electromagnet need highest performance

Power supplies from Lake Shore Cryotronics

Electromagnets

The low electrical noise design of the Serie Model 640 make these power supplies ideal for use with small to large electromagnets in high precision laboratory settings, ensuring greater resolution and finer detail in data taken during highly sensitive measurements.

Superconducting Magnets

The Model 625 is ideal for small to medium sized superconducting magnets used in high sensitivity measurements, a practical alternative to both the larger, one size fits all, superconducting magnet supplies and the endless adaptations of generic power supplies. The Model 625 provides high precision, low noise, safety, and convenience.



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 



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.

MeasureReady™ FastHall™ Station

Based on M91 controller, the FastHall Station is an integrated, high-precision tabletop measurement system for simplified Hall measurements and less experimental setup.

The FastHall Station includes a Windows® 10 PC, 1T permanent magnet, high precision sample holder, and all the necessary software and cabling to provide a range of measurement capabilities.

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 Model 8425 is ideal 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.

- Free of charge
- Coordinates all aspects of experiments
- Helps confirm useful data
- Shares data

And much more!



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-SE – Entry level ellipsometer

The alpha-SE 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

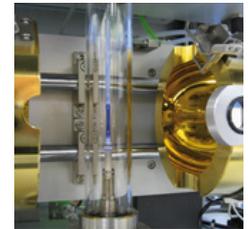
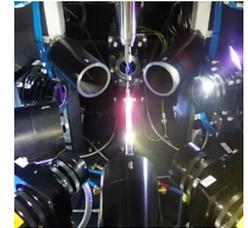
- FZ temp range: 400°C - 3000°C
- Temp reproducibility: $\pm 1^\circ\text{C}$
- Speed: 0.1/200 mm (mm/hr); 0.1-40 rpm
- FZ region pressure: 1×10^{-4} torr to 10 bar

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 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

4D Technology

An Onto Innovation Subsidiary



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

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 lock-in 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

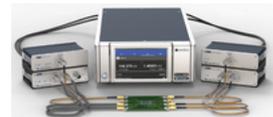
This extremely low-noise simultaneous source and measure system ensures inherently synchronized measurements from up to 3 source/measure channels per half-rack instrument for a range of material and device research applications.

Admiral Instruments potentiostats/galvanostats Research-Grade precision, time saving, best quality/price ratio, compact and versatile: Admiral Instruments offer new concept potentiostats/galvanostats equipped with modern, Easy-to-Use, license free software for data acquisition and analysis for fully automated measurement in electrochemistry.

- Electrochemical Impedance Spectroscopy
- High-Current Loads for Batteries/Fuel Cells
- Solar Cell Analysis & Optimization
- Corrosion Monitoring & Modelling

Anmesys

Voltage Controlled Current Source with the patented Active Common Mode Rejection technology, dedicated for use with DAQ units and lock-in amplifiers.



Nanoindenters – NanoTest

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.

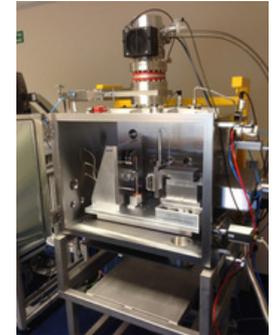
Supported techniques include:

- 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.

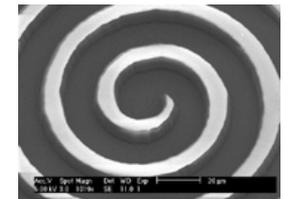
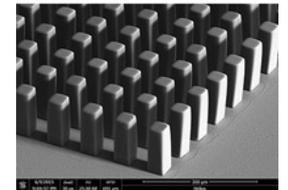
A temperature-compensated light-excluding enclosure with safety interlock allows it to be used equally well in an open laboratory environment or in a clean room.

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.



X-ray Microscopy & micro-Computed Tomography

Micro and nano 3D tomography for any application

Sigray: advanced 3D x-ray microscopes

Sigray's microscope product family offers the most unique and innovative features on the market.

Vertically integrated across X-ray source, optics and detector, Sigray guarantees unique advanced features available nowhere else:

- Spatial resolutions down to nanometers
- Multitarget/multienergy sources
- Integrated Talbot-Lau Interferometry techniques
- Fully automated systems and much more to fit any application.

Applications

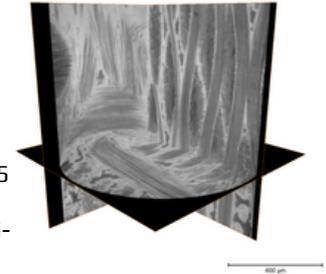
- Materials science
- Life science
- Semiconductor
- Additive manufacturing
- Pharmaceuticals

Platforms

TriLambdaXRM-30: highest spatial resolution

PrismaXRM-800: largest voltage range and 0.5 μm spatial resolution

ChromaXRM-500: revolutionary multiple quasi-monochromatic X-ray beams



Scanco Medical: microCT scanners

Scanco Medical offers a wide range of microCT scanners for 3D imaging and analysis studies.

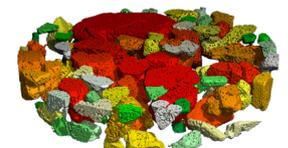
μCT Scanners are Specimen Systems ideal for imaging very small structures with submicron resolution of materials specimens and are supplied with high-end computing equipment and sophisticated analysis and visualization software to provide the most comprehensive and industry-leading imaging solutions.

Features

- Peak Energy up to 130 KVp
- Resolution down to 0.5 μm
- Optional sample and filter changers
- Optional cooling/heating and mechanical testing stages
- Cabinet cone-beam microCT
- Fully shielded

Applications

- Material and Fibers analysis
- Geology & Paleontology
- Food



Thin films: stress characterization and coating

Industry standard for mass production and research facilities

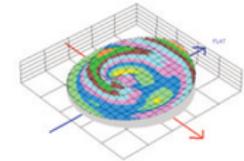
FLX Flexus thin film stress measurement systems

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.

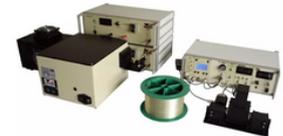
Measurements

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

Standards

- ISO/EN 8980-3/ISO/EN 12312-1
- ANSI Z80.3A5/NZS 1067
- IEC/EN 60793-1-10/IEC/EN 60793-1-44
- ISO 24443A5/NZS 2604 FDA 2011

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



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 50mK - 1000K.

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: 50mK
- Adiabatic Demagnetization Fridge: 100mK
- ^3He Fridge: 500mK
- Oven: 1000K
- Magnetic Field: up to ± 16 Tesla

Measurement Options

Thermal Measurements

- Heat Capacity
- Thermal Transport

Magnetometry

- Vibrating Sample Magnetometry
- FORC
- Torque Magnetometry
- AC Susceptibility
- Ultra Low Field
- Magneto-Optics

Thermal Expansion

- Dilatometer

Electro-Transport

- DC Resistivity
- Electrical Transport
- Horizontal and Vertical Rotators
- Multi-Function Probe

Scanning Probe Microscopy

- AFM/MFM
- Scanning Hall Probe Microscope
- Confocal Microscope

Spectroscopy

- Raman & Luminescence
- Ferromagnetic Resonance

Optics

- Optical Multi-Function Probe
- Optix integrated breadboard
- Magneto-Optics

High Pressure cells

- for Magnetometry
- for Electrical Measurements



Probe Stations

Electro-optical measurements in variable magnetic field and temperature

The broadest range on the market!

Lake Shore Cryotronics and Janis Research Company, historical brands in probe station manufacturing, has joined to offer even more capabilities.

The stations are suited for electrical, microwave, THz and optical measurements.

With a wider set of options, each system can be configured for any kinds of applications.

Depending on the system, they can be fitted with various magnets and cryostats.

The use of positionable probes accelerates characterization while being non destructive and offering the optical access.

But Probe Stations suffer of deviation of DUT temperature respect to sample stage: Lake Shore has brought the thermal management to the next level, providing a measurement platform you can really trust.

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

Applications

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



JANIS



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





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



Spectrographs and Detectors

For Modular Spectroscopy

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.



ANDOR



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 sources
- Quartz Tungsten Halogen (QTH) sources
- Dual emitter light sources
- Uniform sources
- Spectral line lamps
- Fibres, lenses, filter holders, shutters, beam turners

Tunable 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 30 μ m

Calibration Standards

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



Spectroscopic Ellipsometers

For thin film 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-SE - Entry level ellipsometer

The alpha-SE 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



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



Confocal Raman Microscopes – Alpha300 R

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)

WITec
focus innovations



High Performance Raman Analyzers – R532

Ultimate sensitivity and speed for magnetic characterization

EnSpectr R532

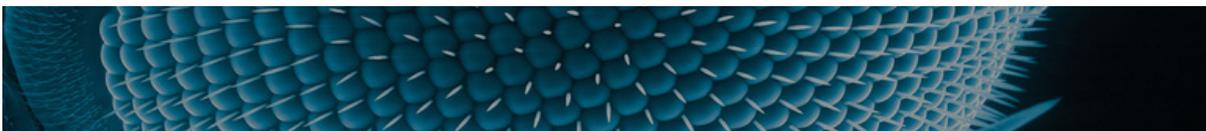
EnSpectr R532® is a unique instrument that combines the advantage of a portable probe system with the performance of a highly specified laboratory instrument. It performs identification of substances through walls of sealed bags, transparent bottles, vials, and ampoules. Results are displayed within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

EnSpectr
Enhanced Spectrometry





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



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 maintains 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

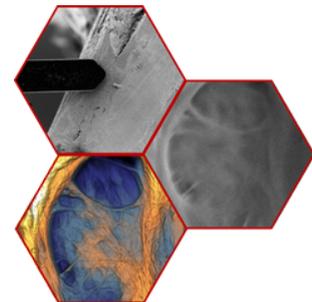
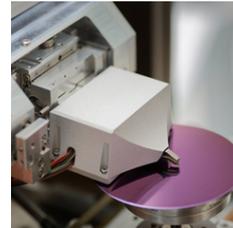
- Contact mode
- Non-Contact mode
- Tapping mode
- Phase contrast
- Force volume
- Conductive mode
- EFM
- MFM
- Lithography

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



Scanning Electron Microscopy

Full range SEM platforms for any application

Tabletop SEM and Compact SEM

The HITACHI tabletop SEM TM series and the compact FlexSEM are the right instruments for a complete and immediate nano-world experience. These integrate all the features of a full-size SEM: a 4-quadrant BSE detector, an UVD-SE detector for low vacuum characterization and CL analysis. Moreover, both the systems are suitable for EDX microanalysis and an optional STEM detector.

The ease of use and the absence of scheduled maintenance makes these instruments a versatile tool for every laboratory.

Features

- Easy to Use
- No environmental requirements
- Easy and economic maintenance
- SE, BSE, EDX, CL and STEM characterizations
- Variable pressure modes

Applications

- Materials science
- Life science
- Medical/pharmaceutical science
- Chemicals
- Asbestos analysis

HIGH-END SEM, FIB-SEM and ULTRA-FAST SEM

The extensive range of HIGH-END EM solutions consists of thermionic SEM, Schottky or UHR Cold-Cathode FEG-SEMs and dual or triple beam FIB-SEM.

The Ultra-Fast multi beam SEM can acquire images 100 times faster than any other SEM. It also enables large scale imaging without supervision thanks to its high-end automation software.

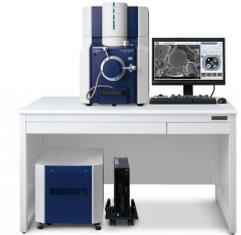
Features

- Variable pressure and cryogenic conditions
- Extremely bright and stable Cold FEG
- Superior LOW-kV performances
- 64 parallel beams
- Shorter dwell time
- Load multiple and huge samples at once
- Gain time and cost efficiencies

Applications

- Materials science
- Life science
- Medical/pharmaceutical science
- Chemicals

HITACHI



delmic



Transmission Electron Microscopy

TEM platforms and In Situ TEM techniques

TEM/STEM from HITACHI High-Tech

HITACHI's unique TEM/STEM platforms are the results of years of developments in this field.

The wide range of electron gun configurations, the most advanced imaging and aberration correction systems, the ultimate lenses engineering makes these instruments suitable for many fields of research.

From medicine to material science, from polymers to glassy materials, for semiconductors, for structural and chemical characterizations of nanomaterials.

Features

- 20-300kV accelerating voltage range

Environmental TEM techniques

DENSolutions develops, manufactures and markets 4 In Situ solutions for TEM.

At the heart of DENSolutions 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 TEM

Features

- In Situ Heating
- In Situ Biasing

- High brightness & stability cold FE electron gun
- Holder linkage with FIB systems
- Simultaneous Cs-corrected SE & STEM imaging
- Large solid-angle EDS detector
- EELS, HOLOGRAPHY and 3D tomography
- Automated image stitching
- User friendly operation
- Normal room light operation
- Advanced stage navigation for whole grid searching

- In Situ Heating & Biasing in liquid environment
- In Situ Heating in a gaseous environment

Applications

- Material science
- Life science
- Nanotechnology
- Solar Cells
- Catalysis and corrosion
- Drug delivery

HITACHI



DENS solutions



Correlative and multi-technique EM solutions

Cathodoluminescence (CL) and Correlative Light Electron Microscopy (CLEM)

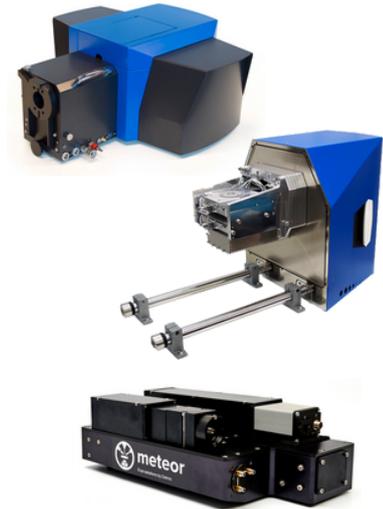
DELMIC provides various platforms that differ in terms of performance, compactness and acquisition modes.

The available CL solutions provides up to 8 different acquisition modes: panchromatic CL, RGB, Angle-resolved and Time-resolved imaging, Polarimetry and Polarizations spectroscopy, Hyperspectral imaging and LSEK, while the unique integrated CLEM platform enables extremely fast Fluorescence microscopy.

Applications

- Geology
- Nanophotonics
- Materials science
- Cancer research
- Marine biology
- Neuroscience
- Cell biology
- Large biological samples

delmic



Cryo Electron Microscopy samples preparation

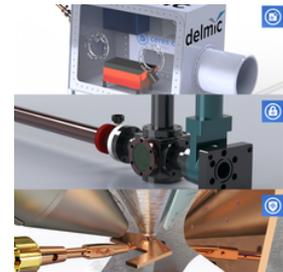
Cryo-EM and Cryo-ET workflow simplifications

These solutions are designed for those who want to simplify and then unlock the power of cryo-ET workflow to obtain better quality results, higher throughput and higher resolutions.

You can reduce the number of transfer steps between microscopes with the fully integratable Cryo FIB-SEM fluorescence light microscope (FLM) as well as minimize ice contamination and maintain the vitrified samples in a safe environment to obtain world-class results.

Key Benefits

- Minimize ice contamination
- Boost productivity
- Ease the Cryo- ET workflow
- Seamless and contamination free transfer
- Reduce the number of transfer steps
- Gain time and cost efficiencies



Sample Preparation (Ion milling, Sputter, UV cleaner)

Sample Preparation Tool Lineup for Electron Microscopes

Ion Milling Systems

ArBlade 5000 - supports both cross-section milling and flat milling to prepare samples depending on the purpose. Cross section width can be expanded to 8mm for applications requiring wide area milling such as electric components.

IM4000Plus - supports both cross-section milling and flat milling to prepare samples depending on the purpose. Cooling unit is available for samples susceptible to deformation or melting during heat generating processing. Air protection holder prevents air exposure of reactive samples during sample transfer.

Sample Cleaners

ZONESEM II - Tabletop Sample Cleaner that uses UV-based cleaning technology to minimize or eliminate hydrocarbon contamination for electron microscopy imaging.

ZONETEM - removes hydrocarbon contamination deposited on samples by UV light irradiation and helps observe true structure of the samples. It also permits easy operation and can process multiple samples at a time.

Ion Sputter

MC1000 - An ion sputter increases the conductivity of non-conductive sample to prevent charging during electron microscope observation. MC1000 employs magnetron sputtering technology to reduce damage to the sample, and the target can be selected from among Pt, Pt-Pd, Au and Au-Pd depending on the purpose.

HITACHI



X-ray Microscopy

Synchrotron performances to your laboratory

Sigray: most advanced systems in X-Ray

Multi-target, high flux Sigray's patented x-ray technologies will provide your team 24-7 access to capabilities otherwise only available by traveling to synchrotron facilities.

Sigray's microscopy systems include x-ray microscopes and micro x-ray fluorescence systems.

3D X-ray Microscopes

Sigray's 3D X-ray Microscope product family offers the most unique and innovative features on the market.

Spanning spatial resolutions from nanometers to millimeters there is a solution for every application including materials science, life science, semiconductor, additive manufacturing and pharmaceuticals.

TriLambdaXRM-30

Nanoscale 3D X-ray microscope with resolution down to 30 nm and three operating energies

PrismaXRM-800

Flagship sub-micron 3D X-ray microscope featuring best in class versatility, resolution and throughput.

Available Talbot-Lau interferometry offers exclusive contrast modes: Quantitative Phase and Sub-resolution Darkfield.

ChromaXRM-500

Turnkey quasi-monochromatic 3D X-ray microscope with tunable energy and sub-micron resolution in a compact desktop form factor.

X-ray Fluorescence (XRF) Microscopy

A powerful spatially-resolved elemental mapping and chemical microanalysis technique.

MicroXRF advantages include:

- High sensitivity: up to 1ppm
- Non-destructive for in situ or in operando analysis of elemental migration
- Simultaneous detection of multiple elements and no sample preparation required

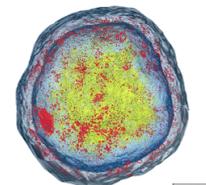
AttoMap-200

Ambient pressure and ultralarge stage travel

AttoMap-310

Vacuum and goniometer stage for variable x-ray angles of incidence.

SIGRAY



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.

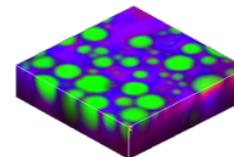
Alpha300 RAS

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.

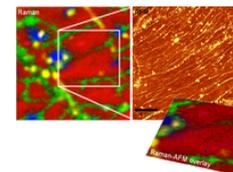
The combined Raman-AFM-SNOM microscope is ideally suited for high-resolution Raman imaging techniques such as nearfield-Raman imaging and TERS (high-resolution Raman).

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) – Nanosurf

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 and large scan area in one scanner
- Fully motorized system: full control via software
- Compatible with inverted microscopes
- 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 microscopes
- 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.

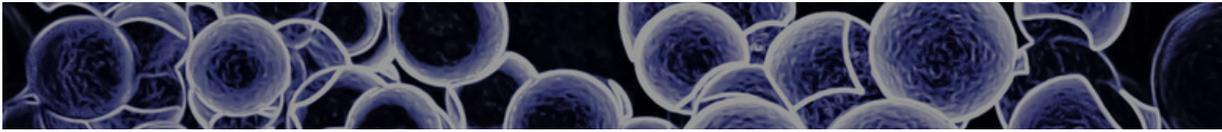
Alphacen 300 – Large samples AFM

The Alphacen 300 is a tip scanning AFM for heavy and large samples. The system take 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 achieve atomic resolution in minutes.





IMAGING

Hyperspectral Imaging

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

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. Back-illuminated 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.

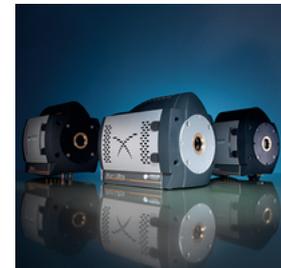
Balor, Marana, Zyla & Neo sCMOS detectors

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

PolarCam Micropolarizer Cameras

Imaging Polarimeters

PolarCam snapshot micropolarizer cameras simultaneously capture a snapshot image of four polarization angles from each video frame.

These unique cameras enable polarimetric measurements for applications in process control, medical imaging, remote sensing and more.

The micropolarizer array is bonded directly to the sensor and includes no moving parts.

Features

- 5.1 MP sensors (2448 x 2048 pixels)
- Frame rate up to 74 fps
- CMOS Sony IMX250 Sensor Type
- PolarView software provides real-time display and calculation of key polarization parameters
- PolarCam SDK gives you access to common camera controls and settings
- Weight approx 90g (0.20 lbs)
- GigE or USB3 interface

CORDIN
SCIENTIFIC IMAGING



4D Technology

An Onto Innovation Subsidiary



Infrared Imaging Cameras

IR Cameras for High End Imaging Applications

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

LWIR Uncooled VarioCam Cameras Series

The VarioCam Camera Series is based on uncooled microbolometer FPA detector with 640x480 to 1024x768 IR pixels format. The VarioCAM cameras are suited for hand-held and/or mobile applications such as aerial thermography or preventive maintenance. The VarioCAM Head is suited for demanding stationary monitoring and it's based on a solid light metal housing with IP67 protection degree.

Features

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

Applications

- Mobile thermography
- Preventative maintenance
- Building thermography
- Electronics/electrical 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.

MWIR Cooled ImageIR Cameras Series

The high-end ImageIR cameras range is based on MCT or InSb 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
- High dynamic range
- 10 GigE interface
- Separate Filter & Rotating Aperture Wheel

Applications

- High-speed thermography
- Thermographic Automation
- Process monitoring and optimization
- Non-destructive testing

INFRAtec.



X-ray Imaging

Synchrotron performances to your laboratory

Sigray: most advanced systems in X-Ray

Multi-target, high flux Sigray's patented x-ray technologies will provide your team 24-7 access to capabilities otherwise only available by traveling to synchrotron facilities.

Sigray's microscopy systems include x-ray microscopes and micro x-ray fluorescence systems.

3D X-ray Microscopes

Sigray's 3D X-ray Microscope product family offers the most unique and innovative features on the market.

Spanning spatial resolutions from nanometers to millimeters there is a solution for every application including materials science, life science, semiconductor, additive manufacturing and pharmaceuticals.

TriLambdaXRM-30

Nanoscale 3D X-ray microscope with resolution down to 30 nm and three operating energies

PrismaXRM-800

Flagship sub-micron 3D X-ray microscope featuring best in class versatility, resolution and throughput.

Available Talbot-Lau interferometry offers exclusive contrast modes: Quantitative Phase and Sub-resolution Darkfield.

ChromaXRM-500

Turnkey quasi-monochromatic 3D X-ray microscope with tunable energy and sub-micron resolution in a compact desktop form factor.

X-ray Fluorescence (XRF) Microscopy

A powerful spatially-resolved elemental mapping and chemical microanalysis technique.

MicroXRF advantages include:

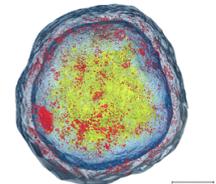
- High sensitivity: up to 1ppm
- Non-destructive for in situ or in operando analysis of elemental migration
- Simultaneous detection of multiple elements and no sample preparation required

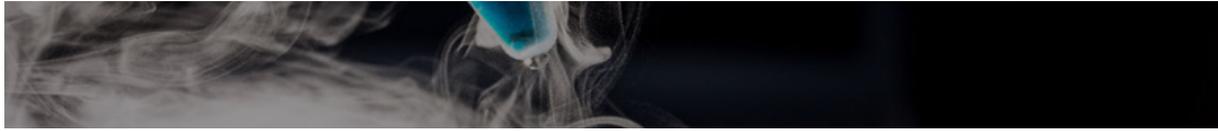
AttoMap-200

Ambient pressure and ultralarge stage travel

AttoMap-310

Vacuum and goniometer stage for variable x-ray angles of incidence.





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, H₂, 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: cryoolers 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.



JANIS



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 Sensors

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.

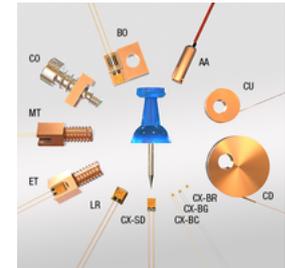
Excellent measurement performance, superior control accuracy and convenient operation in a wide range of advanced research applications, whether the need is for high accuracy with minimal thermal impact or precise temperature control in high magnetic fields or dependable measurement in radiation environments.

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.

Janis Research Company

Since 1961 Janis Research Company has been providing the highest-quality cryogenic equipment for research, characterization, and industrial applications to some of the world's largest corporations and best-known research centers and institutions.

The reasons for this record of success are simple: precision engineering and quality manufacturing, ease-of-operation, day-after-day reliability and performance and an unmatched level of service and support.

Janis offers 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 Cryostats
 - 1.5 K - 4 K - 10 K base temperature
 - Sample in vacuum or exchange gas
 - Low vibration designs
 - Custom Engineering
- Variable temperature Superconducting Magnet Systems
- Cryogenic Cold Traps
- Detector Cooling Systems

Wet systems – Helium and Nitrogen cooling

- Continuous flow cryostat systems
 - Sample in vacuum or in vapor
- Reservoir variable temperature cryostats
 - Sample in exchange gas or in flowing vapor
- Superconducting Magnet Systems
- Liquid Helium Research Dewars
- Detector cooling systems

Recirculating Gas Coolers

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.

JanisULT – Ultra Low Temperatures

JanisULT designs and builds refrigerators for operation below 1K with a focus on quantum technology applications.

J-ULT offers the widest range of helium-3 refrigerators and dilution refrigerators available on the market and is the market leaders in UHV compatible solutions for surface science.

High-performance cryogen-free dilution refrigerators for Quantum Science are developed in conjunction with Google.

JANIS



Cryogenics for Quantum Information and Microscopy

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

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.

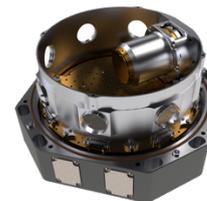
Operation is fully automated, including vacuum pump out, cooldown, temperature stabilization at setpoint, warm-up and purge with dry nitrogen to keep the system surfaces, sample and optics clean.

The compressor utilizes special variable helium flow technology to automatically optimize the operations, minimize cooldown time, save power and reduce wear on the system, extending the system and coldhead life time and the time interval to service.

Since most of the experiments are performed at a stable temperature setpoint, the system operates at an input power that is appropriate for the sample temperature. The settings may be adjusted to optimize the cooling power or lower vibration.

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.



Cryomagnet for Quantum Information 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 pre-wired 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 pre-installed.

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.

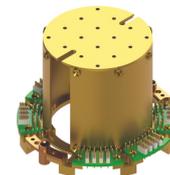
The RF coax wiring assembly contains four coaxial cables capable of carrying high frequency signals up to 20 GHz.

Positioning

OptiCool cryostat can be configured with a piezo-based 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 Transfers
- Up to 250 Liter Capacity

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

Helium gas purifier: ATP30 and LN2 trap

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

Depending on the purifier, the cooling power is either provided by liquid nitrogen (LN2 cooling trap) or 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

Optical Filters

UV, Visible, IR: specific for each application, wide range of coatings and customizable

There are a number of variations of an optical filter's construction, and each has its advantages. We offer a variety of options so that you can select the best-suited filter type for your application.

Applications

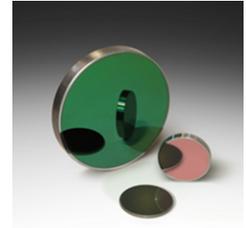
- Astronomy
- Spectroscopy
- Laser
- Machine vision
- Non-destructive tests
- Defence
- Medical & biomedical

Products

- Bandpass filters
- Short and longpass filters
- Astronomy/UBVRI filters
- Dichroic filters & sets
- Filters for fluorescence and Raman Spectroscopy
- IR filters
- ND filters
- Heat control filters
- Colored glass filters & sets

Specs

- High quality-price ratio
- Custom solutions



Optics and Optomechanics components

High quality products with large possibility of customization

Optics & optical coatings

High precision spherical, aspherical, achromatic lenses and other types of optical elements and more than 100 various optical coatings used in R&D of laser optical technology.

Microscopes objectives for UV, visible and IR applications and semi-custom or custom optics are also available.

Applications

- Medical
- Industrial
- Aerospace
- Defense
- Life sciences
- Consumer applications

Optomechanics

Optomechanical elements are the interface between the optical components in your setup and the working surface. Hence, high quality and precision offered by Optosigma components are the key features you want to have for your experiment.

- Mirror, lens and optical mounts
- Cages and rails
- Posts and bases
- Vacuum compatible components

Manual stages & Motion control

Manual stages are designed to provide precise, high-resolution travel over any combination of the six linear degrees of freedom. They constrain any form of unwanted movement like: pitch, yaw, roll, as well as x-, y-, or z-axis translation. The offering includes:

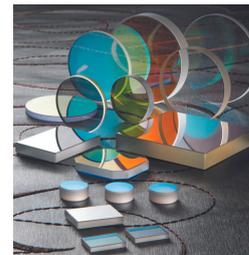
- Linear stages
- Rotation stages
- Goniometers
- Labjacks
- Manual actuators like micrometers

Additionally, they are available in materials ranging from brass and aluminum, to steel and stainless steel.

Customization inquiries are welcome.

Optical Tables

Honeycomb tabletops with a matrix of threaded holes on the surface and a vibration isolation system – Rigid or Pneumatic - for several applications: microscopy, metrology, optical fiber alignment, interferometry, or wherever optical experiments are done.



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 sub-micron 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

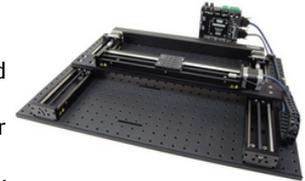
Features

- 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



Polarizer 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



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.

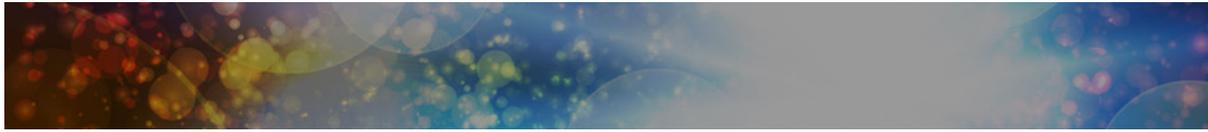
Windows

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



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-Xenon Hg(Xe) arc sources
- Quartz Tungsten Halogen (QTH) sources
- Uniform sources
- Spectral line lamps
- 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 30 μ m

Calibration Standards

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

Solar Simulators

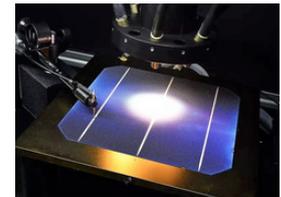
We supply a variety of solar simulators. They provide a uniform, collimated output beam with a close spectral match to sunlight.

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 I-V 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 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 FLIM
- Flow Cytometry
- Optogenetics
- Calcium Imaging
- Forensic

Key Benefits

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

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.

- **DVC150** 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 photodetectors, image sensors and radiometers.

- Measurement of Triple/4 Junction PV Cells
- EQE/ IQE Testing of Photovoltaic Devices

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 Photoluminescence
- Photochromic Lens Testing Standards, Metrics and Methodology
- Photonic Crystal Fibre Attenuation

Applications

Spectral, spatial and temporal emission characteristics:

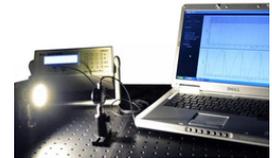
- Mid-Infrared LED Characterisation
- Supercontinuum Characterisation
- Photobiological Safety In Lighting Applications
- Evaluating The Flicker by Lighting products
- Equivalency Code For Tanning Appliance Fluorescent Ultraviolet lamps
- Photobiological Safety Testing of Image Projectors
- Type Testing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

Opto-electronic evaluation of photodetectors and image sensors:

- Go beyond PV EQE testing
- EQE Testing Beyond the Band Edge
- Measurement of 4 Junction PV Cells
- Measurement of Triple Junction PV Cells
- EQE/ IQE Testing of Photovoltaic Devices

Monochromatic light probing of material optical properties:

- Photonic Crystal Fibre Attenuation
- Quantum Dot Photoluminescence
- In Vitro UVA testing of sunscreen products
- In Vivo SPF testing of sunscreen products
- 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 with the highest guaranteed peak power on the market with fixed wavelengths of 920 and 1064 nm

- 920 nm and 1064 nm / < 100 fs / Up to 5 W

Altair

Compact fiber laser producing high average power with femtosecond pulses (<160 fs)

- 1035 nm / < 150 fs / Up to 20 W / Up to 1 μ J

Diadem

High-energy, versatile femtosecond fiber laser operating at either 1030 or 1064 nm in the most compact and robust air-cooled configuration on the market.

- 1030 nm and 1064 nm / < 400fs / Up to 4 μ J / Up to 30W

Sirius

Compact, high energy hybrid picosecond laser fully configurable. Also available with green or UV wavelengths.

- 1064/532 nm/ < 10 ps / Up to 60 μ J / >5W / Single shot to 1 MHz

Antares

Advanced picosecond laser offering average power from 5W up to 40W at 1030 nm or 1064 nm.

Also available in the green or UV through frequency conversion

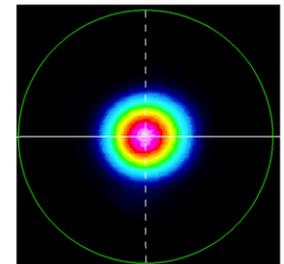
- 1035nm and 1064 nm/ < 10 ps / > 375 nJ / Up to 40W / Narrow linewidth

Key Benefits

- Compact
- High Power
- Integrated GDD precompensation: Adjustable from 0 to -60 000 fs² (option: extension from 0 to -90 000 fs²)
- Integrated power modulation
- XSight AOM module for fine power control and fast power modulation on Alcor
- FLEx femtosecond pulse fiber delivery on Alcor

Applications

- Two-photon microscopy
- Bioimaging
- Neurosciences
- Ophthalmology
- Life sciences
- Instrumentation
- Micromachining
- Medical devices
- Nonlinear Optics
- CIGS Scribing & Selective ablation
- Semiconductor inspection
- Fluorescence Lifetime Imaging (FLIM)



Laser Beam Diagnostic Systems

For laser beam monitoring in industrial applications

PRIMES produces sophisticated devices for beam diagnostics and monitoring that analyse real process parameters under industrial operating conditions.

Laser Power Meters

Compact and portable power meters for single shot measurements and cooled power meters for continuous operation.

PocketMonitor

This is a compact power meter suitable for CW lasers with maximum power up to 12 kW.

Cube

The Cube range includes uncooled devices that allow for single shot series power measurements in the NIR and green wavelengths range up to 20 KW power or up to 250 KW/cm² power density based on the model.

CPM/PM

The CPM and PM are water cooled devices for continuous laser power measurements with very high accuracy ($\pm 2\%$). The different models cover power ranges up to 30 kW and power density up to 15 KW/cm².

Focus and Raw Beam Analysis Systems

The beam distribution of a laser beam represents an important property for assessing beam quality. Beam position, beam dimensions, beam symmetry and power density distribution can be recorded and analysed with the Primes systems.

FocusMonitor Plus

The FM+ is a scanning diagnostic system for the focused beam analysis of CW high power laser sources used for laser material processing.

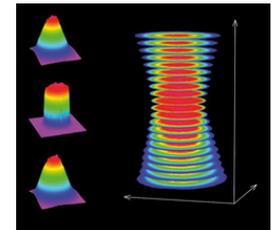
The integrated z-axis, with a vertical stroke of 120 mm enables the automatic 3D measurement of complete caustics over four Rayleigh lengths according to ISO 11146.

The FMW+ is a compact version of the FM+ designed for the installation in limited spaces inside the micro-machining systems as the AM machines.

Applications

- Laser power measurements
- Focus and raw laser beam diagnostics
- Microprocessing (laser drilling or laser milling)
- Laser material processing as cutting, welding, remote welding, powder generation
- Laser service & maintenance and also rapid fault analysis
- Commissioning and acceptance inspection

PRIMES



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.

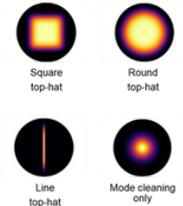
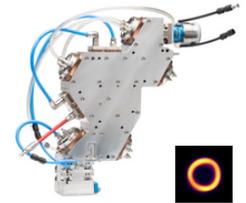
Features

- 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 high-quality Bessel beam for ultrashort pulsed laser used in glass machining like glass drilling and cutting processes.

cailabs
SHAPING THE LIGHT





LIFE SCIENCES

Surface Plasmon Resonance (SPR) & SPR Microscopy

Label free and real time molecular interaction analysis technology

SPR

Optical-based real-time detection method with high sensitivity and label-free capability.

SPR Microscopy

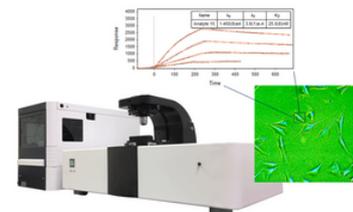
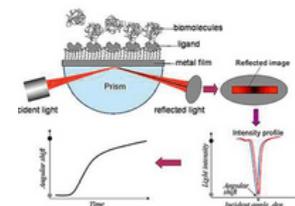
Integrating optical microscopy and SPR, is a powerful technique for measuring binding activities of membrane proteins in vitro. It allows the simultaneous measurement of phenotypical changes of the sample via bright field and binding strength and kinetics via SPR.

Key Features

- Integrated optical microscopy with SPR bright-field and SPR microscopies in one instrument.
- In vitro and label-free binding activities mapping
- Nanometer scaled binding response of virus, bacteria and nanoparticles

Applications

- Biomolecular interactions and kinetics
- Electrochemical Measurements
- Chemical Vapour Sensing
- Environmental monitoring, food quality and safety



High-throughput cellular imagers

2D and 3D cell culture scanners

Cell3imager systems developed by SCREEN are 2D and 3D cell culture scanners able to perform high-speed measurement and analysis of the multiplication and morphological changes in cells without using any test reagent.

Cell3Imager Estier

Stage-top optical coherence tomography (OCT) instrument for non-invasive analysis of the 3D structures like microvessels/tubular structures, tissues, spheroids and organoids.

- Preclinical 3D ex vivo imaging platform
- Non-invasive deep tissue imaging
- Any standard cell culture ware can be used

Cell3imager Neo

High speed and bright-field 3D spheroid imaging system

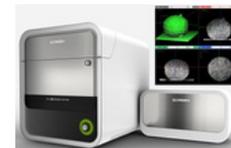
- LED-based imaging system
- Preset plate definitions for all major cell culture platforms

Cell3imager Duos 2

High-throughput, high-resolution imager for multi-fluorescence imaging of 3D and 2D cell culture

- Up to 5 fluorescence channels
- Less meniscus and clear imaging even at the peripheral area

SCREEN



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

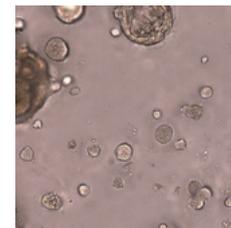
- Turn-key system for zero maintainance
- Compact design in ultra.stable unit that can simultaneously control 1000+ trapped objects.

- 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



$$V_m = \sum_{i=1}^n \frac{CF_i}{(1+r)^i} \quad 1 - n \cdot d \quad \frac{dF_B}{dW} = r_B$$



EDUCATIONAL

Educational Equipment for Universities

Scientific equipment, experiments and solution systems

Phywe is one of the world's largest providers of system solutions for the instruction of the natural science.

The products range comprises **scientific equipment, experiments and solution systems** along with **modern digital e-learning systems, literature, software and APPs** for the areas of physics, chemistry, biology, medicine, engineering, material science and earth science.

Features

- High quality – made in Germany
- Thousands of devices and experiments
- Extensive experimental literature
- Curricula compliant

Digital science education

Alongside classic experiments, PHYWE developed a concept for digital teaching that consists of four components:

- Experiment sets - Sensors
- Software - Display unit

Experiment sets

Available sets for students or teachers: include in one box all necessary components for performing several experiments.

Sensors & Software

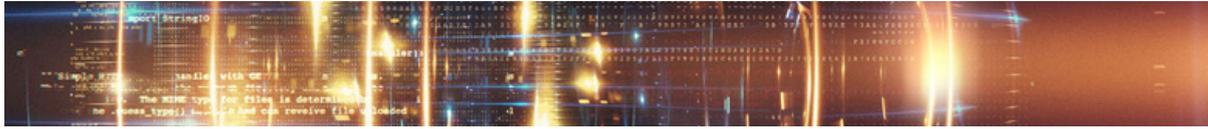
Over 40 sensors with more than 70 measured quantities, Cobra SMARTsense sensors connect wirelessly (Bluetooth) or wired (USB) directly to the student's digital end device (smartphone, tablet or desktop PC). Using the free measureAPP for iOS, Android and Windows, measured values can be easily recorded and graphically displayed.

Display Unit

Cobra SMARTlink is a high-performance Android tablet with 10.1" display, 7 integrated sensors and the pre-installed measurement software measureAPP, 4 USB-Ports for connection of additional sensors, microphone and GPS-sensor.

PHYWE
excellence in science





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

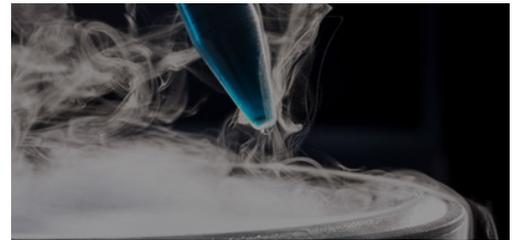
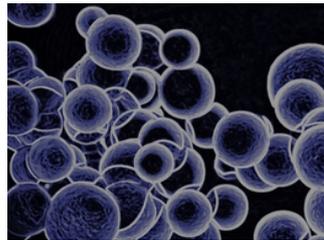




Quantum Design
ITALY

MAGNETISM
MATERIALS SCIENCE
SPECTROSCOPY
MICROSCOPY
IMAGING
CRYOGENICS
OPTICS
LIGHT & LASERS
LIFE SCIENCES
EDUCATIONAL
PRODUCTS FOR INDUSTRY

Our Instruments for your Research



📍 Via Francesco Saponi, 27 00143 Roma (RM) Italy

☎ +39 065004204

✉ italy@qd-europe.com

🌐 www.qd-europe.com