LabRAM Soleil
RAMAN MICROSCOPE

Getting There Faster!

www.horiba.com/labramssoleil
When he created Maison Soleil, and then Jobin Yvon, today HORIBA Scientific, Jean-Baptiste Soleil never imagined the LabRAM Soleil microscope would be named after him 200 years later. The first multimodal Raman microscope designed for UV-Vis-NIR imaging, the LabRAM Soleil sets the new standard for your advanced research laboratory and quality control department. Its innovative optical design affords images of unmatched precision and very high resolution spectra.

**Automation**
Focus on your job, it takes care of the rest

Use LabRAM Soleil's advanced automation features every step of the way to save time and focus on your other tasks. This system is twice as automated as the previous generation, speeding up your workflow like never before:

- True self-operating
- Remote maintenance
- Up to 6 motorized lasers (4 built-in, 2 external)
- Up to 6 spectroscopic modes (Raman, Ultra Low Frequency, Photo and upconversion luminescence, ...)
- Instant objective recognition*
Getting **There** Faster!

The LabRAM Soleil Raman microscope: Your ideal lab companion

**Intuitive software to simplify workflows**
A wealth of apps in LabStore

With LabRAM Soleil and its built-in LabSpec software, acquisition and analysis of your measurements is a whole lot faster. The intuitive interface lets you harness the full power of the system, and you can configure the software to suit your specific needs.

**Ultrafast imaging**
Quick and illuminating results

Unrivaled multimodal imaging performance gives you the ability to observe samples in different modes for all kinds of applications, thanks to the innovative design of the optical compartment, its optimized broadband dielectric mirrors and a high throughput spectrometer.

**SmartSampling**
To map up to 100 times faster

With HORIBA’s patented SmartSampling™ technology added on and the LabRAM Soleil’s stability and precision, hyperspectral mapping is made much faster by an image-compression algorithm.

**QScan**
Lightsheet confocal imaging

QScan™ patented confocal imaging is a high quality optical system to enable scanning of the excitation laser over the sample surface for the following customer benefits:
- Image multilayer sample with high confocality
- Map your sample without moving it
- Point-and-shoot operation, directly on the video image

(*) Patented feature
(**) Depending on configuration

The LabRAM Soleil multimodal microscope has been designed with application experts with automation features, ultrafast imaging, robust design and intuitive software, to supercharge your analyses.
Great variety of optical viewing modes

- Reflected (episcopic) or transmitted (diascopic) illumination
- Bright-field/dark-field, epifluorescence, phase contrast and differential interference contrast (DIC) microscopy
- ViewSharp™ 3D topography

Your samples deserve full analytical treatment. LabRAM Soleil offers a range of features to enable comprehensive analysis of your samples.
Great variety of hyperspectral imaging features

- XYZ 3D confocal image, Z-profile (single-point or plane by plane with QScan™ option)
- Low frequency (30 cm⁻¹) and ultra low frequency (5 cm⁻¹) Raman scattering
- Photoluminescence (PL), electroluminescence, photocurrent, upconversion
- Nanoscale spectroscopy: NanoRaman™ (TERS), NanoPL, and Cathodoluminescence with our AFM and SEM extensions

A modular and flexible optical microscope

LabRAM Soleil, while very compact, has one of the largest class 1 sample compartments on the market. Its ergonomic design allows you to add a range of accessories (micromanipulator, 4-point probe electrical measurement devices, cryostats, incubators, etc.) safely and easily. What’s more, its modular design lets you switch from an open-space to an upright configuration in minutes.
2D materials

Understanding the limitations of the semiconductors of the future calls for contactless, non-destructive techniques and submicron resolution. The LabRAM Soleil has been designed with just that in mind, affording the ability to measure the ultra-low-frequency Raman spectrum and photoluminescence quickly and automatically, thanks to its patented SmartSampling™ technology. The image shown here reveals growth defects in tungsten disulfide flakes.

University of La Sapienza, Rome, Italy - Claudia Fasolato, Research Scientist

"The LabRAM Soleil is so compact, well-illuminated and versatile that you can measure any kind of sample with it! It's the ideal tool for our physics and biophysics research group, where we're working on a wide variety of applications from nano-objects to perovskites and biological samples."

Confocal 3D imaging of an inclusion

Confocal Raman microscopy is used in geochemistry and petrology to analyze components trapped in fluid, gaseous or solid inclusions in minerals.

Here, our experts have detected traces of water and carbon dioxide in a sample of quartz. The CO$_2$ concentration and the presence of its liquid and gas phases, as well as their uniformity, provide key information to help the geochemist gain more insight into the environment and the quality of surrounding minerals. The LabRAM Soleil’s confocal capability and mechanical stability enable it to obtain a 3D image in very high definition (2½ million pixels, inclusion of 30x30x40 µm$^3$).
The proof’s in the picture
earth science, applications of choice

Multilayer polymers

Multilayer polymer research very often involves characterizing hidden defects buried during the process, or analyzing interface issues. Here, thanks to the LabRAM Soleil’s unique QScan™ technology, the analyst can quickly generate a confocal 3D map using a large XY laser lightsheet (100 µm x 100 µm) and excellent confocal performance in the Z direction (1 µm). Any artifacts or air bubbles buried in the matrix are rapidly detected and can then be analyzed in finer detail using the same tool in microspot mode.
Serving every kind of life and environmental science applications

Raman microscopy, combined with multivariate analysis, is used to characterize the distribution of active principles and excipients in medicines. Here, a tablet containing 8 components has been mapped in minutes, to be able to guarantee the mixture is homogeneous.

VIBRA-SANTÉ HUB, Center for Interdisciplinary Research on Medicines, Liege, Belgium – Eric Ziemons, Director

With a multimodal Raman microscope as easy to set up as the LabRAM Soleil, we were quickly up to speed. We were able to study our pharmaceutical samples safely and without risk of contamination as it has Class 1 capability built in.

It’s the ideal tool for the analyst of the future!
Serving every kind of life and environmental science applications

Microplastics

Raman microscopy is more effective than Fourier transform infrared (FTIR) microscopy for detecting particles smaller than 10 µm, making it the ideal technique for analyzing microplastics, whether from the natural environment or in bottled water. In this example, we can see just how fast analysis with the LabRAM Soleil is. Thanks to Mosaic and ParticleFinder apps, analysis of thousands of particles on large filters can be fully automated. LabRAM Soleil fully automated laser switch limits the impact of the fluorescence background (stemming from organic impurities, colouring agents and other additives) which often overshadow the Raman signals and prevent identification of the underlying polymer.

IFREMER, Brest, France – Maria El Rakwe, Research scientist

We really like the LabRAM Soleil’s optimized design, which speeds up analysis of microplastics. It has helped us to improve our profitability, no matter what kind of environmental sample we’re looking at (notably water).

Cell imaging

Studying how cells work is of fundamental importance in cellular biology, and involves looking at them individually. Raman spectroscopy achieves this feat in combination with confocal microscopes, revealing the physiological dynamics and interactions of cells in vitro, where conventional techniques can only obtain a mean value for a population. Raman spectra offer a wealth of information useful to biochemists, such as cell phenotype, by analyzing nucleic acids, carbohydrate, lipid and protein content, etc.

For pharmacology applications, confocal Raman microscopy also reveals where a medicine is present in a cell and allows analysis of nanovectors aggregating on the cell membrane. This technique is quickly becoming established as the standard in oncology, allowing researchers to optimize medical treatment approaches and reduce chemotherapy doses, in particular.
LabSpec 6: Simplicity taken to the next level

The LabSpec 6 software suite draws on our extensive experience of Raman spectroscopy and imaging, combining ease of use with a range of features configurable to each user’s specific needs. And now with its very own App Store, Raman imaging has never been this accessible!

EasyImage, The app that simplifies your workflow!

The EasyImage™ is a new application developed by our expert teams that draws on HORIBA’s know-how in Raman spectroscopy at every step of the image production process, from adjusting the focus to optimization of parameters and interpretation of Raman imaging.

1
Focus
Targeting and focus on point XYZ

2
Optimization
Adjustment of image parameters (contrast, etc.)

Multivariate analysis
A full range of multivariate analysis algorithms (PCA, MCR, K-means, etc.) are built into the software, enabling simplified and automated analysis of chemical components for maximum efficiency.
Intuitive Software
level with EasyImage™

3 Characterization
Identification and chemical analysis

4 Images and interpretation

5 Reports
Infinite customization features

Rapid identification by database
A large choice of databases, including the HORIBA database compiling all our know-how (KnowItAll®) in one place.

3D Surface and volume
Combining topographic and confocal analysis for 3D imaging
ParticleFinder™ for particle analysis

ParticleFinder performs a comprehensive classification of particles in seconds, combining morphological and chemical analysis.

Typical applications are rapid quality control of microplastics or pharmaceutical substances.

Easy navigation package for advanced multimodal imaging

NavMap™ is an innovative video feature that shows the global sample and the zoomed region of interest within the sample, simultaneously, in real-time.

NavSharp™ technology delivers sharp and real-time navigation on a sample image with any topography. The surface focus is readjusted automatically with the use of an automated Z sample stage.

ViewSharp™ focus stacking constructs an image in which all surfaces are in focus simultaneously, and creates a 3D topography image. It guarantees the highest focal quality in hyperspectral images, by using the recorded topography which corresponds to the best focus of any pixel of the image.
Intuitive Software

**SmartSampling™: Map up to 100 times faster**

With HORIBA's patented *SmartSampling™* technology added on and the *LabRAM Soleil’s optomechanical stability and precision*, hyperspectral mapping is made much faster by an image-compression algorithm. The system intelligently targets points of interest in the sample’s and sub-sample’s uniform or empty areas.

**LabRAM Soleil** generates images up to 100 times faster than conventional systems. Such superior performance is made possible by two key advantages:

- The perfect alignment of the laser optical path and its two position-sensitive detectors (PSD),
- The tight calibration of the video image with respect to the laser’s position.

Convallaria cell, (left) video image / (center) 14 minutes SmartSampling image / (right) typically equivalent point by point image obtained in 14 minutes

---

**ProtectionPlus™: User profile management and maximum data traceability**

- User profiles can be configured and are password-protected
- *AuditTrail* guarantees data traceability at each step in the process
- *ProtectionPlus* assures compliance with FDA 21
- CFR Part 11 and GMP/GLP requirements
LabRAM Soleil, serving your applications
More modularity now and for the future

LabRAM Soleil is both robust and modular. Its optical and mechanical design minimizes vibrations, its optional auto-alignment feature keeps maintenance callouts to a minimum, and its temperature-controlled objectives turret ensures excellent stability over time for precise and reproducible results.

LabRAM Soleil is the most modular microscope in its class on the market today. Adding a circuit board, sensor, imaging system or diffraction grating turret has never been easier. Everything has been designed to ensure quick setup of your initial system and future upgrades, and our global network of customer support engineers is there to guarantee premium service wherever you are.

LabRAM Soleil is easy to maintain with a progressive maintenance plan (3 levels). A dedicated maintenance team will ensure predictive, preventive and curative interventions. The instrument design ensures easy access to all parts to minimize service downtime. We offer a standard 2 year warranty including lasers and detectors. You can customize warranty conditions and maintenance contract extensions through your local representative.

Get even more out of your LabRAM Soleil by combining it with our Atomic Force Microscope (AFM) and gain access to spectroscopic measurements at the nanoscale

You can easily couple your LabRAM Soleil to OmegaScope, our AFM system available in different controlled environments, allowing you to acquire correlative AFM/Raman/Photoluminescence (PL) and Tip-Enhanced Raman and PL measurements (TERS, TEPL).

See physical (electrical, mechanical, magnetic, etc.), opto-electrical and chemical properties at the nanoscale for a broad range of samples (advanced materials, semiconductors, molecules, thin films, biological samples) with the combination of LabRAM Soleil and OmegaScope.

Enjoy global support

You can also count on the support and renowned expertise of our applications engineers for advice and training. See our website to learn more about our hardware and software training solutions.

www.horiba.com/labramsoleil
### LabRAM Soleil main specifications

#### Getting There Faster

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wavelength range</strong></td>
<td>UV-Vis-NIR</td>
</tr>
<tr>
<td><strong>Standard laser wavelengths</strong></td>
<td>325, 405, 473, 532, 638, 785 nm</td>
</tr>
<tr>
<td><strong>Spectrometer scanning speed</strong></td>
<td>Up to 400 nm/s</td>
</tr>
<tr>
<td><strong>Number of gratings</strong></td>
<td>unlimited</td>
</tr>
<tr>
<td><strong>Fast Imaging</strong></td>
<td>&lt;1ms/spectrum</td>
</tr>
<tr>
<td><strong>3D confocal slicing with laser lightsheet illumination</strong></td>
<td>QScan (patented)</td>
</tr>
<tr>
<td><strong>Low wavenumber cut-off</strong></td>
<td>5 cm⁻¹</td>
</tr>
<tr>
<td><strong>Standard wavenumber cut-off</strong></td>
<td>30 cm⁻¹</td>
</tr>
<tr>
<td><strong>High wavenumber cut-off for PL</strong></td>
<td>1600 nm</td>
</tr>
<tr>
<td><strong>Laser auto-alignment procedure</strong></td>
<td>15 s</td>
</tr>
<tr>
<td><strong>Built-in lasers</strong></td>
<td>Up to 4 solid-state lasers</td>
</tr>
<tr>
<td><strong>External lasers</strong></td>
<td>Unlimited</td>
</tr>
<tr>
<td><strong>Spectroscopic motorized modalities</strong></td>
<td>Up to 6 laser filters</td>
</tr>
<tr>
<td><strong>Rayleigh filter orientation</strong></td>
<td>Individual filter computer controlled</td>
</tr>
<tr>
<td><strong>AFM / SEM coupling</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Operating temperature range</strong></td>
<td>18-28 °C</td>
</tr>
<tr>
<td><strong>Dimensions (W x D x H in mm)</strong></td>
<td>898 x 797 x 806</td>
</tr>
<tr>
<td><strong>Weight (kg)</strong></td>
<td>120 kg</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>&lt; 600 W for a fully loaded configuration</td>
</tr>
<tr>
<td><strong>Built-in lasers</strong></td>
<td>NUV to NIR wavelengths available.</td>
</tr>
<tr>
<td><strong>External lasers</strong></td>
<td>For large gas and ultrafast lasers typically.</td>
</tr>
<tr>
<td><strong>Spectroscopic motorized modalities</strong></td>
<td>Raman, PL, ULF, Upconversion luminescence…</td>
</tr>
<tr>
<td><strong>Rayleigh filter orientation</strong></td>
<td>Factory preset &amp; user adjustable angle to adapt with sample reflectivity.</td>
</tr>
<tr>
<td><strong>AFM / SEM coupling</strong></td>
<td>Built-in horizontal exit for direct Atomic Force microscope coupling, optional fiber entrance for SEM coupling with RCLUE.</td>
</tr>
<tr>
<td><strong>Operating temperature range</strong></td>
<td>Non condensing</td>
</tr>
<tr>
<td><strong>Dimensions (W x D x H in mm)</strong></td>
<td>~1 cubic meter, including lasers, CDRH enclosure, electronics and cooling to save space in your laboratory</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>Eco-friendly and safe design, with built-in class 1 enclosure, low power consumption electronics and cooling, 1 power cable EU / US type</td>
</tr>
</tbody>
</table>
Worldwide Training and Technical Support

HORIBA Jobin Yvon, established in 1819, and now part of the HORIBA Scientific segment, is one of the world’s largest manufacturers of analytical and spectroscopic systems and components.

The HORIBA Scientific teams are committed to serving our customers with high performance products and superior technical support.

Our staff of experienced application and service engineers, located around the world, provides full support for your instrument.

Well equipped application laboratories allow for sample analysis and hands-on training for new and experienced users.

Find out more at www.horiba.com/labramsoleil