EDINBURGH INSTRUMENTS

RM5

Confocal Raman Microscope

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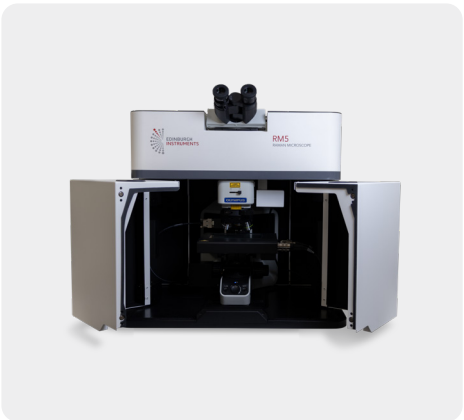
RM5 Confocal Raman Microscope

Our versatile RM5 Raman Microscope delivers high-precision spectral imaging within a compact footprint.

The RM5 is designed to meet your research needs, enabling measurements from the nanoscale to the macro level. Fully configurable for disciplines including nanotechnology, materials science, pharmaceuticals, forensics, and life sciences. With advanced confocal optics and intuitive software, the RM5 provides reliable, high-quality data – ideal for both rigorous quality control and innovative academic research.




LASER
APERTURE
BF
DF

Key Features

3 Internal Lasers

Integrate up to 3 internal lasers (405 nm - 1064 nm) for ultimate flexibility across diverse applications, all within a compact footprint.

Truly Confocal

Industry-leading pinhole flexibility for ultimate application optimisation and image definition.

5 Integrated Gratings

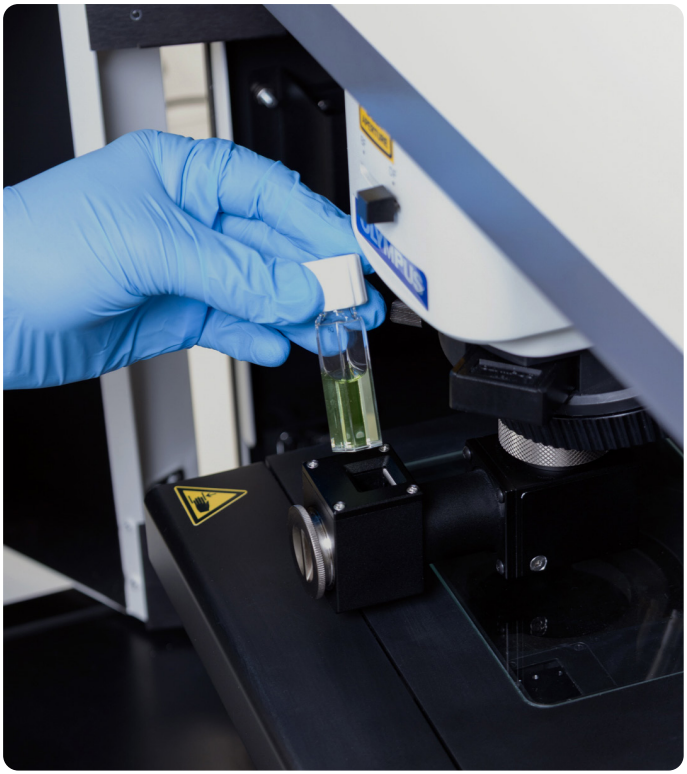
Gain maximum control over your spectral analysis. Select from up to 5 software-controlled gratings, each optimised for specific laser wavelengths to deliver the ideal spectral range and resolution.

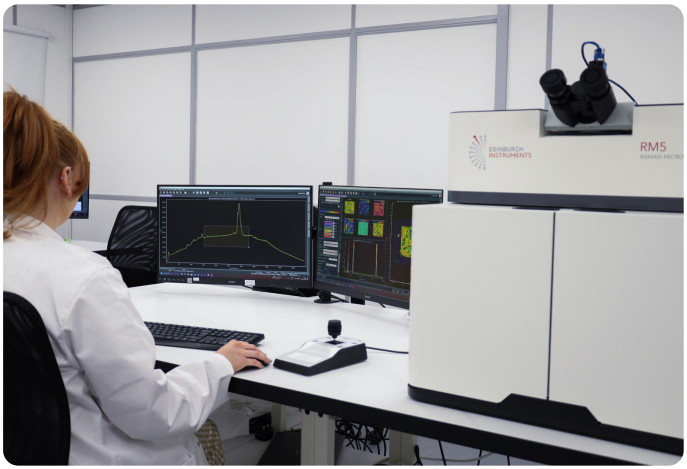
Optically Optimised

Benefit from superior signal quality and performance delivered by free-space coupled lasers and a precision mirror-based spectrograph.

Dual Detector

Any wavelength, any speed. Dual detector slots allow for CCD, EMCCD, and InGaAs integration, tackling any Raman challenge.





"Our RM5 sits in a multi-user facility allowing research into a range of applications such as thin films, semiconductors, and carbon materials.

The ease of use makes the instrument accessible to multiple research groups and coupled with the excellent customer support, our experience with Edinburgh Instruments has been exceptional."

Space-Saving Powerhouse

With all components housed internally, the RM5 fits seamlessly into your lab, today and tomorrow.

Self Calibration

Maintain the accuracy of your Raman measurements effortlessly with automated internal silicon and neon calibrations.

Raman Imaging Unlocked

Effortlessly combine automated microscopy with powerful MAP software packages for rapid and accurate mapping.

Raman Made Easy

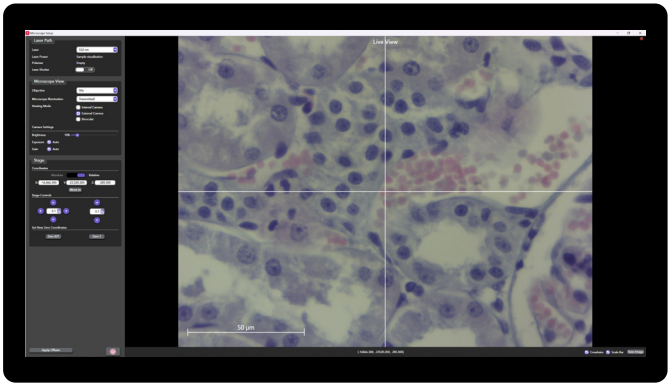
From setup to analysis, the RM5's intuitive interface streamlines your workflow for rapid results.

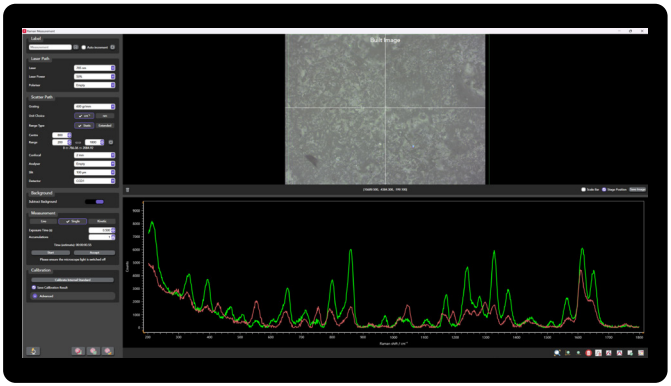
Ramacle® Software: Your RM5 Command Centre

Step into a seamlessly integrated Raman experience with Ramacle Software. This comprehensive package acts as your central command hub, providing intuitive control over every instrument function while effortlessly managing your valuable data.

From experiment setup to final analysis, Ramacle streamlines your workflow, allowing you to focus on discovery.

- **Intuitive Control**
  Take command of all RM5 functions with a streamlined, intuitive interface.
- **Publication-Ready Data**
  Generate publication-quality data effortlessly with a user-friendly interface and optimised output.
- **Live Monitoring & Optimisation**
  Observe and refine your experiments in real-time. Visualise your sample and adjust parameters live for ultimate control.
- **Maintain Complete Data Integrity**
  Capture comprehensive measurement and instrument details for every dataset.
- **Effortlessly Integrate Data**
  Streamline analysis in Ramacle and across platforms with straightforward import/export.



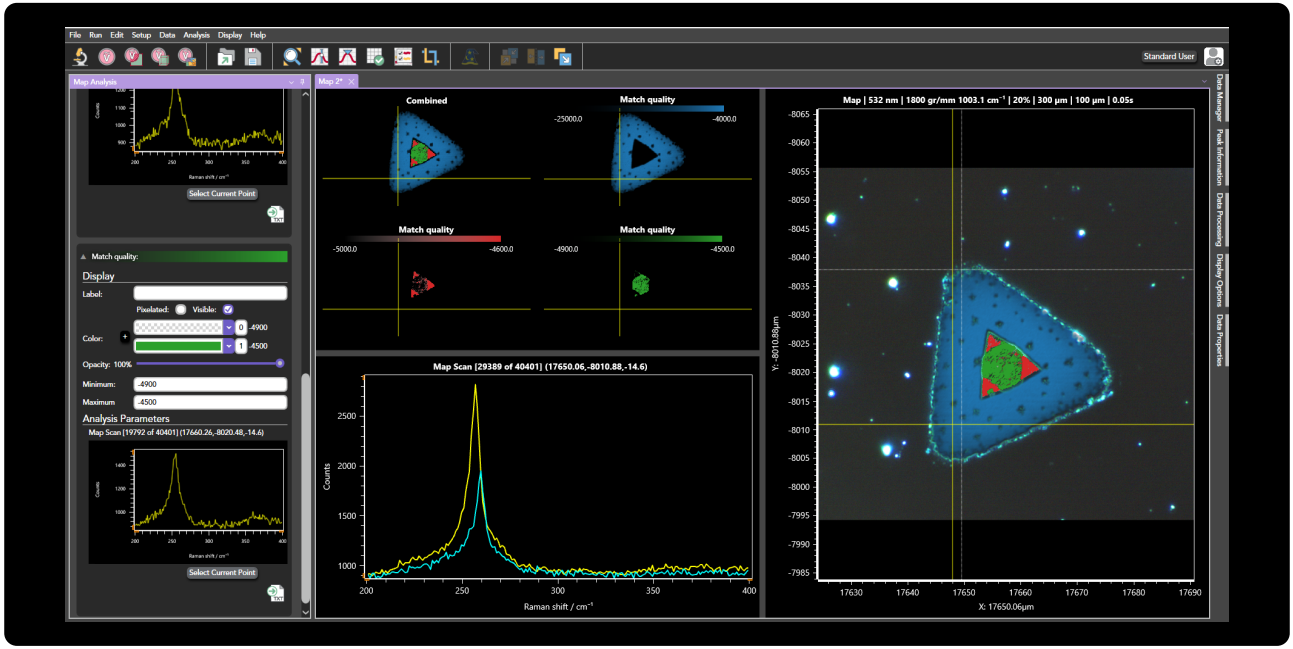


Standard with Ramacle:
Powerful Tools at Your Fingertips

- Flexible laser and scatter pathway selection for optimised experiments
- Real-time sample and laser visualisation
- Multiple acquisition modes: Single, accumulate, kinetic
- Self-calibrating for reliable data
- Streamlined analysis with integrated data processing
- Standard SCII/CSV: effortless cross-platform data sharing

Expand Your Capabilities:
Optional Software Upgrades

- Advanced Mapping Suite: 1D, 2D, FastMAP, SurfMAP, MultiMAP for spatial analysis
- Polariser and analyser selection and control
- Integrated temperature control for in-situ analysis
- Rapid spectral ID with KnowItAll® library
- Multiwell plate ready for high-throughput screening
- ParticleMAP: dedicated particle analysis
- Custom automation & advanced analysis via Python



Mapping with Ramacle®
See your samples in new dimensions

2D Chemical Mapping:
Surface Insights Made Simple

Visualise Component Distribution

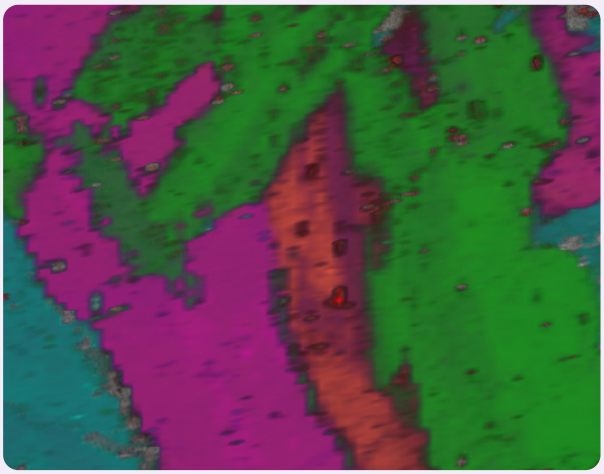
Instantly reveal the spatial distribution of components across your sample.

Flexible Area Selection

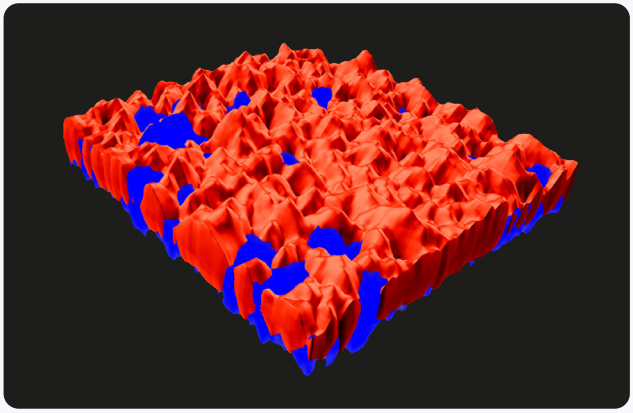
Easily select any region of interest, even across large stitched images.

Automated XY Mapping

Effortlessly generate detailed 2D maps. Simply set your parameters, and Ramacle automatically acquires high-density spectral data.



2D map of a gemstone revealing 3 main constituents: sodalite, orthoclase, and nepheline



3D confocal Raman imaging of spreadable butter. Blue regions are water, and red regions represent the organic phase

3D Chemical Mapping:
Explore the Depth

Go Beyond The Surface

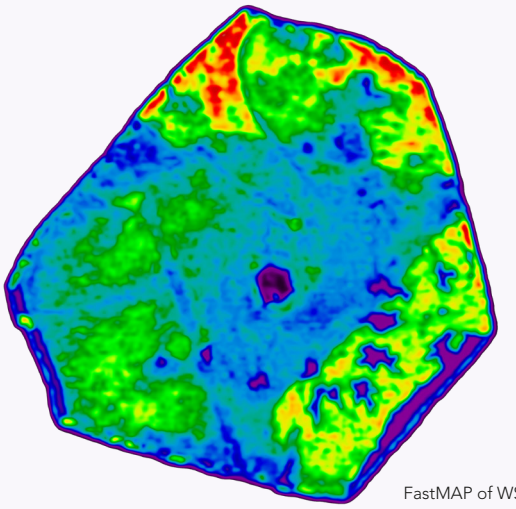
Delve into your sample's depth for comprehensive 3D chemical imaging.

Harness The Power Of Confocal Microscopy

Acquire precise, high-resolution 3D chemical data with the truly confocal RM5.

Explore Your 3D Data In Multiple Ways

Slice through layers, stack images, or visualise the full 3D volume for complete understanding.



FastMAP of WS_2

FastMAP®:
Accelerate Your Results

Reclaim Time

Acquire 2D and 3D chemical maps in a fraction of the time compared to traditional methods.

No Compromise On Quality

Maintain excellent spectral resolution and image clarity, even with faster acquisition times.

Ideal For Strong Signals

Rapidly and efficiently collect data from samples with high Raman activity.

SurfMAP®:
Conquer Complex Surfaces

Maintain Focus, Maximise Resolution

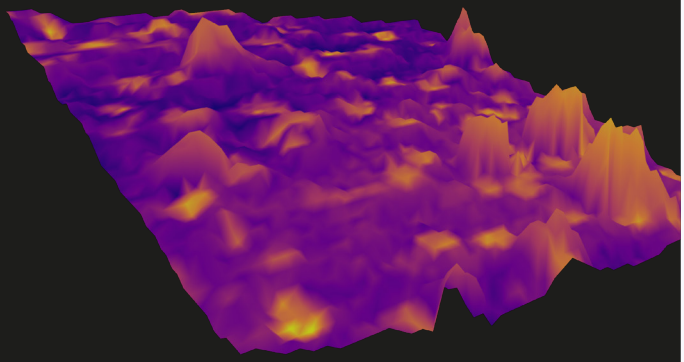
Analyses samples with rough or tilted surfaces by keeping the laser perfectly focused throughout the Raman map.

Intelligent Focus For Every Point

Ramacle automatically creates a surface profile using white light imaging, ensuring optimal focus during Raman mapping.

3D Topography Visualisation

Displays the resulting Raman map with sample height variations for comprehensive analysis.

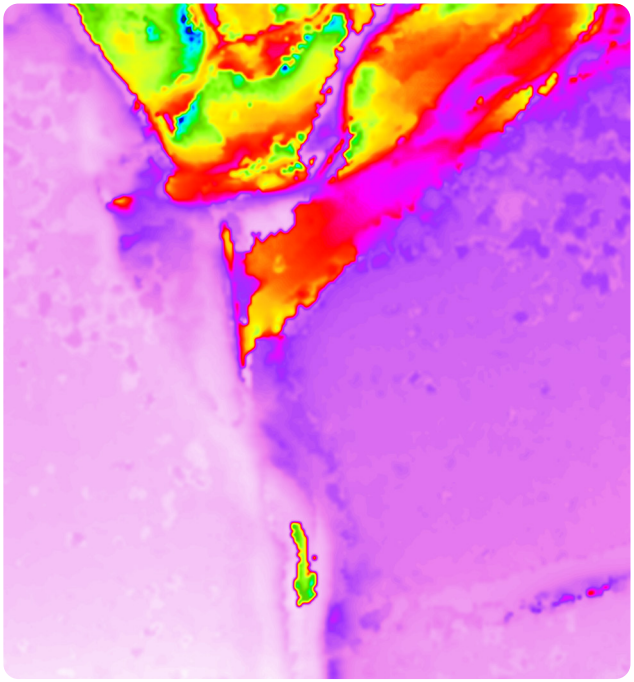


Simultaneous topographic and Raman imaging of a formulation of an antipsychotic medication

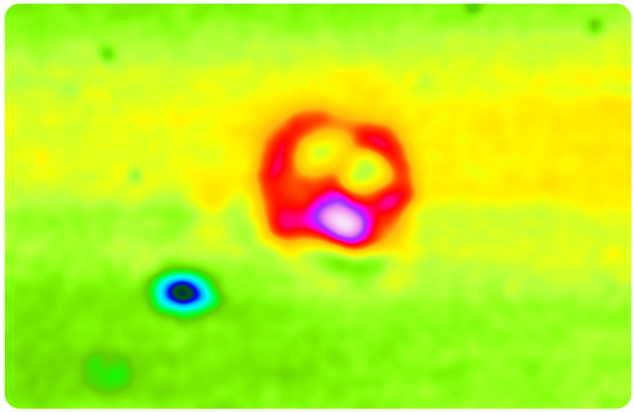
Analyse your wafers on the RM5 with software features such as wafter template and tilt correction

Materials Science

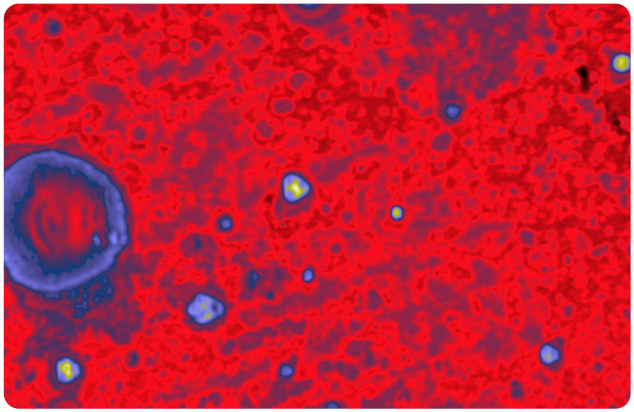
- Map micro-scale stress and strain, revealing critical performance characteristics in advanced materials like ceramics and polymer composites.
- Characterise the composition and structural integrity of novel materials, including nanomaterials, ensuring optimal material properties.
- Analyse the impact of environmental factors on material degradation, such as corrosion, to predict material lifespan and failure points.
- Pinpoint defects and phase distributions in semiconductor wafers, thin films, and layered structures, crucial for device performance and reliability.



Raman Imaging of strain and crystallinity in a silicon semiconductor wafer using Raman mode widths. Orange and white regions are nanocrystalline silicon, and dark blue regions are strained silicon

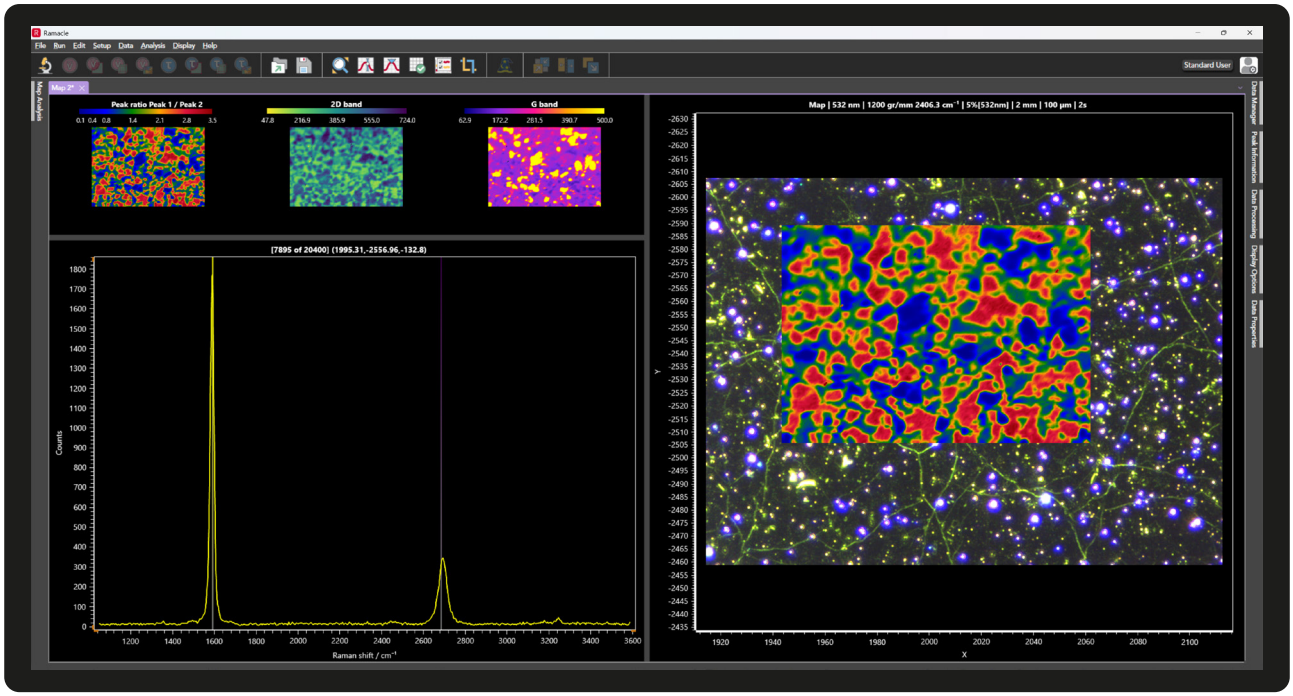


PCA image of SiC showing the presence of polytype defects and their effect on the surrounding wafer

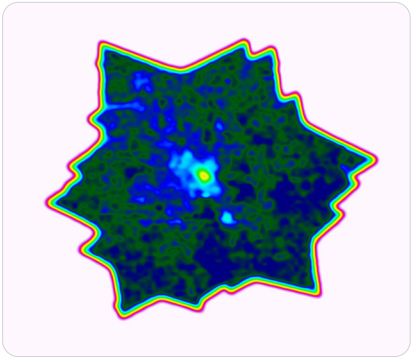


Copper oxide PL map showing variability in the bandgap at 630 nm (red/black) and the presence of defects, 750 nm (grey)

Nanotechnology



I2D/IG Raman mapping of graphene for layer number determination



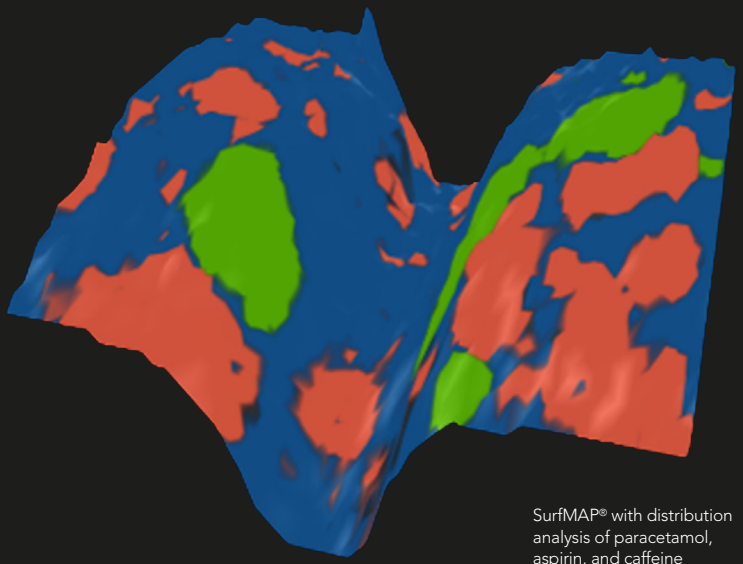
- Uncover elemental distribution and phase in quantum dots, nanowires, and other nanomaterials.
- Determine layer number, stacking, and electronic/mechanical properties of graphene and related materials.
- Identify dislocations and map strain distribution to assess nanomaterial quality.

Raman image plot of E_{2g} and A_{1g} intensity from $MoSe_2$

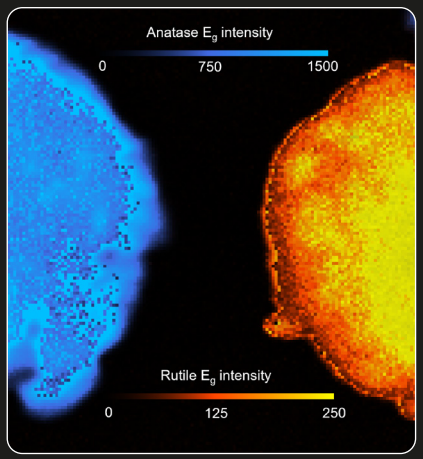
E_{2g}/A_{1g} Raman mapping intensity ratio for strain, defects, grain size and the thickness

Pharmaceuticals

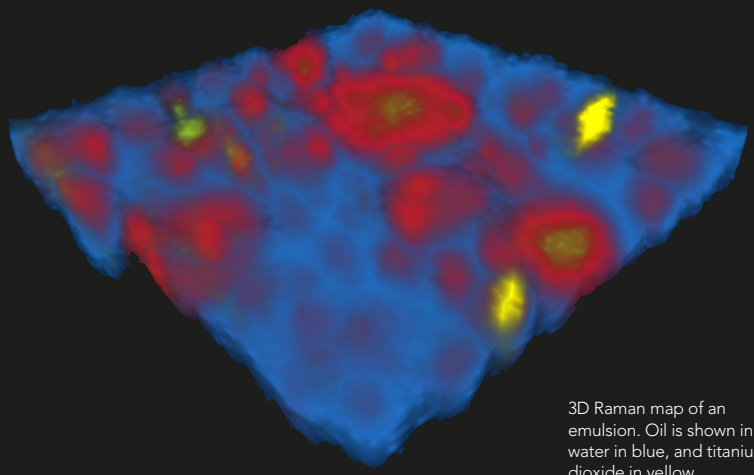
- Map API distribution within drug formulations (tablets, coatings) to guarantee uniformity and quality.
- Identify polymorphs and visualize their spatial distribution within solid dosage forms for enhanced formulation understanding.
- Monitor drug release and dissolution profiles using Raman mapping techniques to optimise drug delivery.
- Analyse the distribution of excipients within drug formulations to ensure optimal performance and stability.



SurfMAP® with distribution analysis of paracetamol, aspirin, and caffeine



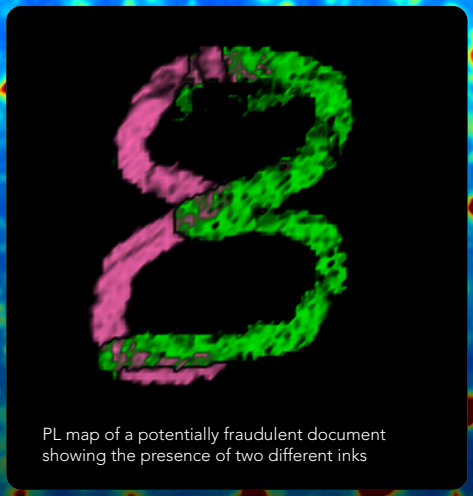
Raman map distinguishing anatase and rutile polymorphs of titanium dioxide



3D Raman map of an emulsion. Oil is shown in red, water in blue, and titanium dioxide in yellow

Forensics

- Rapid identification of trace materials, such as fibres, paints, and explosives, for forensic investigations.
- Chemical characterisation of unknown microparticles and residues found at crime scenes.
- Accurately analyse the composition of inks and toners on documents for forensic document examination.
- Confidently identify the chemical makeup of illicit substances for rapid and reliable analysis.



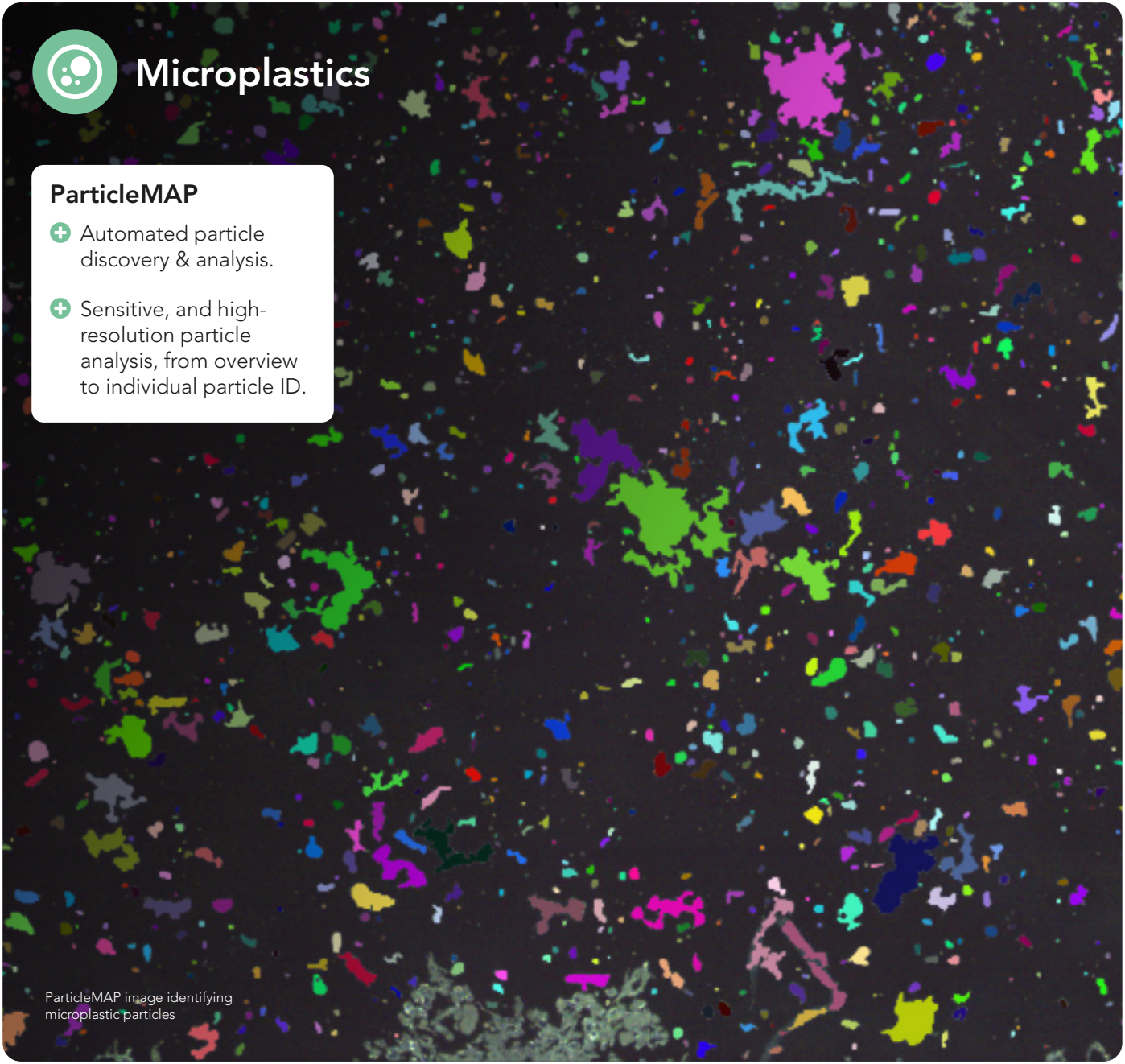
PL map of a potentially fraudulent document showing the presence of two different inks

FastMAP® revealing trace amounts of paracetamol (red) deposited in a fingerprint on aluminum foil

Microplastics

ParticleMAP

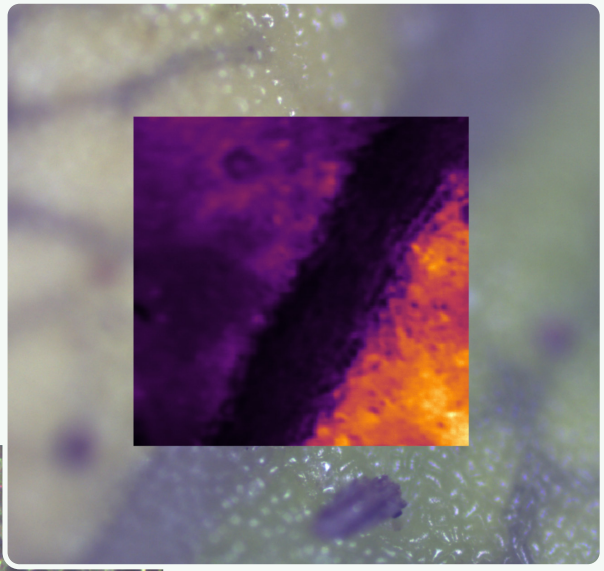
- Automated particle discovery & analysis.
- Sensitive, and high-resolution particle analysis, from overview to individual particle ID.



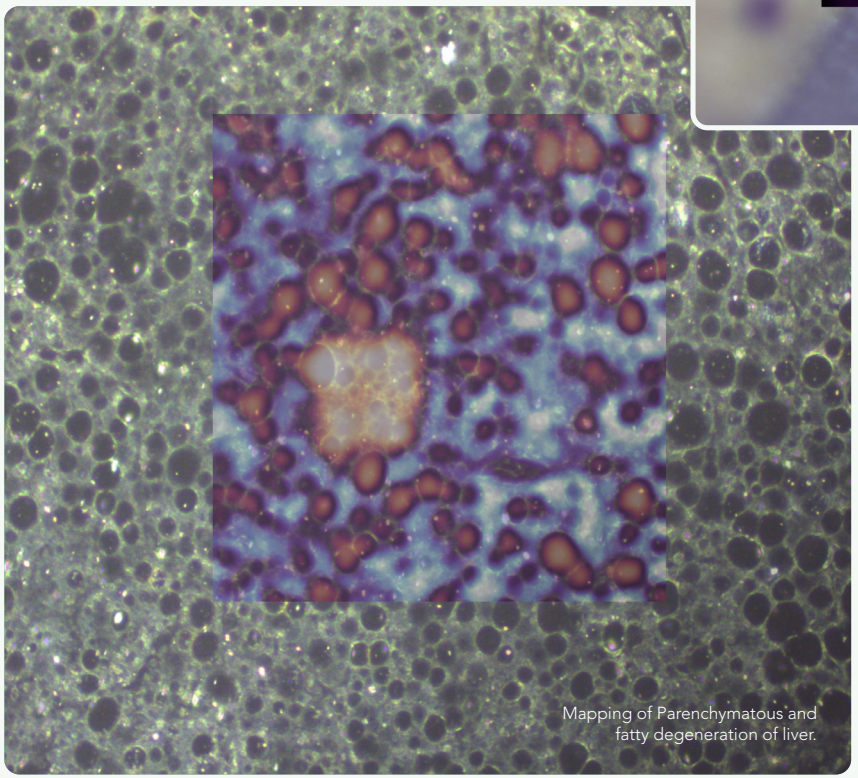
ParticleMAP image identifying microplastic particles

Life Sciences

- Visualise the chemical architecture of cells and tissues in both animal and plant samples, mapping proteins, lipids, carbohydrates, and more.
- Determining the chemical composition of plant cell walls.



Chlorophyll PL intensity image across a browning leaf. Increased intensity corresponds to visibly greener sections of the leaf

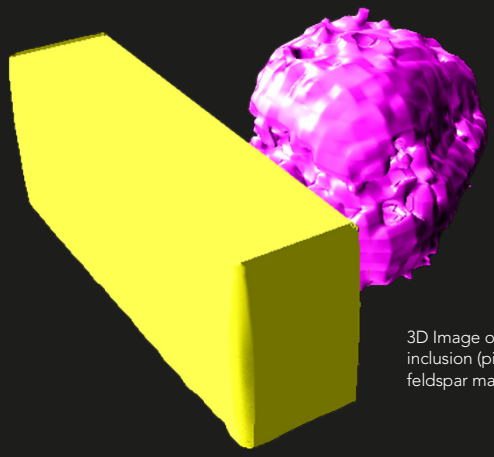


Mapping of Parenchymatous and fatty degeneration of liver.

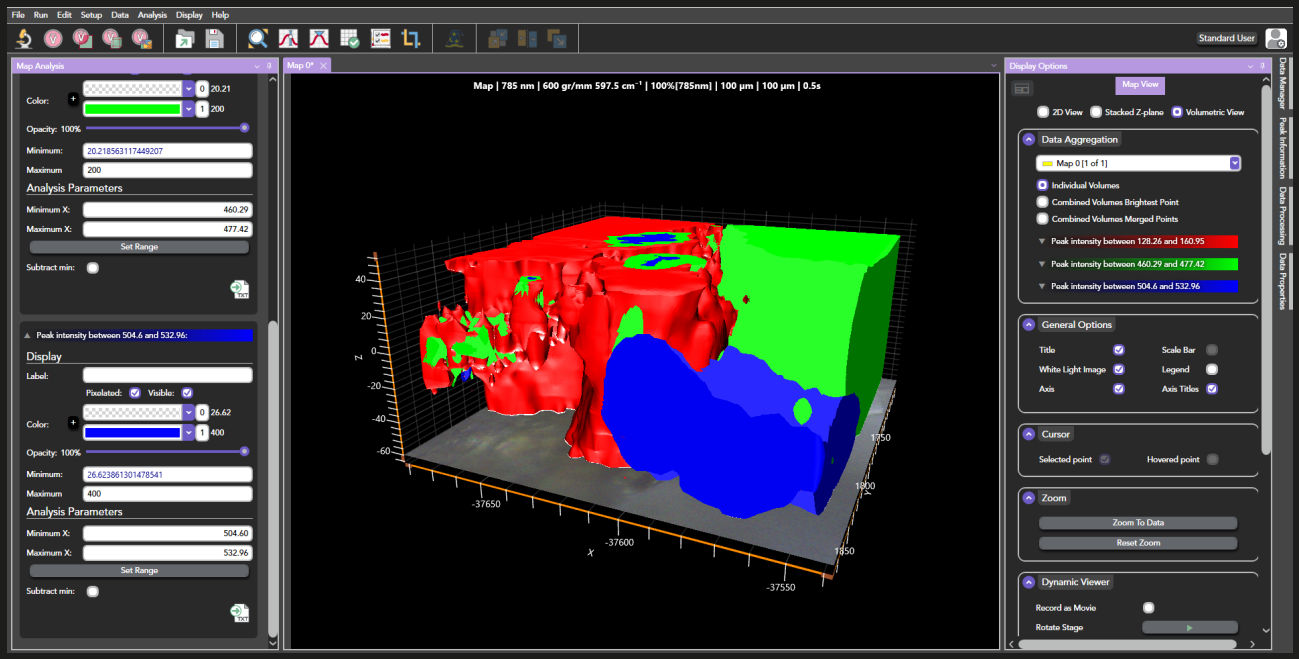
- Track the distribution of drugs and other compounds within biological tissues and plant structures, essential for understanding uptake and efficacy.
- Observe cellular and plant responses to stimuli like environmental shifts or chemical interventions.

Geology & Mineralogy

- Mineral & Micro-Feature Analysis: Identify and map minerals, inclusions, and micro-features in geological samples.
- Compositional & Organic Mapping: Determine chemical composition and map organic matter distribution in geological layers and samples.



3D Image of an anatase inclusion (pink) within a feldspar matrix (yellow)



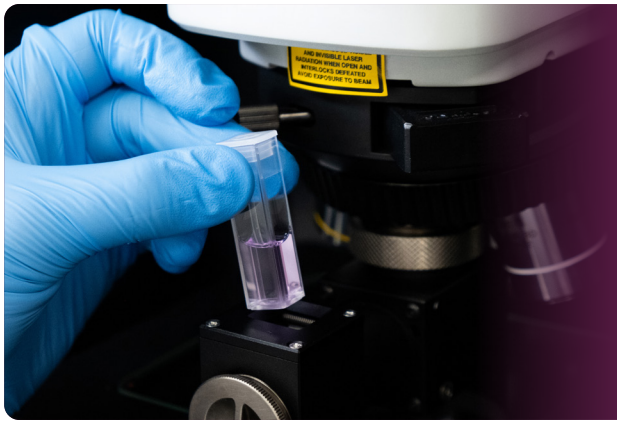
Feldspar and organic matter (blue), quartz (green), and anatase (red) imaged in a crack within a piece of feldspar rock

Art & Archeology

- Unmask the Authenticity of Art and Artifacts: Non-destructively identify pigments, binding media, and materials to detect forgeries and verify provenance.
- Analyse the chemical composition of aging materials (pigments, metals, organic components) to understand degradation processes and guide conservation efforts.

Raman map of a painting with different pigments.

Accessories

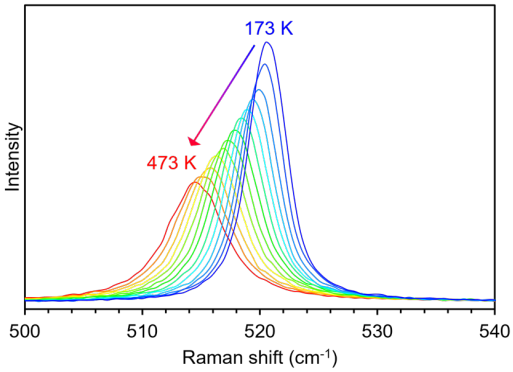


RM5 Cuvette Holder:
Simplify Liquid Analysis

- Quickly perform reliable liquid Raman measurements.
- Analyse a variety of liquid samples using standard or micro quartz/plastic cuvettes.
- Ensure focused, interference-free results with an integrated 10x objective.

Temperature Stages:
Automate Thermal Analysis

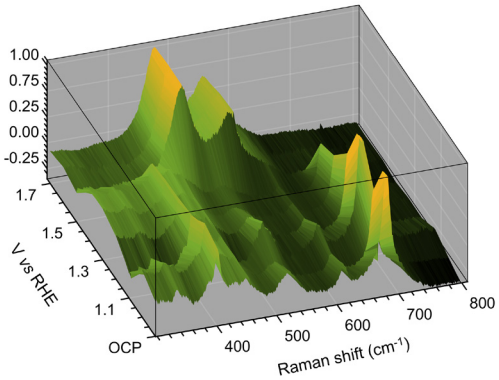
- Integrate a range of heating and cooling stages for automated temperature-dependent studies directly within Ramacle® software.



Raman spectra recorded from an n-doped Si chip between 173 K and 473 K in 25 K steps provides information about thermal expansion and the Fermi energy

Electrochemistry Stages:
Real-Time Reaction Insights

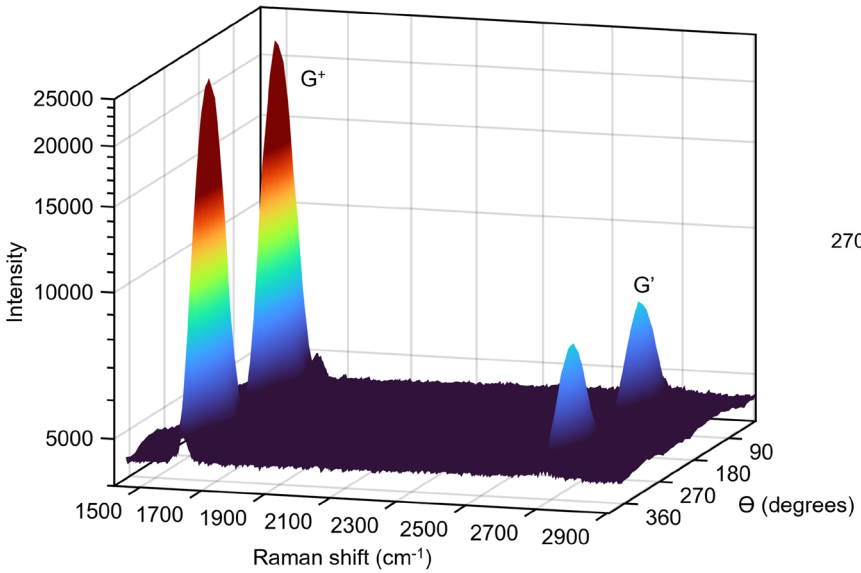
- The RM5 supports diverse electrochemistry and battery cycling cells, ensuring optimal analysis with long working distance objectives.



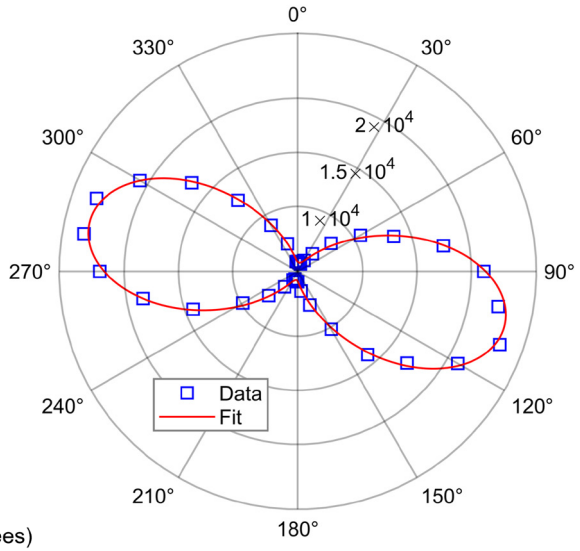
Detection of the compositional change in an oxygen evolution reaction electrocatalyst from $NiFeP_x$ to NiFeOH at the voltage required for water splitting using *operando* Raman

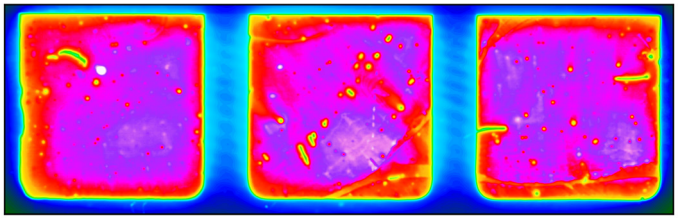
Polarisation Kit

- Fully software-controlled waveplates and analysers for polarisation-dependent Raman.
- Angular stages available for for 360° polarisation studies.



Angle-resolved polarised Raman microscopy reveals the alignment and orientation of an organised carbon nanotube architecture through the mapping of the polarised G+ band intensity





Photocurrent image of an organic solar cell, acquired simultaneously alongside a Raman image of the material using a 532 nm laser

Photocurrent

- Visualise defects with photocurrent imaging, enabled by an external interface and trigger module.
- Correlate with simultaneous Raman/PL data within Ramacle.

Specifications

Lasers		Up to 3 narrow-band lasers including: 532 nm, 638 nm, 785 nm
		Other wavelengths available on request
		Laser selection is fully computer-controlled
Laser Rejection Filters		Up to 3 laser rejection filters included
		Filter exchange is fully computer-controlled
Laser Attenuation		4 orders of magnitude, continuous
		Fully computer-controlled
Spectral Resolution		From <0.3 cm^{-1} *
Spectral Range		50 cm^{-1} - 4000 cm^{-1} *
Spectrograph	Type	Asymmetric Czerny-Turner
	Focal Length	225 mm
	Gratings	5-position grating turret, fully computer-controlled
	Slits	Continuously adjustable, fully computer-controlled
Confocal Imaging		Adjustable confocal pinhole, fully computer-controlled
Detectors	Standard Detector	High sensitivity ultra low noise CCD
		Front illuminated CCD for standard use and optimisation in the NIR
		Back illuminated CCD for enhanced sensitivity and spectral range
	Optional Second Detector	EMCCD detector, InGaAs and others available on request
		Selection of detectors, fully computer-controlled

* depending on grating, laser and CCD selection

Raman Polarisation	Optional	Polarisation kit available, fully computer-controlled
Internal Calibration		Wavelength calibration standard (Neon)
		Raman shift standard (Silicon)
		Sensitivity validation standard (Silicon)
		Automated laser alignment
Microscope System	Functionality	Full upright microscope with brightfield and darkfield illuminator
	Optional	Polarisation, Differential Interference Contrast (DIC) capability and fluorescence imaging
	Objective(s)	10x and 100x objective included as standard; up to 5 can be included
	Sample Viewing	Trinocular eyepiece, embedded CMOS video camera, second video camera optional
	Sample Stage	XY manual stage
	Optional	XYZ motorised stage, for confocal Raman mapping
		Temperature-controlled sample stages available
Software	Ramacle®	Comprehensive all-in-one, intuitive software package
	Operating System	Windows®
	Functionality	Data acquisition, spectrograph control, graphical display, data processing
	Optional	Chemometric, spectral library packages - KnowItAll™
Laser Safety	Without Laser Enclosure	Class 3B
	With Laser Enclosure	Class 1
Dimensions	W x D x H †	600 mm x 800 mm x 600 mm
	Weight †	63 kg

† without laser enclosure

EDINBURGH
INSTRUMENTS

With over five decades of expertise in molecular spectroscopy, Edinburgh Instruments proudly introduces the RM5 Confocal Raman Microscope – an instrument designed to bring our legacy of innovation into the hands of today's researchers.

The RM5 combines precision engineering with intuitive design, offering a powerful platform for Raman analysis that is as accessible as it is advanced.

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