OXFORD INSTRUMENTS

alphaCART

Freely positionable, fiber-coupled, confocal Raman system

Research-grade Raman microspectroscopy goes mobile

- Art and archaeology
- Geology
- *In-situ* process observation

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alphaCART

Bringing the lab to the sample

alphaCART is Oxford Instruments' portable Raman system for all applications that require research-grade spectral analysis outside of conventional laboratory environments. The alphaCART's Raman probe can be flexibly positioned in front of bulky, immovable or precious objects that can't be transported to a microscope or that don't fit under one.

The alphaCART system leverages the advanced optics and modular design of Oxford Instruments' witec360 Raman microscopes and profits from the company's longstanding expertise in fiber coupling technology. Thus, alphaCART provides the same diffraction-limited spatial resolution and confocality, high spectral resolution and superior signal sensitivity as all Oxford Instruments witec360 systems.

Benefits

alphaCART enables the nondestructive analysis of:

- Oversized samples
- Fragile or precious objects (no transport required)
- Samples that exhibit fluorescence
- Inclusions in various materials
- Processes inside reaction chambers
- Gases and liquids inside glass containers
- Samples at high temperature

Key features

- Freely positionable, fiber-coupled Raman probe
- High spectral and spatial resolution, confocality and signal sensitivity
- Sample survey with white-light illumination and color video camera
- Objective, laser and spectrometer configuration options
- Rolling flight case containing and protecting all components (optional)
- Advanced data post-processing
- Polarization-sensitive measurements (optional)
- Compatibility with witec360 series upgrades and accessories

System components

1 RAMAN PROBE
High confocality and sensitivity; available with white-light illumination or color video camera

2 LASER
Different wavelengths and output powers available

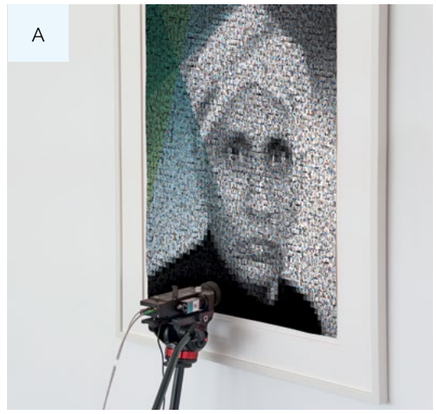
3 OPTICAL FIBERS
High signal throughput and optimal beam shape

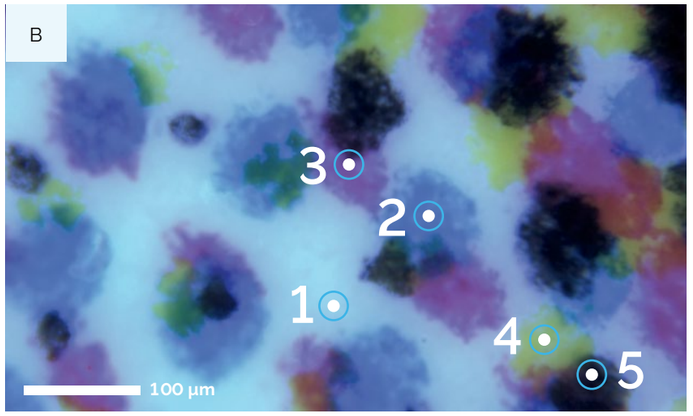
4 LAPTOP WITH INTEGRATED SOFTWARE SUITE
Data acquisition and advanced post-processing

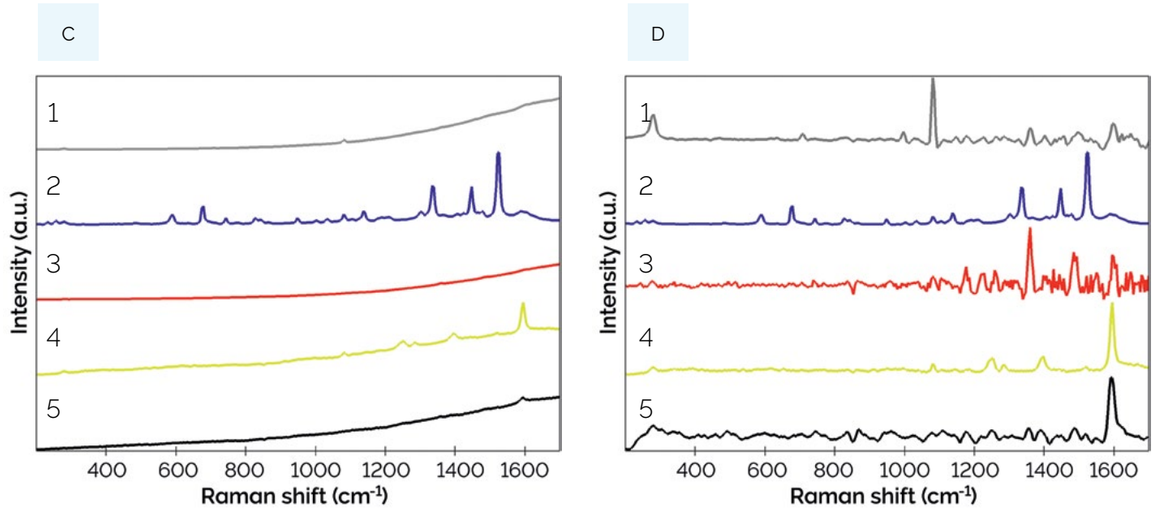
5 SPECTROMETER
Wavelength-optimized with high sensitivity and resolution

Applications

Raman detection over high background signals







Background subtraction and smoothing

Raman analysis of a poster through protective glass

alphaCART's high confocality and sensitivity enable Raman analyses of fluorescing materials and weak Raman scatterers, even through protective glass. Its Raman probe was positioned in front of a framed poster **(A)**. A white-light image revealed ink spots in different colors **(B)**. Raman signals recorded at the indicated positions with a 532 nm laser were partially obscured by the high fluorescence background from the paint **(C)**. However, applying efficient background subtraction and smoothing algorithms revealed the characteristic Raman spectra of the various pigments and of the coated paper **(D)**.

Analysis of art and historic objects

Nondestructive characterization of the Imperial Crown of the Holy Roman Empire

alphaCART was involved in the most thorough analysis to date of the Imperial Crown of the Holy Roman Empire, conducted at the Kunsthistorisches Museum in Vienna, Austria. Raman and photoluminescence measurements of the Crown's gemstones provided detailed insights into this historic treasure, which were published in the Journal of Gemmology (DOI: 10.15506/JoG.2023.38.5.448).

ANALYSIS OF ART AND HISTORIC OBJECTS

Nondestructive characterization of the Imperial Crown of the Holy Roman Empire

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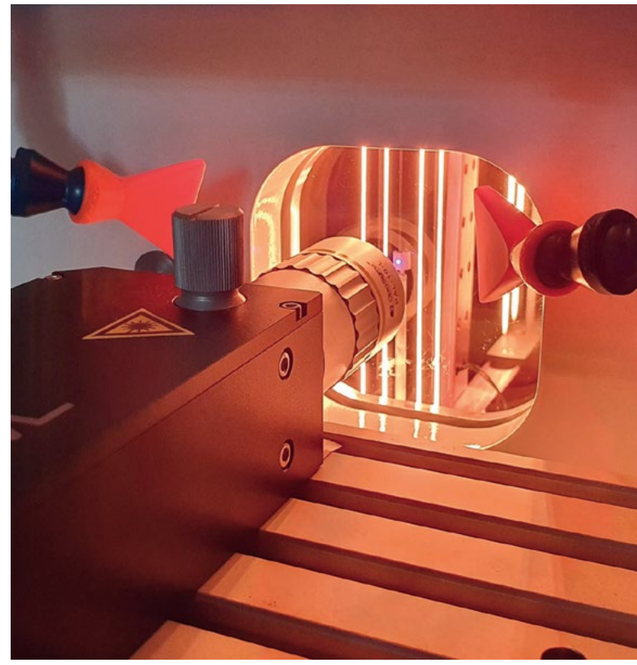

In-situ process observation

In-situ monitoring of diamond coating

The alphaCART Raman probe can be positioned in front of reaction chambers, such as the hot-filament chemical vapor deposition (HFCVD) reactor shown here. *In-situ* monitoring of the entire diamond coating and cooling process via Raman spectroscopy was made possible by alphaCART's high sensitivity and confocality.

Read the full study "In situ Raman spectroscopy of thermal stress in diamond on steel during HF-CVD coating and subsequent quenching" in Vacuum (DOI: 10.1016/j.vacuum.2025.114563)

Courtesy of Thomas Helmreich, Maximilian Göltz, Stefan M. Rosiwal, Chair of Materials Science and Engineering for Metals (WTM), Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany.

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Our Raman microscopes are manufactured at our facility in Ulm, Germany, and we have offices and support centres located worldwide.

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