

Research-grade Raman
microspectroscopy goes mobile

alphaCART

Portable, freely positionable, fiber-coupled,
confocal Raman system



alphaCART

Bringing the lab to the sample

alphaCART is WITec's 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 WITec's established alpha300 series Raman microscopes and profits from WITec'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 WITec alpha300 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)
- Full compatibility with alpha300 series upgrades and accessories



System components

Optical fibers

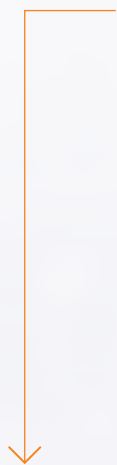
High signal throughput and optimal beam shape

Laptop with WITec Software Suite

Data acquisition and advanced post-processing

Raman probe

High confocality and sensitivity; available with white-light illumination and color video camera



Laser

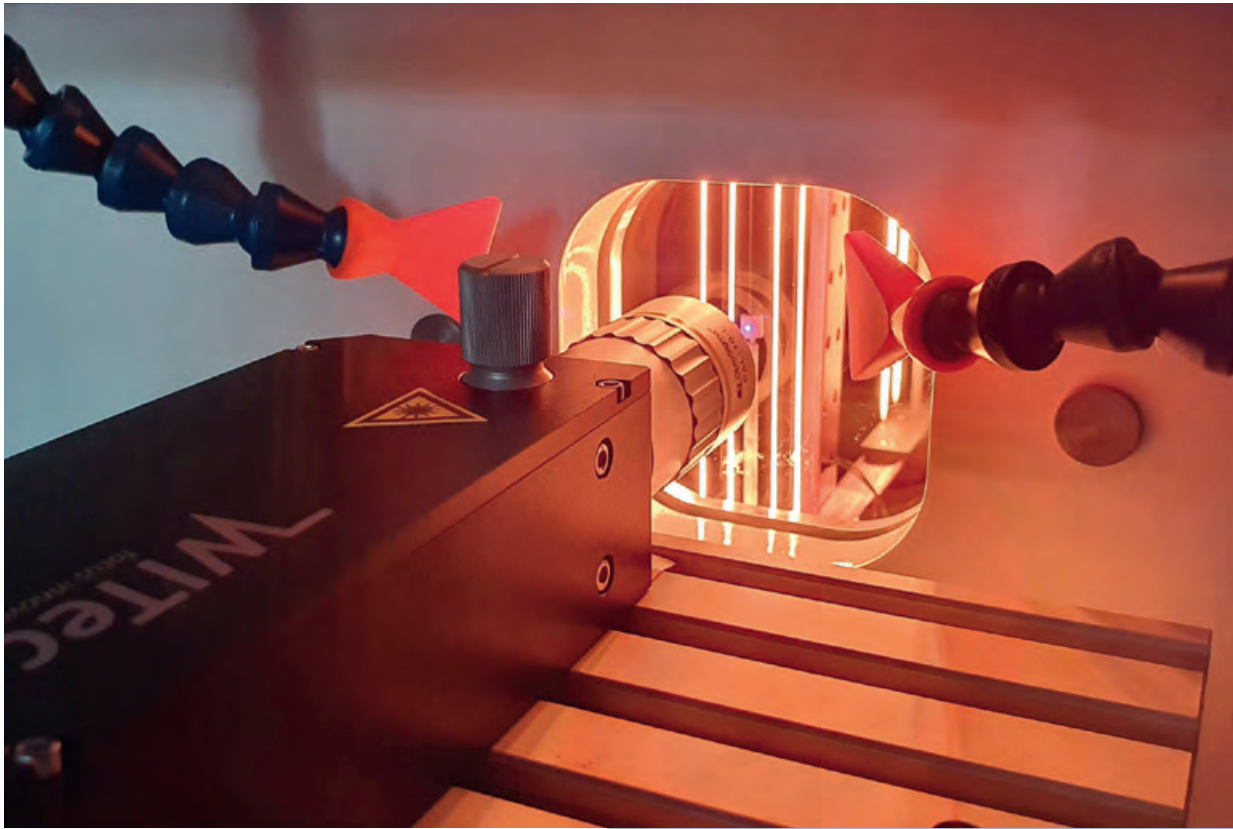
Different wavelengths and output powers available

UHTS spectrometer

Wavelength-optimized with high sensitivity and resolution



Applications

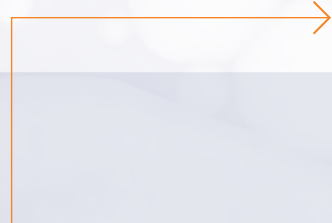


In situ process observation

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 (HF-CVD) reactor shown here. Temperature-dependent Raman spectra were recorded during diamond coating of a steel tool and subsequent cooling from 870°C to 30°C. The study yielded information about thermal stress and the quality of the diamond layer, and crystallographic modifications of the steel substrate. alphaCART's high sensitivity and confocality enabled the detection of the relatively weak Raman signals from the thin diamond layer through the glass window.

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.



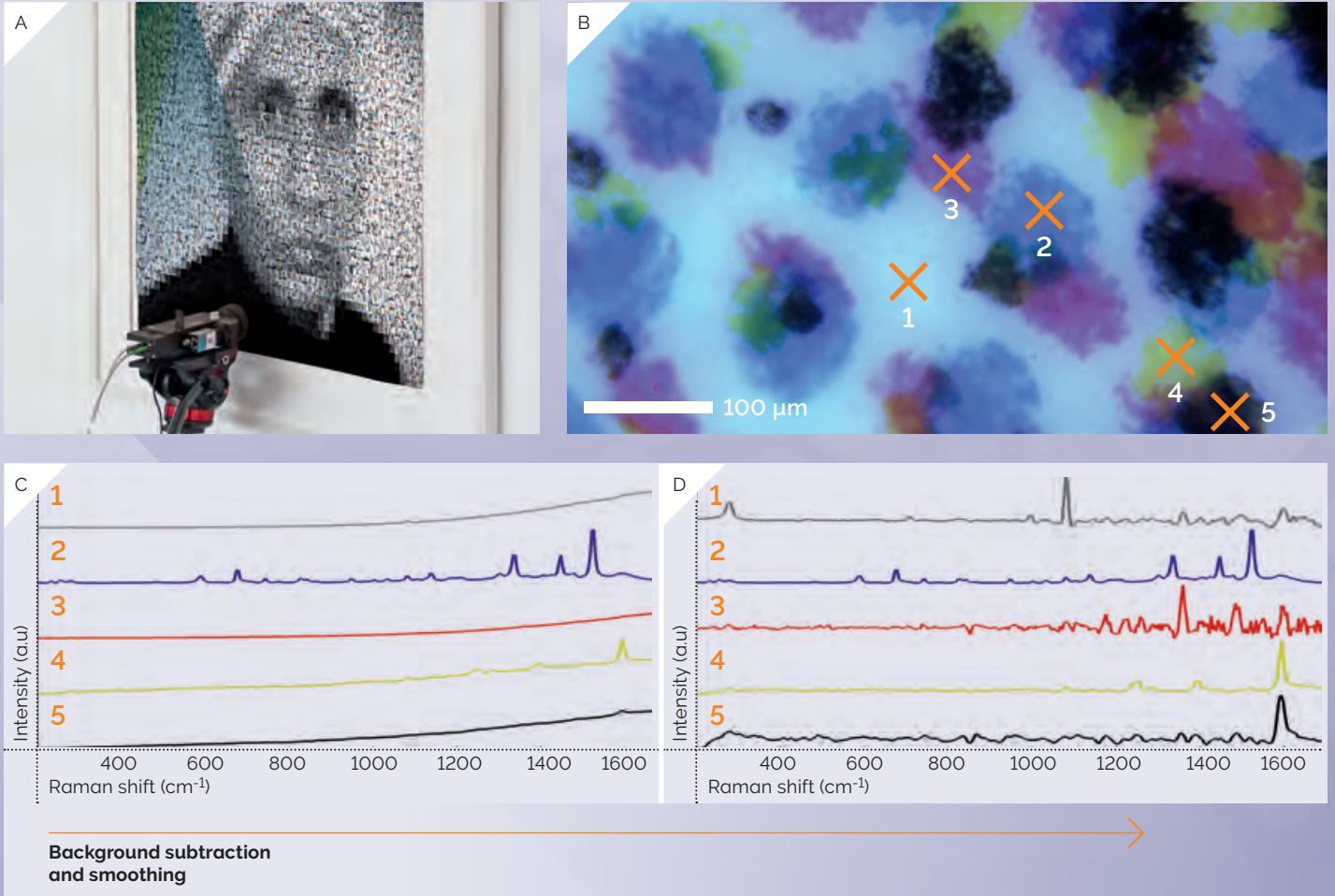
Analysis of art and historic objects

Nondestructive characterization of the Imperial Crown of the Holy Roman Empire



Applications

Raman detection over high background signals



Raman analysis of a poster through protective glass

alphaCART's high focality 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).

WITec Microscopes



alpha300 S:
Scanning Near-field
Optical Microscope

alpha300 A:
Atomic Force
Microscope

alpha300 R:
Confocal Raman
Microscope

alpha300 Ri:
Inverted Confocal
Raman Microscope

RISE®: Raman Imaging
and Scanning Electron
Microscope

alpha300 apyron™: Automated
Confocal Raman Microscope

alpha300 access:
Confocal Micro-Raman System

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Explore the alphaCART product page

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