

Premier Solution for Automated  
3D Confocal Raman Imaging

# alpha300 *apyron*

Optimized Performance and Workflow

**NEXT  
GENERATION**



# apyron

with AutoBeam™ opto-mechanical components

The alpha300 *apyron* is the top of the line in WITec's series of Raman imaging microscopes. It has been developed to combine ease-of-use and ultimate capability by automating hardware control and offering pre-configured measurement routines. This streamlines the experimental workflow and generates reproducible results with unrivaled speed, sensitivity and resolution.



*apyron* [ἀπειρον] is derived from the ancient Greek word for infinity

## Extensive automation

- Simplifies operation of the instrument.
- Requires less human input.
- Reduces potential sources of error.
- Enables complete remote control for use in environmental enclosures such as glove boxes.
- Enhances reproducibility.

## True confocality and wavelength-optimized design

- Guarantees maximum throughput.
- Provides sharp images with resolution limited only by physical law.
- Yields spectral resolution down to 0.1 relative wavenumbers/cm (@633 nm).
- Supports FAST RAMAN IMAGING without sacrificing resolution.

## What automation means

The alpha300 *apyron's* automation supports users during every step of the imaging process, making it the ideal Raman microscope for:

- Multi-user laboratories with varying requirements and levels of user experience.
- Researchers employing remote operation, such as in enclosed environments.
- Raman newcomers with advanced imaging requirements.
- Veteran Raman microscopists seeking the next performance benchmark.
- Industry facilities with recurring experimental situations and an emphasis on time-critical turnover.

Automation helps during every step of Raman imaging measurements

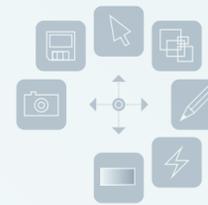
NEW

### Setup

- TrueCal executes pre-configured calibration routines.
- Innovative AutoBeam™ components for automatic beam path alignment.
  - > AutoBeam objective turret: positions selected objective, compensates for offsets.
  - > AutoBeam illumination selector: switches between illumination options.
  - > AutoBeam laser coupler: selects laser wavelength from UV to NIR.
  - > AutoBeam output coupler: connects and aligns selected spectrometer.
  - > AutoBeam calibration source: calibrates spectrometer gratings.
  - > AutoBeam iris diaphragms: adjust illumination for best contrast and homogeneity.
  - > AutoBeam polarizer: operates polarizer and analyzer automatically.

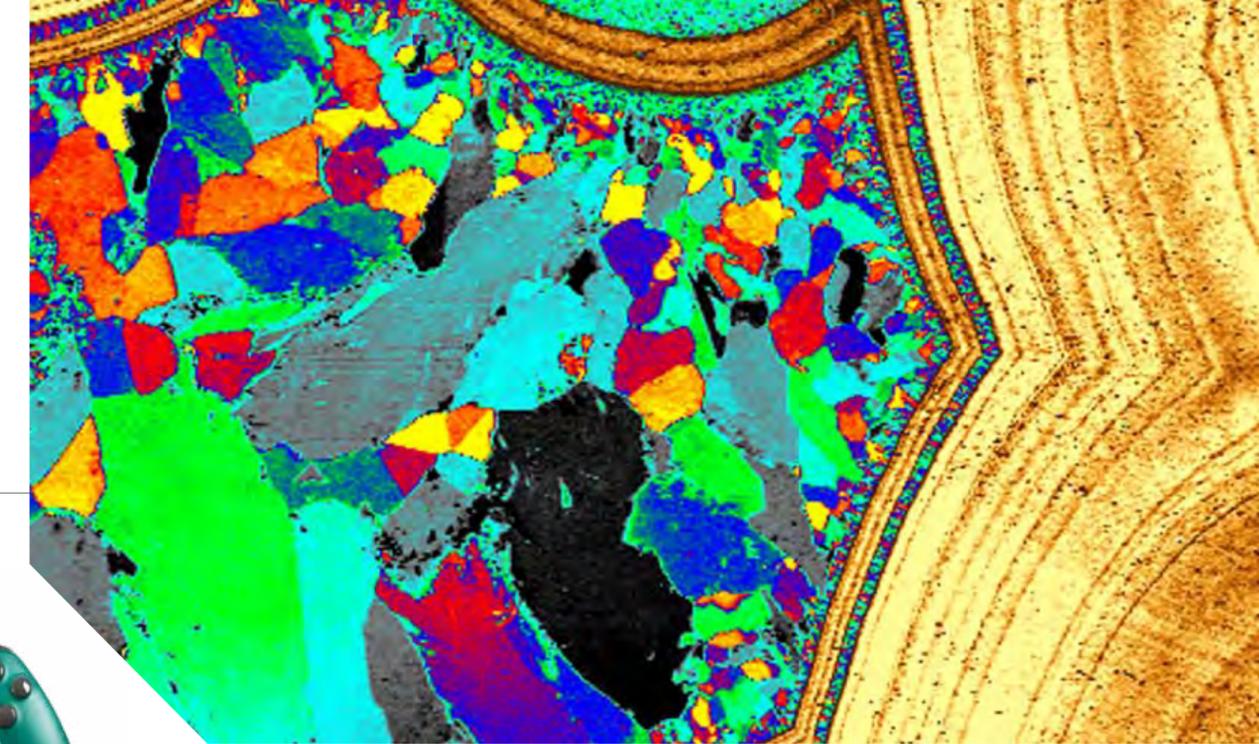
### Raman imaging

- TruePower determines absolute laser power with <0.1 mW accuracy.
- Instrument positions and repositions sample automatically with motorized and piezo-driven scanning stages.
- Focus stabilization actively maintains focus during entire measurements.
- Motorized objective turret includes offset-compensation for convenient precision; compatible with AFM/SNOM objectives.
- EasyLink handheld controller offers intuitive instrument operation.



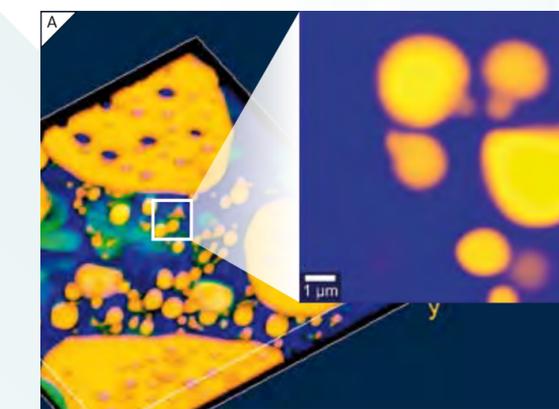
## Data processing, export and display

- Suite FIVE software wizard guides the user through the processing of Raman spectra, from background reduction through image generation.
- TrueMatch software helps to identify molecules by comparing measured spectra with existing databases.
- Suite FIVE facilitates the export and display of your data.



Raman image of a cut agate with various phases of silica and silicon oxides identified by their Raman spectra.

## High spatial and spectral resolution simultaneously: CCl<sub>4</sub> in an emulsion



(A) 3D confocal Raman image of an emulsion, with a zoomed-in view of the inset. (B) shows the corresponding spectra: Green: alkane; blue: water; yellow: CCl<sub>4</sub> and oil. Due to the high spectral resolution of the spectroscopic system, the CCl<sub>4</sub> band at 460 relative wavenumbers (cm<sup>-1</sup>) can be resolved at room temperature into three peaks, as shown in the zoom-in. These peaks reflect the isotopic variations of the molecules.

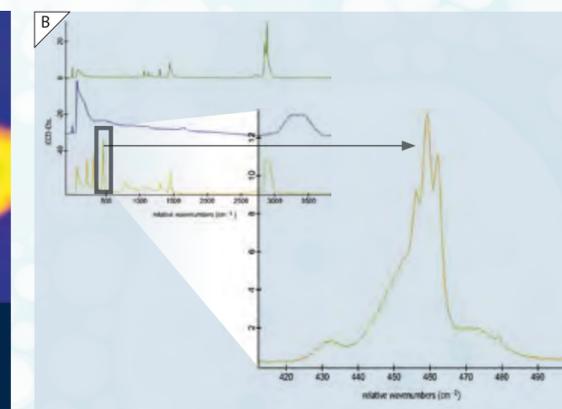
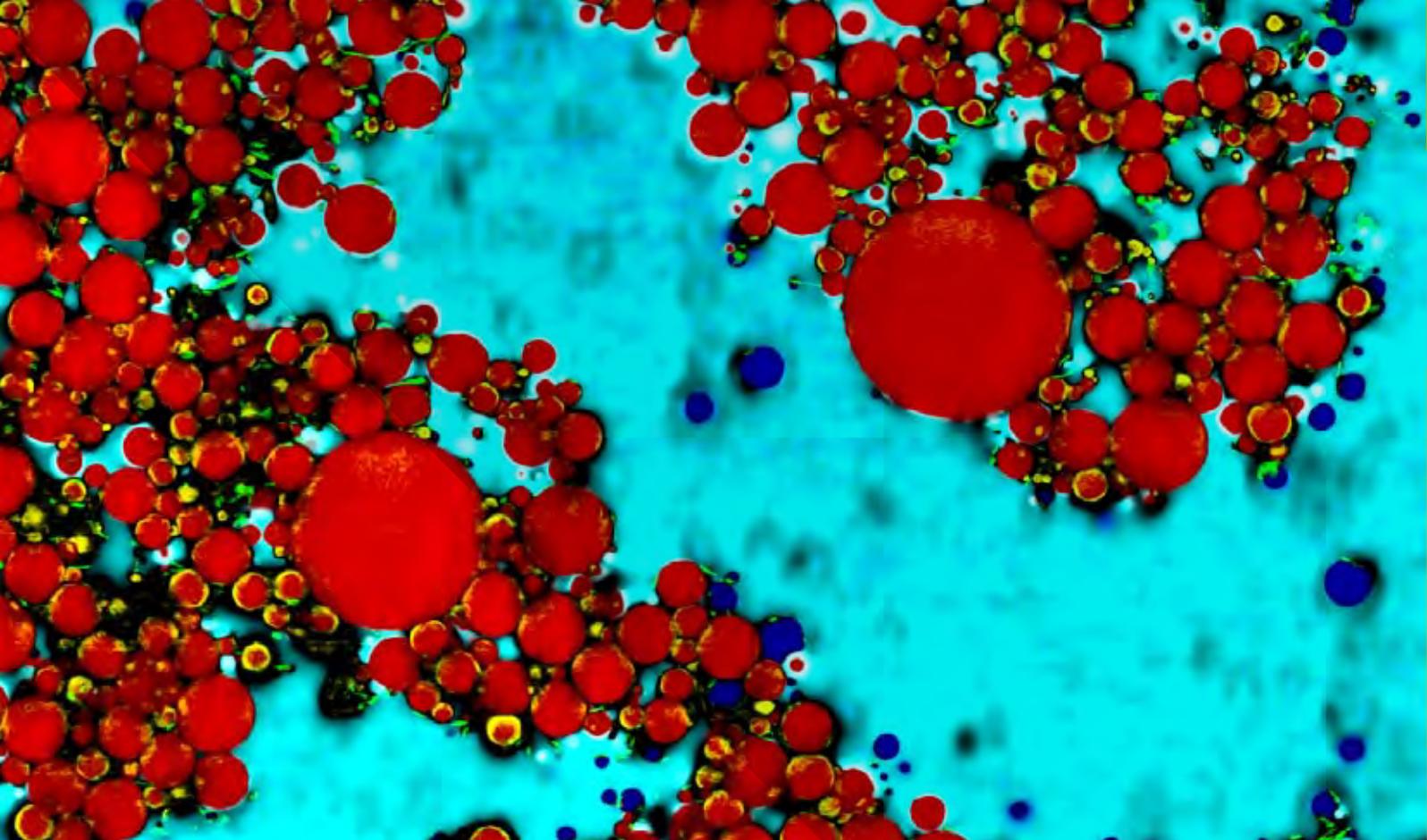


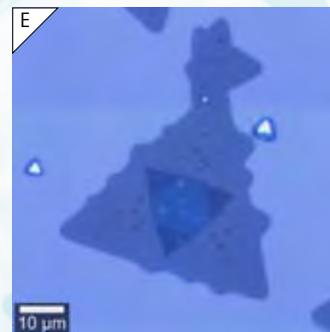
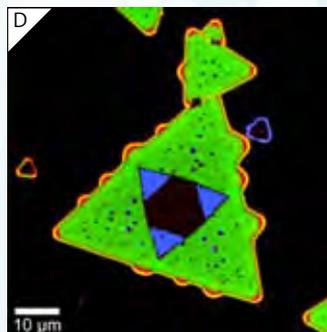
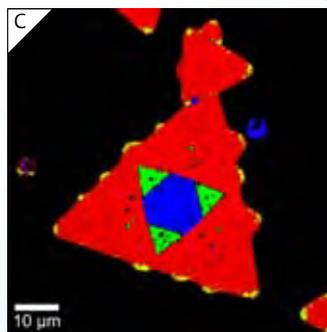
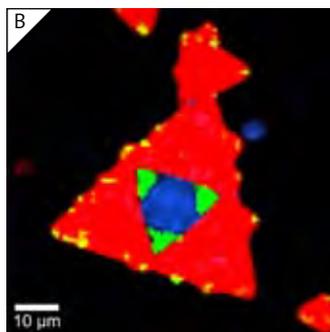
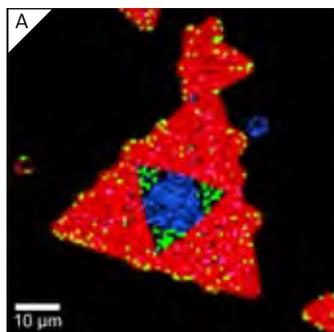
Image parameters: 200 x 200 x 20 pixels, 100 x 100 x 10 μm<sup>3</sup> scan range, 6 ms integration time per spectrum, 532 nm excitation wavelength.





Raman image of a moisturizing shower gel with increased oil content. Red: oil; yellow: emulsifier; blue and cyan: aqueous phases.

## The alpha300 *apyron* offers unrivaled data acquisition speed



The extremely high performance and speed of the alpha300 *apyron* microscope is vividly demonstrated with the analysis of a tungsten diselenide ( $\text{WSe}_2$ ) sample.

**(A)** In about 2 minutes, a clear and informative  $75 \times 75 \mu\text{m}^2$  Raman image of the  $\text{WSe}_2$  flake was recorded. The flake consists of single layer areas (red), double layers (green) and multi-layers (blue). **(B)** shows the same measurement after smoothing. **(C)** A measurement of about 17 minutes produced an even sharper image. The integration time was 6 ms per pixel in both experiments. The increased signal to noise ratio was achieved by reducing the pixel size from 750 nm in **(A)** to 230 nm in **(C)**. In **(D)** the photoluminescence image of the same flake is presented, corresponding perfectly with the Raman image. **(E)** White-light image of the sample.

## WITec alpha300 series



**alpha300  
access**

**alpha300 R**  
Confocal Raman  
Microscope

**alpha300 Ri**  
Inverted Confocal  
Raman Microscope

**RISE™**  
Correlative  
Raman-SEM Imaging

**alpha300 apyron™**  
Automated Confocal Raman Miroscope



**WE TAKE CARE**

WITec uses environmentally friendly printed materials. While this policy is only a small contribution to a healthy environment, we at WITec believe that focusing on details can effect positive change in the world.

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