

Laser Raman Microscope
RAMANtouch

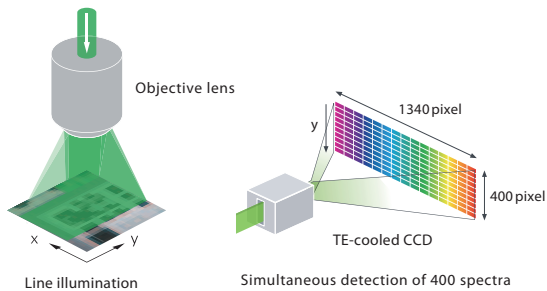


With the great features of high spatial resolution near diffraction limit and the ultra-fast Raman imaging system, RAMANtouch will meet the needs at the world's highest level.

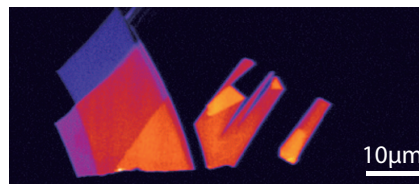
Brand new world of Raman Imaging at the World's fastest, finest quality

Ultra-high speed Raman imaging by line illumination

Nanophoton has developed an original technology which illuminates the sample with a line shaped laser beam. The scattered Raman light is detected by the CCD with 400 pixel in y-axis direction, obtaining 400 spectra at one exposure. By adopting the laser beam scanning with galvanometer mirrors, the ultra-fast and high accuracy scanning of RAMANTouch enables Raman imaging of some hundred thousand pixel within quick few minutes.



Raman Image of Graphene on Si/SiO₂ substrate



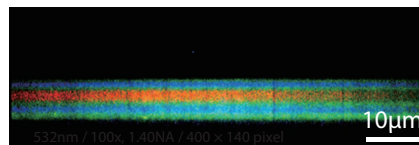
532nm / 100x, 0.90NA / 400 × 169 pixel

■ : Mono layer ■ : Double layer ■ : Triple layer ■ : Quadruple layer

Sample by the courtesy of Dr. Daiju Tsuya of National Institute for Materials Science

Measuring time
5min

Cross sectional Raman image of multi-layered plastic film



532nm / 100x, 1.40NA / 400 × 140 pixel

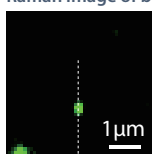
■ : Polyethylene ■ : Nylon ■ : Polypropylene

Measuring time
5min

Guaranteed spatial resolution at diffraction limit of 350nm

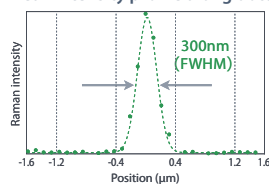
As the leading edge developer of laser microscopes, Nanophoton has designed the ideal optical system to reach the theoretical limit; and here it is. RAMANTouch has reached the spatial resolution of 350nm by adopting the high quality lasers of single transverse mode. The data below is the Raman imaging of a diamond bead (200nm diameter). The Full Width at Half Maximum (FWHM) is at the guaranteed spatial resolution of 350nm. This is obtained from the peak intensity profile along the dotted lines shown in the image.

Raman image of bead



532nm / 100x, 0.90NA

Peak intensity profile along dotted lines



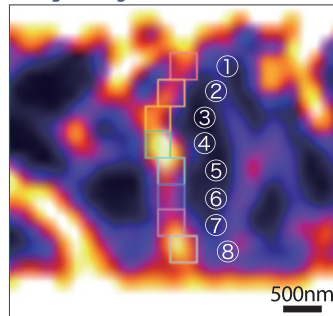
Raman image of Carbon Nanotubes

Distribution of G-band intensity



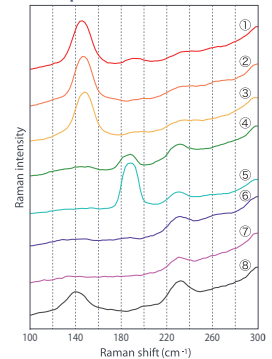
532nm / 100x, 0.90NA / 400 × 33 pixel / 16 min

Enlarged image



Low High
G-band intensity

RBM peak of each selected area

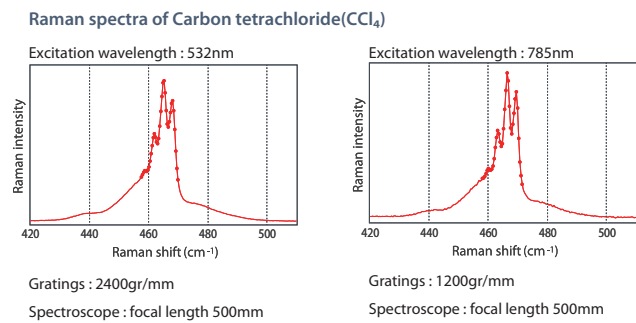


Samples by the courtesy of Prof. Shigeo Maruyama of Tokyo University

As the professionals of Laser Microscopes, Nanophoton's world leading innovative technology has realized an unparalleled imaging performance.

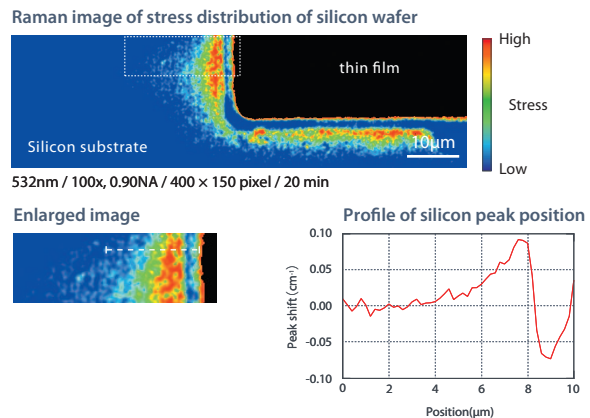
High spectral resolution distinguishes close peaks

"To ensure enough spectral resolution" " To ensure decent lighting" " To be as compact as possible" . To achieve these 3 goals, RAMANtouch has adopted a spectroscope with a focal length of 500 mm. The spectral resolution under 1.2cm^{-1} (FWHM) is obtained with the grating of 1200gr/mm. The graphs right is the Raman spectra of Carbon tetrachloride(CCl_4) at excitation wavelength of 532nm and 785nm. Both excitation wavelength detects the complicated group of Raman peaks separately.



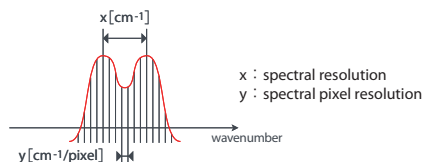
Accurate peak positioning enables high accuracy stress analysis

The Raman peak position of silicon at 520cm^{-1} shifts when the crystal lattice distorts by stress. It shifts to the higher wavenumber when compressed, and shifts to the lower when pulled. The amount of shift is proportional to the amount of stress given. The image right is the Raman image of silicon wafer, with thin film formed on the surface, colored by the stress distribution. The change in peak position of silicon around the border of film is analyzed by plane, then observed by image. The graph of silicon peak position along the dotted line(enlarged image) show stress distribution is analyzed at a high accuracy of over 0.1cm^{-1} .



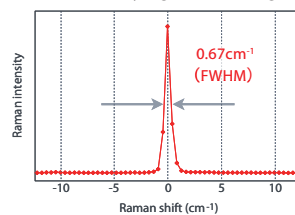
Difference between Spectral and Pixel resolution

Pixel resolution indicates the area(cm^2) per pixel of dispersed Raman light which hits CCD. The more fine pixel the CCD has, the smaller the pixel resolution gets. However, smaller pixel resolution does not relate with higher spectral resolution.



Evaluation of Spectral resolution

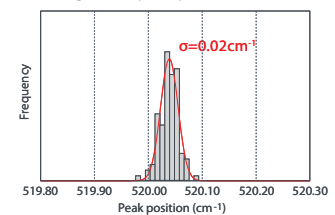
FWHM of Rayleigh scattered light



Excitation wavelength : 785nm
Grating : 1200gr/mm
Spectroscope : focal length 500mm

Evaluation of peak positioning accuracy

Histogram of peak position of silicon



Excitation wavelength : 532nm
Grating : 2400gr/mm
Spectroscope : focal length 500mm

Main Performance

Main Performance	
Spatial resolution (X / Y / Z)	350nm / 500nm / 1000nm (@532nm, 100x 0.90NA)
Spectral range	100cm ⁻¹ ~
Spectral resolution (FWHM)	1.2cm ⁻¹ (@785nm, 1200gr/mm)
Pixel resolution (spectrum)	0.3cm ⁻¹ /pixel (@785nm, 1200gr/mm)
Accuracy of peak position	0.1cm ⁻¹

Main Specification

Main Specification	
Laser wavelength	488nm, 532nm, 671nm, 785nm
Laser illumination method	Point illumination / Line illumination
Focal length of spectrograph	500mm
Grating selection	150, 300, 600, 1200, 1800, 2400gr/mm (3 gratings at maximum)
Detector	TE-cooled CCD 1340 × 400 pixel format
Microscope	Upright / Inverted

Option	<ul style="list-style-type: none"> • Database • Cooling / Heating stage • Motorized stage for wide field observation • Basic Polarization Optics for Polarized Raman measurement • High accuracy peak position / peak shift measurement • Remote operation with iPad
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Body Dimension and Weight

Size (W×H×D)	820 × 450 × 670 mm
Weight	70kg



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