Photon etc
A spectrum of solutions

5795 DE GASPE AVENUE, #222
MONTREAL, QUEBEC, H2S 2X3
CANADA

RIMA™
RAMAN IMAGING SYSTEM

Photon etc's latest innovation, RIMA™, is ideal to characterize a wide range of materials. Exploiting our expertise with Raman filters (TTNF, LLTF) and photoluminescence imaging (IMA™), the next step of evolution was to offer a unique Raman global imaging tool, giving access to high precision maps of molecular vibrations of different samples or probes. When combined to imaging, ultra-narrow volume Bragg grating filtering allows the collection of spatial and spectral information of complete surfaces, giving access to a detailed molecular cartography. Contact us to learn more about our standard systems or customization possibilities.

TECHNICAL SPECIFICATIONS

Spectral Range*	200 nm window between 400 to 1000 nm
Spectral Resolution	0.2 nm (down to 2 cm^{-1})
Spatial Resolution	Sub-micron
Microscope	Olympus BX51 or IX71
Objectives	20X, 50X, 100X
Camera*	Cooled digital 12 or 16 bit CCD Camera (EMCCD available)
Maximum Sample Format	4" x 4" (10 cm x 10 cm)
X, Y Travel Range	76 mm x 52 mm
Z Stage Resolution	1 µm
Maximum Scanning Speed	150 ms
Wavelegth Absolute Accuracy	0.03 nm
Excitation Wavelegths*	355 nm, 532 nm, 780 nm
Video Mode	Megapixel camera for sample vizualisation
Preprocessing	Spatial filtering, statistical tools, spectrum extraction, data normalization, spectral calibration
Hyperspectral Data Format	FITS, HDF5
Single Image Data Format	JPG, PNG, TIFF, CSV, PDF, SGV
Software	Computer with PHySpec™ control and analysis software incuded
Dimensions	≈ 30" x 30" x 30" (≈ 76 cm x 76 cm x 76 cm)
Weight	≈ 80 Kg

*Customization available (e.g. 1000-1750 nm, external laser input extension, and more)

RAMAN HYPERSPECTRAL IMAGING TO MAP Si/Ti WAFERS

Raman spectroscopy imaging simultaneously identifies and localizes a number of molecular species because of Raman diffusion specificity. This allows for the characterization of vibrational, optical and electronic properties that are difficult to observe with other measurement techniques. Raman spectroscopy requires maximum measurement efficiency because the signal from Raman diffusion is much weaker than other optical characterization techniques.

A new type of Raman spectroscopy imager, RIMA™, has been developed by University of Montreal and Photon etc. The patented technology of the Bragg Tunable Filter (BTF) significantly reduces the acquisition time compared to currently available imagers while keeping high spatial and spectral resolutions. The standard methods, point-to-point measurements or imagers using liquid crystal tunable filters, increase substantially the acquisition time because of the downtime of mechanical displacements of the sample or the low filter transmission and polarization sensitivity. With a BTF, a single wavelength is detected at a once on the whole image. Wavelengths are scanned by changing the angle of incidence of the beam on the grating. The decision to use spectral rather than spatial scanning saves in acquisition time. The BTF has an achievable efficiency up to 80%, allowing for non-destructive molecular analysis with high sensitivity. The transmission is continuously tunable over 400 nm range with a spectral resolution of 0.2 nm.

RIMA™ was tested with a Si substrate where a pattern of Ti has been deposited. We use a single mode doubled Nd:YAG laser operating at 532 nm and a 100× Olympus microscope objective. The illumination area has a diameter of 80 µm. The power density on the sample is 3 kW·cm^{-2}. Figure 1 (a) shows an image at 532 nm, corresponding to the reflection of the laser. The pattern "26" showing a higher reflectance is a structure of Ti. The surrounding area with lower reflectance is the Si substrate. Figure 1 (b) shows an image at 520 cm^{-1} from the laser line, corresponding to the Si Raman diffusion. We clearly observe a signal emitted from the Si substrate whereas no light is emitted from the Ti pattern. Figure 1 (c) shows the spectra at the laser wavelength and at 520 cm^{-1} from it. The narrow peak centered at 520 cm^{-1} coming from the Si substrate and the absence of light from the Ti patterns demonstrate that we observe the Raman diffusion from the Si substrate with good spatial and spectral resolutions of 7 cm^{-1}.

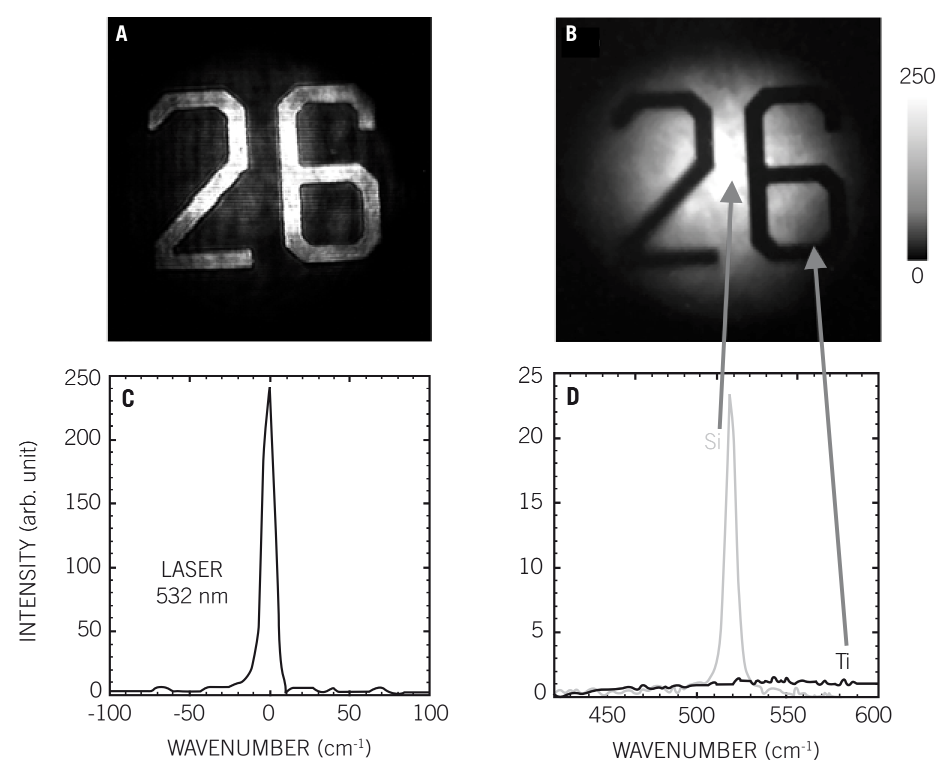

FIGURE 1 : Monochromatic images at (a) 532 nm and (b) 520 cm^{-1} of a Si substrate with a pattern of Ti. (c) shows the spectra as a function of the wavenumber of different positions on the image.