Photon etc
A spectrum of solutions

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RIMA™
HYPERSPECTRAL MICROSCOPE

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RIMA is a hyperspectral global microscope delivering spectral and spatial information. This system rapidly provides Raman maps over large megapixel-scale fields of view. Based on high throughput global-imaging filters, RIMA is faster and more efficient than standard point-by-point or line-scan based systems.

MEGAPIXEL IMAGES **IN MINUTES!**

TECHNICAL SPECIFICATIONS		
Excitation wavelength	532 nm or 660 nm	785 nm
Spectral range	190 - 4000 cm^{-1}	190 - 2700 cm^{-1}
Spectral resolution (FWHM)	< 7 cm^{-1}	
Spectral channels	Continuously tunable	
Spatial resolution	Sub-micron - limited by the microscope obejctive NA	
Camera	Back-illuminated CCD	Back-illuminated deep-depletion CCD
Microscope	Upright or inverted	
Wavelegth absolute accuracy	1 cm^{-1}	
Maximum scanning speed	150 ms per wavenumber	
X, Y Travel range	76 mm x 52 mm (with a manual stage)	
Z Stage resolution	100 nm	
Video mode	Megapixel camera for sample vizualisation	
Preprocessing	Spatial filtering, statistical tools, spectrum extraction, data normalization, spectral calibration	
Hyperspectral data format	HDF5, FITS	
Software	PC (Windows10 - 64-bits) with PHySpec™ control and analysis software (computer included)	
Dimensions*	≈ 102 cm x 76 cm x 76 cm	
Weight	≈ 80 kg	
Power requirement	120 VAC / 12A / 60Hz 230 VAC / 12A / 50Hz	

OPTIONS AND ACCESSORIES	
	Objectives magnification: 20X, 40X, 50X, 60X, 100X
	Spectral range extension: Anti-Stokes
	Motorized stage: 100 mm x 100 mm travel, 22 nm resolution
	Camera: EMCCD
	**Optical table with passive anti-vibration isolation recommended: 900 x 1800 x 60 mm (36 x 72 x 2.4 inches) or 900 x 900 x 60 mm (36 x 36 x 2.4 inches) next to 900 x 900 mm (36 x 36 inches) standard table*

RIMA APPLICATIONS OVERVIEW:

- Perform low-dimensional material analyses like graphene and carbon nanotubes.
- Monitor and analyze biological tissues non-invasively.
- Identify materials (plastic, metals) and characterize their structure (crystallinity, phase, chemical bond, strain, stress).

Hyperspectral Raman imaging using Bragg tunable filters of graphene and other low dimensional materials

Etienne Gaufrès, Stéphane Marcet, Vincent Aymong, Nathalie Y-Wa Tang, Alexandre Favron, Felix Thouin, Charlotte Allard, David Rioux, Nicolas Cottenye, Marc Verhaegen and Richard Martel. DOI: 10.1002/jrs.5298

Journal of RAMAN SPECTROSCOPY

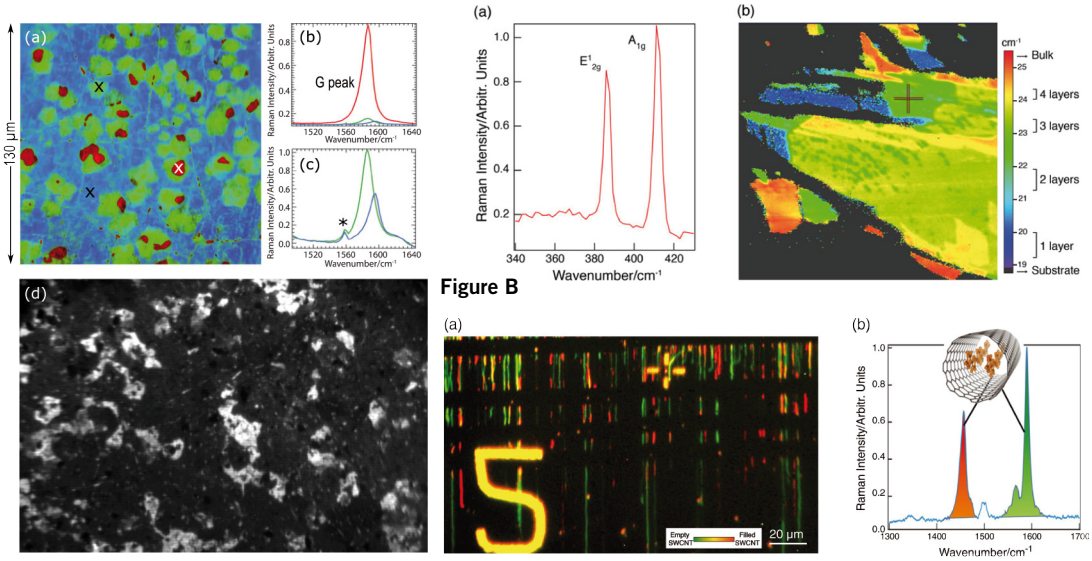


Figure A

Figure B

Figure C

Figure A. (a) 130 µm × 130 µm Raman mappings of the G peak intensity at λ = 532 nm of graphene bilayer islands on a graphene monolayer. (b,c) Spectra of monolayer (blue) graphene and of nonresonant (green) and resonant (red) bilayer graphene islands from selected points in (a). The peak indicated by * is an instrument artifact. (d) Raman image (70 × 47 µm²) of the G peak intensity of an artificial bilayer of graphene composed of two monolayers stacked on top of each other.

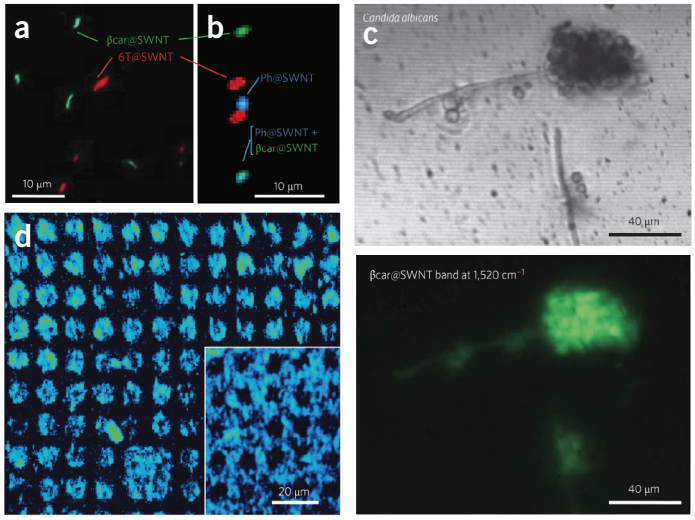
Figure B. (a) Raman spectrum at λ_{exc} = 532 nm of few layers MoS_2 extracted from a RIMA hyperspectral cube of the sample and corresponding to the area pointed by a cross in (b). (b) Color coded cartography (130 µm × 130 µm) of the layer composition of exfoliated MoS_2 deposited on 100 nm SiO_2/Si substrate. The color code is obtained from the difference in peak positions between the A_{1g} and E^1_{2g} modes.

Figure C. (a) 260 × 260 µm² Raman mapping of 6T molecules encapsulated in carbon nanotubes (6T@SWCNTs). The image is a superposition of the maximum intensity of CNTs at 1590 cm⁻¹ (green scale) and 6T at 1450 cm⁻¹ (red scale) obtained after background subtraction. Empty CNTs in green can be distinguished from filled CNTs with 6T molecules in yellow or red, depending on the intensity. (b) A representative Raman spectrum of the sample showing the characteristic peaks of 6T around 1460 cm⁻¹ and the G band of CNTs around 1590 cm⁻¹.

Giant Raman scattering from J-aggregated dyes inside carbon nanotubes for multispectral imaging

nature photonics

E. Gaufrès, N. Y.-Wa Tang, F. Lapointe, J. Cabana, M.-A. Nadon, N. Cottenye, F. Raymond, T. Szkopek and R. Martel. DOI: 10.1038/NPHOTON.2013.309

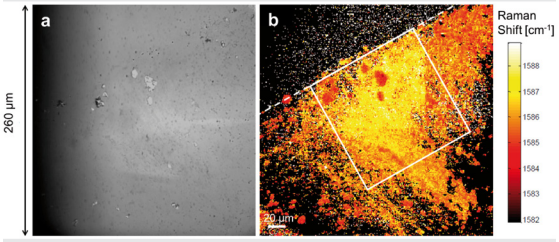


Raman multiplexing, protein recognition and tagged bacteria with dyes@SWNTs nanoprobes. (a) Raman hyperspectral image at λ = 532 nm of isolated bundles of 6T@SWNTs (red) and ßcar@SWNTs (green) co-deposited at low coverage onto a Si/SiO_2 substrate. (b) As in a, but using a mixture of 6T@SWNTs, ßcar@SWNT and Ph@SWNT (blue) nanoprobes on Si/SiO_2. (c) Top image: optical image of Candida albicans tagged with ßcar@PEG–SWNT. Bottom image: corresponding Raman image taken at 532 nm of the ßcar@f-SWNT mode centred at 1,520 cm⁻¹. (d) Raman image of the ßcar@PEG-biot–SWNT probe taken at 532 nm using the peak centred at 1,520 cm⁻¹. The ßcar@PEG-biot–SWNT probes selectively attached to immobilized streptavidin by microcontact printing in circular dot shapes (diameter, 10 µm). Inset: results using the reverse pattern with surface streptavidin located surrounding the dots.

MDPI

Electrostatic Deposition of Large-Surface Graphene

Charles Trudeau, Laura-Isabelle Dion-Bertrand, Sankha Mukherjee, Richard Marte and Sylvain G. Cloutier. DOI:10.3390/ma11010116



(a) White-light hyperspectral image with high field-of-view showing the edge of the deposition (dashed line). (b) Hyperspectral image of the full graphene deposition mapping the position of the highest intensity around the G peak (1500–1600 cm⁻¹). The white box represents 130 µm × 130 µm. Acquired using RIMA™ - Photon etc.