Photon etc
A spectrum of solutions

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IMA™
HYPERSPECTRAL MICROSCOPE

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Upright configuration

Inverted configuration

IMA is a hyperspectral microscope delivering spectral and spatial information in the VIS, NIR, and SWIR range (400 nm - 1620 nm). This system rapidly maps photoluminescence, electroluminescence, fluorescence, reflectance, and transmittance. Based on high throughput global-imaging filters, IMA is faster and more efficient than standard point-by-point or line-scan based systems.

TECHNICAL SPECIFICATIONS

	VIS - SWIR Model 400 - 1620 nm	
Spectral range	VIS 400-1000 nm	SWIR 900-1620 nm
Spectral resolution (FWHM)	< 2 nm	< 4 nm
Spectral channels	Continuously tunable	
Spatial resolution	Sub-micron - limited by the microscope objective NA	
Camera	CCD, EMCCD, sCMOS	Photon etc. InGaAs camera (ZephIR™ 1.7 or Alizé™ 1.7)
Excitation wavelengths (up to 3 lasers)	405, 447, 532, 561, 660, 730, 785, 808 nm (other wavelengths available upon request)	
Microscope	Upright or inverted, scientific grade	
Wavelength absolute accuracy	FWHM/8	
Maximum scanning speed	150 ms per wavelength	
X, Y Travel range	76 mm x 52 mm (with a manual stage)	
Z Stage resolution	100 nm	
White light illumination	Diascopic, episcopic, Hg, halogen	
Illumination options	Epifluorescence module, darkfield module (oil or dry)	
Video mode	Megapixel camera for sample visualization	
Preprocessing	Spatial filtering, statistical tools, spectrum extraction, data normalization, spectral calibration, overlay, central position map, etc.	
Hysperspectral data format	HDF5, FITS	
Software	PC (Windows10 - 64-bits) with PHySpec™ control and analysis software (computer included)	
Dimensions*	≈ 150 cm x 85 cm x 82 cm	
Weight	≈ 80 kg	
Power requirement	120 VAC / 12A / 60Hz 230 VAC / 12A / 50Hz	

OPTIONS AND ACCESSORIES

	Objectives magnification: 10X, 20X, 40X, 50X, 60X, 100X
	Spectral range extension (e.g. UV Option with FWHM=10 nm)
	Motorized stage: 100 mm x 100 mm travel, 22 nm resolution
	Filter wheel: up to 6 band-pass filters
	Electroluminescence module
	Second camera port
	Absolute photometric calibration
	High resolution module: 900 - 1620 nm FWHM < 1 nm
	**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*

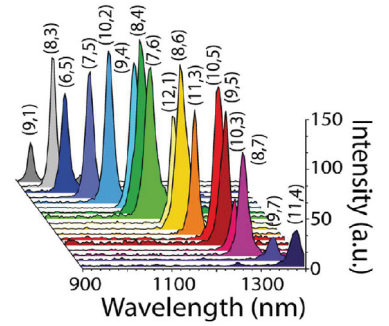
APPLICATIONS

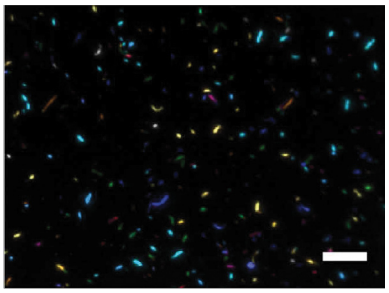
1. MULTIPLEXING

Spectral and spatial identification of CNT

False color fluorescence image of SDC-suspensed HiPco carbon nanotubes on a glass surface. Each color (17 species) corresponds to a spectrum, as shown below.

REF.: Roxbury D. et al. DOI 10.1038/srep14167



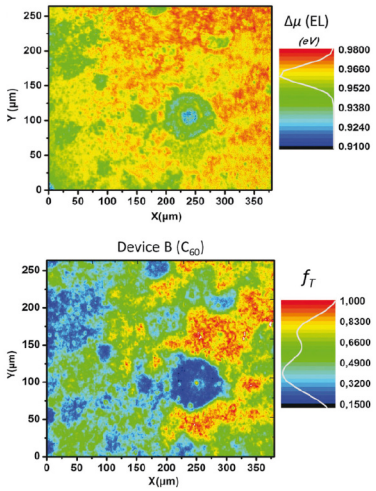


2. INHOMOGENEITY – DEFECTS MAPPING

Luminescence mapping of perovskite devices, absolute calibrated intensity

The top image represents absolute mapping of the quasi-Fermi level splitting derived from EL, for perovskite cells using C_{60} as the ETL. The lower image represents mapping of the current transport efficiency f_T.

REF.: El-Hajje G. et al. DOI: 10.1039/c6ee00462h



KEY POINTS - SPECTRAL AND SPATIAL IMAGING

- » Imaging of multiplexed emitters
- » Study of sample formation, degradation and identification of deficient areas
- » Mapping of spectral heterogeneities
- » Access to the second biological window (900 - 1620 nm)
- » Fast imaging – 1.4 million spectra in minutes
- » Large area – hundreds of μm² up to a few mm² with fast stitching

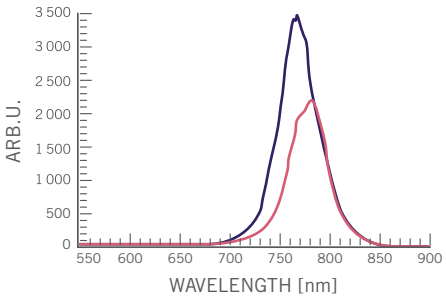
3. DEGRADATION - SAMPLE GROWTH

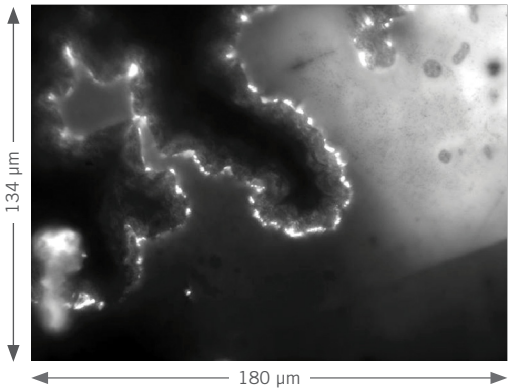
Photoluminescence mapping of perovskite crystals

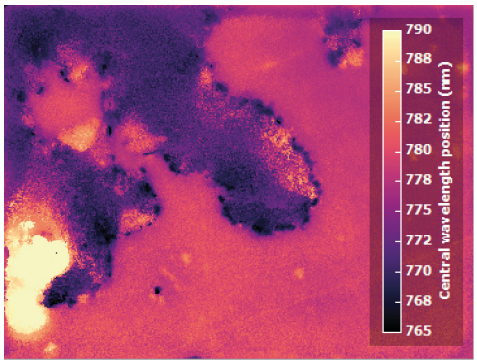
Black and white - PL image extracted at 770 nm, Colored image - false color map of the PL central wavelength,

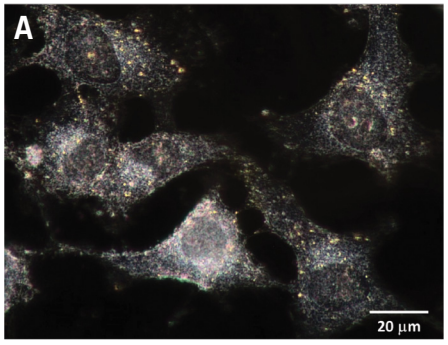
Side figure - two PL spectra extracted from the hyperspectral data – see corresponding colors.

REF.: Samples provided by Mercouri Kanatazidi (Northwestern Univ.) and David Cooke (McGill).









4. CELL LABELLING

Darkfield imaging of gold nanoparticles

A) Darkfield image of human breast cancer cells tagged with gold nanoparticles (60 nm size), B) monochromatic image at 550 nm. GNPs marked in green after PCA, C) manification of a breast cancer cell, D) and spectra of GNPs in different areas. Peaks at 550 nm confirm the presence of single 60 nm NPs. The absence of strongly red-shifted peaks confirm the absence of aggregated NPs. The hyperspectral camera did not detect any GNPs in the areas between the cells.

REF.: Results kindly provided by: David Rioux, Éric Bergeron and Michel Meunier, at École Polytechnique of Montreal, Quebec, Canada.