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IMA™

HYPERSPECTRAL MICROSCOPE

Upright configuration coupled with a CCD camera

Inverted configuration coupled with an InGaAs camera

The IMA™ hyperspectral microscopy platform delivers equally high spectral and spatial resolution. Have this modular system configured to rapidly scan the VIS, NIR and/or SWIR spectrums while mapping a combination of photoluminescence, electroluminescence, fluorescence, reflectance, and/or transmittance. Each IMA™ comes equipped with high throughput global imaging filters; this allows it to measure a megapixel hypercube faster than hyperspectral systems reliant on scanning spectrography.

IMA™ opens the door to

- Perform complex material analyses like solar cell characterization and semiconductor quality control (e.g.: perovskite, GaAs, SiC, CIS, CIGS, etc.)
- Retrieve dark-field images and obtain a contrast of transparent and unstained samples such as polymers, crystals or live cells
- Study IR markers in complex environments including live cells and tissues. Take for instance the spectral heterogeneity of IR fluorophores emitting in the second biological window

TECHNICAL SPECIFICATIONS

	VIS - SWIR Model 400 - 1620 nm	
	VIS	SWIR
Spectral Range	400-1000 nm	900-1620 nm
Spectral Resolution	< 2 nm	< 4 nm
Camera	CCD, EMCCD, sCMOS	Photon Etc. InGaAs Camera
Excitation Wavelengths *(up to 3 lasers)*	405, 447, 532, 561, 660, 730, 785, 808 nm	
Microscope	Upright or Inverted, Scientific grade	
Spatial Resolution	Sub-micron - Limited by the microscope objective N.A.	
Maximum Sample Size	10 cm x 10 cm	
X, Y Travel Range	76 mm x 52 mm	
Z Stage Resolution	100 nm	
Illumination	Diascopic, Episcopic, LED, Hg,	
Illumination Option	*Epifluorescence module, Darkfield module*	
Wavelength Absolute Accuracy	0.25 nm	
Video Mode	Megapixel camera for sample visualization	
Data Processing	Spatial filtering, statistical tools, spectrum extraction, data normalization, spectral calibration, overlay, central position map	
Hysperspectral Data Format	HDF5, FITS	
Single Image Data Format	HDF5, CSV, JPG, PNG, TIFF	
Software	PHySpec™ control and analysis software (computer included)	
Dimensions*	≈ 150 cm x 85 cm x 82 cm	
Weight	≈ 80 kg	

**Optical table, with passive anti-vibration isolation, recommended: 900 mm x 1800 mm x 60 mm (36" x 72" x 2.4") or 900 mm x 900 mm x 60 mm (36" x 36" x 2.4") optical table next to a standard 900 mm x 900 mm (36" x 36") table*

Accessories
Objectives magnification: 10X, 20X, 40X, 50X, 60X, 100X
Spectral range extension (e.g. UV Option)
Motorized stage (100 mm x 100 mm travel)
Filter wheel (with up to 6 band-pass filters)
Electroluminescence module
Second camera port

APPLICATIONS

KEY POINTS - SPECTRAL AND SPATIAL IMAGING

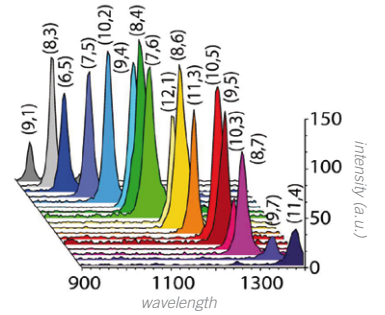
- Imaging of multiplexed emitters
- Identification of defects, grain boundaries and phase segregation
- Study of sample formation, degradation and identification of deficient areas
- Mapping of spectral heterogeneities
- Access to the second biological window (900 - 1600 nm)
- Fast imaging – 1.4 million spectra in minutes
- Large area – hundreds of µm² up to a few mm² with fast stitching

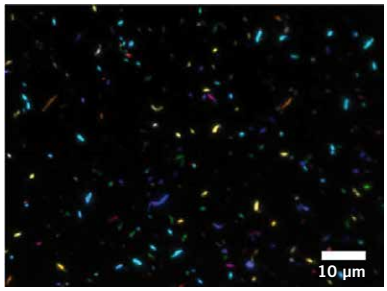
1. MULTIPLEXING

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 (2015)



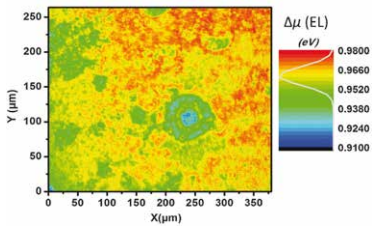


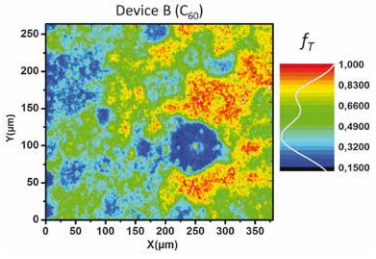
2. INHOMOGENEITY – DEFECTS MAPPING

Absolute luminescence mapping of perovskite devices

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 (2016).



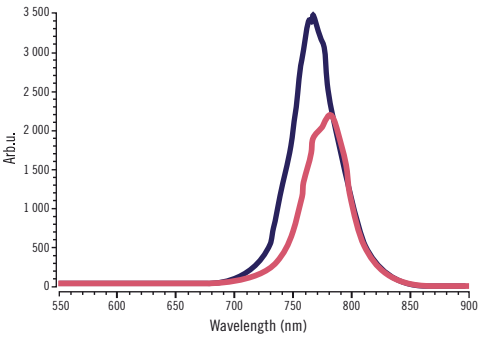


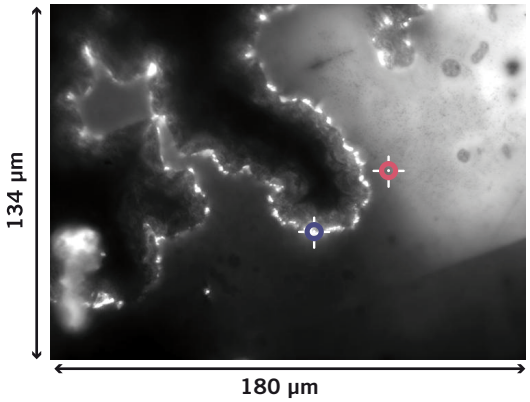
3. DEGRADATION - SAMPLE FORMATION

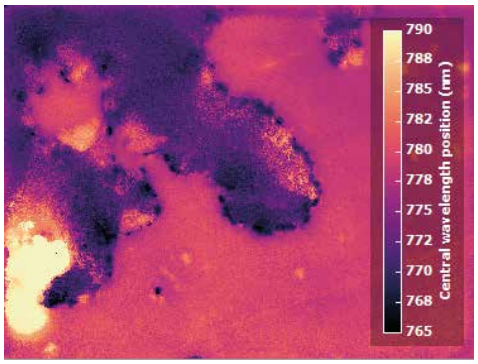
Photoluminescence mapping of perovskite crystals

Black and white - PL image extracted at 770 nm,
Colored image - false color map of the PL central wavelength,
Side image - two PL spectra extracted from the hyperspectral data – see corresponding targets.

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







4. CELL LABELLING

Dark-field imaging of gold nanoparticles

A) Dark-field 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.