Photon etc
A spectrum of solutions

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CANADA

THE HYPERCUBE™

The HyperCube™ will transform your miscroscope into a high resolution spectral imaging system, opening new research perspectives in biological imaging. Designed to fit commercial microscopes, cameras and a vast avriety of excitation modules, The HyperCube™ gives access to the detailed composition of your sample.

The HyperCube™ can be used in an **upright** or in an **inverted** microscope configuration

TECHNICAL SPECIFICATIONS

Spectral Range	400 - 1000 nm / 900 - 1620 nm / 400 - 1620 nm *(Other spectral ranges available upon request)*
Spectral Resolution	< 2 nm (400 - 1000 nm) < 4 nm (900 - 1620 nm)
Spatial Resolution	Limited by the microscope objective N.A
Microscope	Provided by customer - Brand and model need to be approved
Objectives	Provided by customer
Camera	Provided by customer - Brand and model need to be approved
Epifluorescence Filter	Provided by customer
Illumination Lamp	HBO or XBO 100 (Provided by customer)
Darkfield Module	Provided by customer
Wavelength Absolute Accuracy	0.25 nm
Video Mode	Filtered and non-filtered visualization
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	PHySpec™ control and analysis software included
Dimensions	≈ 55 cm (adjustable) 30 cm x 45 cm
Weight	≈ 18.5 kg

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APPLICATIONS

KEY POINTS - *SPECTRAL AND SPATIAL IMAGING*

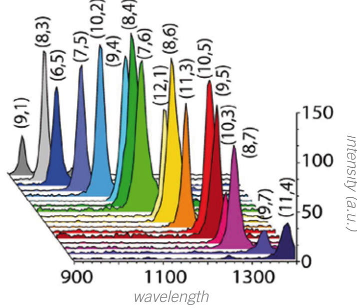
- » Imaging of multiplexed emitters
- » Identification of defects, grain boundaries and phase segregation
- » Study of sample formation, degradation and identification of deficient areas
- » Mapping of spectral heterogeneities
- » Access to the second biological window (900 - 1600 nm)
- » Fast imaging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

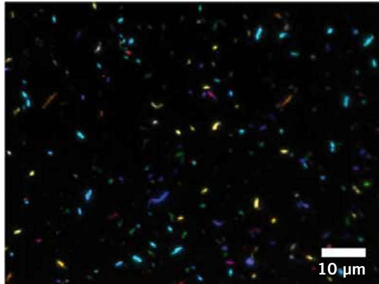
1. MULTIPLEXING

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)



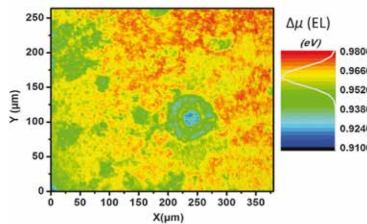


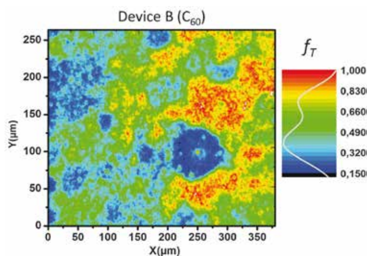
2. INHOMOGENEITY – DEFECTS MAPPING

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).



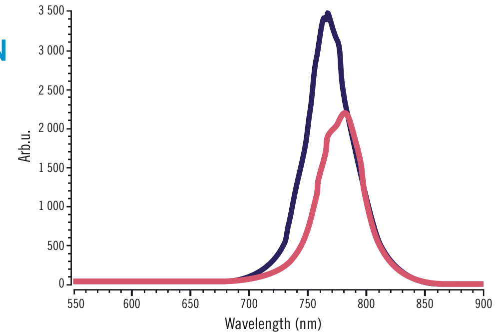


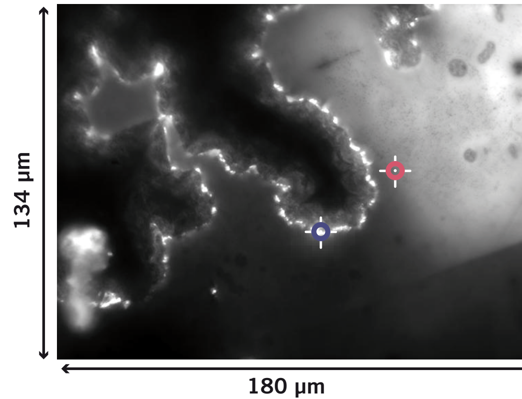
3. DEGRADATION - SAMPLE FORMATION

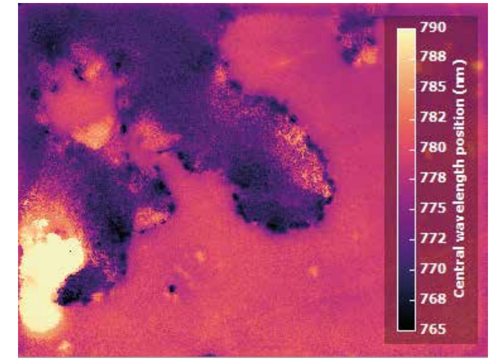
Photoluminescence mapping of perovskite crystals

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).





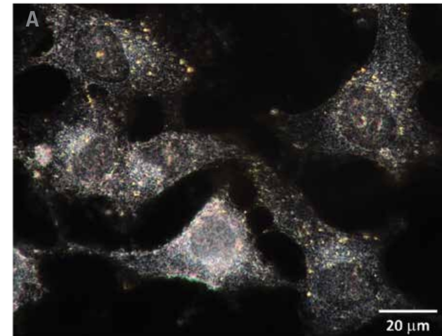


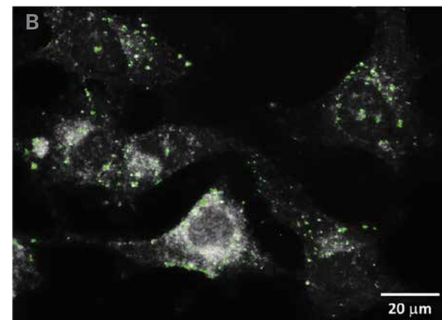
4. CELL LABELLING

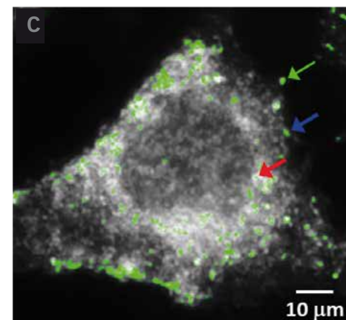
Dark-field imaging of gold nanoparticles

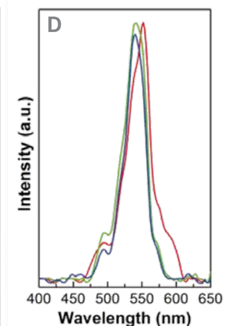
A) Dark-field image of human breast cancer cells tagged with gold nanoparticles (60 nm size), B) monochromatic image at 550 nm. GNPs marked in green after PCA, C) manification of a breast cancer cell, D) and spectra of GNPs in different areas.Peaks at 550 nm confirm the presence of single 60 nm NPs. 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.









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