Photon etc
A spectrum of solutions
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HyperCube™

HYPERSPECTRAL FILTER

The HyperCube is a hyperspectral filter continuously tunable in the VIS, NIR and SWIR spectral ranges. This filter is designed to fit commercial upright or inverted microscopes and couples with standard cameras and excitation modules. Designed around high-throughput Bragg grating filters, the HyperCube is perfectly suited for luminescence, darkfield, and brightfield hyperspectral imaging.

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

TECHNICAL SPECIFICATIONS		
	VIS - SWIR	
	400-1620 nm	
	VIS	SWIR
Spectral range*	400-1000 nm	900-1620 nm
Spectral resolution (FWHM)	< 2 nm	< 4 nm
Spectral channels	Continuously tunable	
Spatial resolution	Sub-micron - limited by microscope objective NA	
Camera	Provided by customer - brand and model must be approved	
Microscope	Provided by customer - brand and model must be approved	
Wavelength absolute accuracy	FWHM/8	
Maximum scanning speed	150 ms per wavelength	
Video mode	Filtered and non-filtered visualization	
Preprocessing	Image stabilization, 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 not included)	
Dimensions (L x W x H)	550 mm x 300 mm x 450 mm	
Weight	18.5 kg	
Operating temperature	10 to 40 -°C	
Storage temperature	0 to 50 -°C	
Power requirement	120 VAC / 1 A / 60 Hz 230 VAC / 1 A / 50 Hz	
	*Other spectral ranges available upon request	
	Objectives, epifluorescence filter and illumination modules provided by customer	

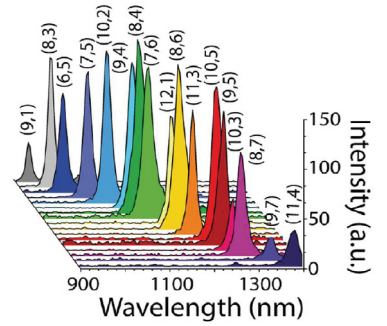
APPLICATIONS

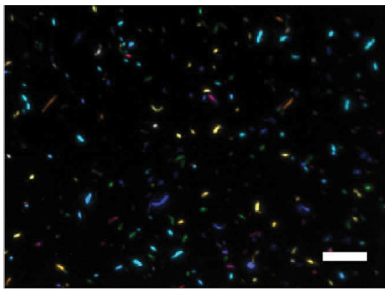
1. MULTIPLEXING

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



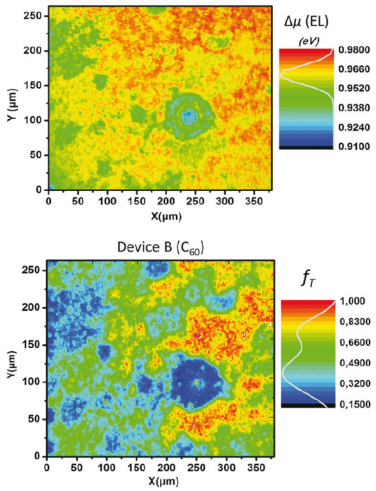


2. INHOMOGENEITY – DEFECTS MAPPING

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

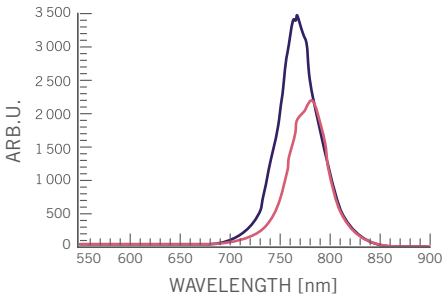
3. DEGRADATION - SAMPLE GROWTH

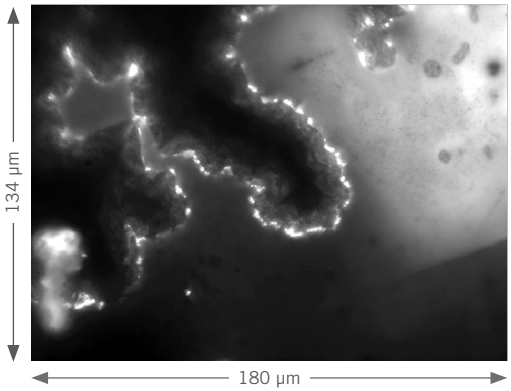
Photoluminescence mapping of perovskite crystals

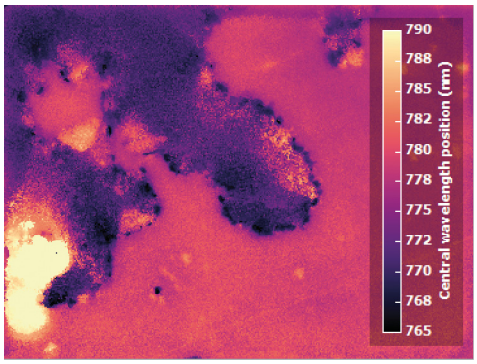
Black and white - PL image extracted at 770 nm, Colored image - false color map of the PL central wavelength,

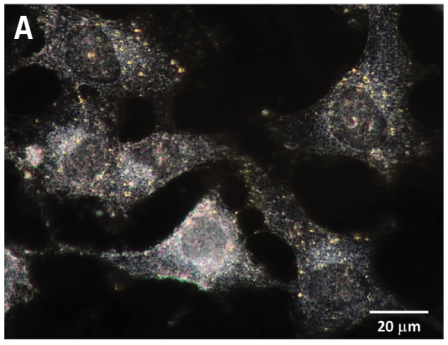
Side figure - two PL spectra extracted from the hyperspectral data – see corresponding colors.

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.