



# SNAPSHOT RGB+NIR MULTISPECTRAL IMAGING CAMERA

Imec's RGB-NIR multispectral platform demonstrates for the very first time the possibility to integrate together standard RGB organic color filters, NIR-cut filter, NIR narrow band-pass filters and on-chip microlenses technology, down to small pixels as small as 5µm today. First image sensor prototypes are now available, packaged in a ready-to-use CMV2000 image sensor standard format for easy integration and early evaluation into final applications.

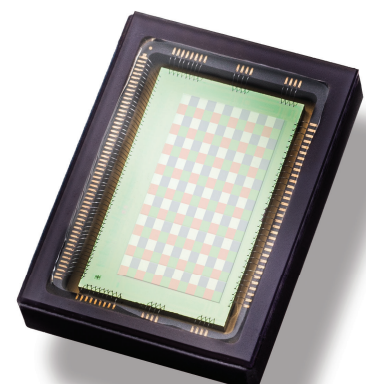
## CMOS BASED SPECTRAL FILTERING TECHNOLOGY FROM INDUSTRIAL TO HIGH VOLUME APPLICATIONS

Leveraging CMOS semiconductor factories, equipments and process technology, imec design and manufacture at wafer-level interference based optical filters that are deposited and patterned directly on top of CMOS image sensor pixel arrays. This unique infrastructure provides very clean (class 1 - particle free) optical filter integration with unprecedented size and cost reduction, with potential for high-volume manufacturing.

The integration of per pixel patternable narrow-band NIR imaging filters together with NIR-cut filter for true color rendering based on standard RGB organic color filter and microlenses array technology is a major integration breakthrough. It is today recognized as a key enabling technology for next-generation human-machine 3D imaging and medical diagnosis. But also in automotive and security surveillance applications where various NIR lighting concepts (LED or laser based) are being explored to improve the detection or tracking of useful signals, on purpose not visible to the human eye.

## KEY BENEFITS

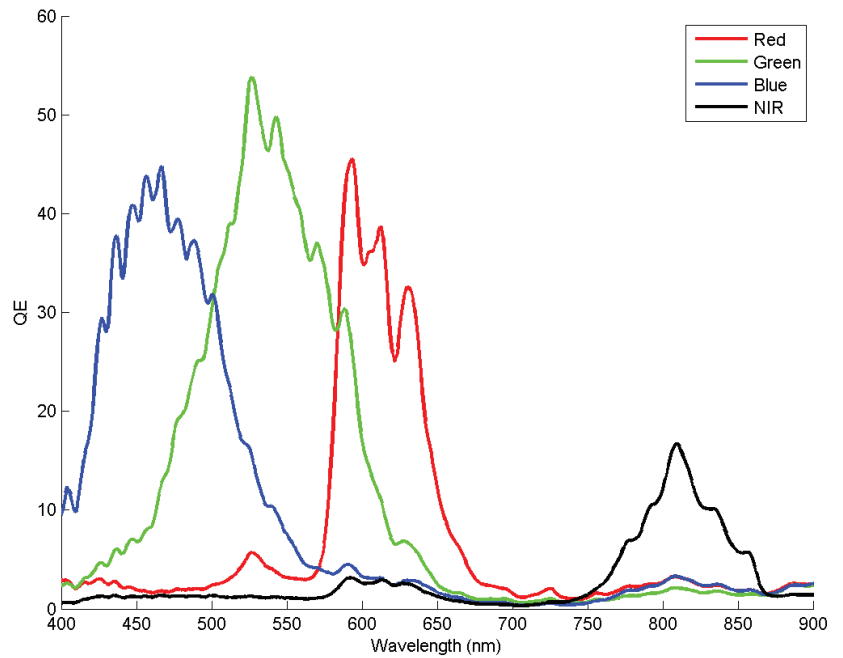
- **Color + narrow band NIR imaging** integrated into one single chip for compact, low-cost and integrated optical design solutions
- **Tunable NIR band-pass filter design** to match filter band (location, FWHM) with your own application requirements, for e.g. with one particular laser or LED wavelength of illumination



RGB-NIR multispectral imager 2x2 mosaic layout

## RGB-NIR MULTISPECTRAL SENSOR & CAMERA SPECIFICATIONS

Acquisition mode	snapshot 2x2 mosaic pattern
Wavelength range	RGB+NIR channels
Number of spectral bands	4 channels
Spatial resolution	1024x544 pixels (RAW per band)
Bandwidth per band (FWHM)	see QE plot
Imager type	CMOS imager, CMOSIS CMV2000 based
Imager resolution	2.Mpixels total
Frame rate	Up to 170fps (limited by USB3.0 camera interface)
Pixel pitch	5.5µm
Bit depth	8 and 10bit
Camera interface	USB3.0
Camera dimensions	26.4 x 26.4 x 21.6 mm
Camera weight	27g without fore-optics



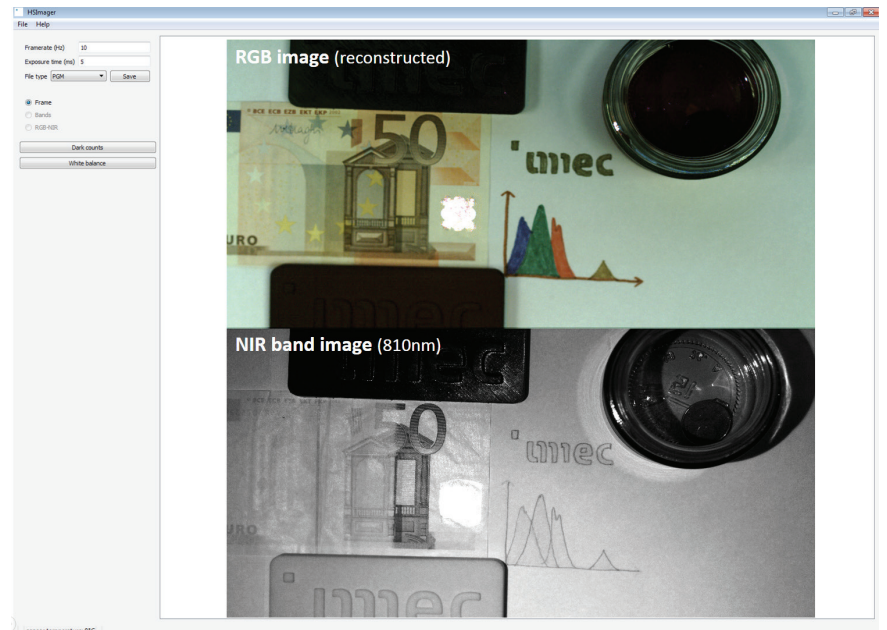
Measured QE responses of RGB+NIR spectral channels (with microlenses array post-processed on top of each filter)

## KEY APPLICATIONS

- Medical imaging using ICG fluorescence
- Human-machine interface for 3D gaming & virtual reality tracking
- Automotive
- Security surveillance
- Industrial inspection
- Food sorting

## MULTISPECTRAL IMAGER & SOFTWARE

The current RGB+NIR multispectral imager is built on a commercially available CMOS image sensor (CMV2000) designed for the high-speed machine vision market. The imager specifications are listed on the table above. The user interface of imec's in-house software is designed for user-friendly color (RGB) and near-infrared (NIR) imaging operations.



Color RGB and near-infrared NIR images of several objects as captured by imec RGB+NIR hyperspectral imaging camera demo-kit

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