

# Optical Systems

Creator  
Developer  
Manufacturer

*EPIC on-line meeting on microscopy (July 2020)*

**LAMBDA-X**  
MASTERS IN INNOVATION

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# What we do

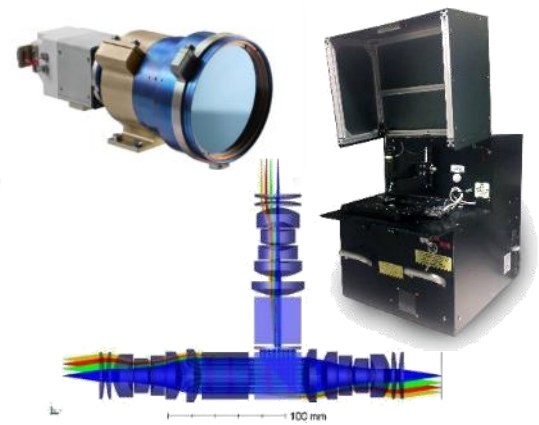
## PRODUCT



*metrology products for the ophthalmic market.*

*World leader in Quality Control of Intra-Ocular Lenses and contact lenses (installation base > 400)*

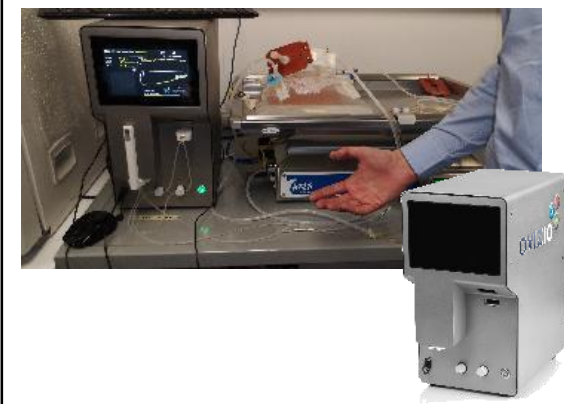
## ENGINEERING



*custom optical systems & product development*

*Optics, opto-mechanics, electronics, software, algorithms, certification*

## CONTRACT MANUFACTURING



*Optical based products*

*1000m<sup>2</sup> of CR facility*

*High precision tooling for optics assembly & metrology*

*Design services, certification*



## MARKET FOCUS

- Ophthalmics*
- Medical*
- Industry*
- Space*
- Security*

*SME created in 1996 (spin-off from ULB)*

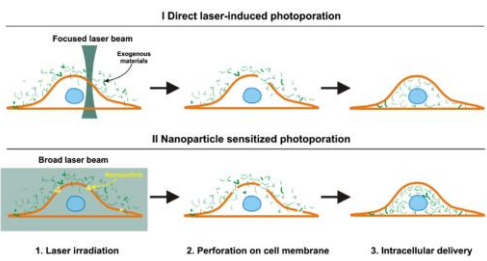
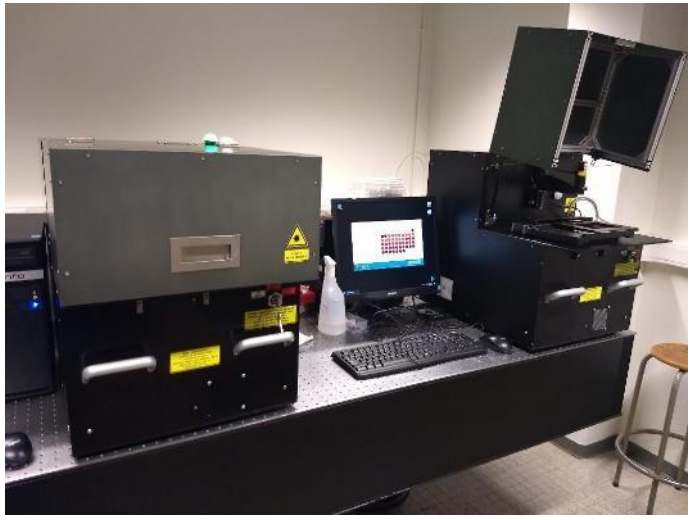
*Team of 45*



# Custom microscopy

## Photoporation

- ns pulsed laser light source
- XYZ scan
- Fluorescence imaging
- CE certified instrument

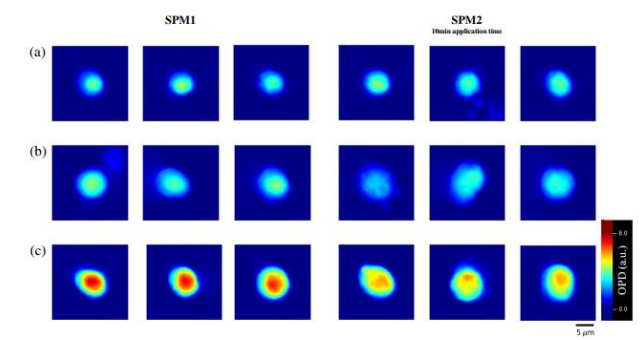


Xiong, Ranhua, Sangram Keshari Samal, Jo Demeester, Andre G. Skirtach, Stefaan C. De Smedt, and Kevin Braeckmans. "Laser-Assisted Photoporation: Fundamentals, Technological Advances and Applications." *Advances in Physics: X* 1, no. 4 (July 3, 2016): 596–620. <https://doi.org/10.1080/23746149.2016.1228476>.

EPIC on-line meeting on microscopy, 13 July 2020

## DHM, absorption microscopy

- Erythrocytes

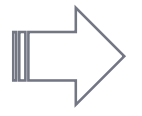


Klenk, Christian, Dominik Heim, Matthias Ugele, and Oliver Hayden. "Impact of Sample Preparation on Holographic Imaging of Leukocytes." *Optical Engineering* 59, no. 10 (December 3, 2019): 1. <https://doi.org/10.1117/1.OE.59.10.102403>.

Didier Beghuin, [dbeghuin@lambda-x.com](mailto:dbeghuin@lambda-x.com)

# Microscopy contract manufacturing

- *Design Transfer*
- *Product industrialization*
- *Design improvements: Quality-Up and cost-down*
- *Dedicated tooling (alignment) & optics metrology*
- *Certification services*
- *Recurrent manufacturing*  
*(10 to 1k+ units/yr)*

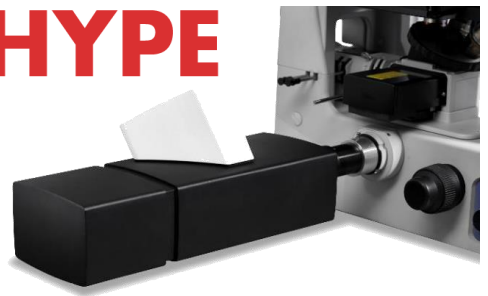


*Is outsourcing the manufacturing of your photonics product a way-to-go ?*

# Raman Imaging microscopy

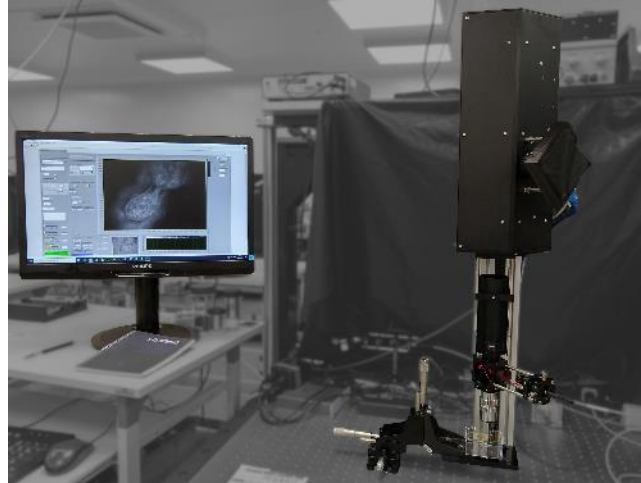
*Innovative hyperspectral imaging device*

## HYPE



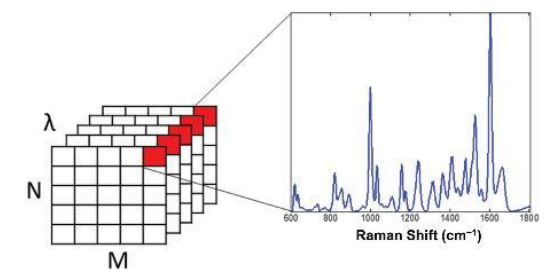
### TECHNOLOGY

- ✓ Multiplexed Fourier Transform spectrometer (1 spectrometer per pixel)
- ✓ High spectral resolution (8cm<sup>-1</sup> or 0.13nm @ 400nm)
- ✓ High spatial resolution (diffraction limit, 150nm/pixel for 40x objective)
- ✓ 400-900nm extendable to SWIR 1700nm
- ✓ Compact & robust for use **at-line** (industry)



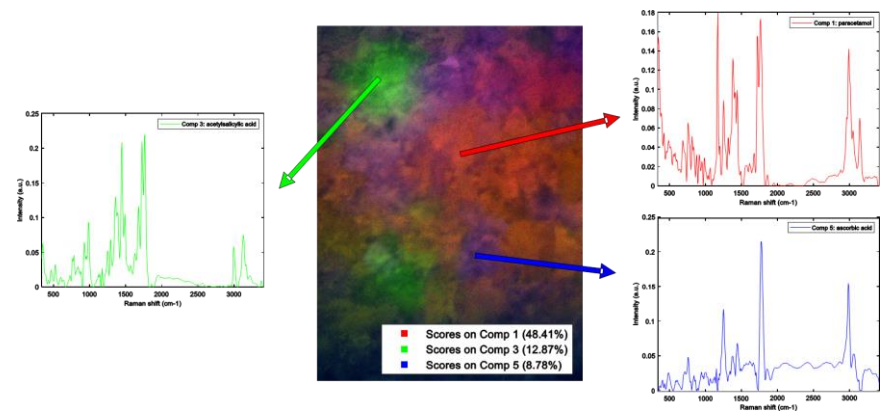
### USER

- ✓ High-throughput hyperspectral imaging device (3Mpx data cubes in ~100 sec)
- ✓ Ultra-high speed for global Raman imaging (>1000x faster than confocal Raman microscope)
- ✓ Tunable FOV (mm<sup>2</sup> ~cm<sup>2</sup> range)
- ✓ No sample damage

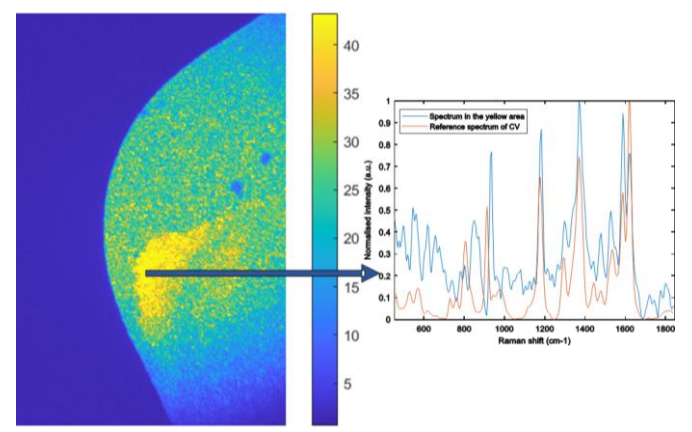


# Applications: Raman imaging

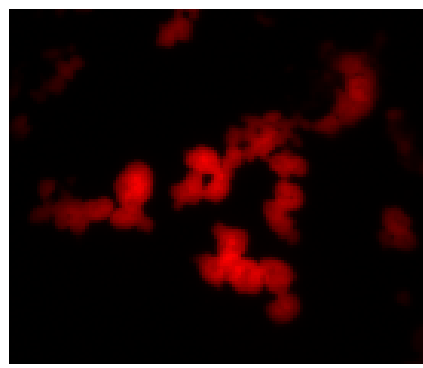
## Global Raman imaging



Pharma: API spatial distribution on drugs (2020, Univ Liège, E. Dumont)

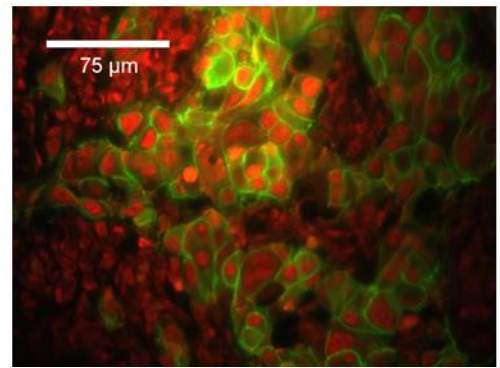


Biotech: SERS imaging of cells and tissues (2020, Univ Liège, E. Dumont)

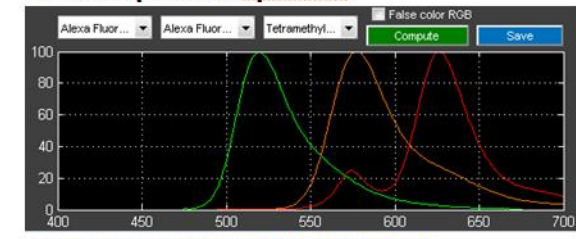


Contamination control: chemical residues imaging (2019)

## Fluorescence spectral imaging

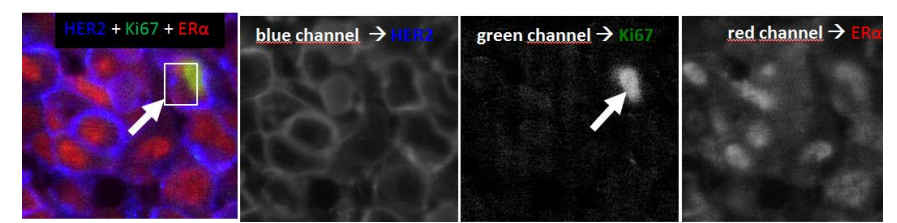


### Fluorophores spectra

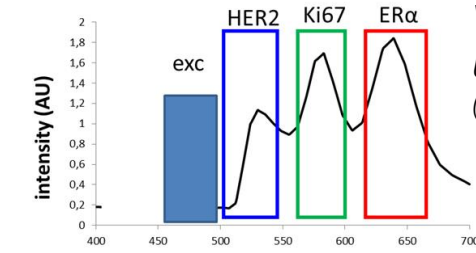


(spectra provided on <https://www.lifetechnologies.com/>)

Biotech: cell imaging (2014, UCL, P. Courtoy)



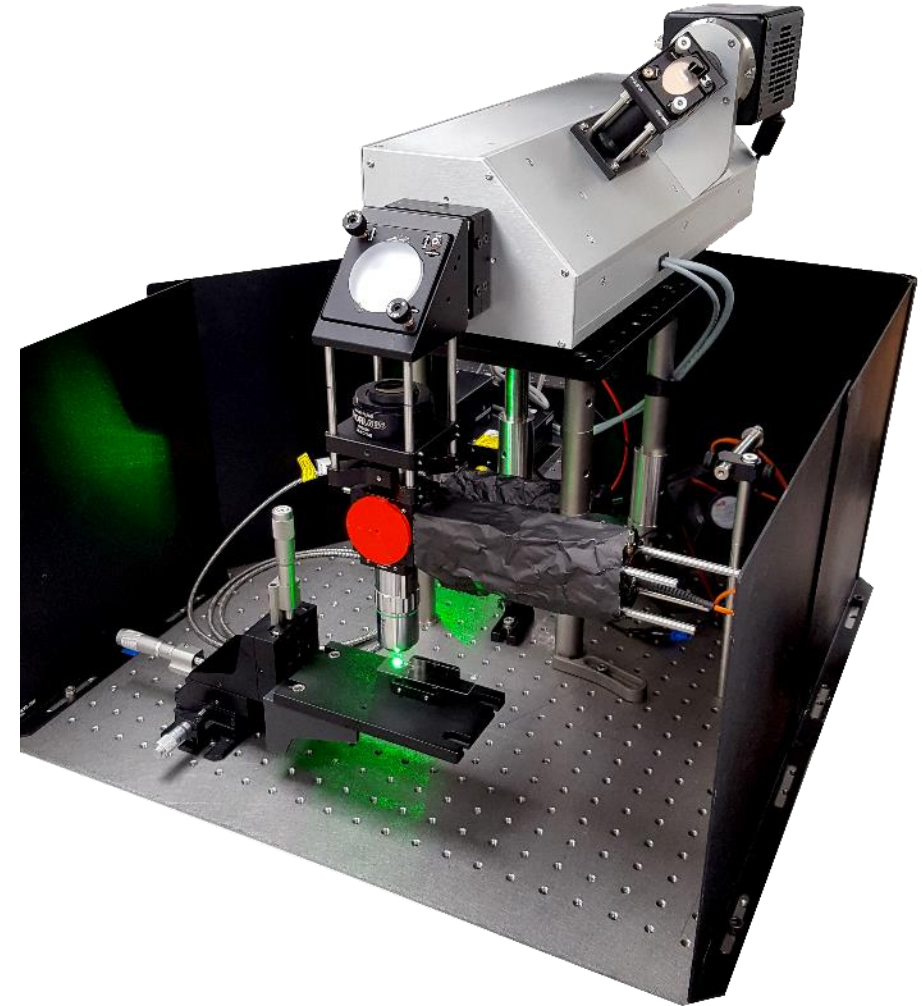
### Spectral analysis of boxed ROI



Vital fluorescence linear unmixing (2014, UCL, P. Courtoy)

# What you can do for us

- ✓ *Raman/hyperspectral applications development*
- ✓ *Low noise cmos cameras*
- ✓ *SWIR cameras*
- ✓ *Narrow band ( $< 4\text{cm}^{-1}$ ) CW SS laser sources (100mW to a few W)*
- ✓ *Hypercube data analysis software*
- ✓ *Commercial distribution*



Thank you for your attention !

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