

AI-ready imaging modules for biomedical and life sciences applications

Opto automates Microscopy

Daniel Kraus
M.Sc.
Product Manager Biophotonics

05.10.22 |

EPIC Meeting at VISION



Opto GmbH

Founded

1980

Organization

GmbH / SAS / DIN ISO 9001/2015

Ownership

100% private

Locations

Munich, Montelimar

Team members

50 worldwide

Mission

Design and Manufacture of Embedded Optical Imaging Modules & Software



Opto France SAS
Montélimar/Annecy, France
Software engineering

Opto GmbH
Munich, Germany, HQ
• Optical / Electronic / Mechanical Design
• Product Development
• Manufacturing / Assembly

HARDWARE



Microscope Sensors

for Bio Med & Industry



SOFTWARE



Application Programming

for Machine Builders & Integrator

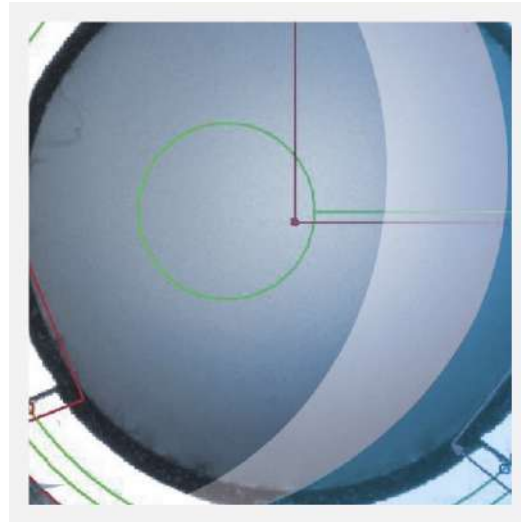
We Automate Microscopy – “Reduced to Your needs”

Business Units

Life Science - Medical



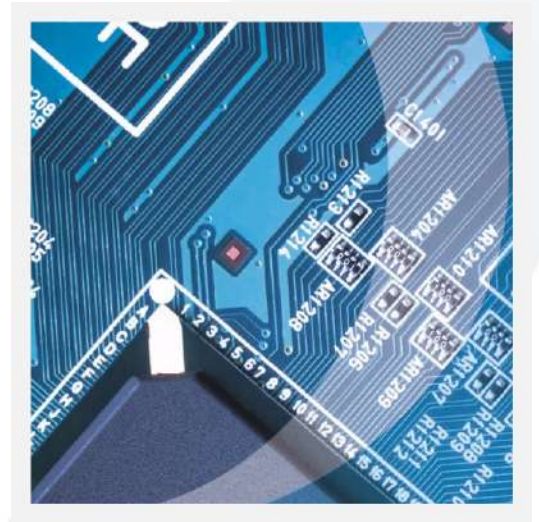
Test - Measurement



Automation / Robotics



Semiconductors / Electronics



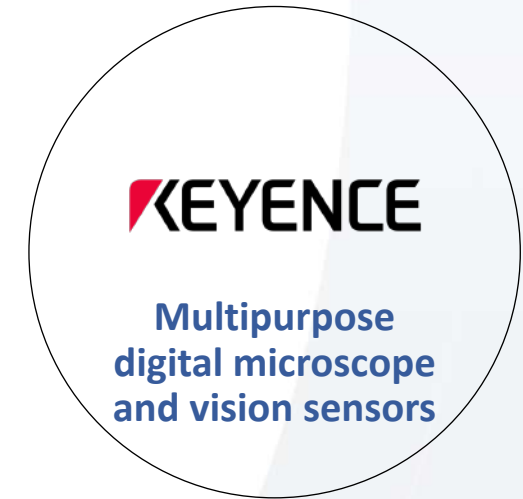
Market Position



- Limited Machine Integration
- Highly priced
- 5k to 100k per unit
- Proprietary Software Platform
- Can't move to Imaging Modules without killing own product lines

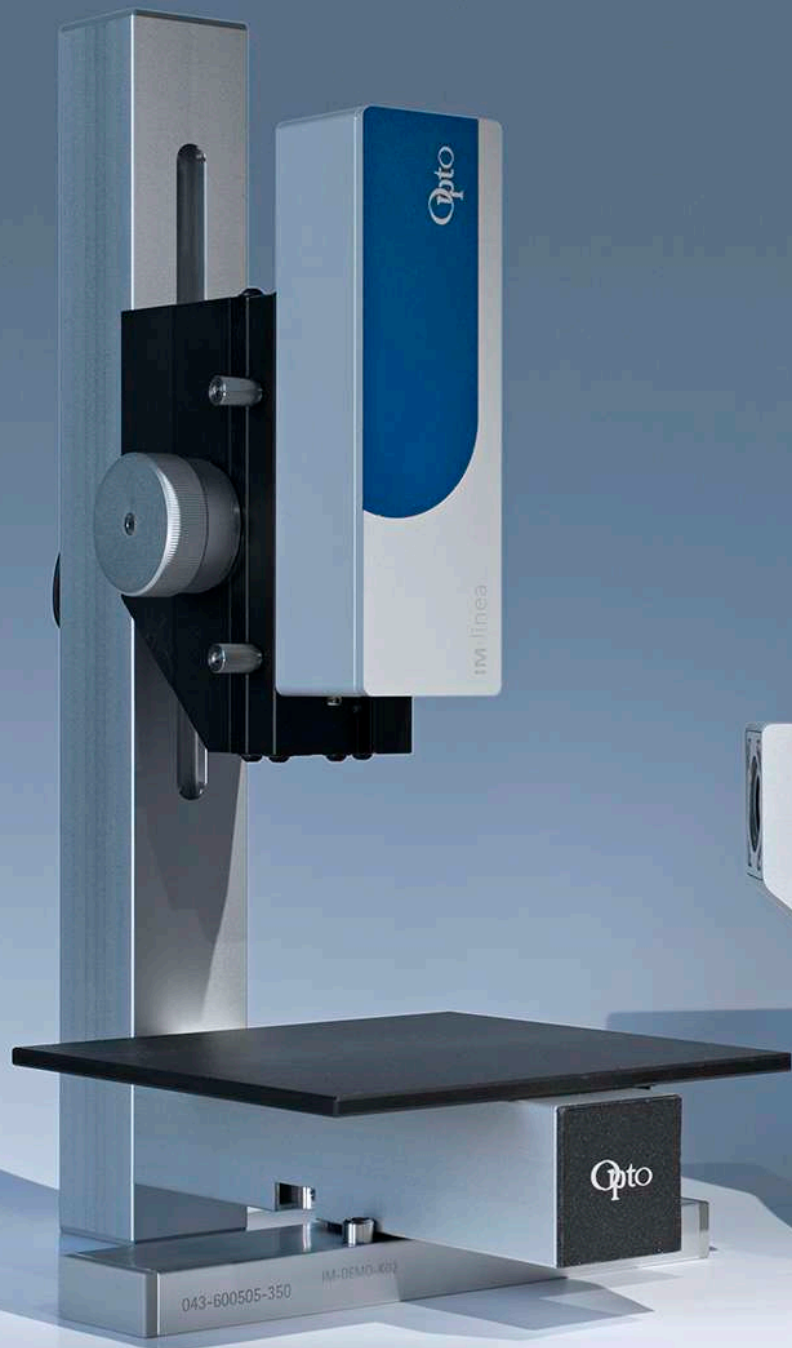


- Mainly for Machine Integration
- Moderate priced
- 3k to 15k per unit
- Open Software Architecture
- BioMed Machine Vision Microscopes

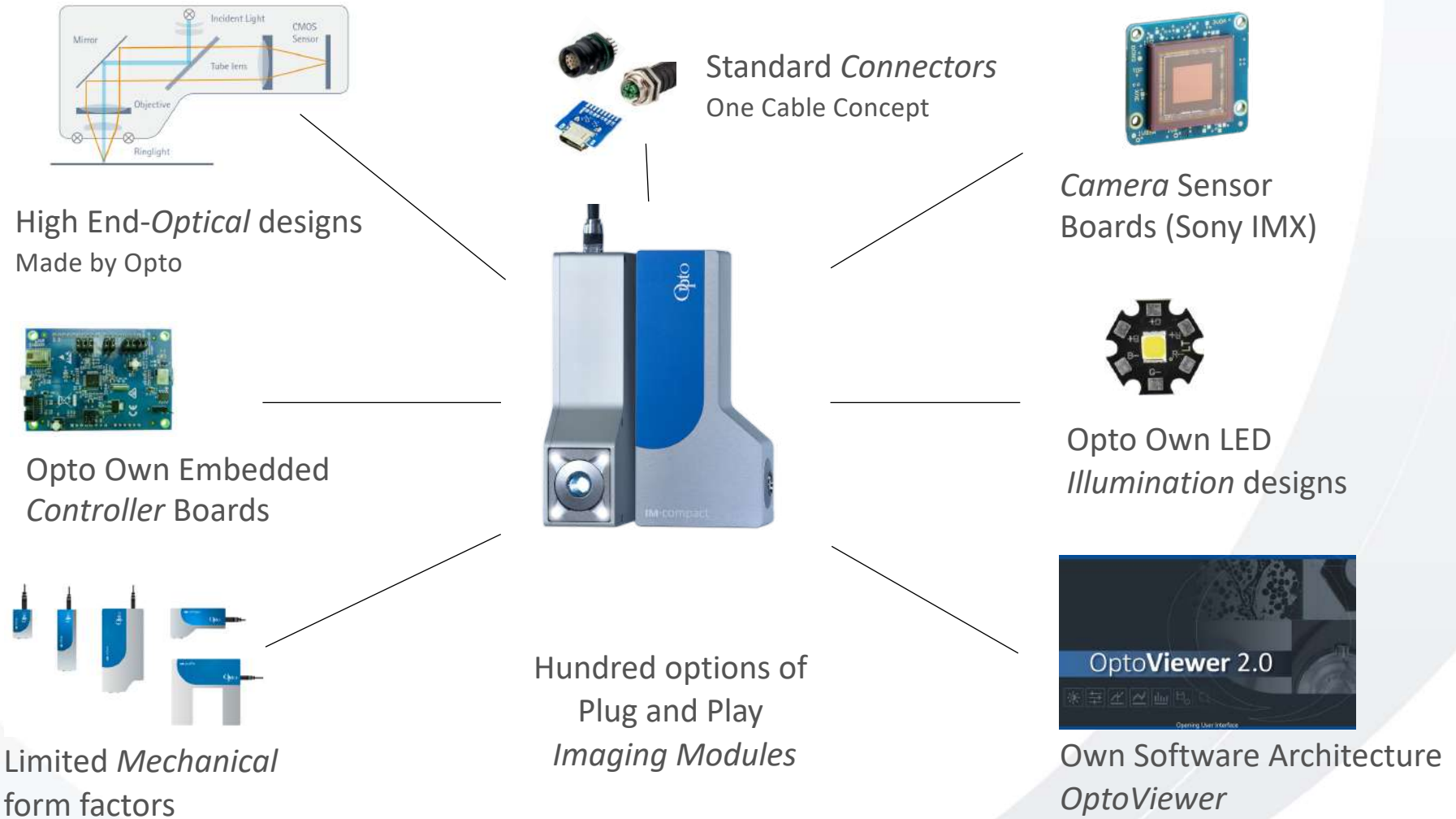


- Limited Machine Integration
- Highly priced
- 5k to 100k per unit
- Proprietary Software Platform
- Can't move to Imaging Modules without killing own product line

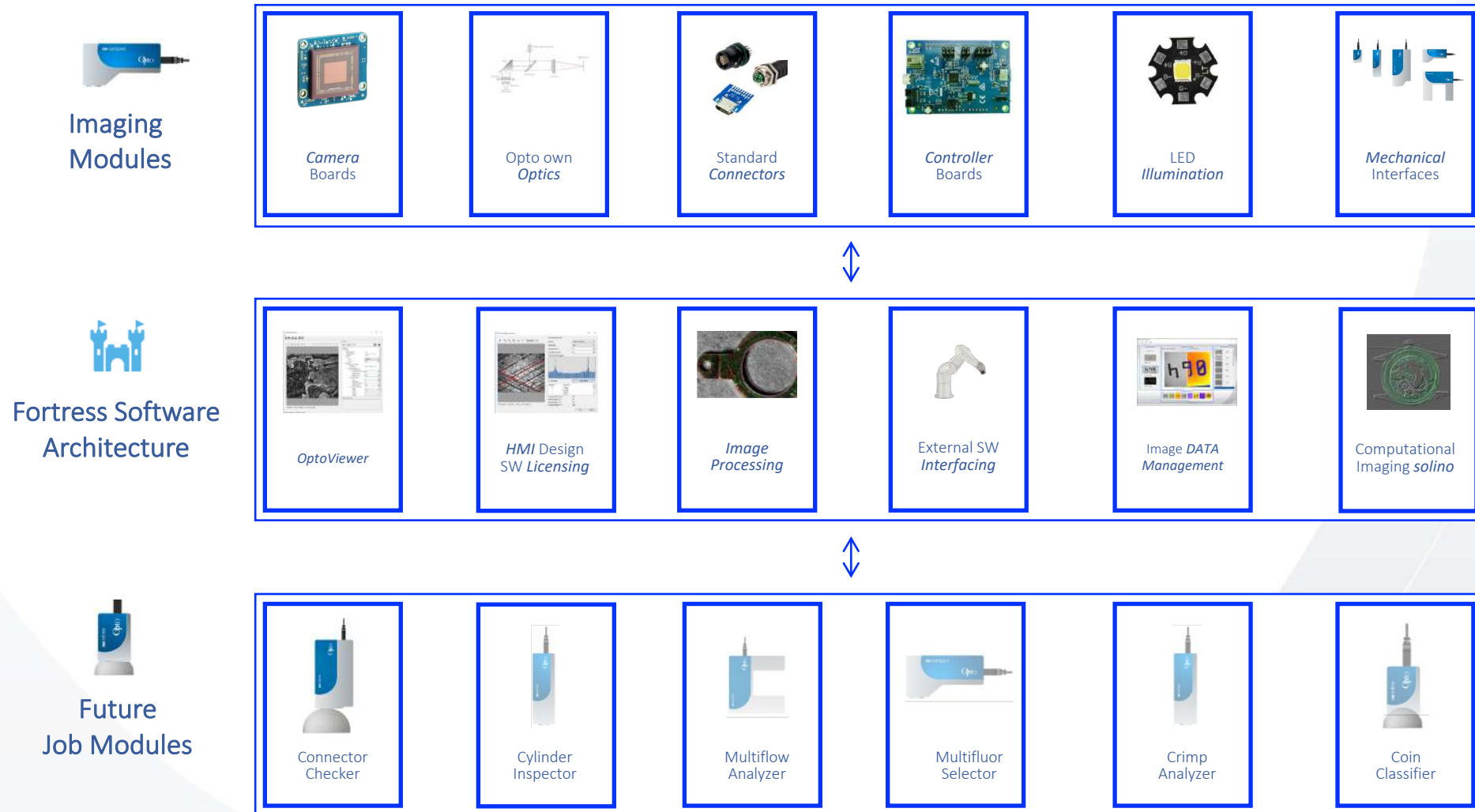
Standard
Imaging Modules



Architecture IM



One Modul for one specific application



Form factors – Imaging Modules

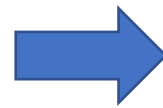


Machine Vision Microscope MVM

- Camera
- Optics
- Coax Illumination
- Ring light
- 3 Wires
- Not pre calibration
- External Light
- External Light Controller needed
- External Software required



Traditional



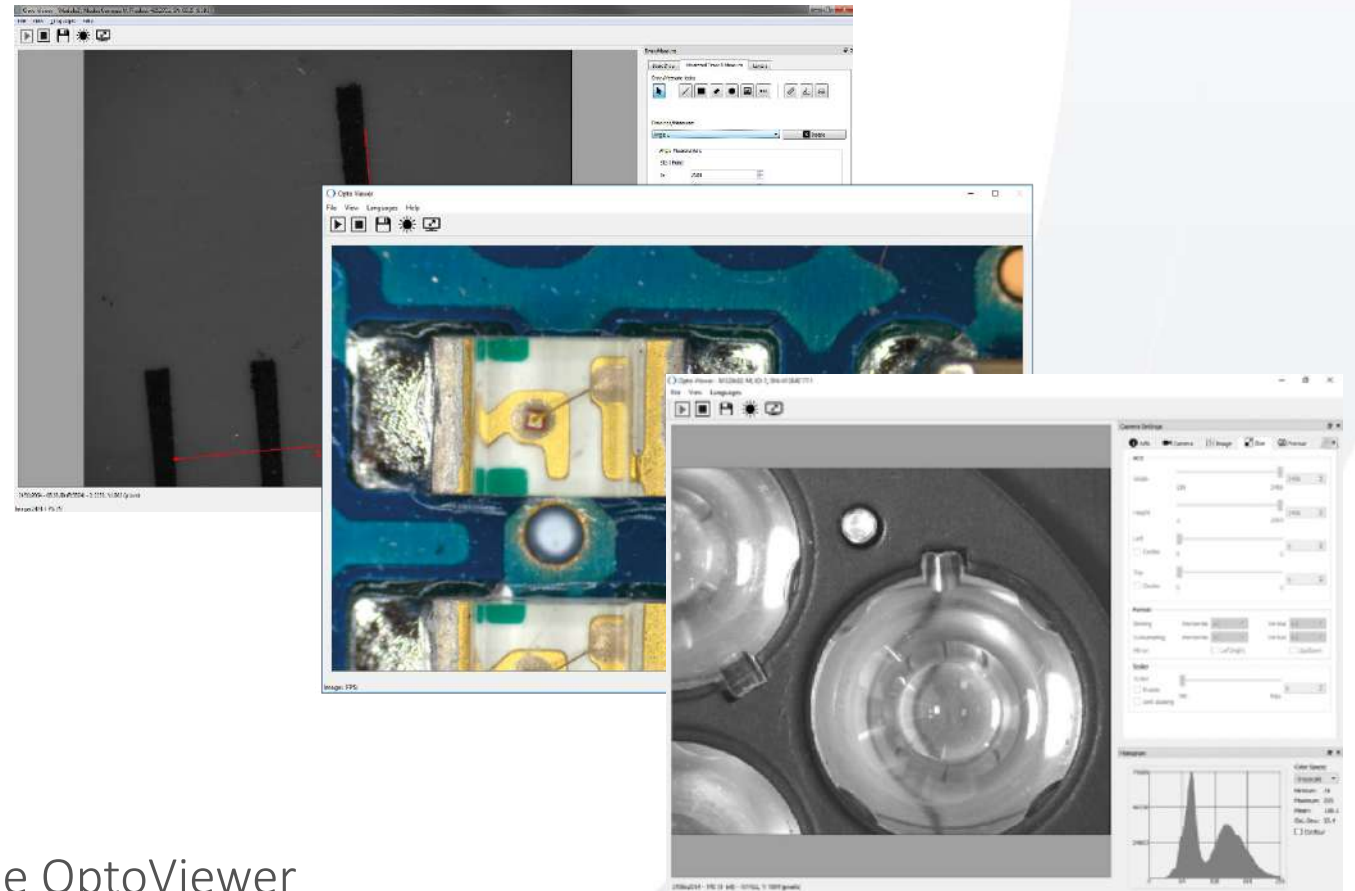
Imaging Module

- Camera
- Optics
- Coax Illumination
- Ring light
- **1 Wire**
- **Pre calibration**
- **Internal Light**
- **Integrated Light Controller**
- **Free OptoViewer included**

OptoViewer 2.0

Opto Viewer enables easy installation of the Camera, drives the different Light Sources and includes many additional functions such as:

- Simple User Interface
- Camera, coaxial & ring light setting
- Settings presets files
- Pre-calibrated magnification settings
- Illumination adjustment
- Flat field correction
- One-click export to image file storage
- Crosshair / grid / scale generator
- Drawing/Annotations (basic, shapes, bitmaps, text)
- Standard Measurement functions
 - Point to Point Distance
 - Angle
 - Focus

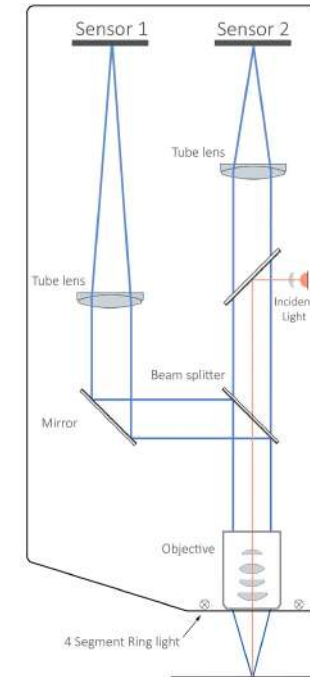


All Imaging Modules are delivered with the free OptoViewer

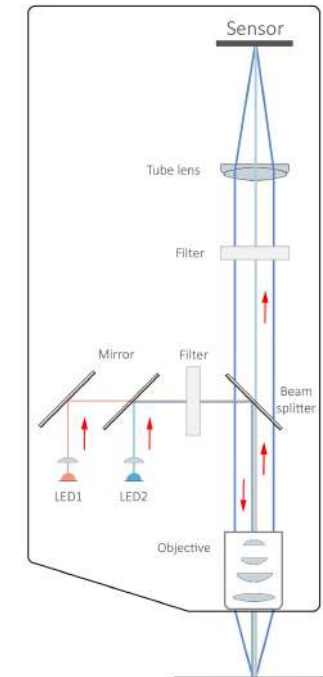
Next Generation Imaging Modules



Dual Camera



Dual Fluorescence



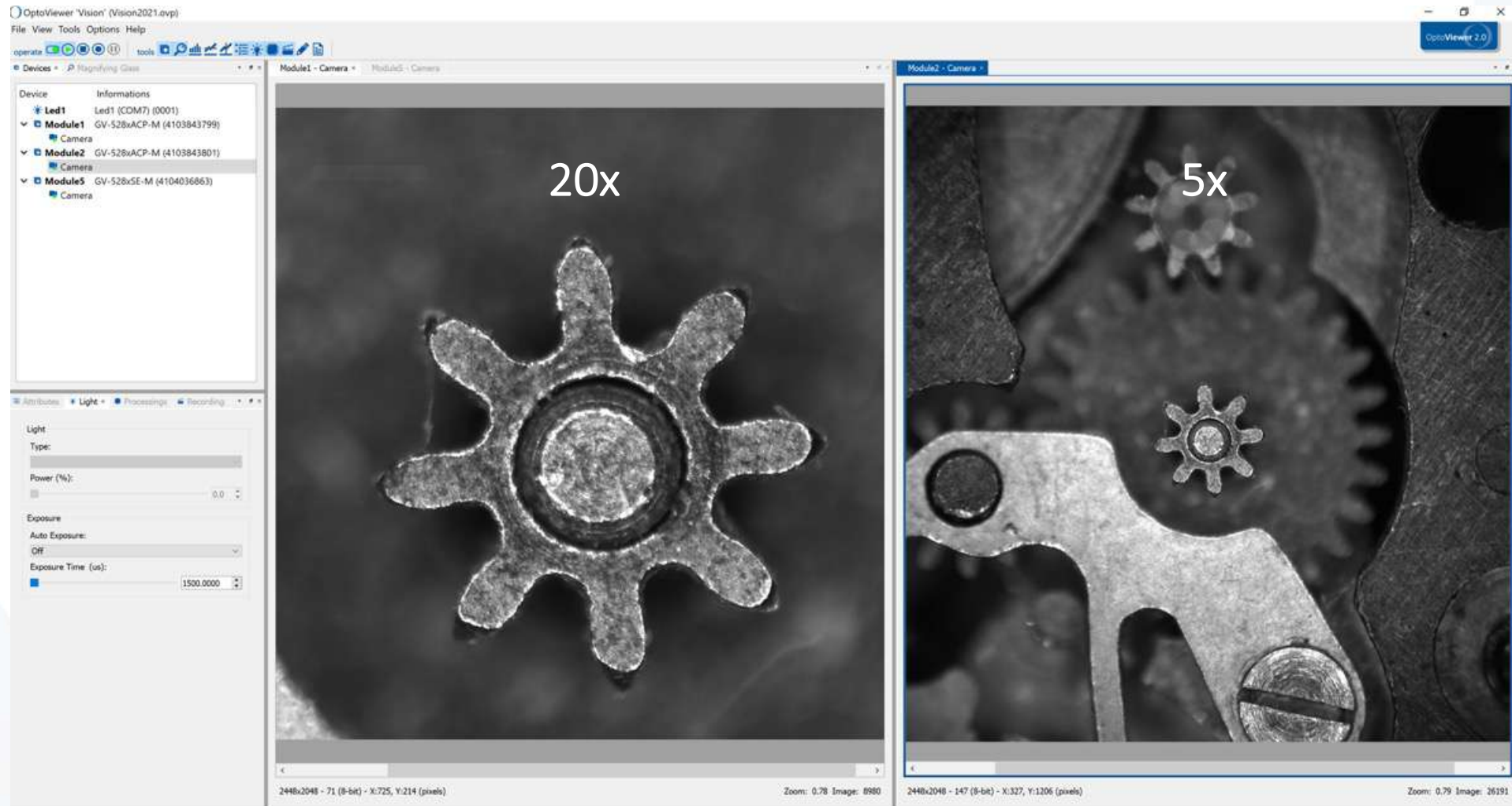
Dual Camera

- To substitute motorized zoom systems
- Complete microscope functionality
- For industry and biomedical applications

Dual Fluorescence

- Multi fluorescence functionality
- Pathology, qPCR Screening, Electrophoresis
- Plug & Play unit for Flow Cytometry (Microfluidic)

Next Generation Imaging Modules – Two magnifications @ same time

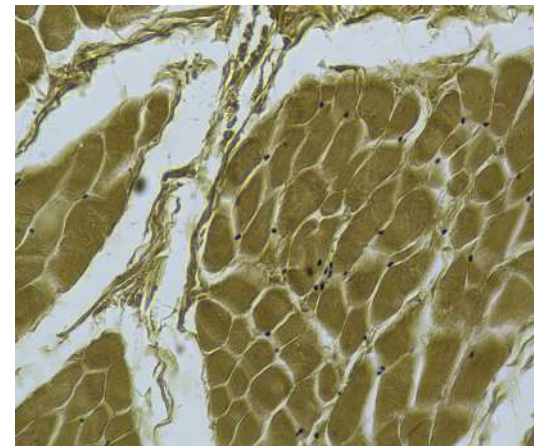
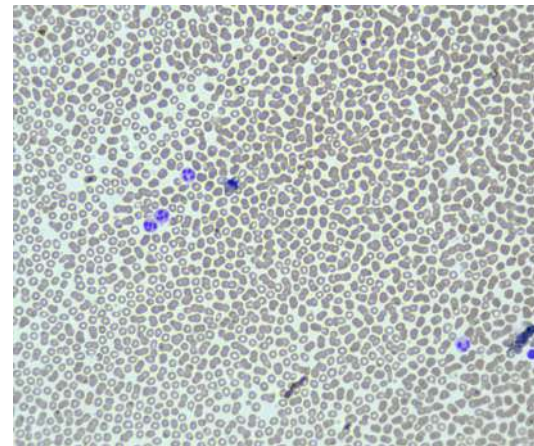
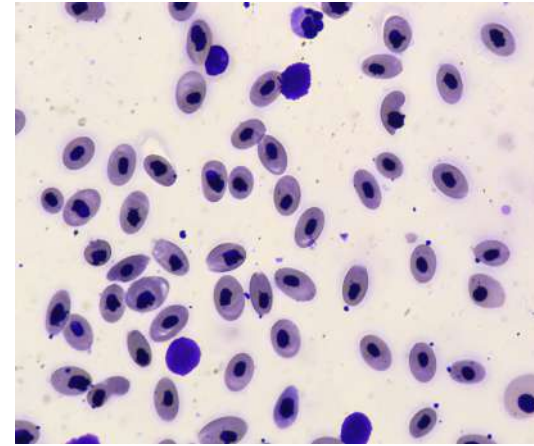
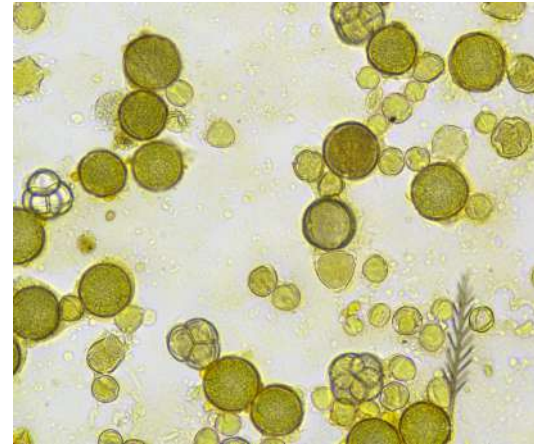


Benefits

- AI ready
- Easy to use
- Plug & Play
- Ultra compact
- Cost-efficient
- flexible to use
- customizable
- not manipulable
- reproducible results
- from one supplier
- software included
- long term availability



Biological & Life Science Application with IM



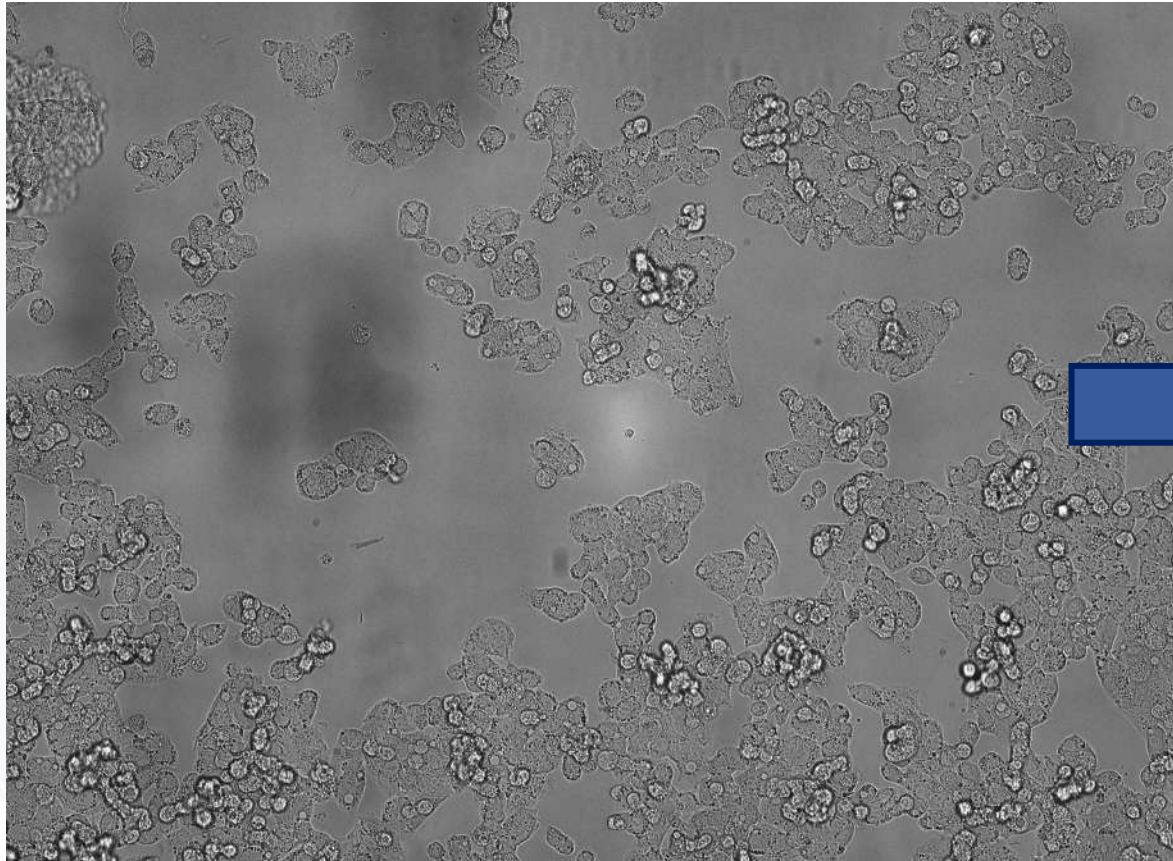
- Tissue
- Pollen
- Urine
- Blood
- Yeast
- Bacteria
- Particles
- ...

Application

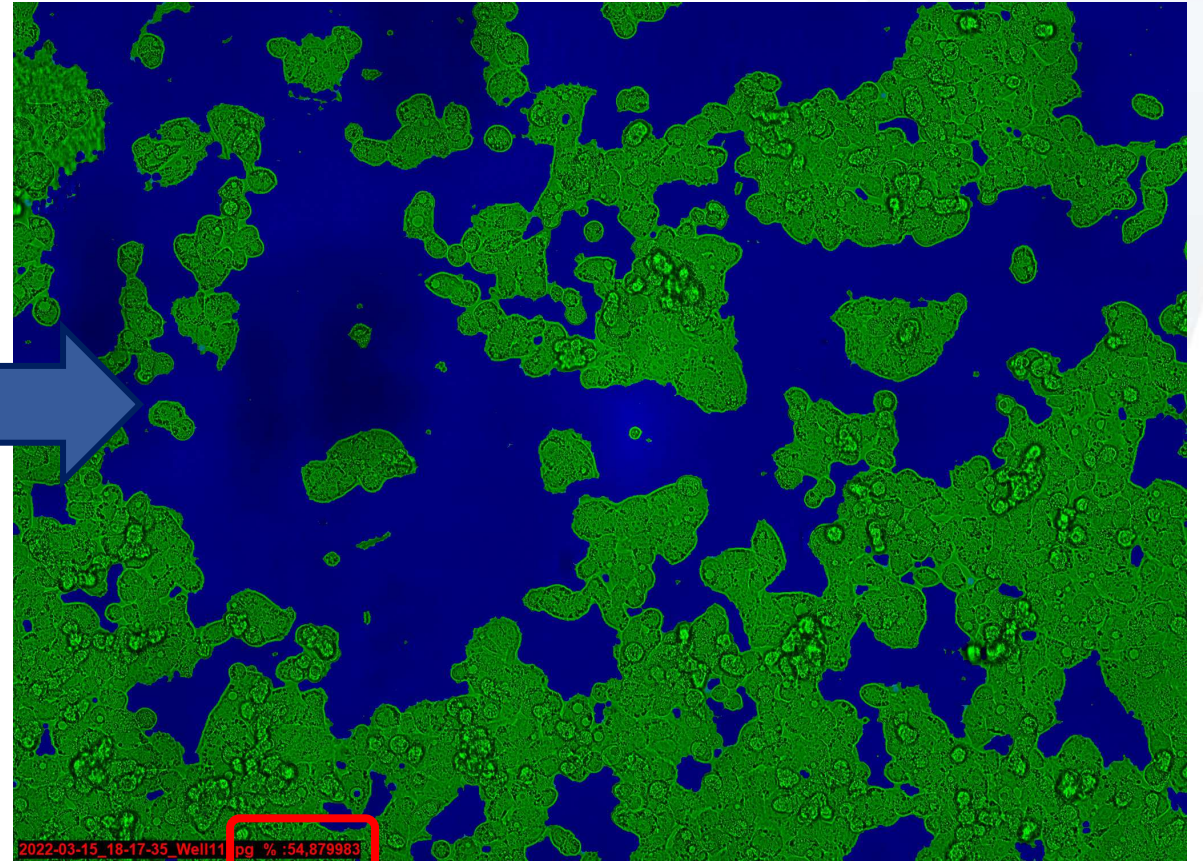
Confluence Measurement

Cell confluence measurement

Raw image from the incubator

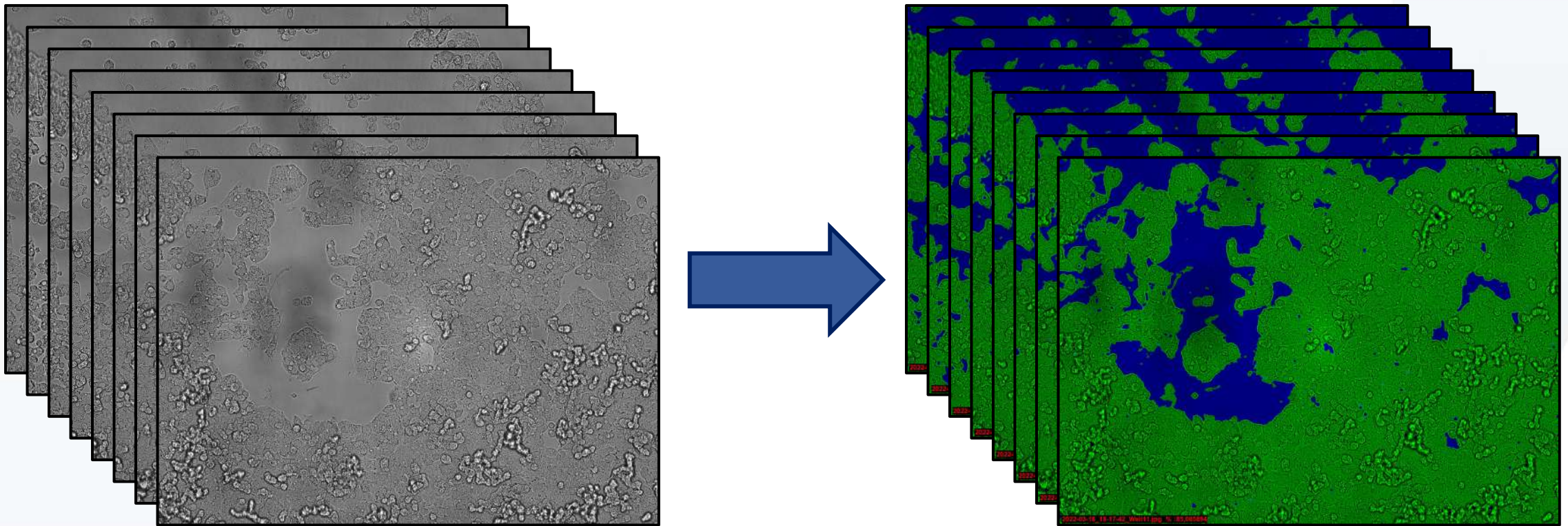


AI processed false color image



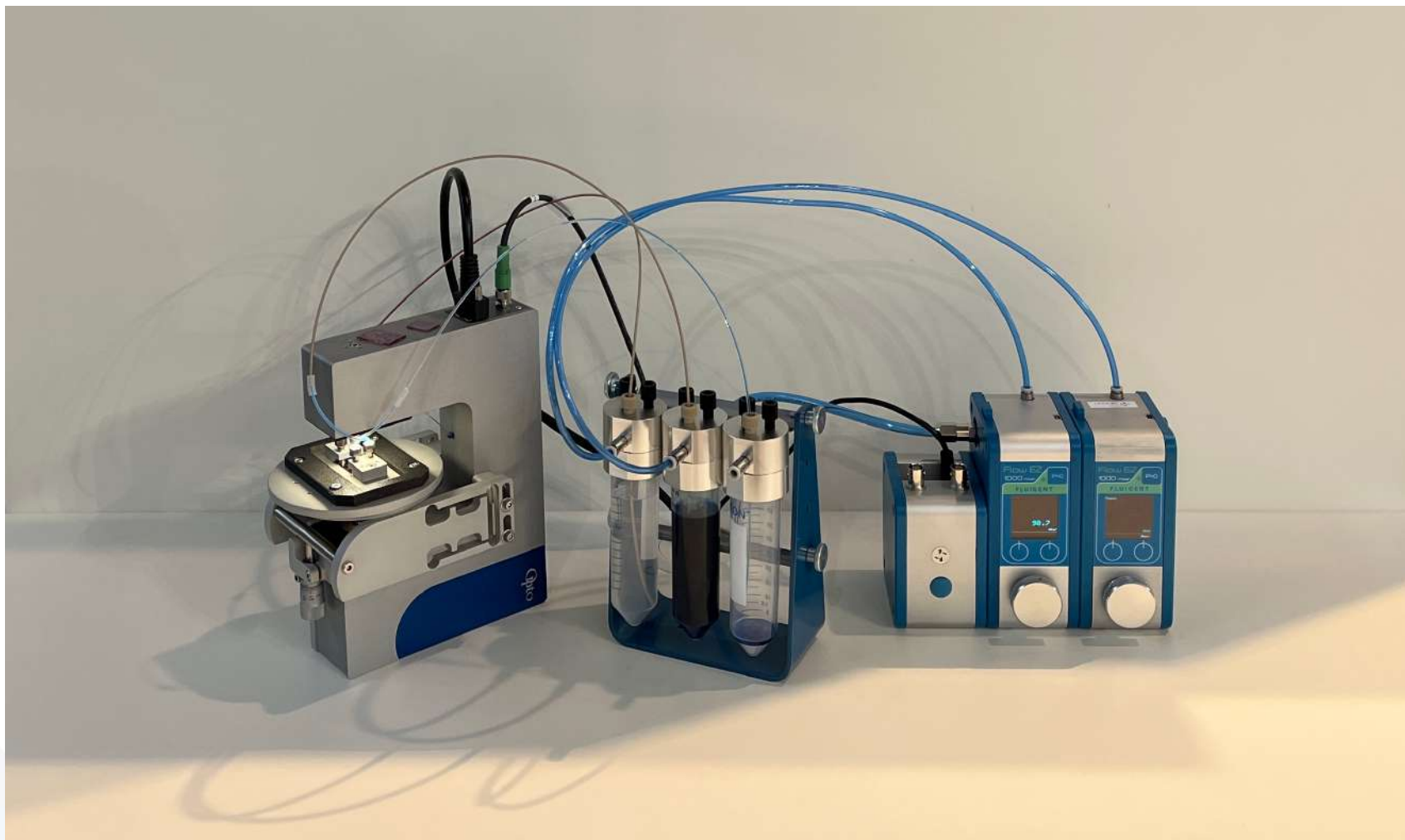
% :54,8799

Cell confluence measurement (time laps)



Application

Droplet detection & counting



Droplet detection & counting

OptoViewer 'Control_1' (Control_1.ovp)
File View Tools Options Help

operate [tools]

Simulation 00001 - Camera x

Average Velocity: 0.25 mm/s
Average Detection Rate: 0.97 objects/s

2051 0.10 mm³ 2050 0.10 mm³ 2049 0.10 mm³ 2048 0.11 mm³

2047 0.11 mm³

2043 0.12 mm³

2042 0.16 mm³ 2041 0.16 mm³

2037 0.15 mm³

2035 0.15 mm³

2034 0.16 mm³ 2029 0.16 mm³ 2044 0.16 mm³ 2045 0.16 mm³

2048x1266 - 3.0,0 (RGB24) - X:0, Y:258 (pixels) Zoom: 0.60 Image: 9798

No Error

Devices x

Device	Information
Simulation 00001	Simulation
Camera	

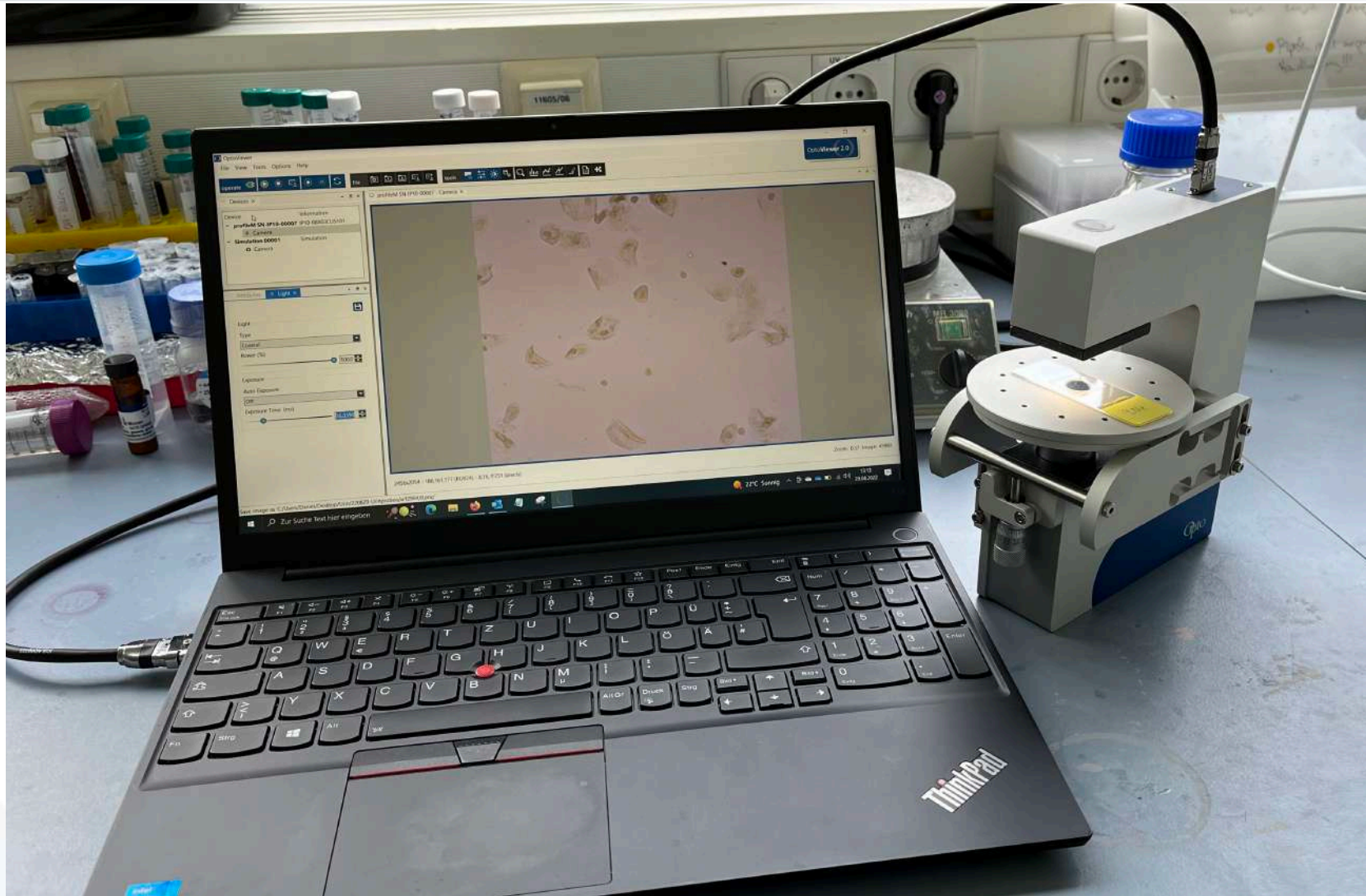
Attributes Light Plugins x

Sequence

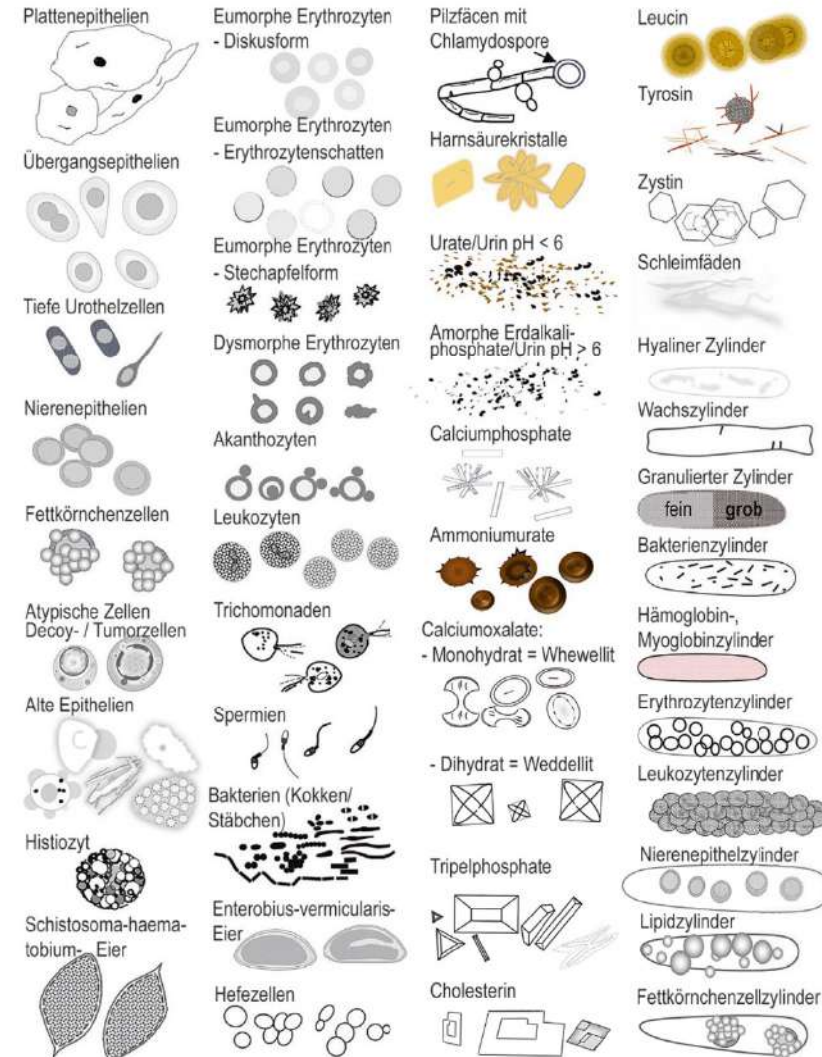
Index	Step Name	Enabled
1	Track Objects	<input checked="" type="checkbox"/>

Application

AI-based urine sediment classification

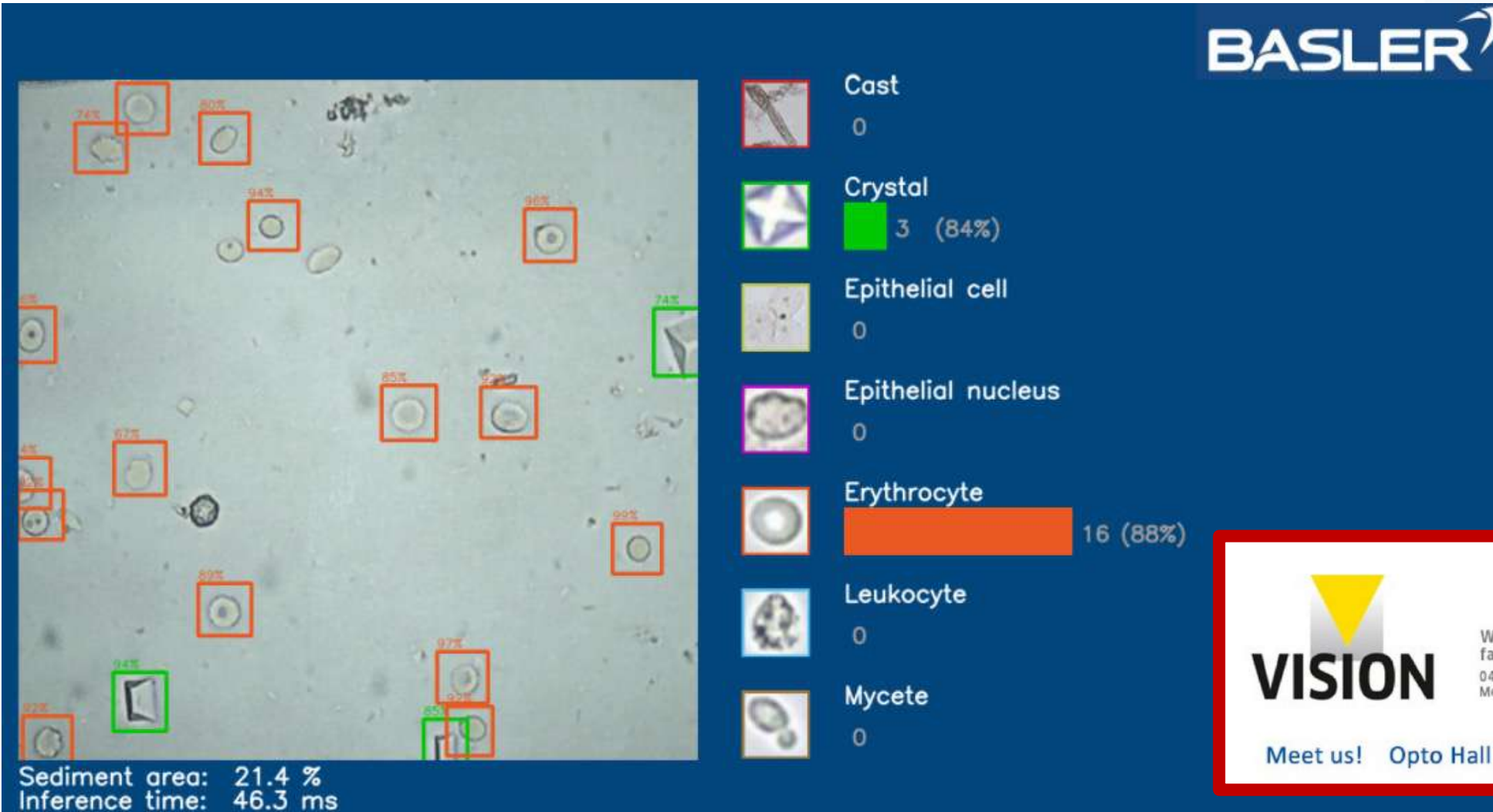


Urine sediment components



Neuendorf, Josefine. "Mikroskopisches Urinsediment-Auswertung und Befundung." *Das Urinsediment*. Springer, Berlin, Heidelberg, 2019. 155-220.

Live Demo @ VISION 2022



BASLER

Sediment area: 21.4 %
Inference time: 46.3 ms

Object Class	Count	Percentage
Cast	0	
Crystal	3	84%
Epithelial cell	0	
Epithelial nucleus	0	
Erythrocyte	16	88%
Leukocyte	0	
Mycete	0	

VISION
World's leading trade fair for machine vision
04-06 October 2022
Messe Stuttgart, Germany

Meet us! Opto Hall 10 / Booth C46

Contact



Daniel Kraus

M. Sc.
Product Manager Biophotonics

Opto GmbH

Lochhamer Schlag 14
82166 Gräfelfing, Germany

Mobile: +49 (0) 171 1194 538
Mail: kraus@opto.de