

# Sharing light and passion

200 years of optical innovation

[www.horiba.com/en\\_en/200years](http://www.horiba.com/en_en/200years)

1819 - 2019



# **Spectrometers & Imaging OEM solutions** for industrial OEM partners

EPIC presentation  
February 22<sup>nd</sup> 2021

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# HORIBA: Five Segments, Five Markets

Automotive Test Systems



Process & Environmental



Medical



Semiconductor



Scientific



## HORIBA France: a Center of Excellence

Initially Jobin Yvon

Created in 1819 from the collaboration between  
Augustin Fresnel and Jean-Baptiste Soleil

**200 years of optical innovation**

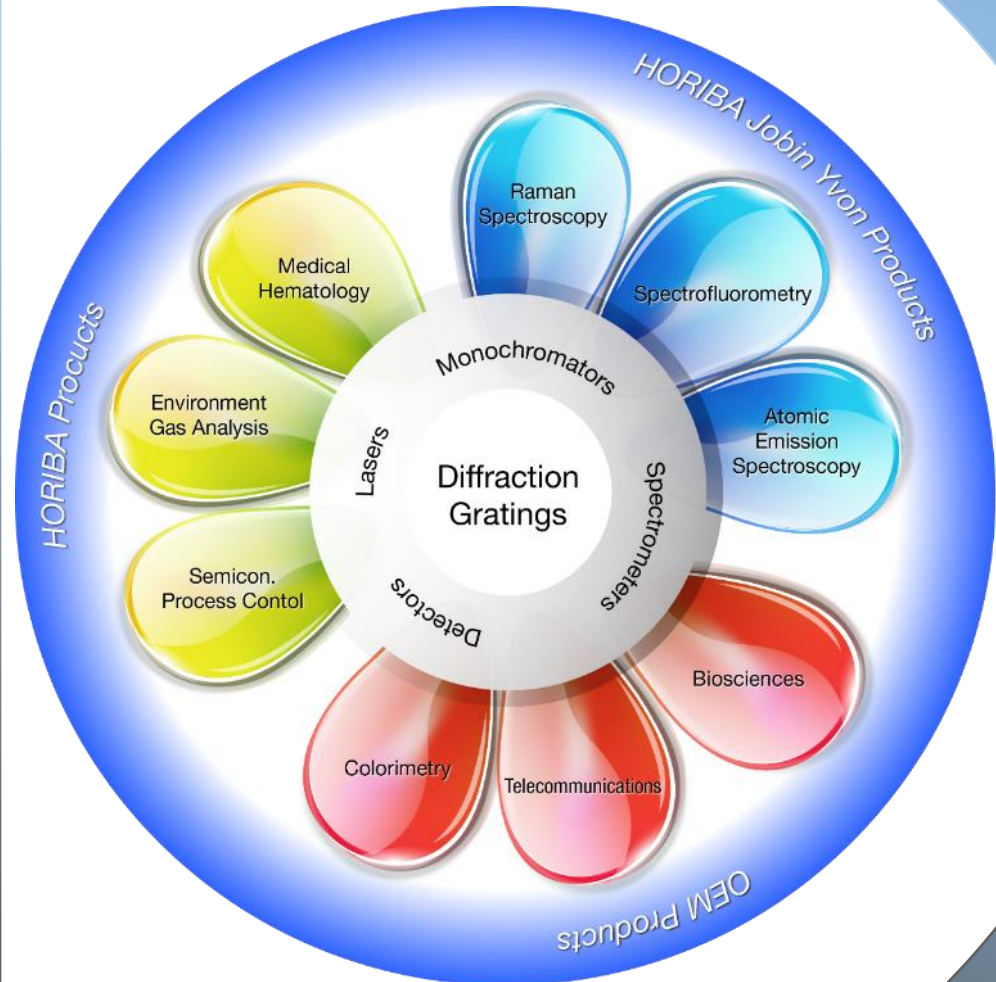
Acquired in 1997 by the HORIBA Group

Global lead for Raman spectroscopy, AFM, ellipsometry, glow discharge,  
ICP, VUV spectrometers, gratings, SPRI



European Research at Paris Saclay

# HORIBA Scientific: From Components to Instruments



## HORIBA France: Light and Passion

We have a passion for what we do

We learn and live from customers

We love research and industry

We base our business on collaboration

We believe in the cultural pillars which are:  
quality, innovation, service, customer satisfaction,  
progress for society

Which future would you like to explore?



European Research at Paris Saclay

# Replica OEM Gratings Mass Production for Industry

“Standard or unique customized cost effective solutions at Industrial scale“

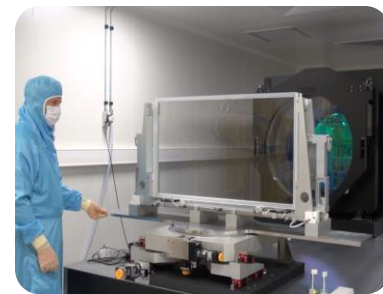
- World leader in Space Hyperspectral imaging (>50 mission)
- More than 500 OEM replica references
- **Replication** of Flat / Spherical / Free Form gratings
- **Leader in Type I & IV** (aberration corrected) Concave\convex grating
- **Constant performances & Traceability by datamatrix**



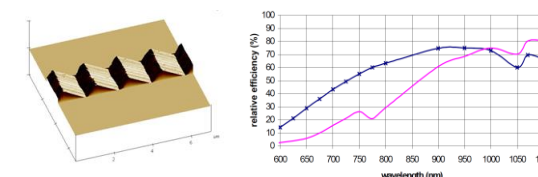
- **Spectral range:** from UV to IR
- **Number of grooves:** from 20 to 4800 l/mm
- **Substrate size:** from 5 to 500 mm
- **Substrate materials:** Glass / Metal / Ceramic / SiC substrate usable
- **Coatings:** Al, AlMgF2, Au, Pt, Ni, etc..



- **New Custom Master Gratings development**
- Based on customer requirements, HORIBA designs & optimizes the grating parameters and the related manufacturing process.



- **Characterization & Metrology**
- Diffraction efficiency
- Wavefront measurement by interferometry
- Groove density by goniometer
- Groove profile



# Spectrometers & Imaging OEM solutions

”Standard or unique customized cost effective solutions at Industrial scale“



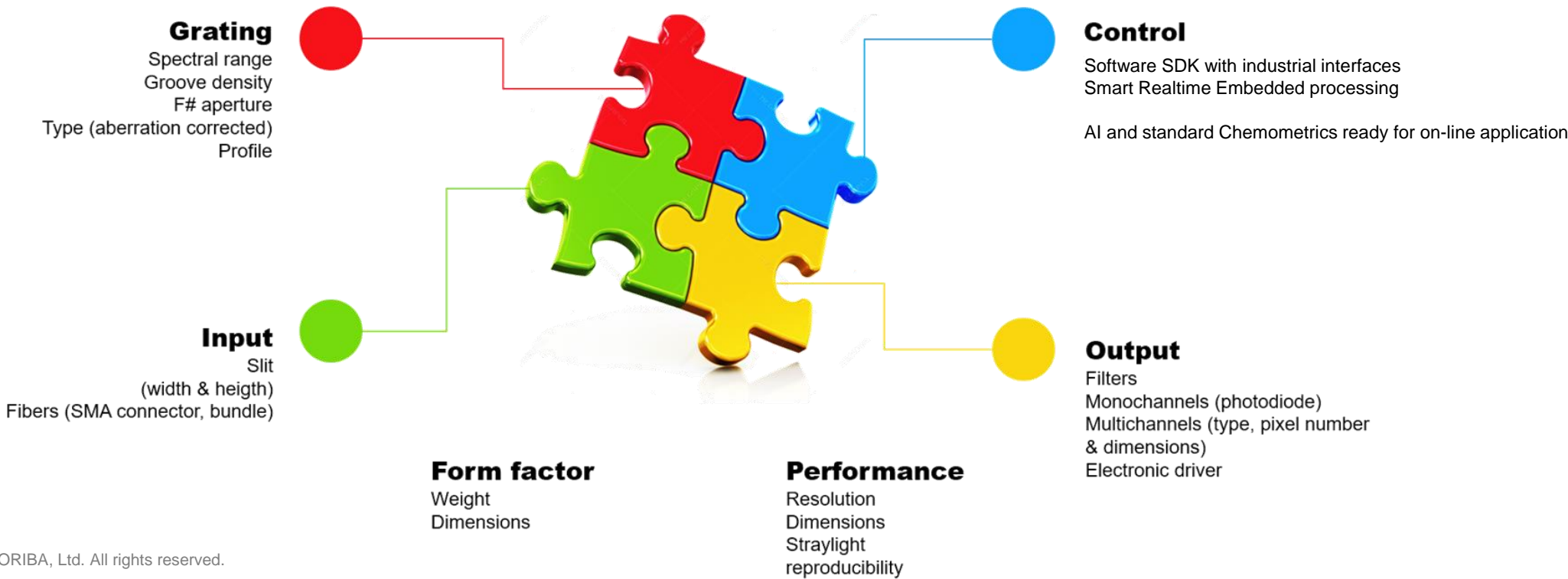
Standard Platform concept



Customized Platform



Full customization





# Spectrometers & Imaging OEM solutions

## For agriculture & Food



**350-850nm Monochromator  
with light source**



Measurement of the moisture, protein, gluten.... content in grains



**NIR Multichannels  
(38 channels) spectrometer**

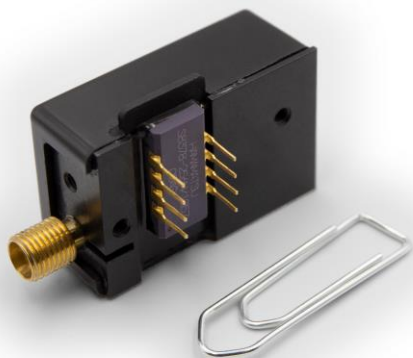


Food & Seed Sorting



# Spectrometers & Imaging OEM solutions

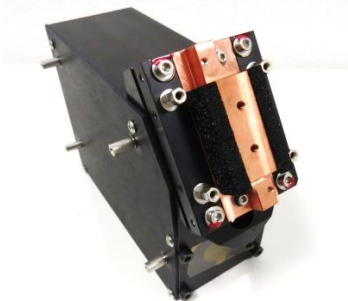
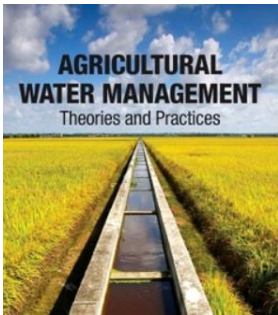
For agriculture & Food



Ultra-compact OEM spectrometer  
UV - VIS 190 – 850 nm (res 6nm -10nm)  
NIR 900-1700nm or extended



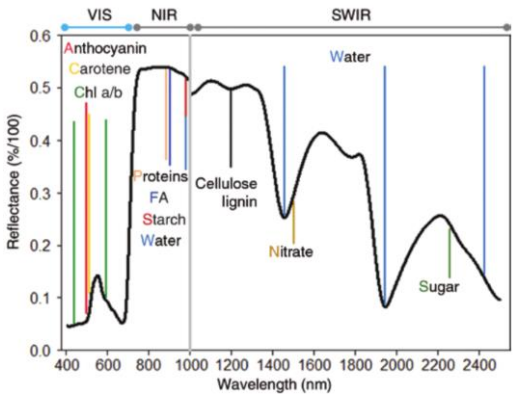
Water analysis



OEM VIS - NIR spectrometer  
High sensitivity (res 0.6 nm)



Online food analysis sorting

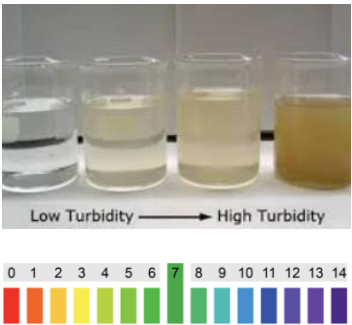




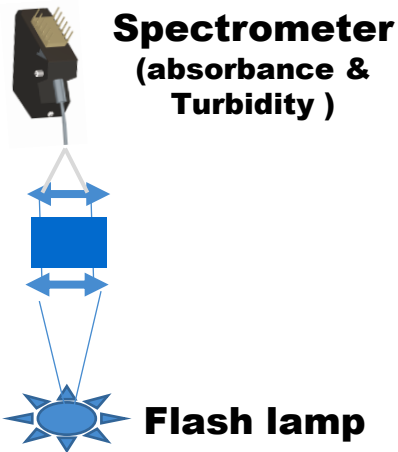
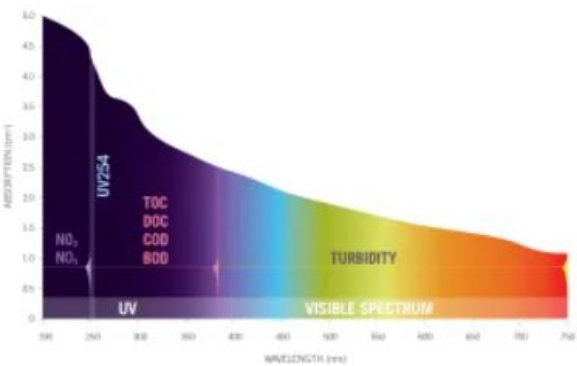
# Spectrometers & Imaging OEM solutions

## For online water analysis

- Drinking water
- Environmental water (lac..)
- Waste water
- Industrial water (release)
- **Parameters controlled**
  - Measure entire absorption spectrum in UV Vis (incl. 254nm)
  - Multiple organic substances detection



Parameter	Abbreviation	Unit
Water temperature	Temp	°C
Total suspended solids	TSS	mg/l
Total dissolved solids	TDS	mg/l
Turbidity	Turb	NTU
Total alkalinity (CaCO <sub>3</sub> )	Alkal	mg/l
Acidity/alkalinity	pH	pH unit
Electrical conductivity	Mmho cm <sup>-1</sup>	µS/cm
Dissolved oxygen	DO	mg/l
Biochemical oxygen demand	BOD <sub>5</sub>	mg/l
Chemical oxygen demand	COD	mg/l
NO <sub>3</sub> <sup>-1</sup>		mg/l
SO <sub>4</sub> <sup>-2</sup>		mg/l
PO <sub>4</sub> <sup>-3</sup>		mg/l
Cl <sup>-1</sup>		mg/l
Fecal coliform	FC	cfu/100ml
Total coliform	TC	cfu/100ml

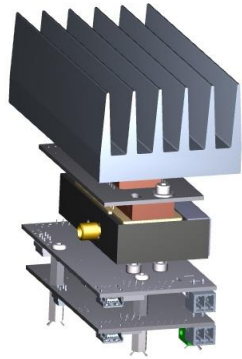


### Key parameters “At a glance”

- Chlorine : Indicator for **several contaminant**,
- Turbidity : indicator for **Pathogens** content,
- pH : Indicator **chemical processes** changes
- Conductivity : Indicator for **several contaminant classes**
- TOC : Total organic carbon
- Particle Count, UV254 Absorption , Dissolved Oxygen

# Spectrometers & Imaging OEM solutions

For process control & sorting



**OEM NIR - SWIR spectrometer  
(900-1700nm) InGaAs cooled**



waste sorting



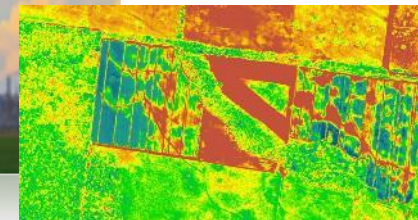
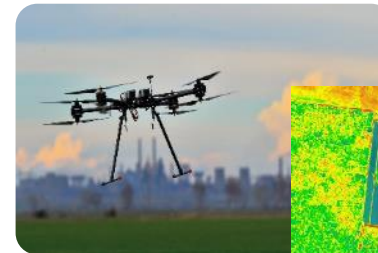
First step sorting result



**OEM Hyperspectral Imaging Camera**



Uniformity, Quality inspection,  
Food contaminants& content.

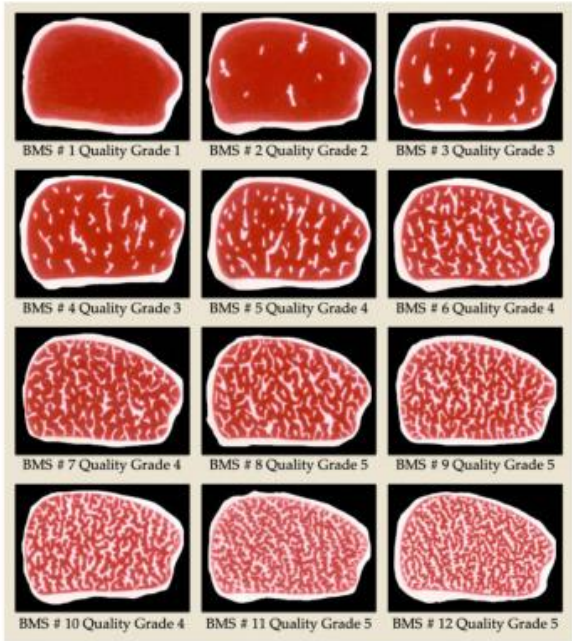


# Spectrometers & Imaging OEM solutions

For process control & sorting



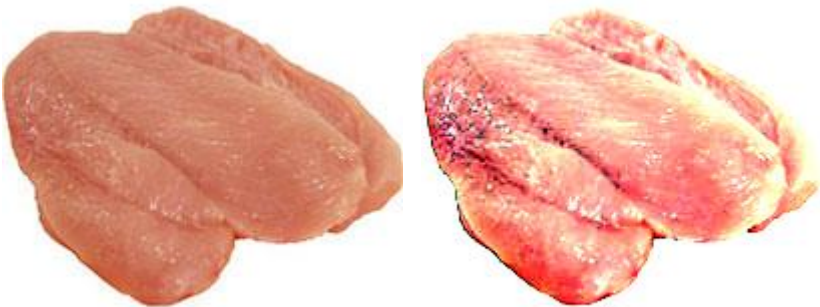
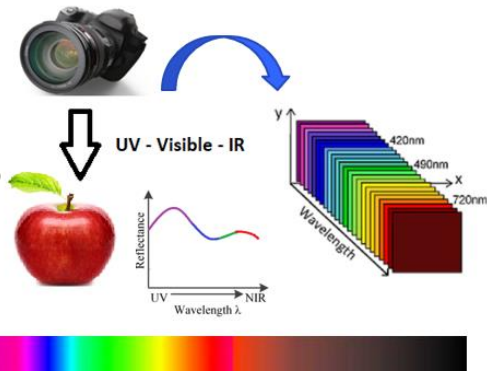
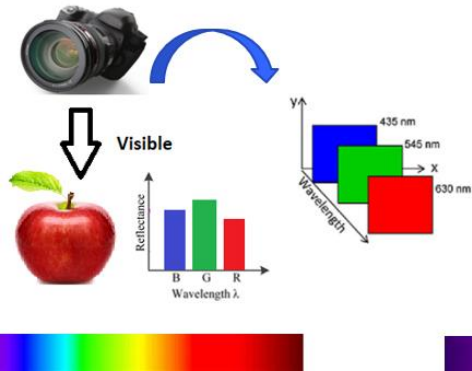
OEM Hyperspectral Imaging Camera



Proteins

Fat

Foreign material

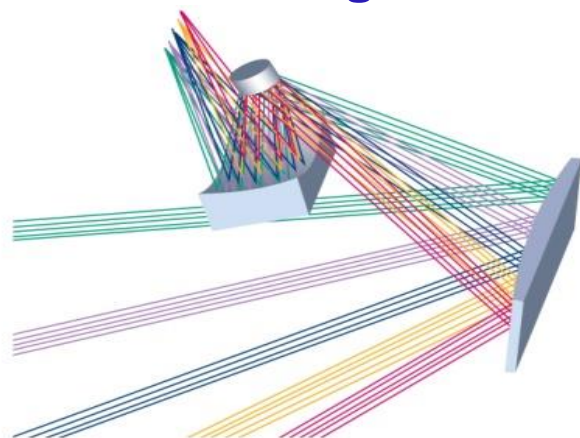


Meat Colour

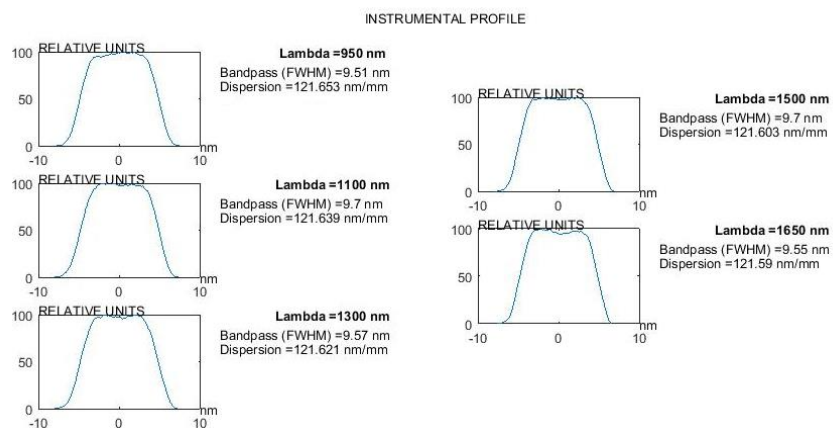
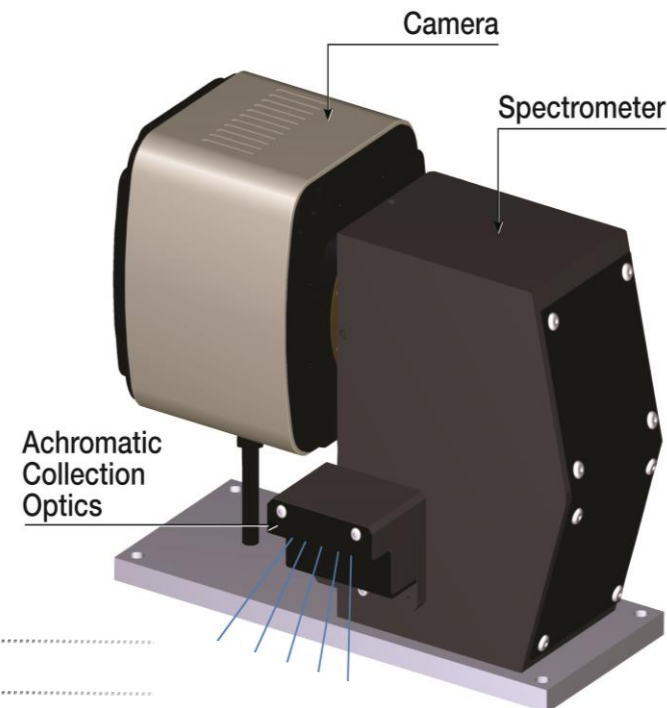


# Spectrometers & Imaging OEM solutions

For process control & sorting



System fully simulated by Ray Tracing & performances calculated.



Omoshiro-okashiku  
Joy and Fun

おもしろ可笑

THANK YOU

Terima kasih  
谢谢  
Gracias  
Σας ευχαριστώ πάρα πολύ  
धन्यवाद  
شُكْرًا  
Danke  
Tack ska du ha  
Grazie  
ขอบคุณครับ  
Большое спасибо  
Cảm ơn  
감사합니다  
Dziękuję  
Obbrigado  
Merci  
ありがとうございました