



# Hyperspectral Camera FIGSPEC Introduction

Hangzhou CHNSpec Technology Co., Ltd







# Link Color with Data



- Advanced in academically and technically

More than 20 invention patents and more than 30 utility model patents.

Related scientific research results were published in the top academic journals in the field of optical color measurement Color Research&Application, Optical Engineering, Optik, Chinese Optics Letters, Acta Optics, Acta Photonica, Optoelectronic Engineering;

CHN Spec Tech participated in a major national scientific instrument project, and as the main project undertaker participated in the leather color matching project of the General Administration of Quality Supervision, Inspection and Quarantine



## ● Award & Honor

Secretary-General of the Optical Committee of Zhejiang Instrument and Meter Association;

In 2013, the company was supported by the "Hangzhou Blue Plan".

In 2014, it was supported by the "Hangzhou Young Eagle Plan".

In 2014, it got the "Hangzhou High-tech Enterprise" certification.

In 2014, it got the "Zhejiang Science and Technology Small and Medium-sized Enterprise" certification.

In 2015, it got "National High-tech Enterprise" certification.

In 2015, "Spectrophotometer" won the Excellent Product Award of China Instrument and Meter Association.

In 2016, a U.S. invention patent was authorized.

In 2017, it was awarded the Zhejiang Province Science and Technology Progress Award.

In 2017, it was awarded the China Industry-University-Research Cooperation Innovation Achievement Award.



# Introduction FigSpec Series Hyperspectral Camera

- Machine vision, color measurement, visible light / near-infrared detection hyperspectral solution
- Spectral range: 400-700nm / 400-1000nm, spectral sampling/pixel 2.5nm
- Imaging speed: Full Spectral range 128Hz, 3300Hz after ROI
- Support multi-region ROI
- Color difference test : print, textile and other industries surface color test & texture detection
- With special light source and control system, the repeatability of single pixel of color measurement can reach  $dE^*ab < 0.1$





# Technical Data

## FigSpec Series Hyperspectral Camera

Model	FS-10	FS-11	FS-12	FS-13
Illuminant	Passive (without illuminant inside device)			
Spectroscopic method	Grating spectroscopy			
Wavelength Range	400-700nm		400-1000nm	
Spectral bands	150		300	
Spectral sampling/pixel	2.5nm			
Slit width	30um			
Transmission Efficiency	>50%		>60%	
Stray light	<0.5%			
Spatial Samples	Max. 1920 (set from software)			
Pixel Size	5.86um			
Imaging speed	Full Spectral range 41Hz, 390Hz after ROI	Full Spectral range 128Hz, 3300Hz after ROI	Full Spectral range 41Hz, 390Hz after ROI	Full Spectral range 128Hz, 3300Hz after ROI
Detector	CMOS			
SNR(Peak)	600/1			
Camera Output	USB3.0			
Interface	C-Mount			
Accessory	USB3.0 cable			
ROI	Single Band	Freely selectable multiple bands	Single Band	Freely selectable multiple bands





## Working Principle

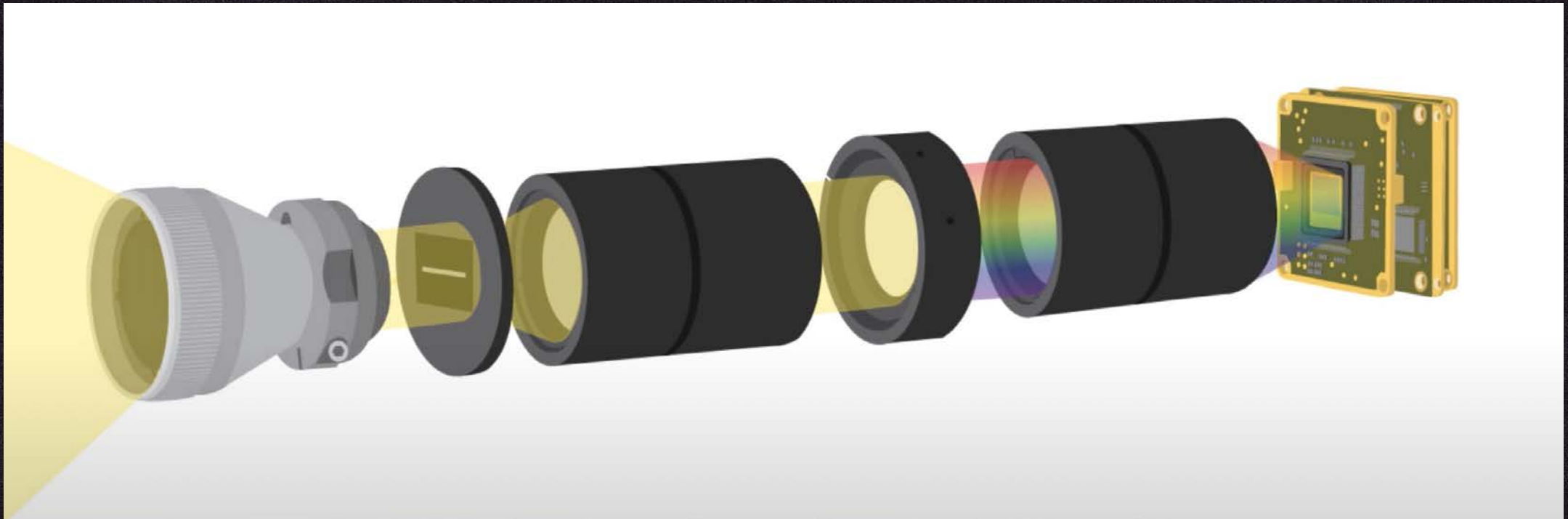
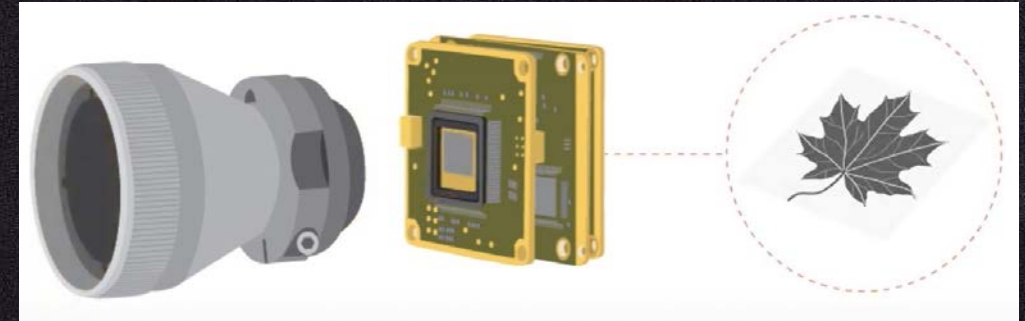
# FigSpec Series Hyperspectral Camera

- The FX series hyperspectral camera adopts a high light transmittance optical design (F/1.7), which raises the camera's light-gathering ability to a new level.
- Only need a line light source to meet the equipment needs.
- However, other spectroscopic technologies (adjustable filters and linear filters, etc.) require a larger area of light source and tens of times the intensity of the light source when the data obtained has the same signal-to-noise ratio.
- Covering 400-1000nm, using scan imaging method, the full-spectral imaging speed can reach 670FPS, and it has a band selection (ROI) function to achieve higher speed



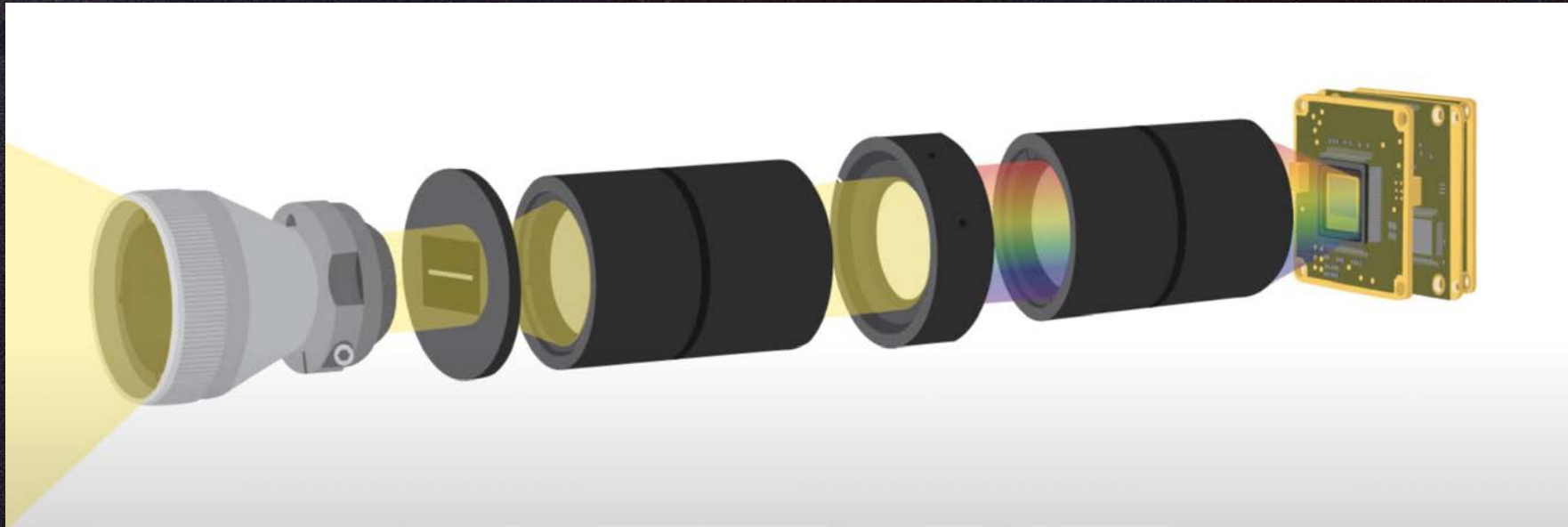


# Working Principle FigSpec Series Hyperspectral Camera

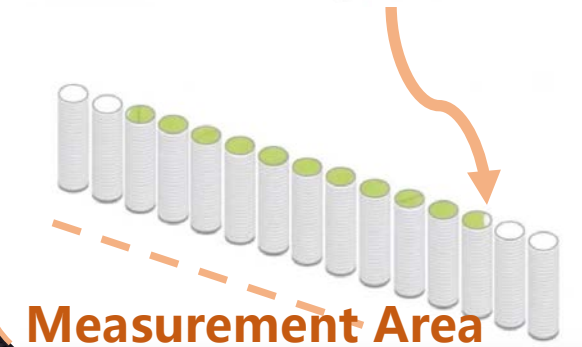
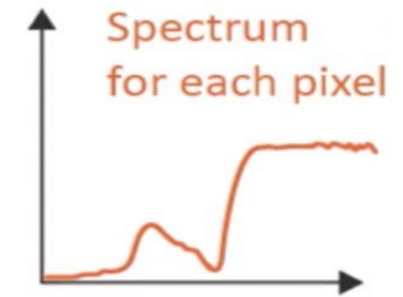




# Working Principle FigSpec Series Hyperspectral Camera



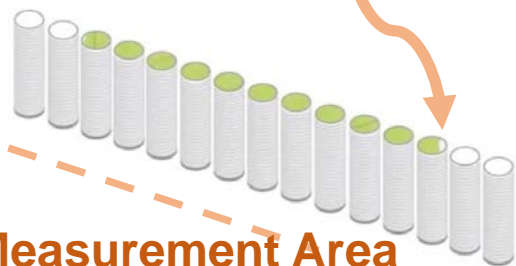
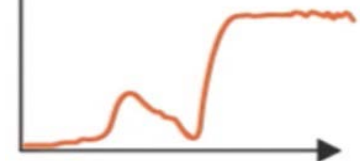
## Spectral Information



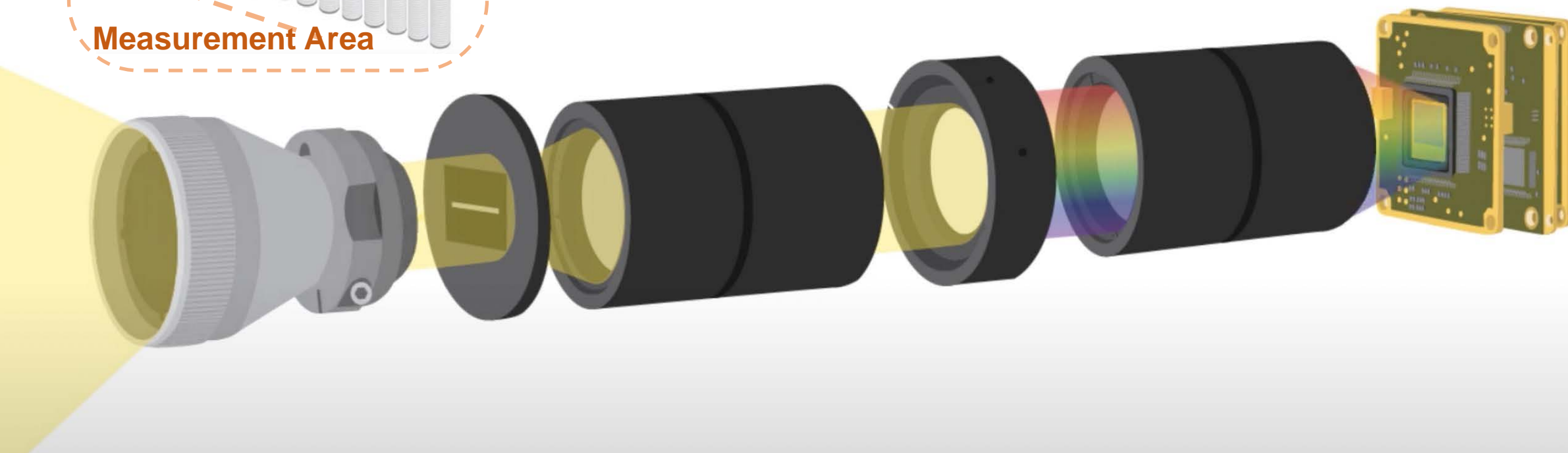
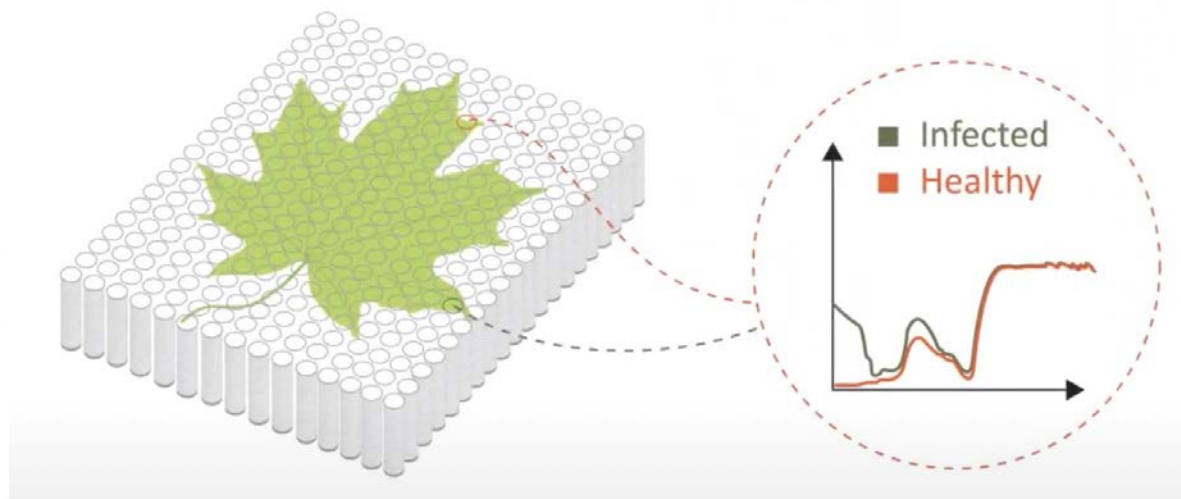


## Spectral Information

Spectrum  
for each pixel

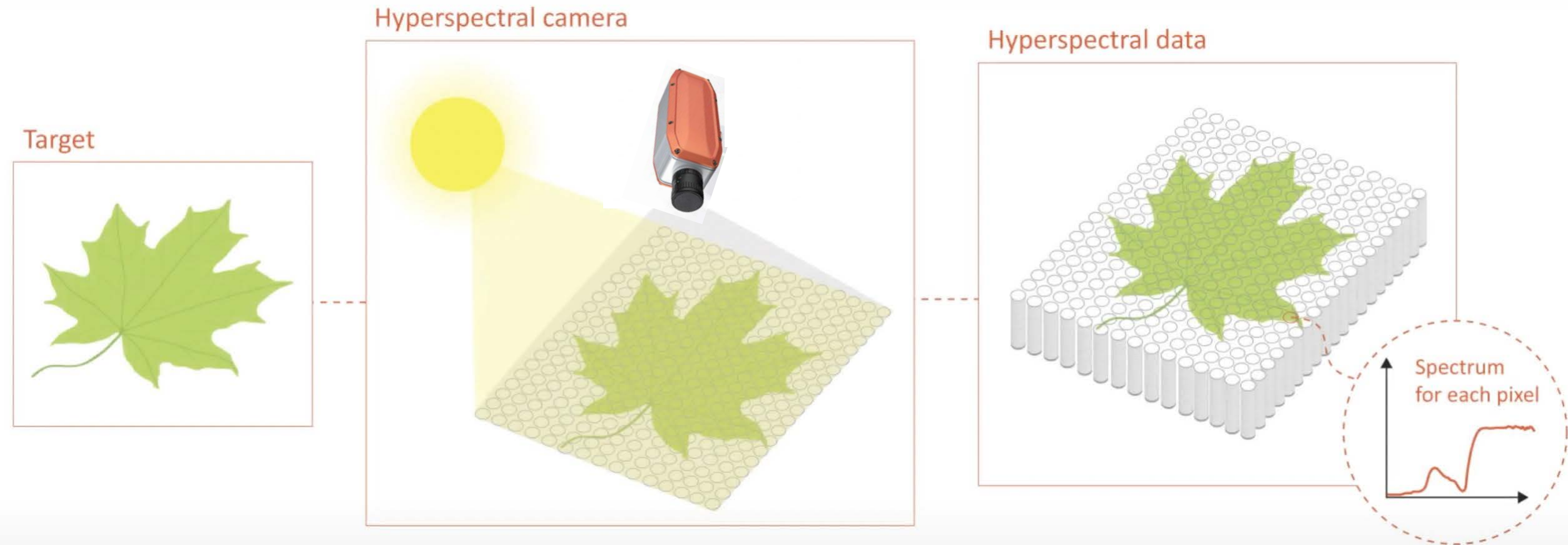


Measurement Area





# Working Principle    Hyperspectral Measurement





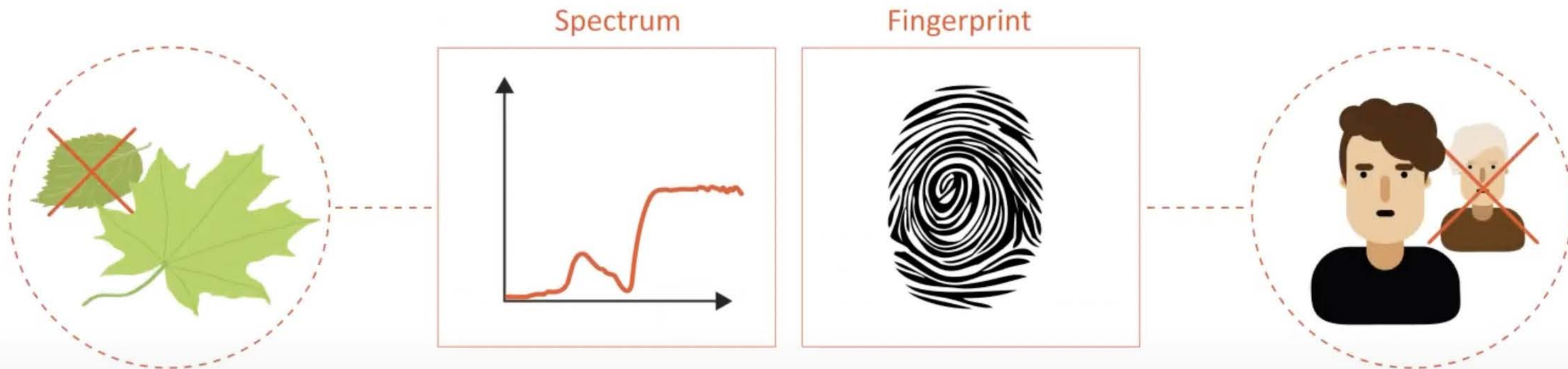
## Working Principle

## Line Scan Measurement Principle



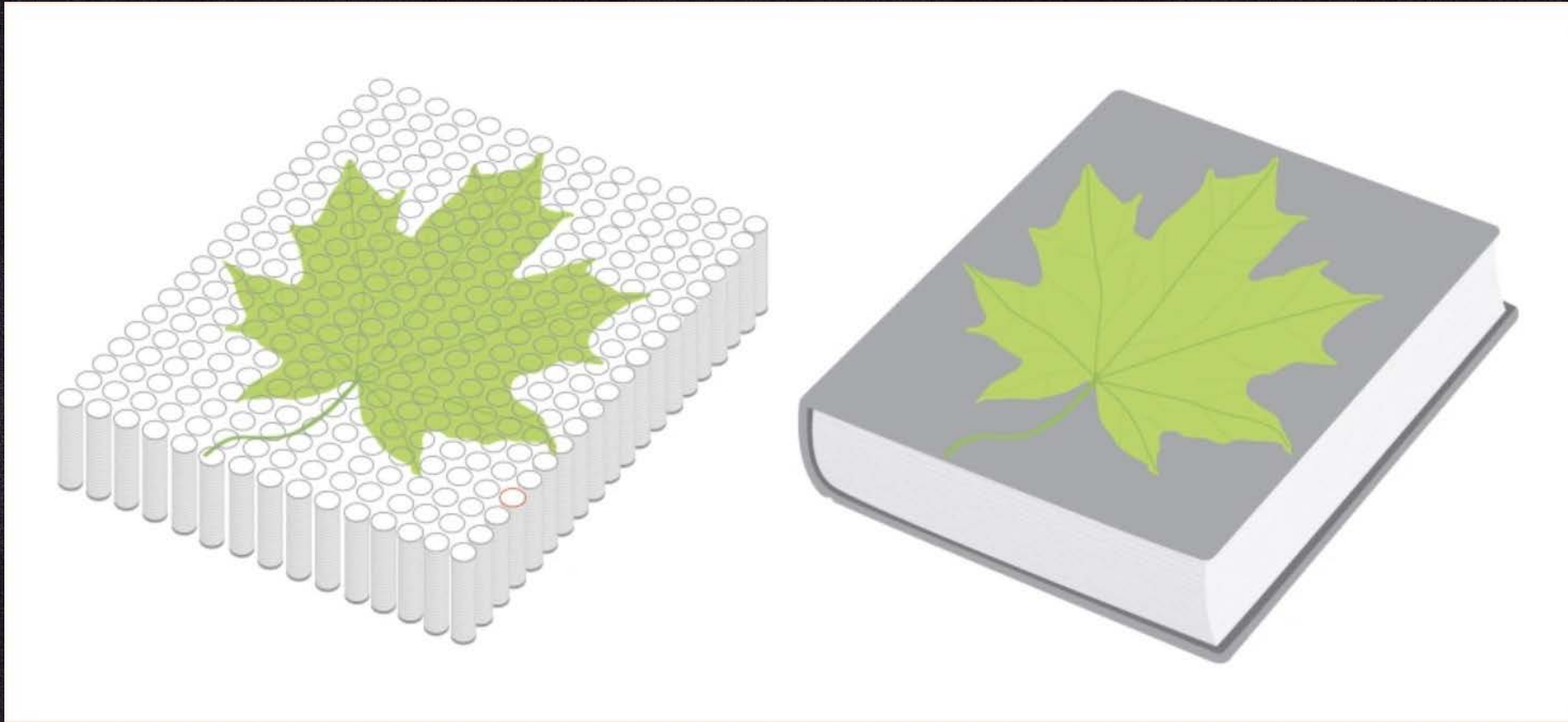


# Working Principle FigSpec Series Hyperspectral Camera





## Working Principle FigSpec Series Hyperspectral Camera





## Application

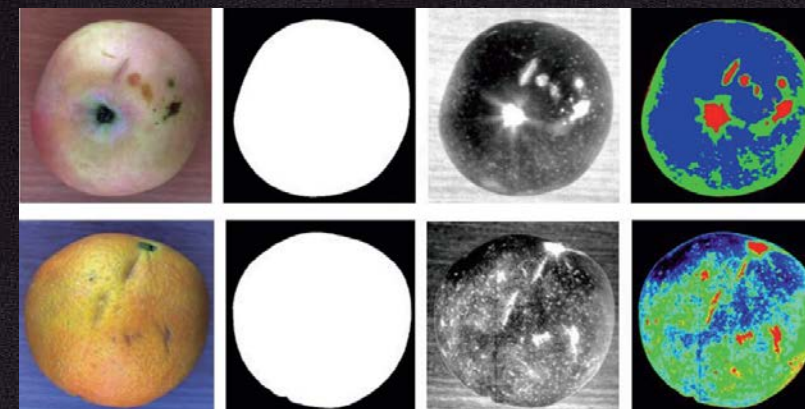
# FigSpec Series Hyperspectral Camera



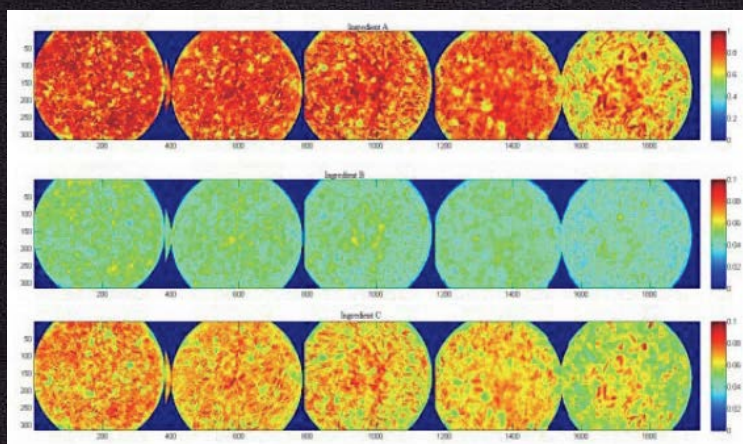
Print Products Quality Control



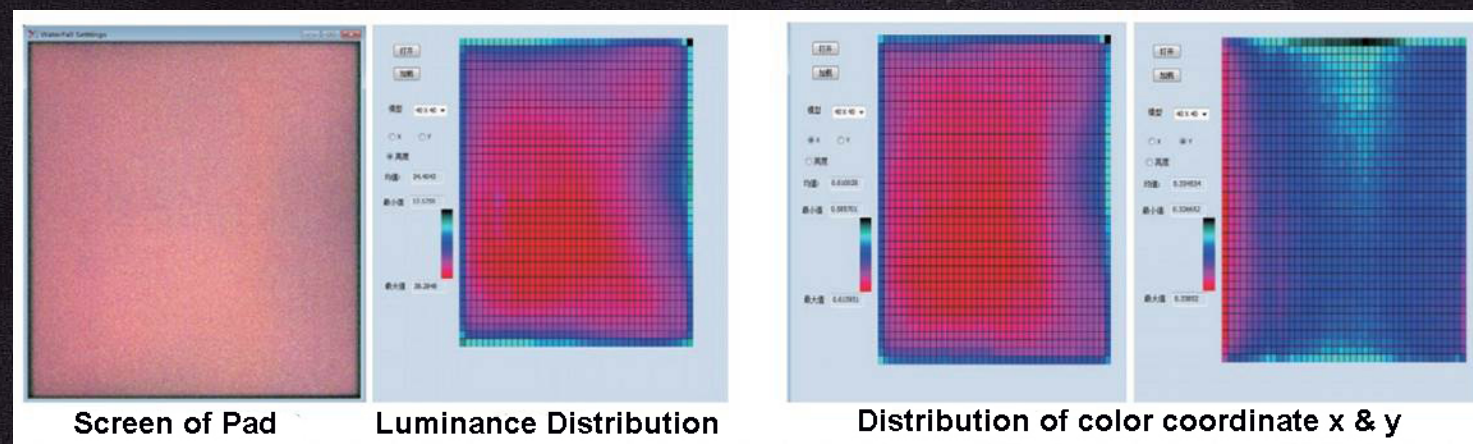
Textile Products Color QC



Fruit sugar content & damage detection



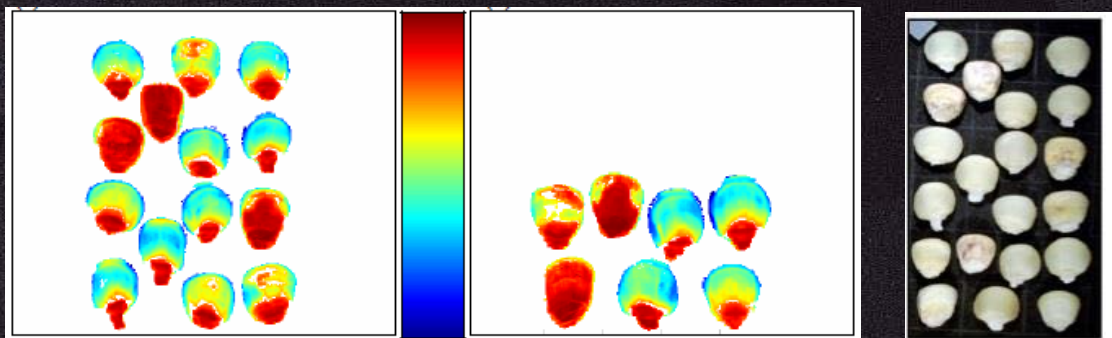
Pharmaceutical Composition and QC Analysis



Screen color & Mura detection



# Agricultural Products Quality Analysis

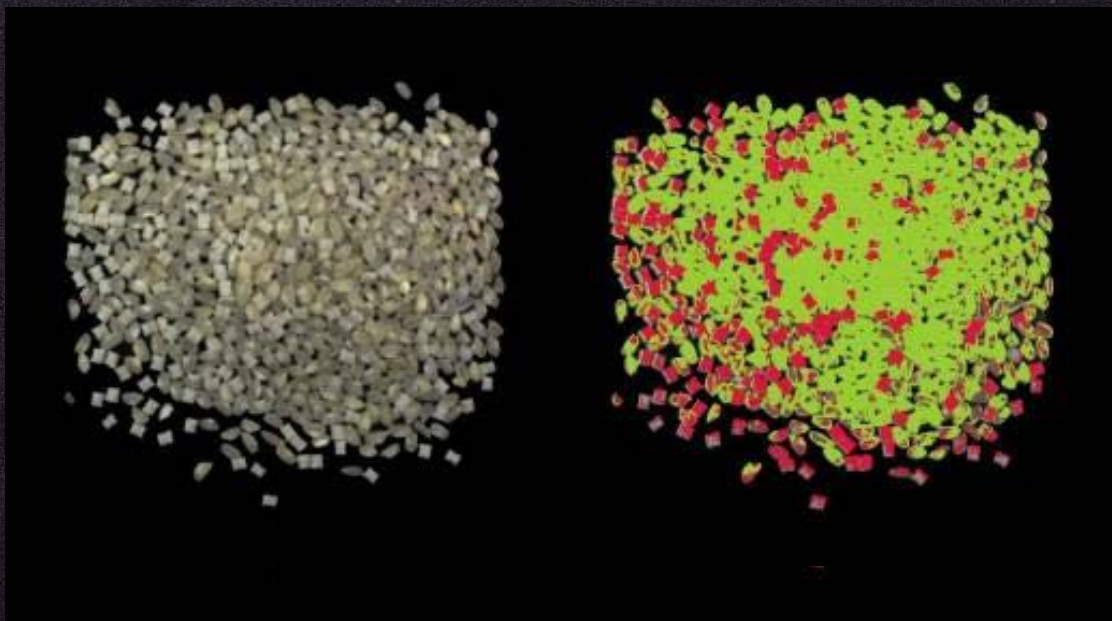


- Plastic adulteration in rice, food fungal infection, food mildew and deterioration, fruit and vegetable damage, pesticide residues

There is a great similarity in external features, which cannot be detected by human eyes and traditional RGB cameras.

The FS series hyperspectral camera collects accurate hyperspectral image data of the measured object by virtue of its unique spectral band.

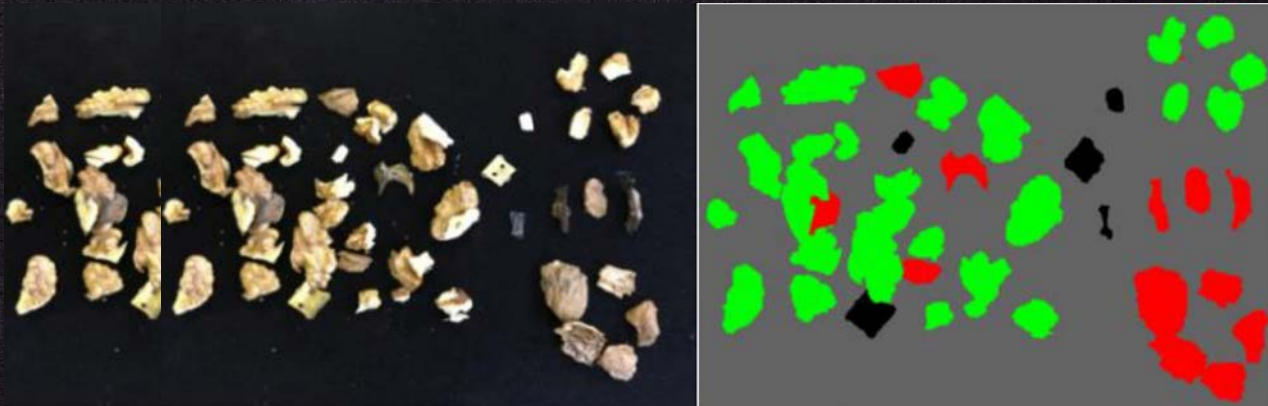
Combining the technology of spectral analysis and image processing to quickly detect the internal and external quality of the food to ensure the authenticity and safety.



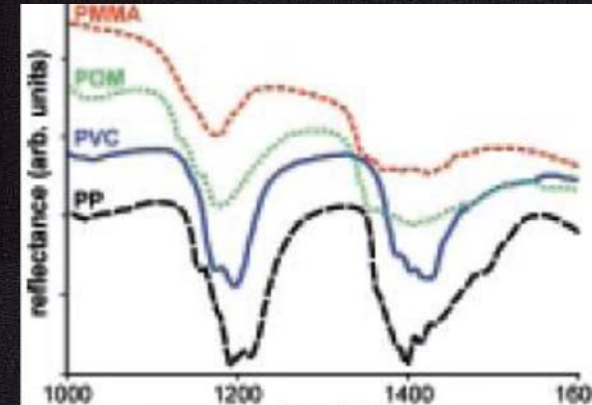


## Application

# Industrial Sorting



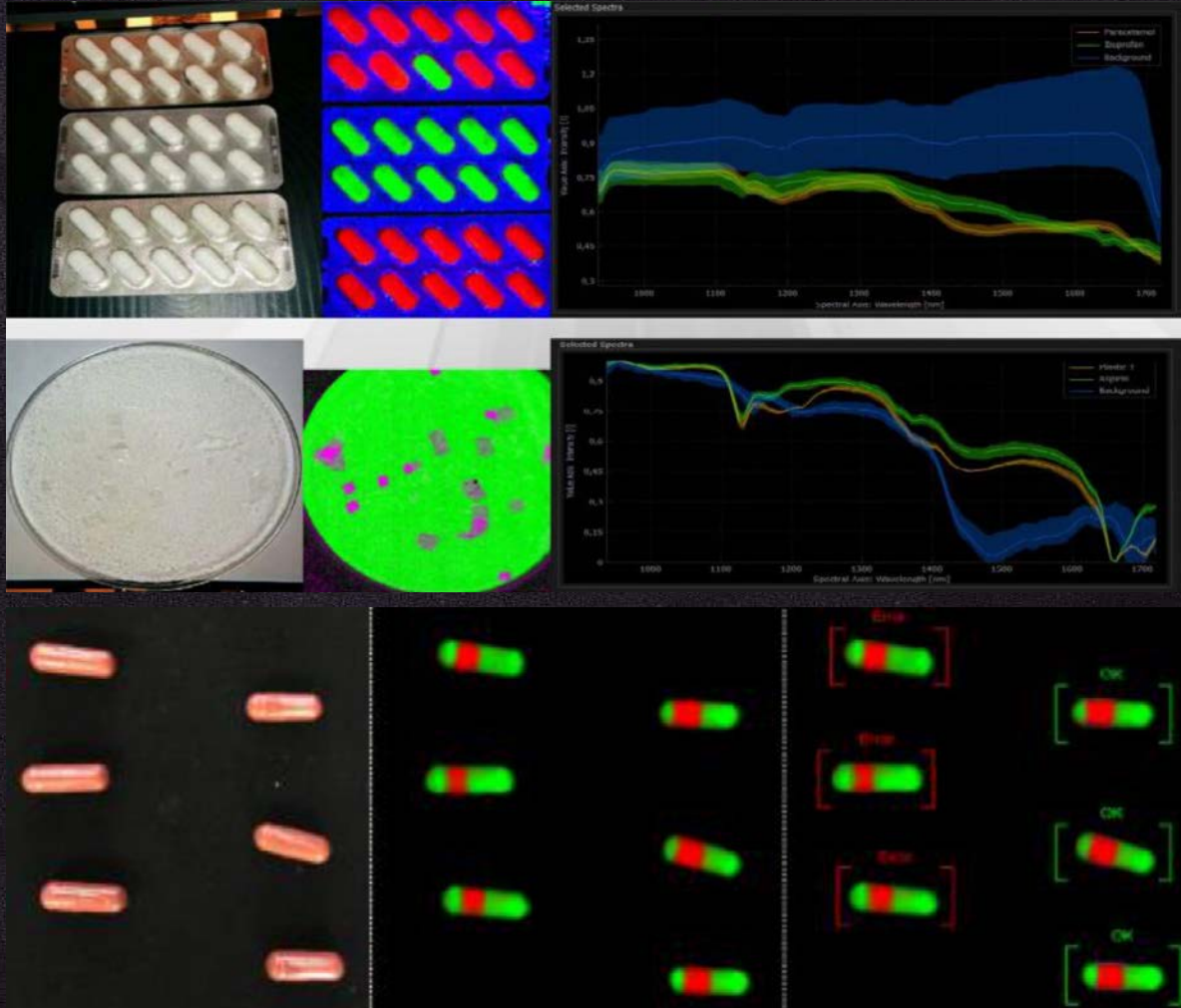
- Industrial sorting is the non-destructive identification and sorting of defective products and various adulterants with similarities and differences in composition or shape, surface or internal deterioration, and various adulterants from large quantities of mixed materials. ◦
- In addition to visible light solutions in the industrial sorting market, near-infrared spectral imaging systems are gradually playing an important role in the sorting of nuts, grains, seeds, vegetables, fruits, garbage, and plastics of different materials.





## Application

# Pharmaceutical Surface QC & Composition Analysis

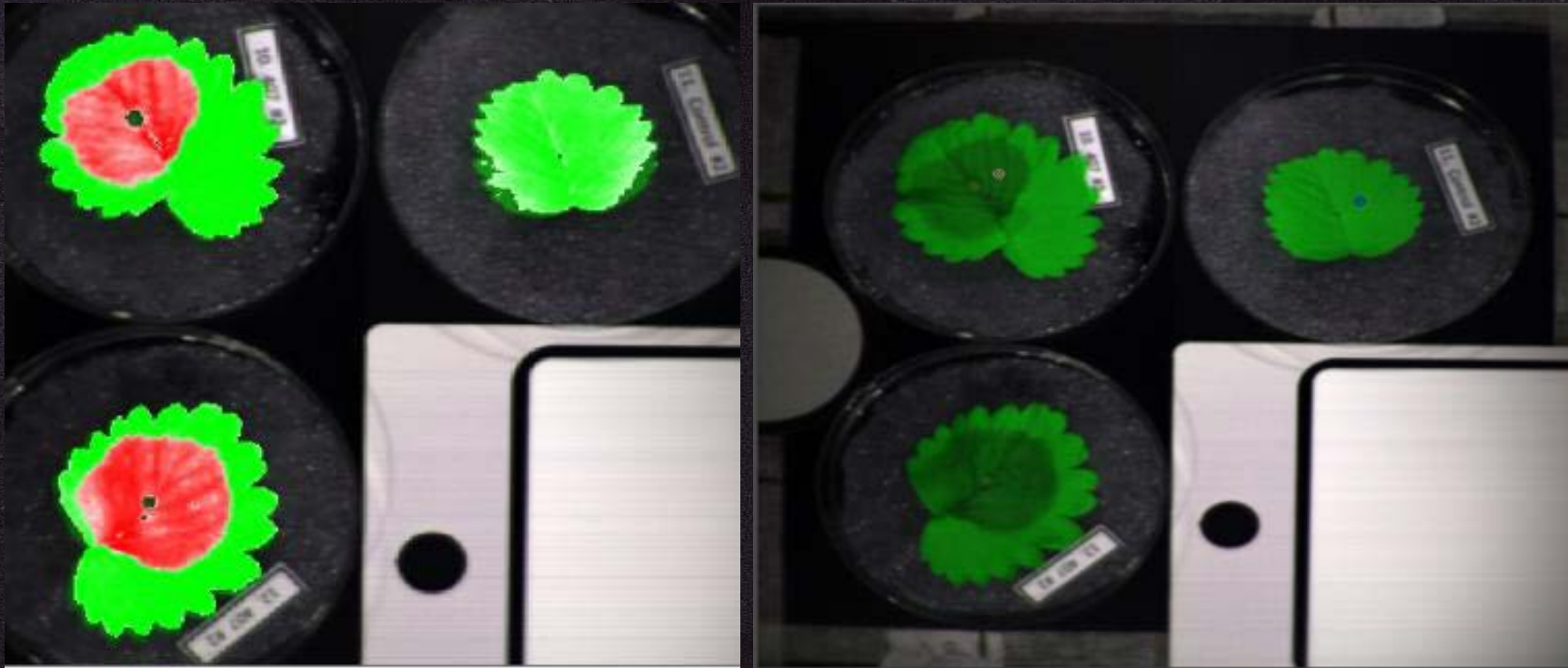


- Analyze whether there are cracks in the sustained-release coating of tablets, whether there are tablets in capsules or blisters, medicines with the same color and different ingredients, and the sealing properties of the left and right parts of the capsule.
- Adopt hyperspectral imaging technology to realize non-destructive inspection of the pharmaceutical process.



## Application

# Hyperspectral detection of strawberry root rot



- The early symptoms of root rot are mainly concentrated in the roots and are not easy to be noticed.
- Monitoring root rot by studying changes in strawberry leaves.



A photograph of a grand library interior, likely the Vatican Museums. The image shows a long, vaulted corridor with high ceilings and rows of bookshelves on both sides. The shelves are filled with books, and the spines of many books are visible. The architecture is classical, with ornate columns and decorative elements. In the foreground, several classical statues are visible, including a large one on the right and a row of smaller ones further down the corridor. The lighting is warm and focused on the central path, creating a sense of depth and grandeur. The text "Thank you!" is overlaid in the center of the image in a white, serif font.

Thank you!