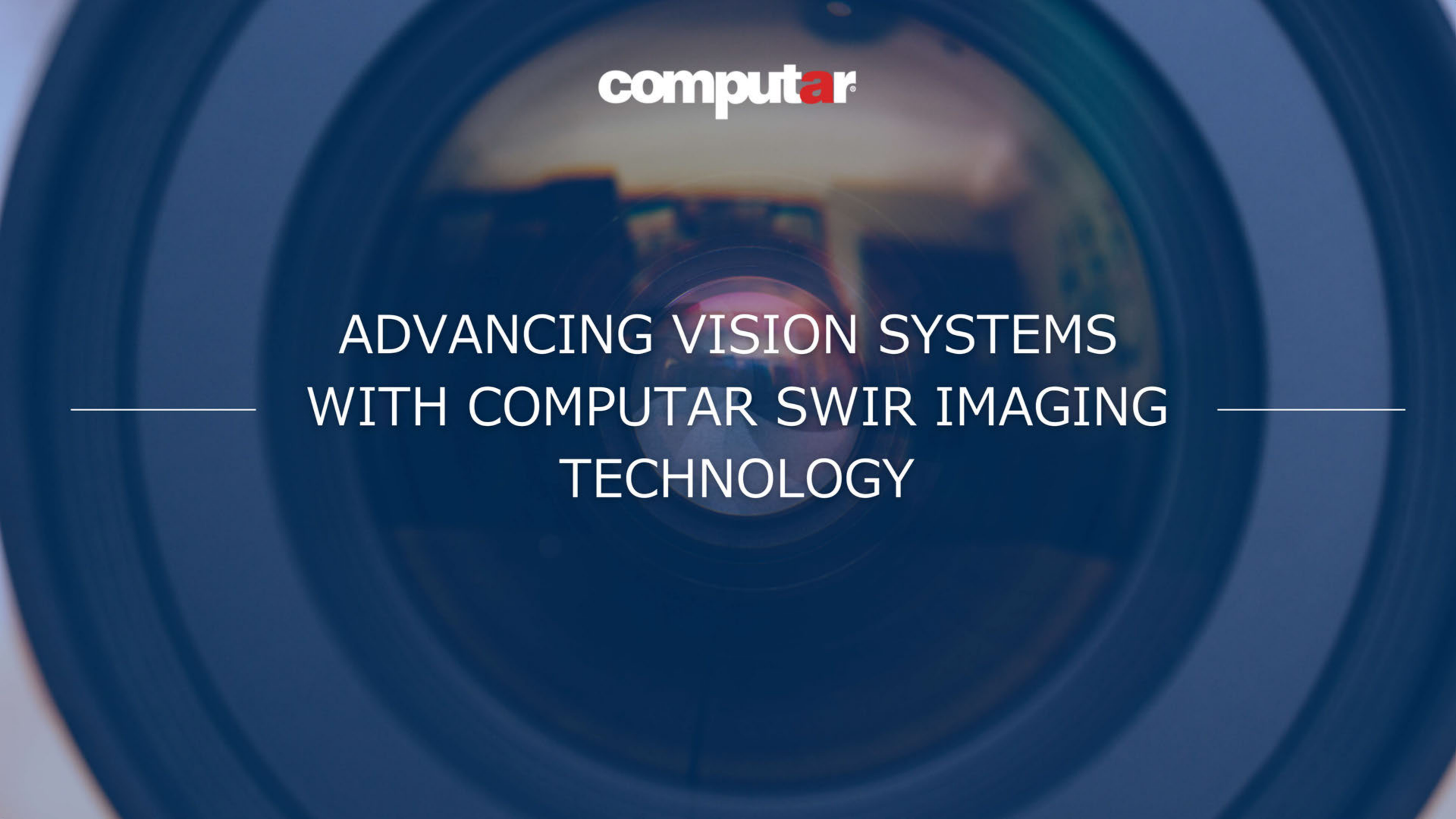

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ADVANCING VISION SYSTEMS WITH COMPUTAR SWIR IMAGING TECHNOLOGY

ABOUT US

Jonathan is an experienced Application Engineer with a demonstrated history of working in the industrial automation industry.

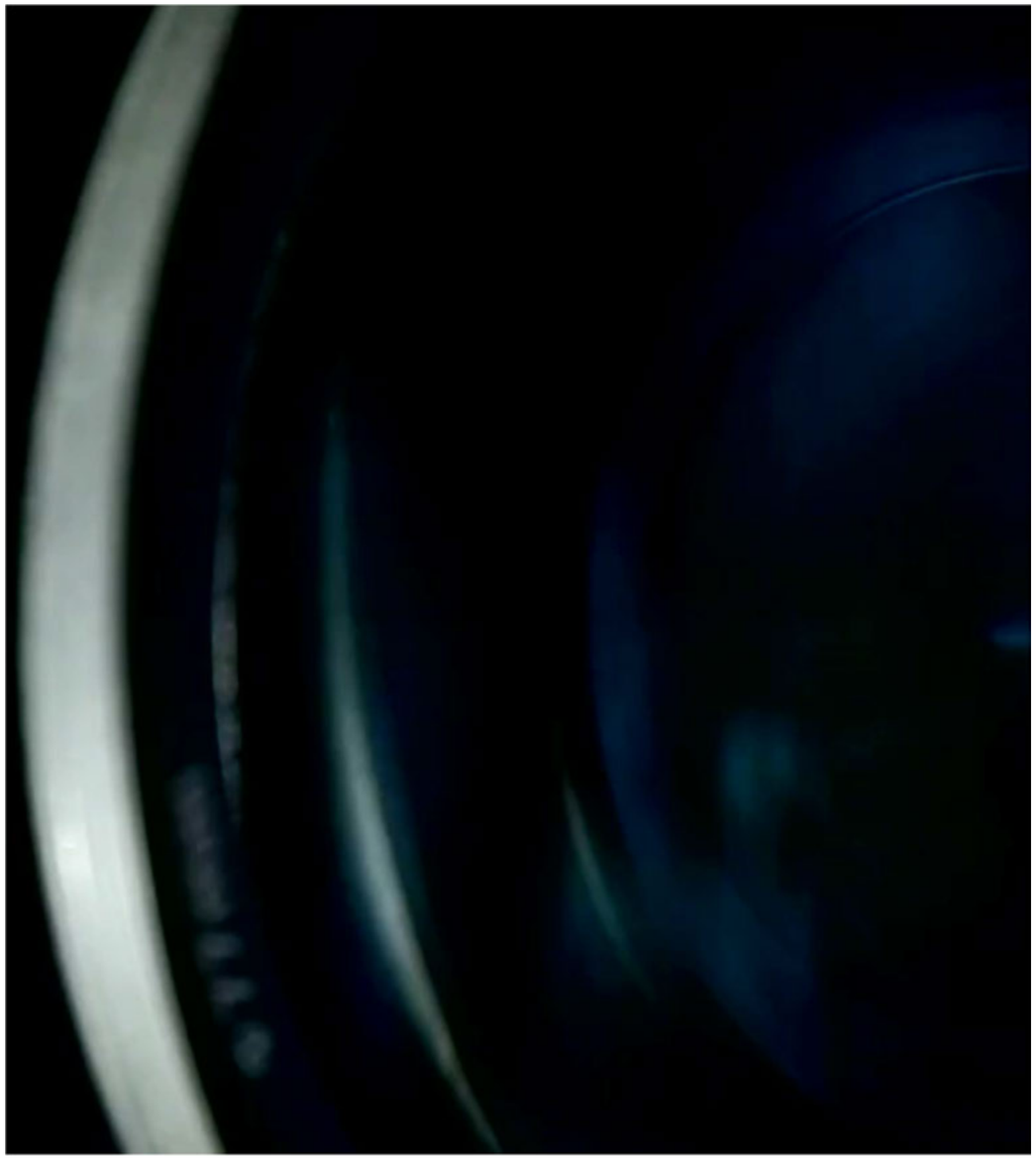
He has a Bachelor of Science from Texas Tech University, where he studied industrial engineering.

For over 40 years, Computar Optics, a part of the global conglomerate CBC Group, has been a leader in developing innovative lenses worldwide.

COMPONENTS
OF SWIR IMAGING

Machine Vision systems typically consist of the following components:

- Cameras: Capture the images of the objects or scenes.
- Lighting: Narrow band LED lighting, Wideband quartz-halogen light
- Filters: Bandpass, Multipass Filters
- Lenses: Focus the light to present a clear image to the camera.
- Image Processing Software: Analyzes the captured images and extracts relevant data.
- Computers/Processors: Perform the computational tasks for image analysis and decision-making.



KEY TAKEAWAYS

- SWIR imaging and how it overcomes the limitations of visible light systems
- Specialized SWIR lens designs
- Unique optical coatings
- Application-specific variants
- Visible+SWIR sensors (IMX990/991/992/993)
- How AR coating technology maximizes lens performance
- Chromatic aberration correction to the limit at 400 nm to 1700 nm
- The ViSWIR Series

Visible vs SWIR (illustrative Example)

TYPES
OF SWIR IMAGING

SWIR CAMERAS
Specialized cameras designed to capture images in the SWIR spectrum.

HYPERSPECTRAL SWIR IMAGING
Capturing images at multiple wavelengths within the SWIR range for detailed spectral analysis.

SWIR LINE SCAN IMAGING
Moving objects are scanned line by line to capture SWIR images.

SWIR THERMAL IMAGING
Combining SWIR imaging with thermal imaging for enhanced detection capabilities.

SWIR REFLECTANCE IMAGING
Analyzing the reflectance of SWIR light for various applications, such as material identification and quality control.

HOW SWIR LENSES WORK

- Material and Coating: SWIR lenses use specialized materials and coatings to efficiently transmit SWIR wavelengths and minimize losses through reflection.

- Optical Design: the design of SWIR lenses focuses on reducing chromatic aberration and distortions in infrared wavelengths for clear imaging.

- Detection and Imaging: SWIR lenses focus SWIR light onto InGaAs detectors in cameras, enabling imaging with distinct SWIR characteristics.

- Applications and Advantages: SWIR imaging is advantageous for seeing through opaque materials and finds applications in surveillance, industrial inspection, semiconductor inspection, and agricultural monitoring (more on this later).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VISMR
HYPER
APO

ViSWIR

HYPER APO

Vision Systems InnoVators Awards
GOLD HONOREE

2022 AWARD
inspect
WORLD OF VISION

Bringing Visible + SWIR into Focus

Compatible with IMX990/991/992/993

ViSWIR

HYPER APO

Designed specifically for the latest high-resolution Visible+SWIR sensors

ViSWIR

Standard Lens

Visible | NIR | SWIR

400nm 550nm 650nm 850nm 1000nm 1200nm 1500nm 1700nm

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ViSWIR

HYPER APO

Features

- High-resolution lens designed specifically for the latest Visible+SWIR sensors.(IMX990/991/992/993)
- AR coating technology that maximizes the performance of ViSWIR lenses and SWIR stray light countermeasures.
- Corrects chromatic aberration to the limit at 400 nm to 1700 nm.

ViSWIR

HYPER APO

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Features

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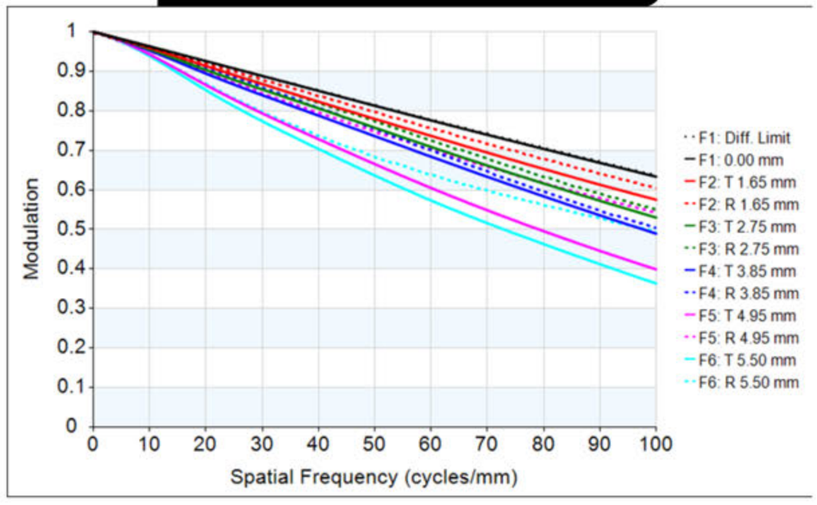
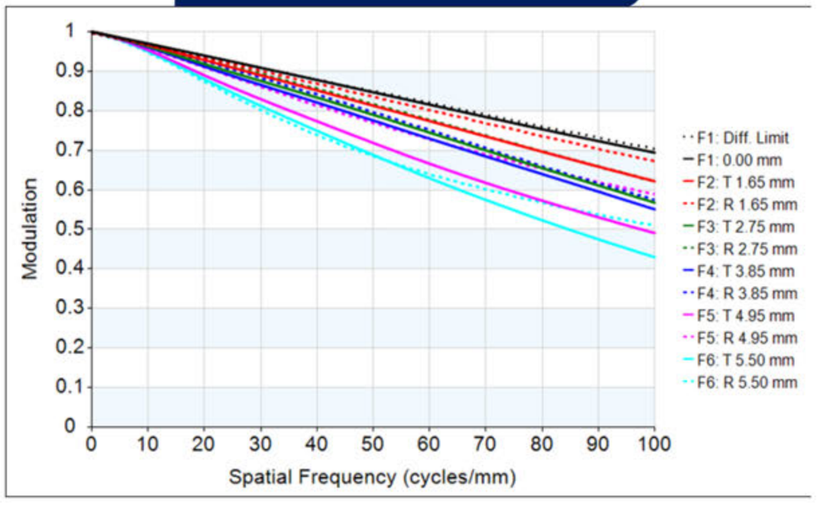
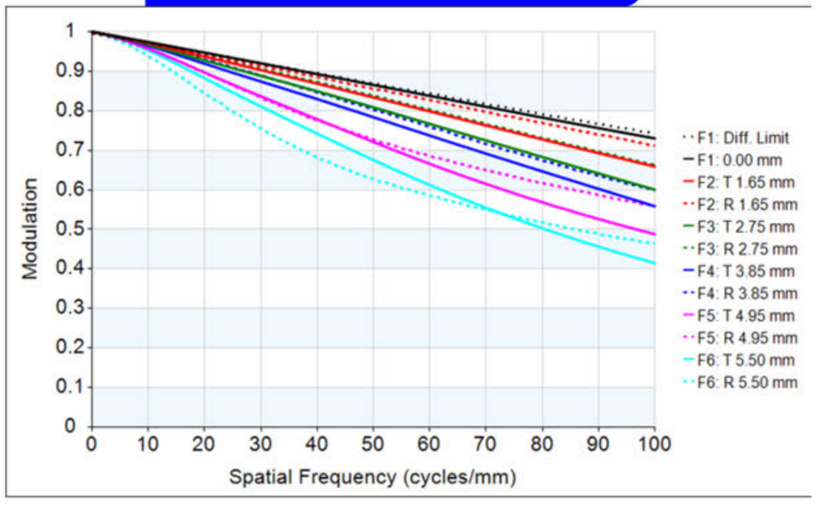
Single wavelength 1550nm



SWIR 900-1700nm



Visible+SWIR 400-1700nm



400-1700nm

900-1700nm

1550nm

400nm 550nm 650nm 850nm 1000nm 1200nm 1500nm 1700nm

High resolution is achieved under the 400~1700nm.

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ViSWIR

HYPER APO

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AR Coating

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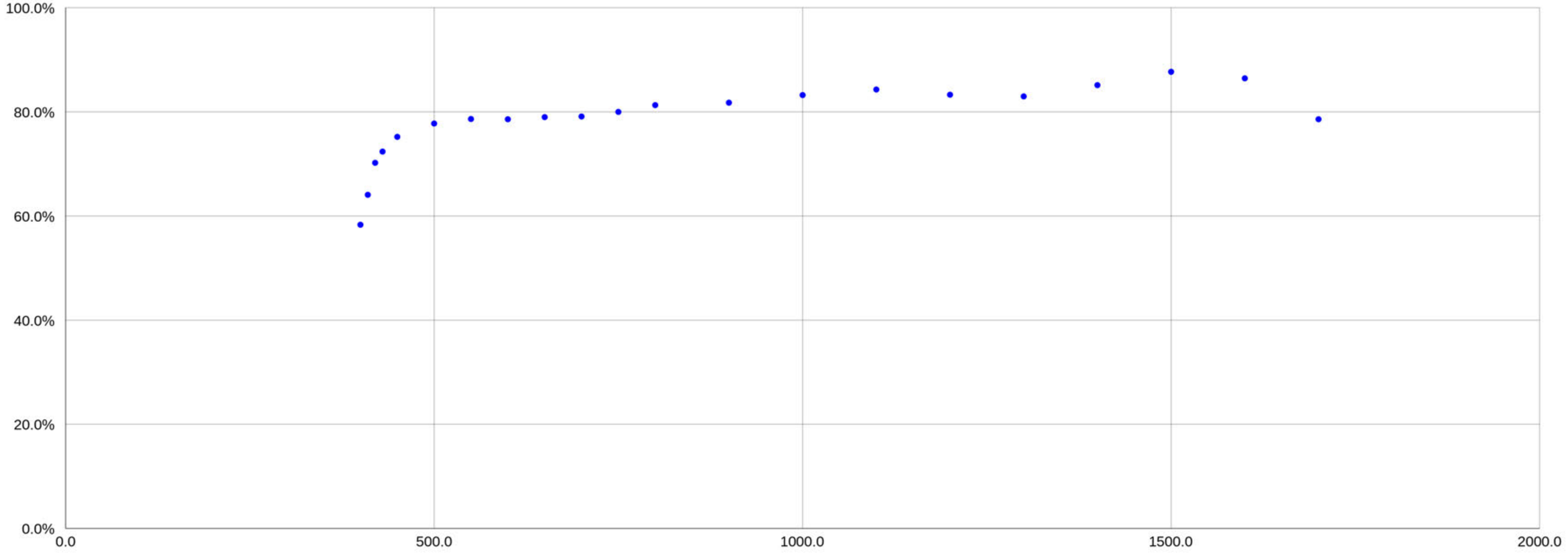
Transmittance Data



Even in industrial fields where long-term use is expected,we have achieved AR coating with minimal changes in characteristics over time.

Internal Reflection Comparison

VS.

Our lenses are designed to suppress internal reflections that adversely affect image quality by applying a special treatment to the mechanical parts that absorbs SWIR light.

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ViSWIR

HYPER APO

Features

- High-resolution lens designed specifically for the latest Visible+SWIR sensors.(IMX990/991/992/993)
- AR coating technology that maximizes the performance of ViSWIR lenses and SWIR stray light countermeasures.
- Corrects chromatic aberration to the limit at 400 nm to 1700 nm.

Axial chromatic aberration

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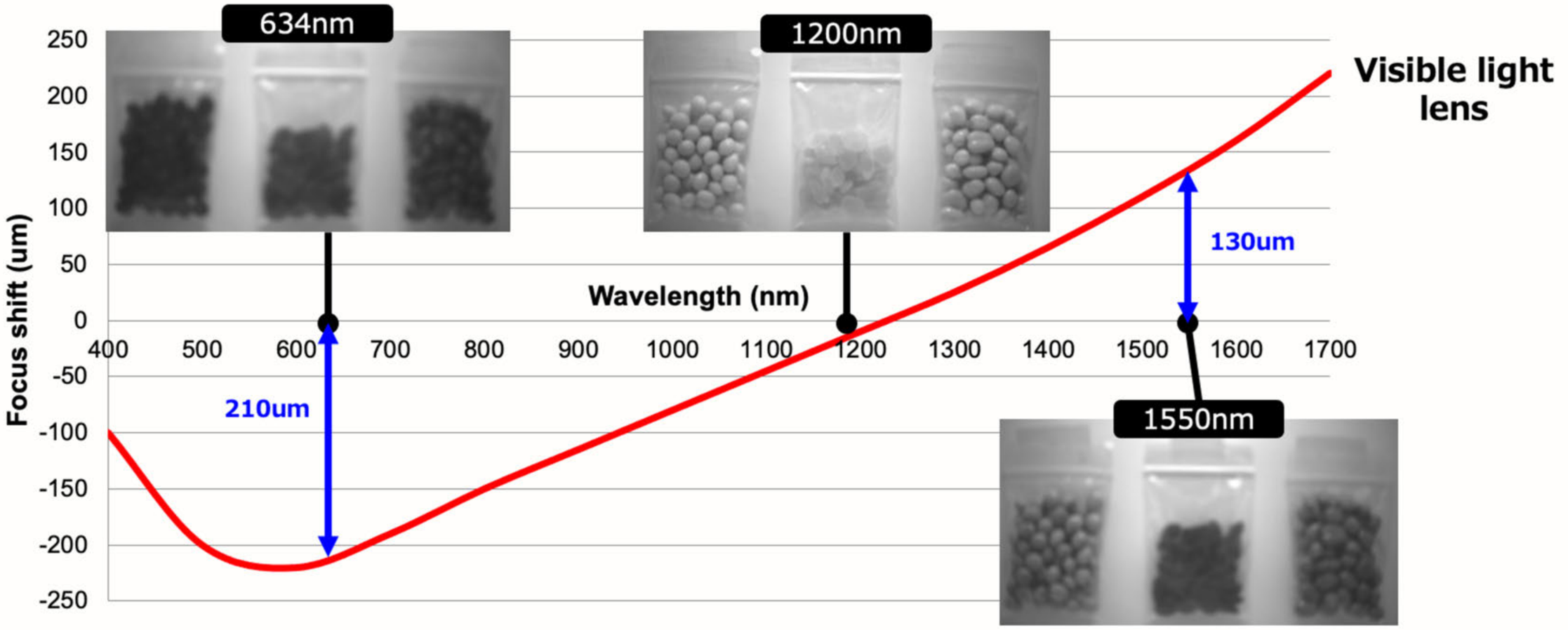
Visible light lens



Axial chromatic aberration

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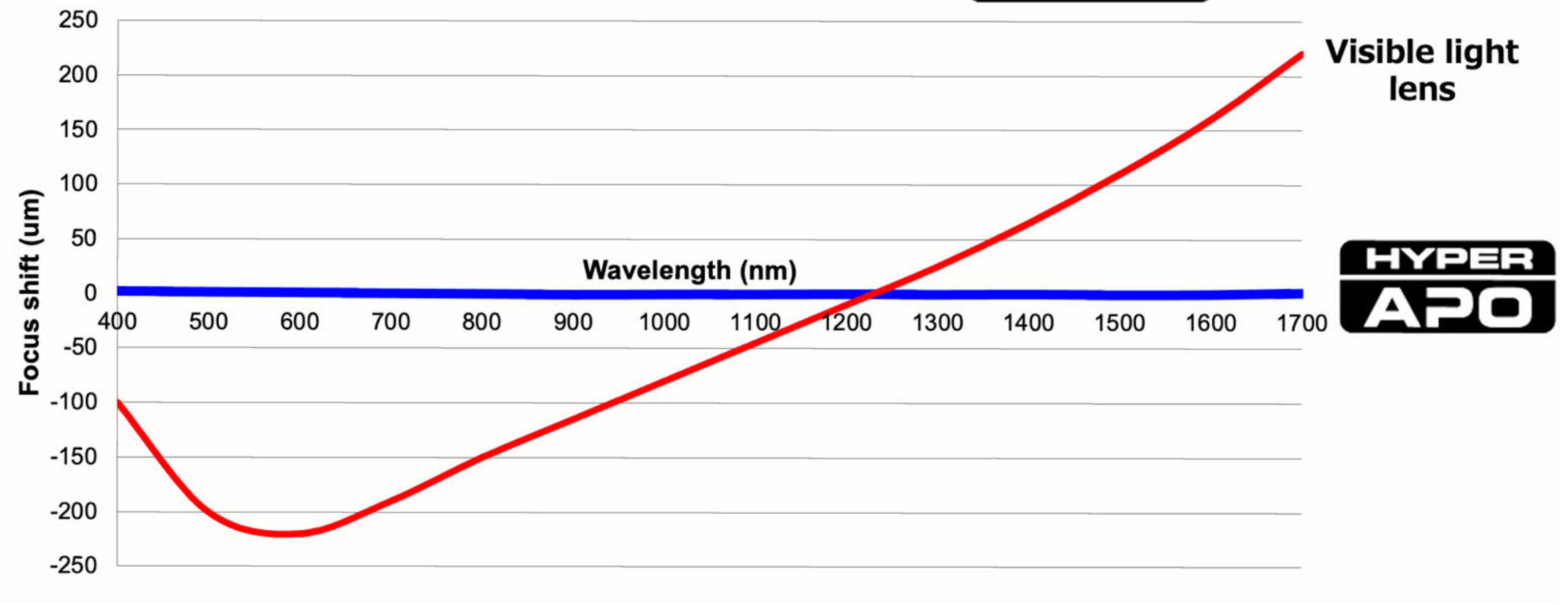
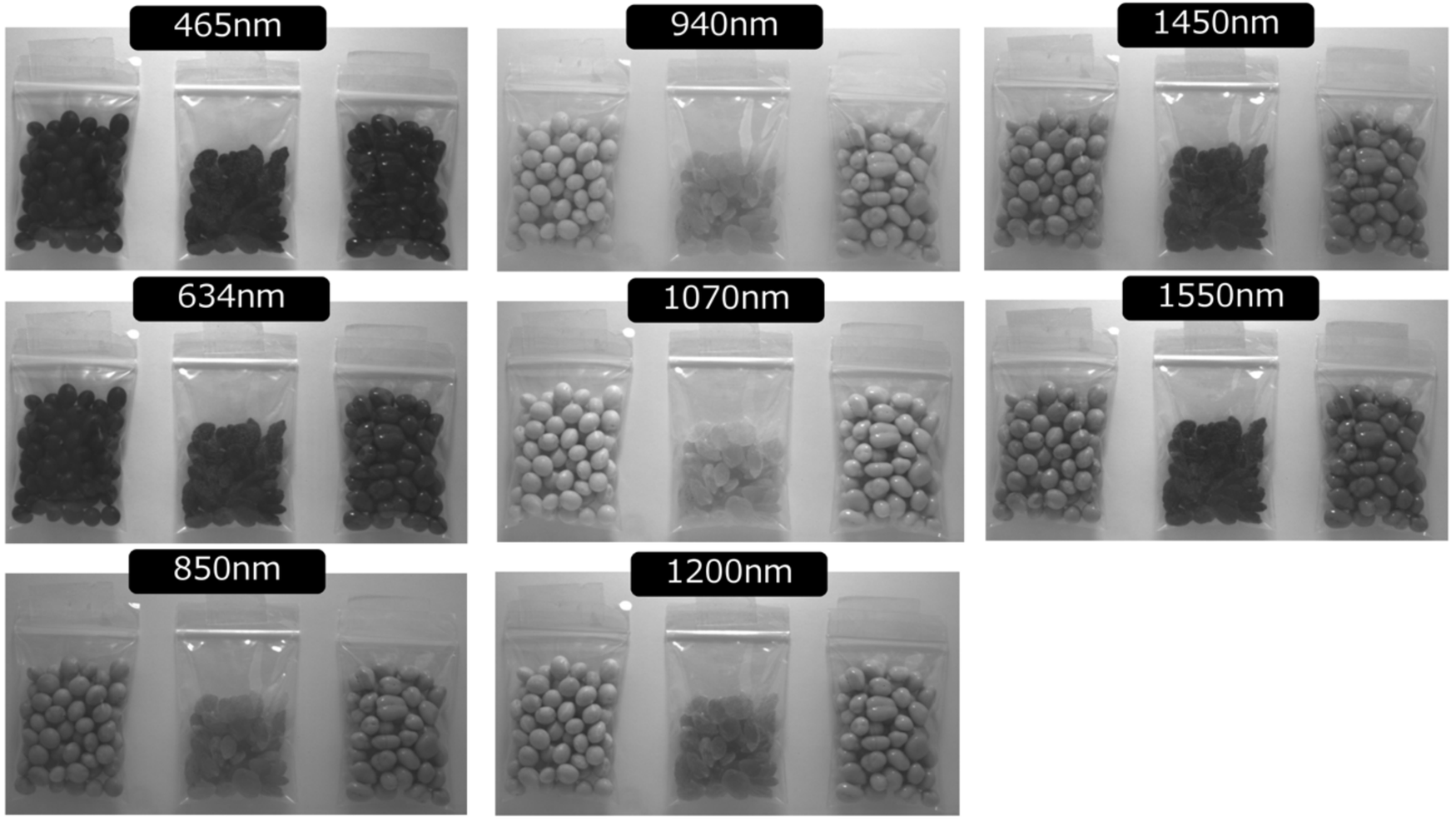
Visible light lens vs HYPER APO



Axial chromatic aberration is completely corrected in the 400-1700 nm range.

Axial chromatic aberration(M0818-APVSW2)



Spectral imaging is possible simply by synchronizing the light source switch and camera imaging, as the focus does not change even when the wavelength is changed.

Lateral Color Aberration

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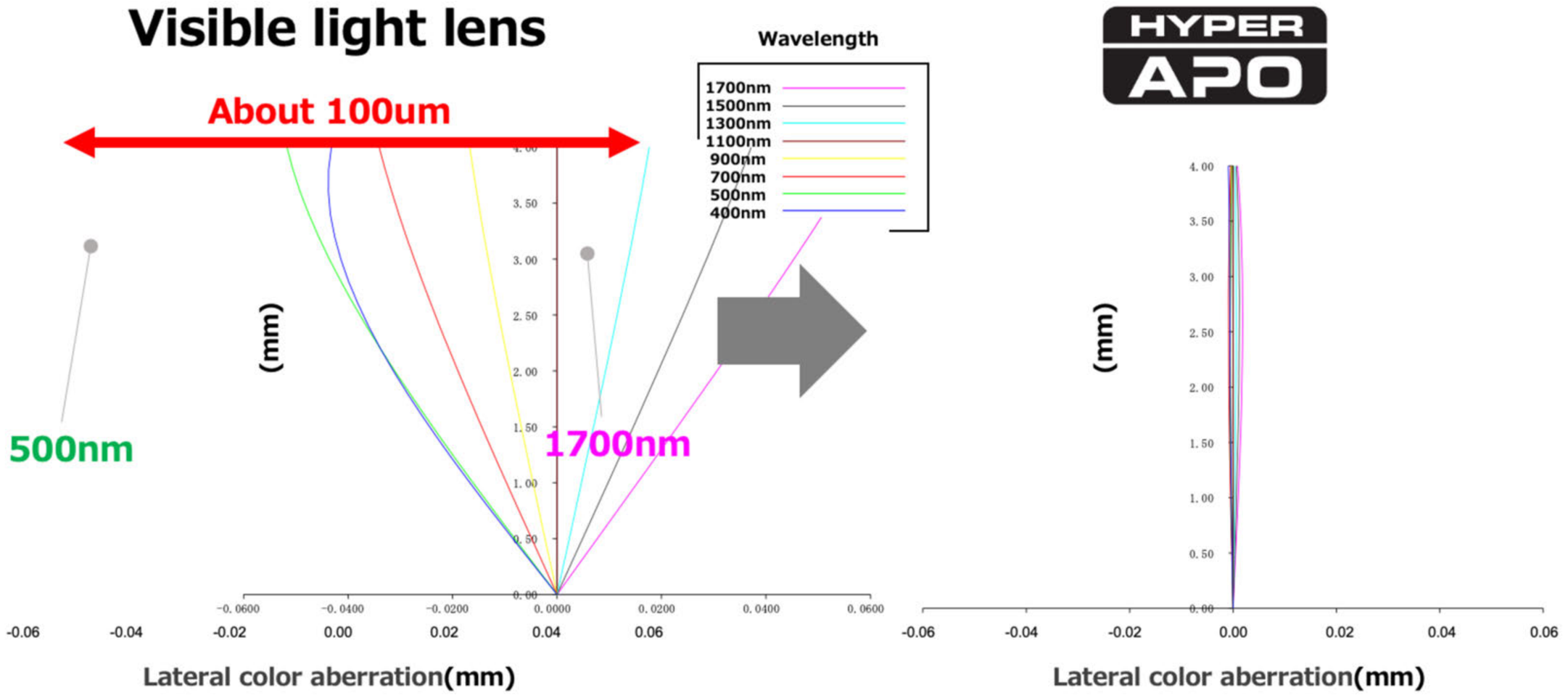
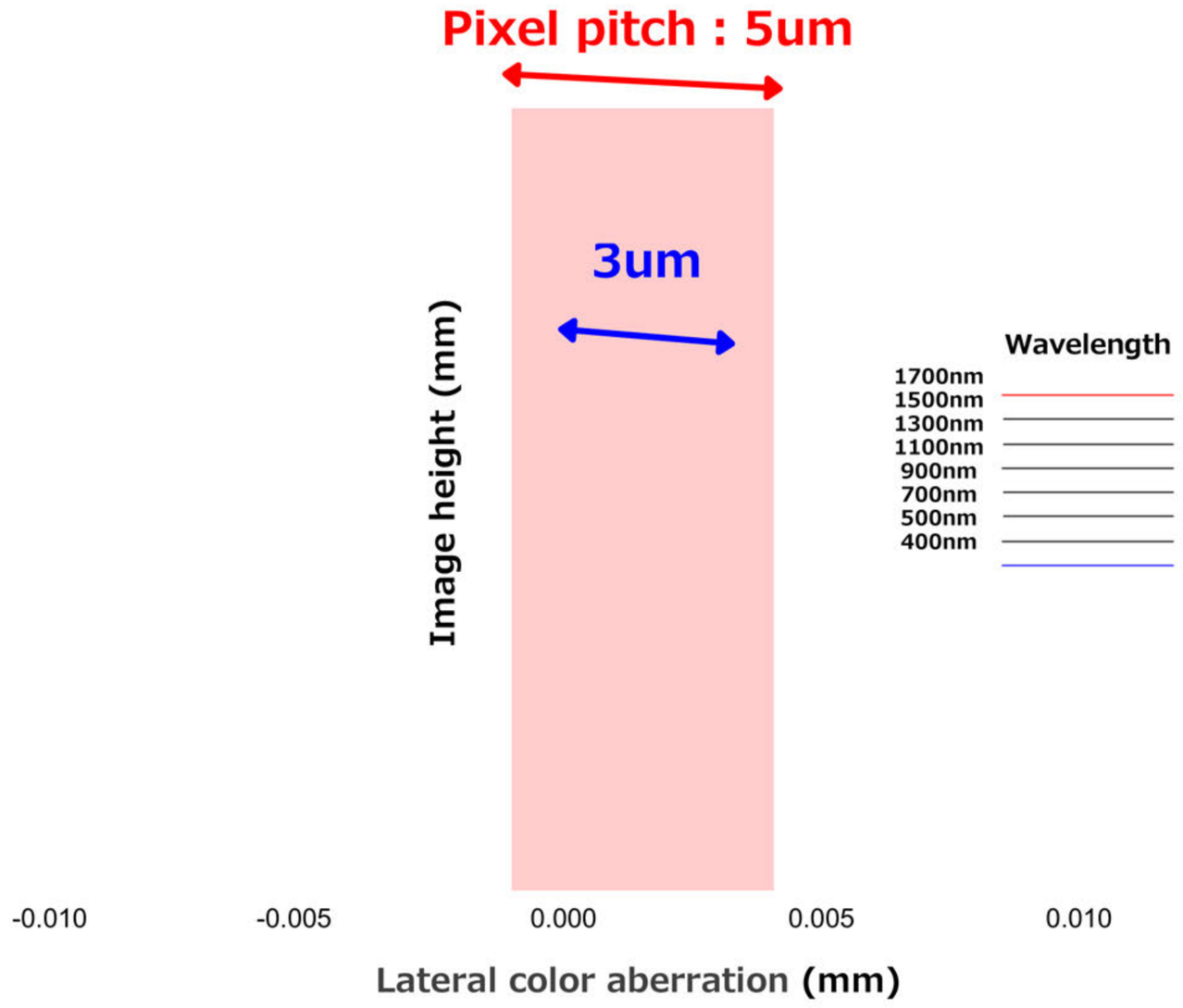
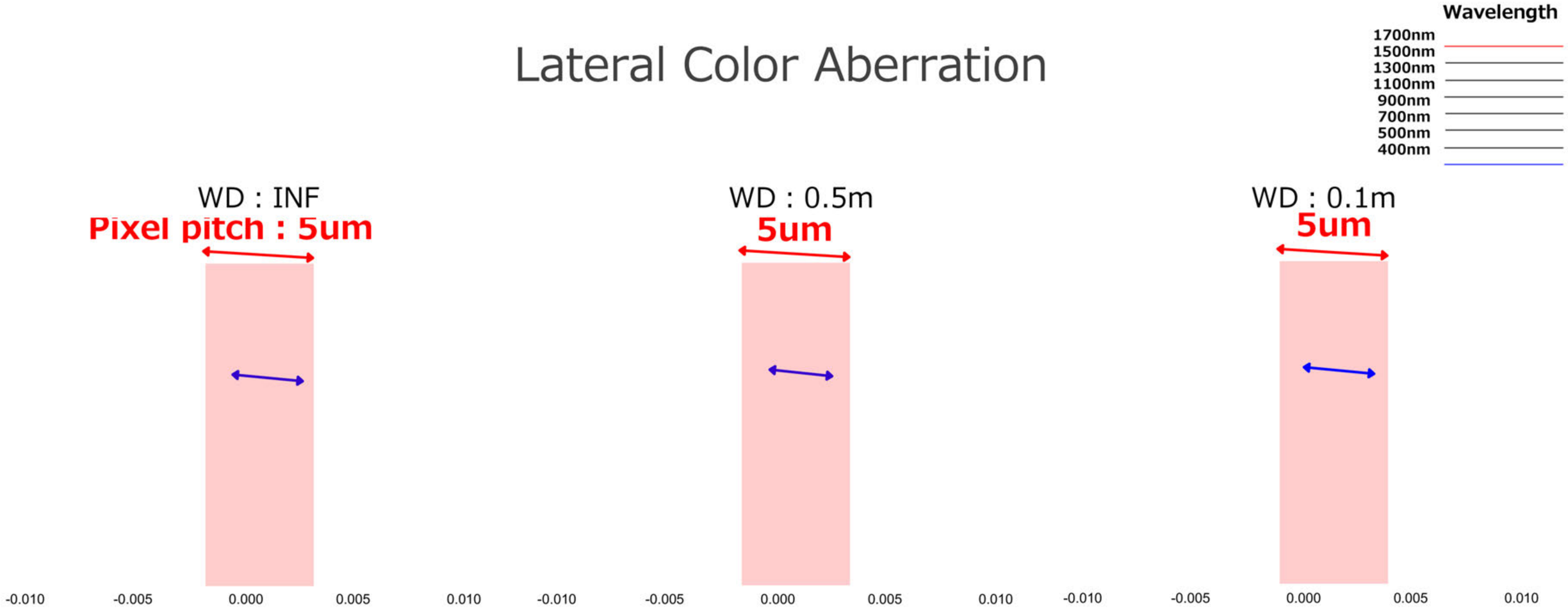


Lateral Color Aberration

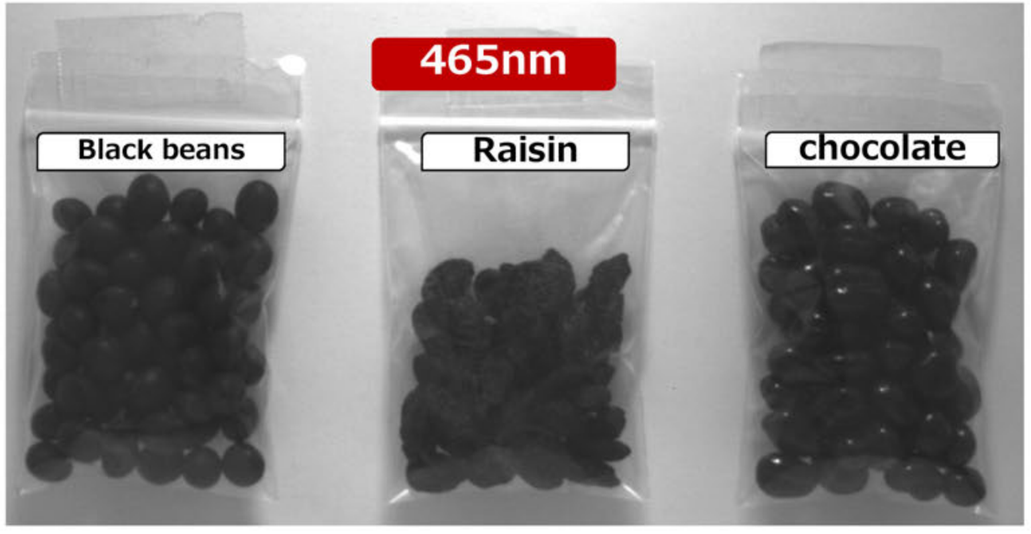


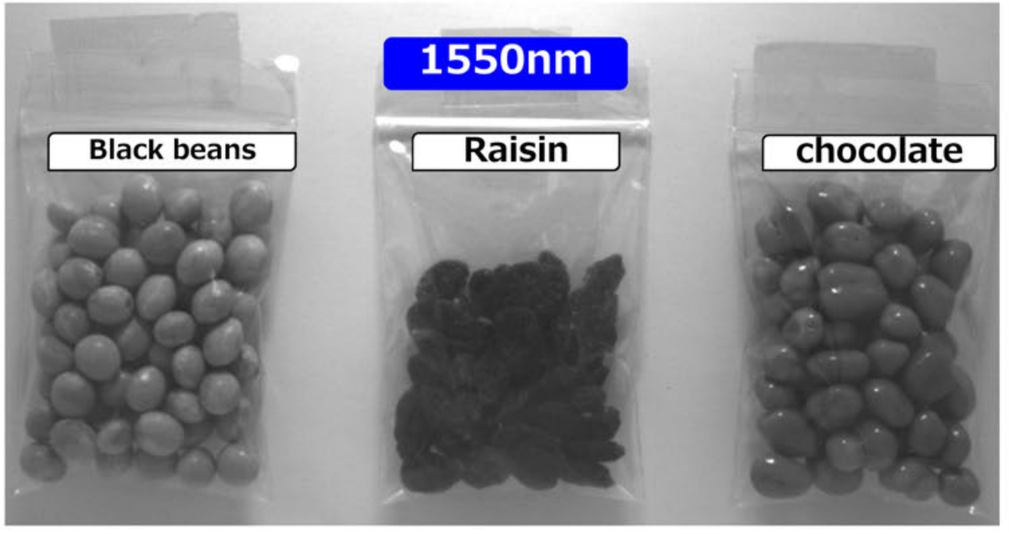
Lateral Color Aberration



- Wide bandwidth with chromatic aberration less than one pixel of the latest InGaAs sensor, even around the edges of the image.
- Suitable for a wide range of applications by suppressing the correction of lateral color aberration from INF to MOD.

EX: Photographs using the ViSWIR Hyper-APO series





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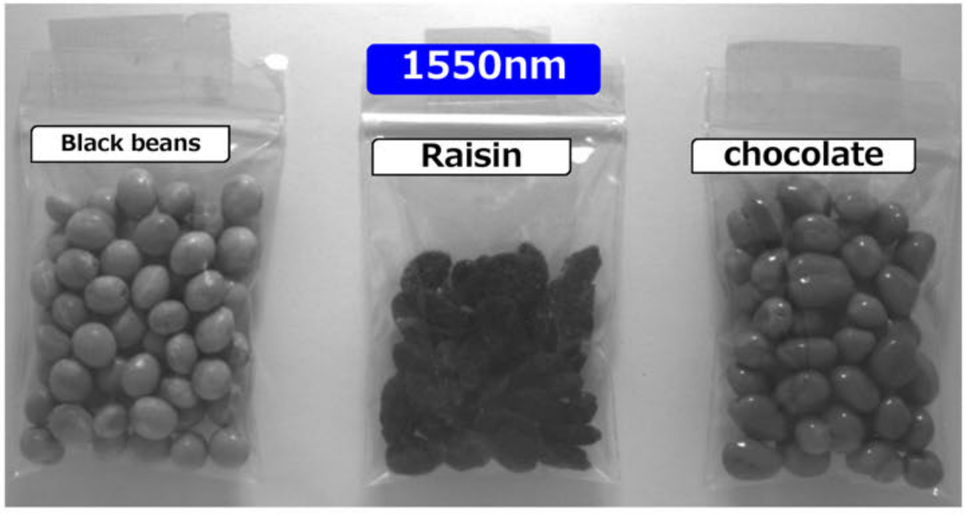

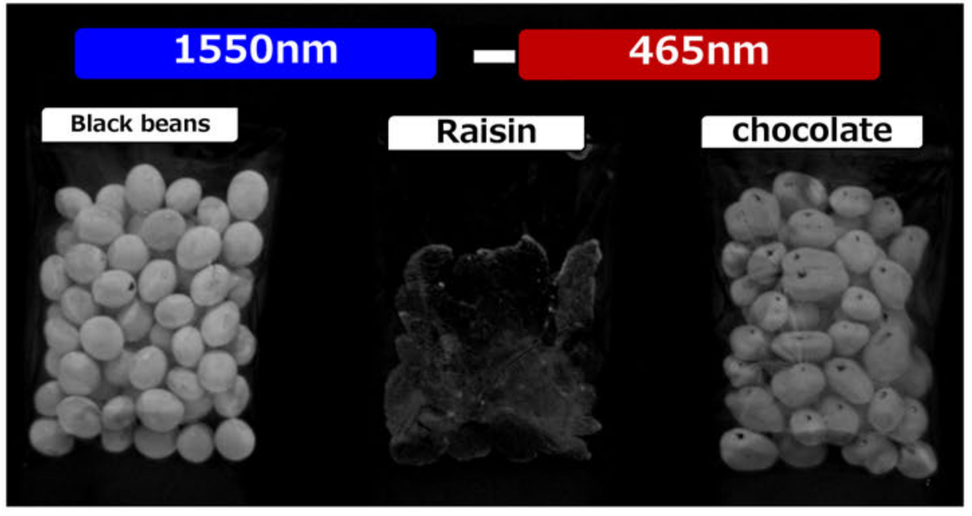

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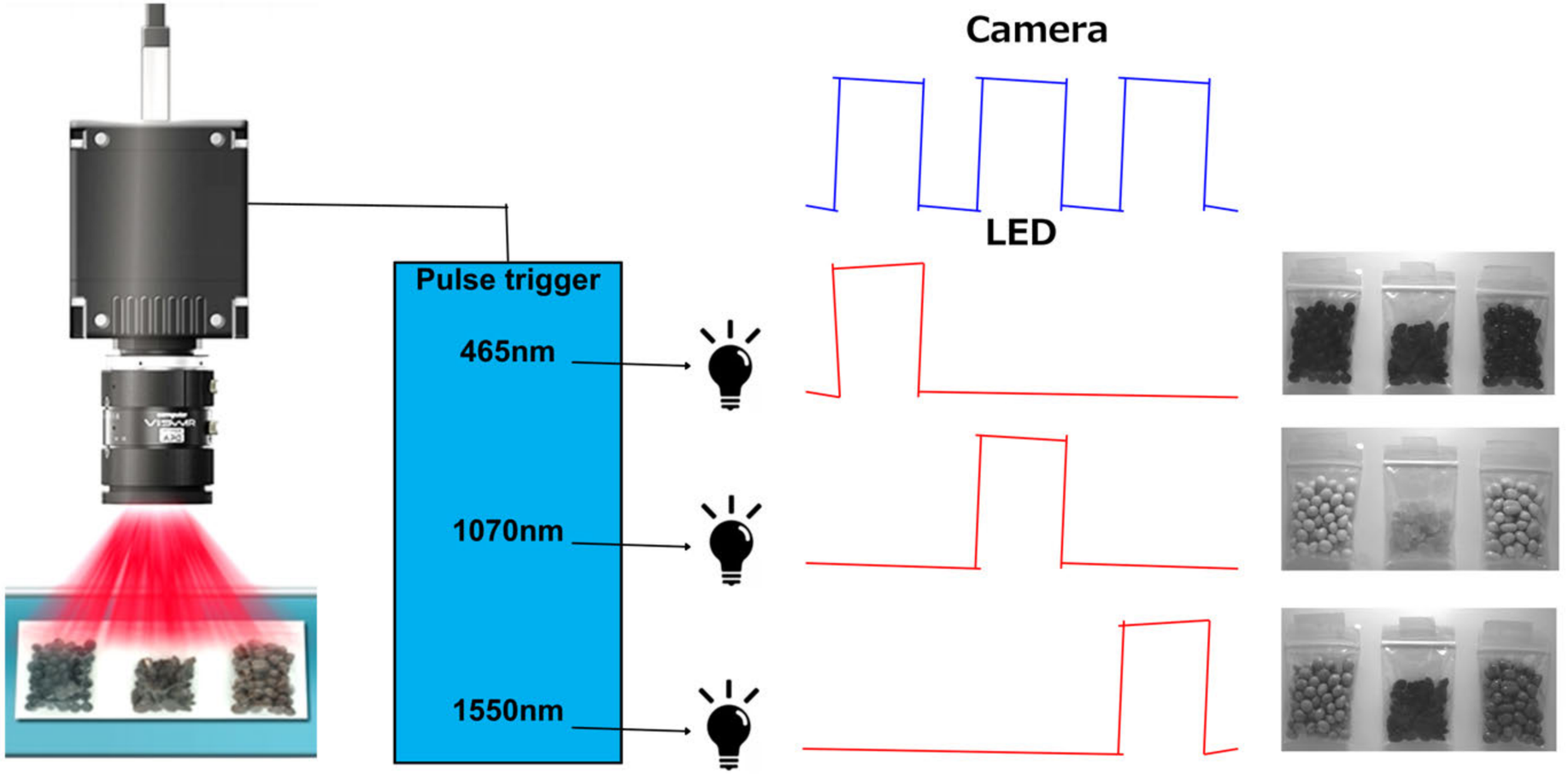
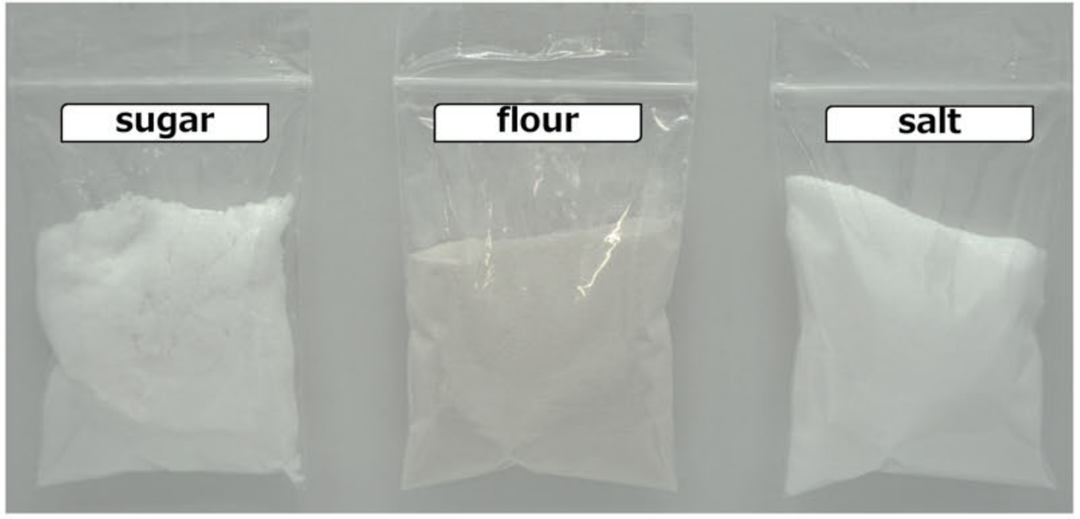
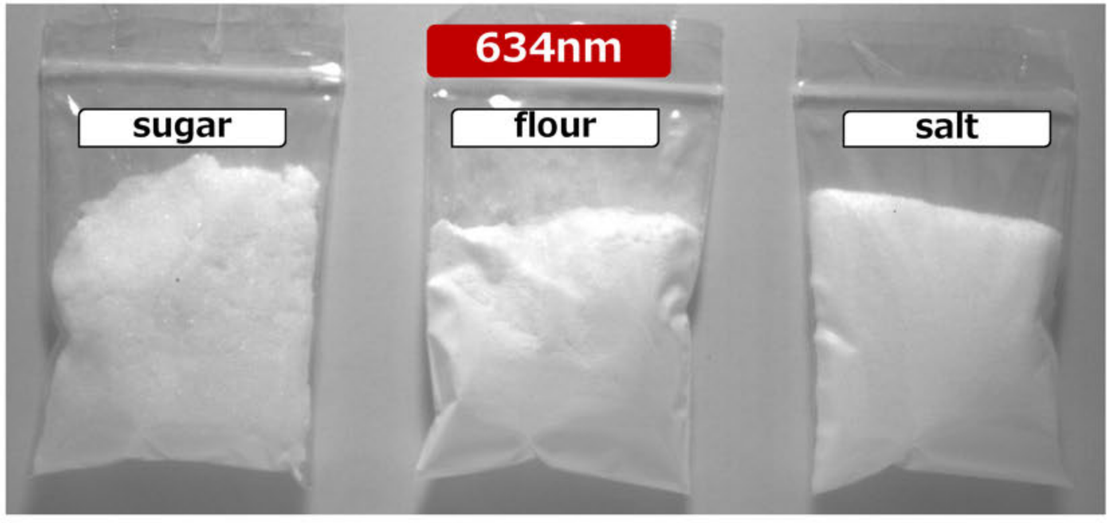
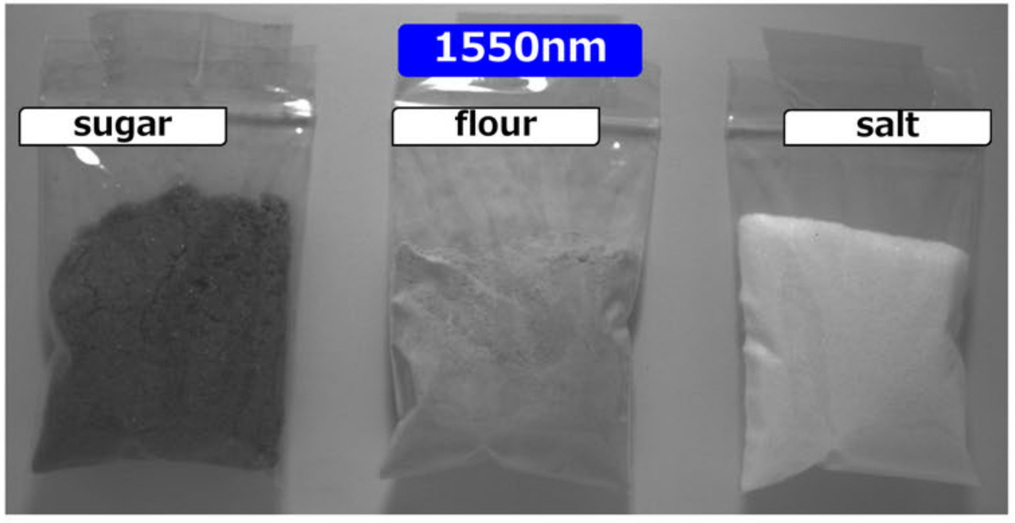


Synchronizing camera imaging and LED lighting enables the acquisition of multi-wavelength images.

EX: Photographs using the ViSWIR Hyper-APO series







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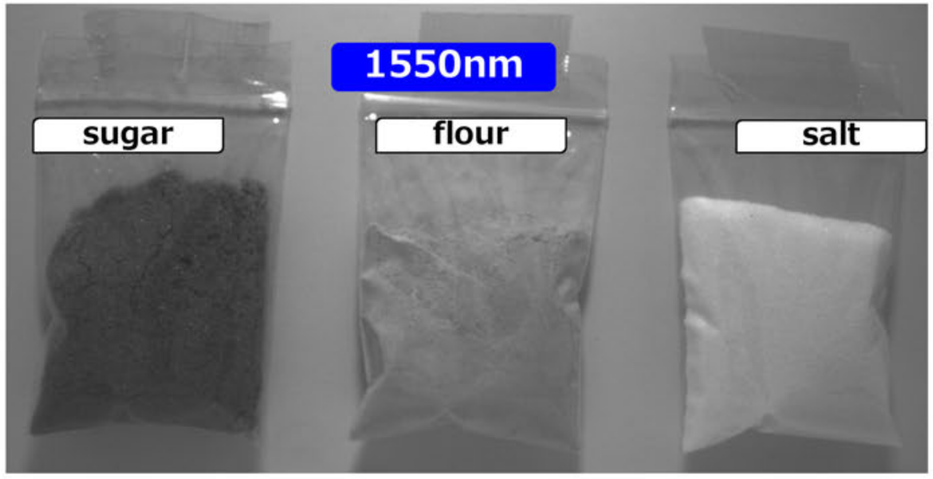

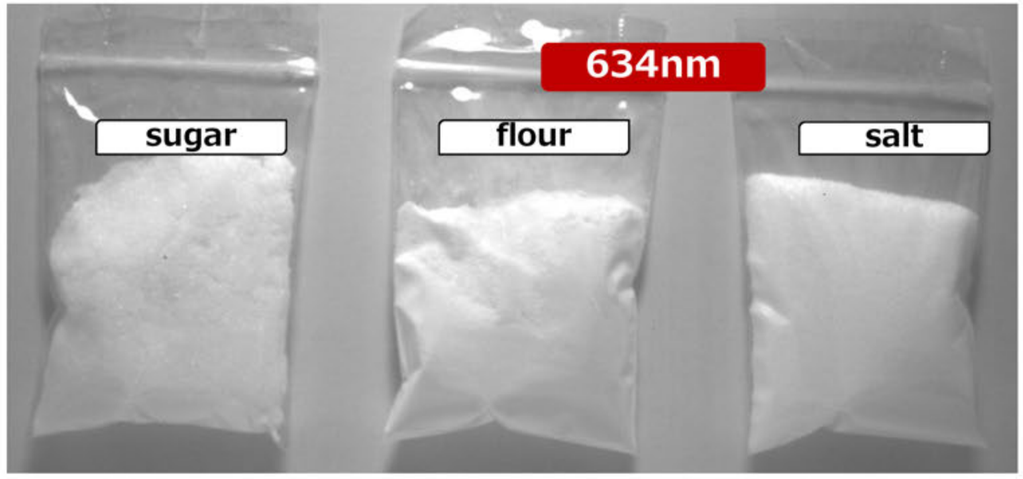

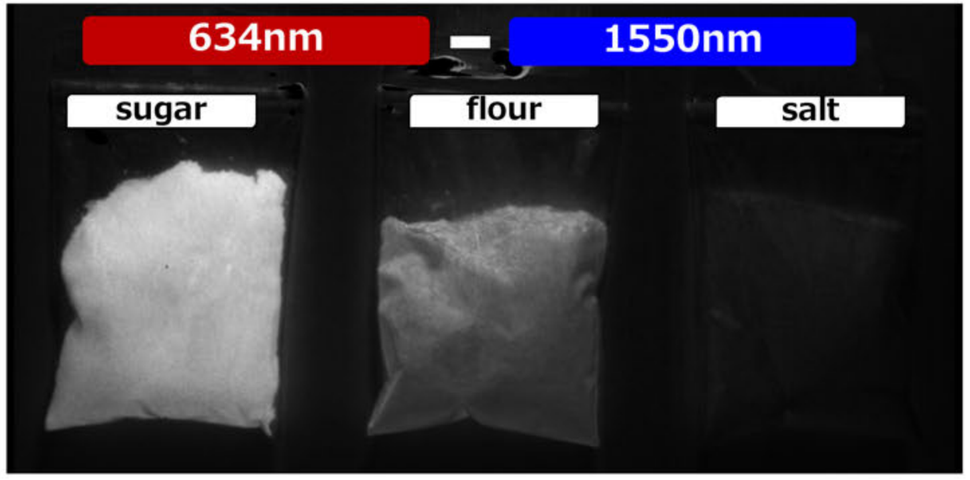

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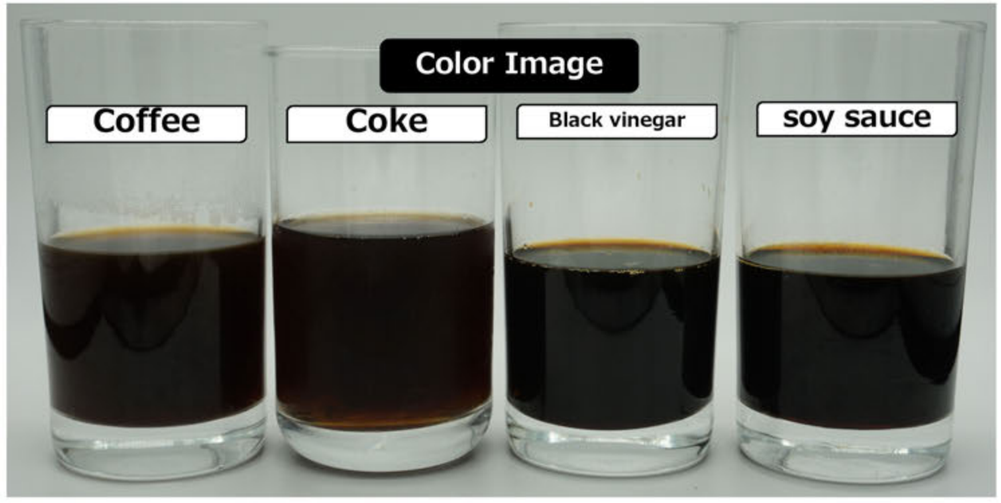

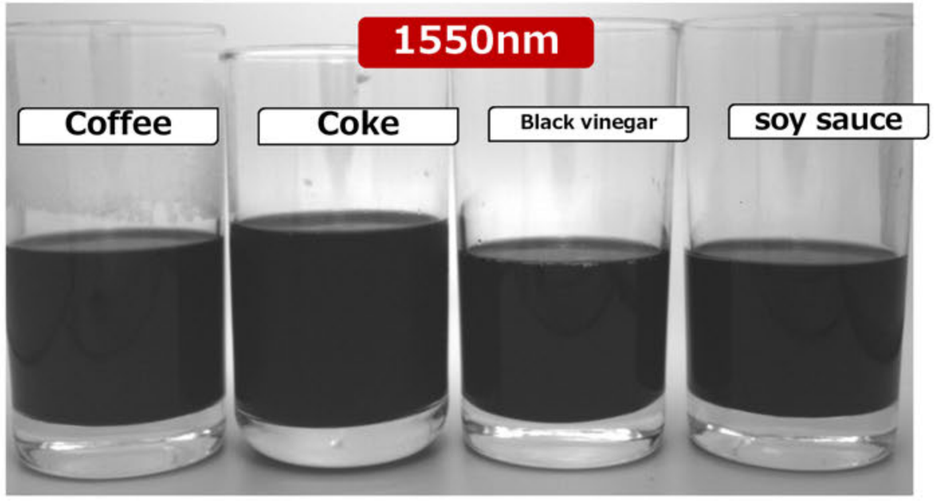

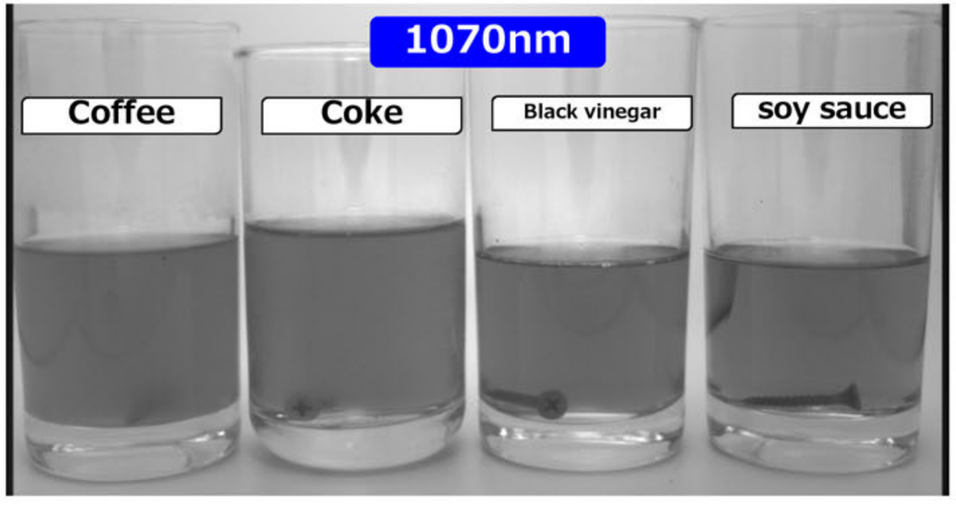

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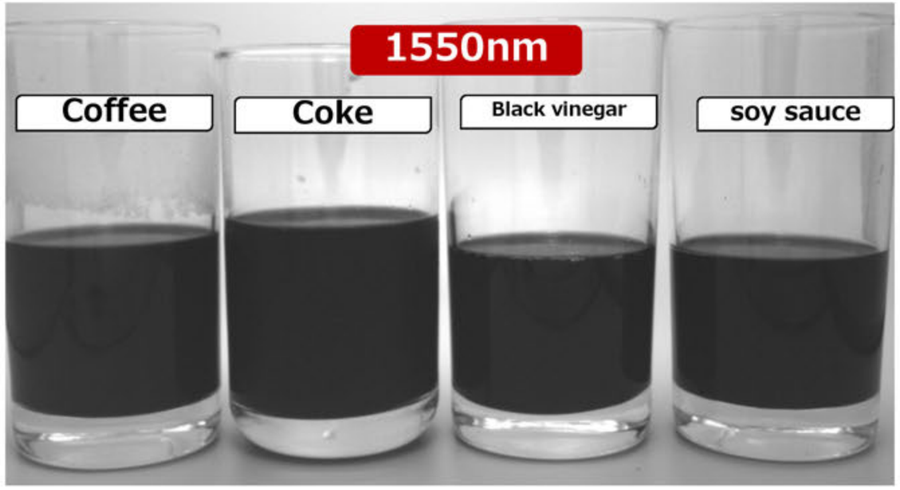
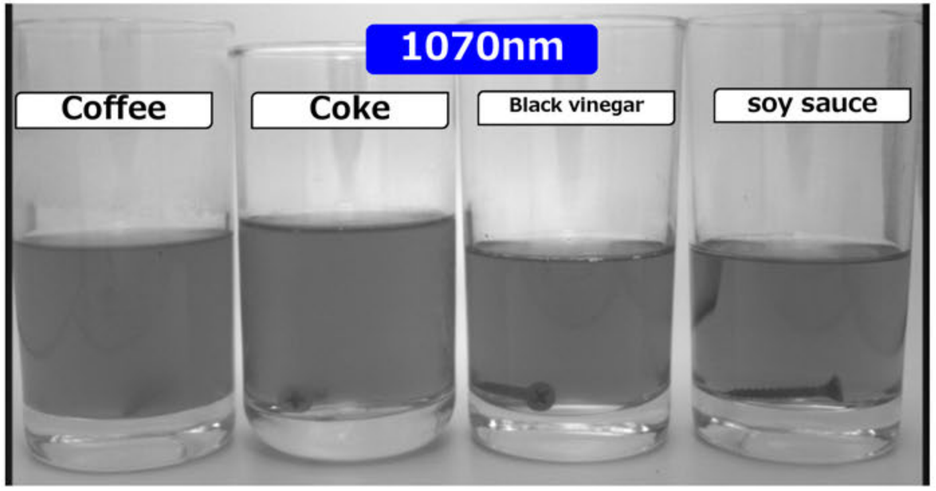
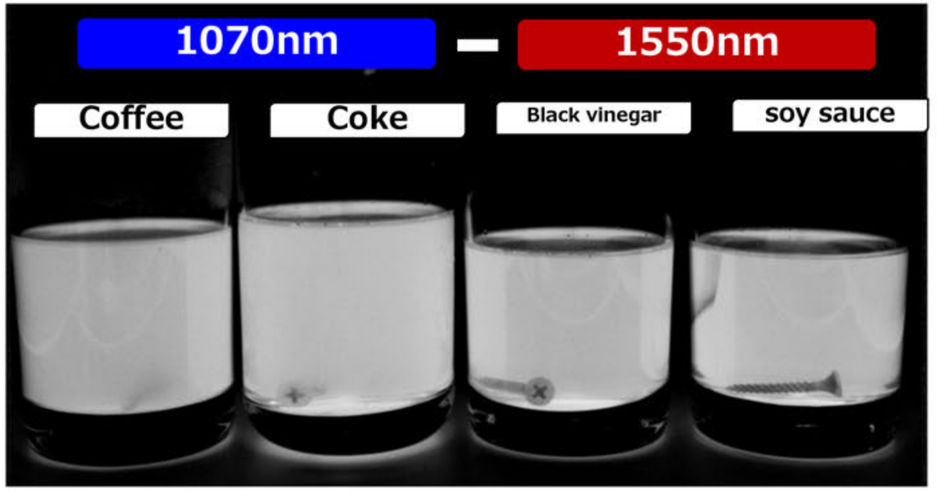
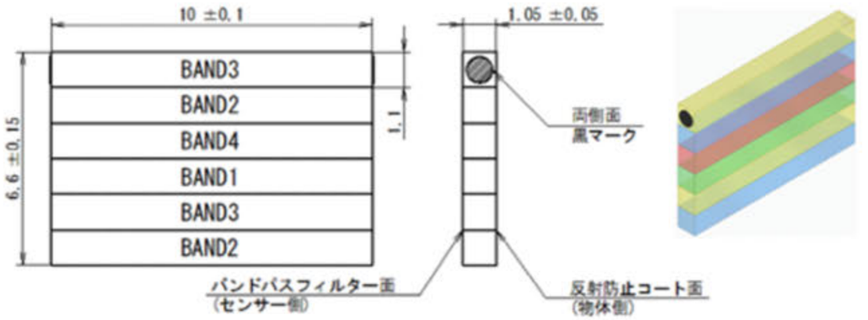




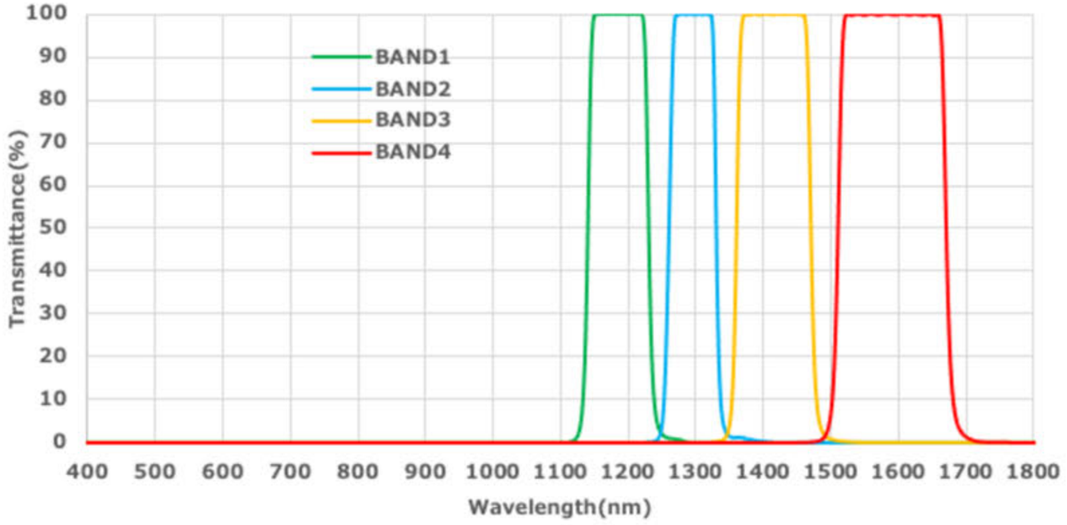


Multi-Band Solution

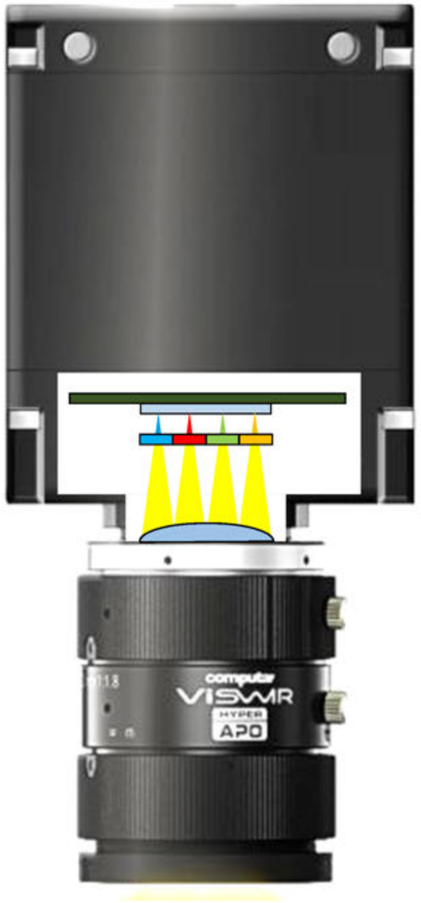
Multi-Band Filter

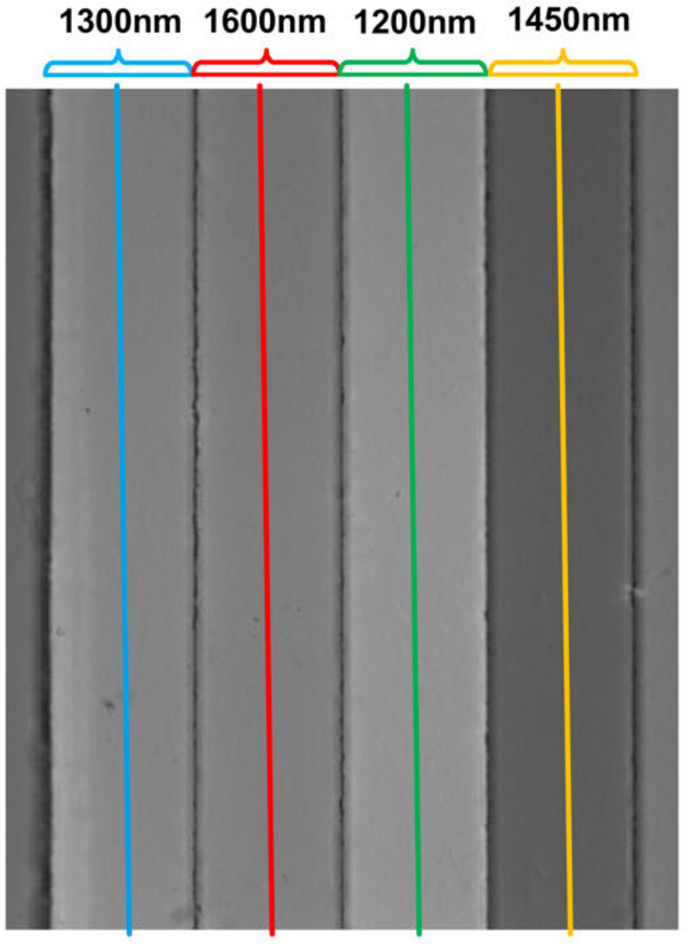


Multi-band filter transmittance (simulation value)



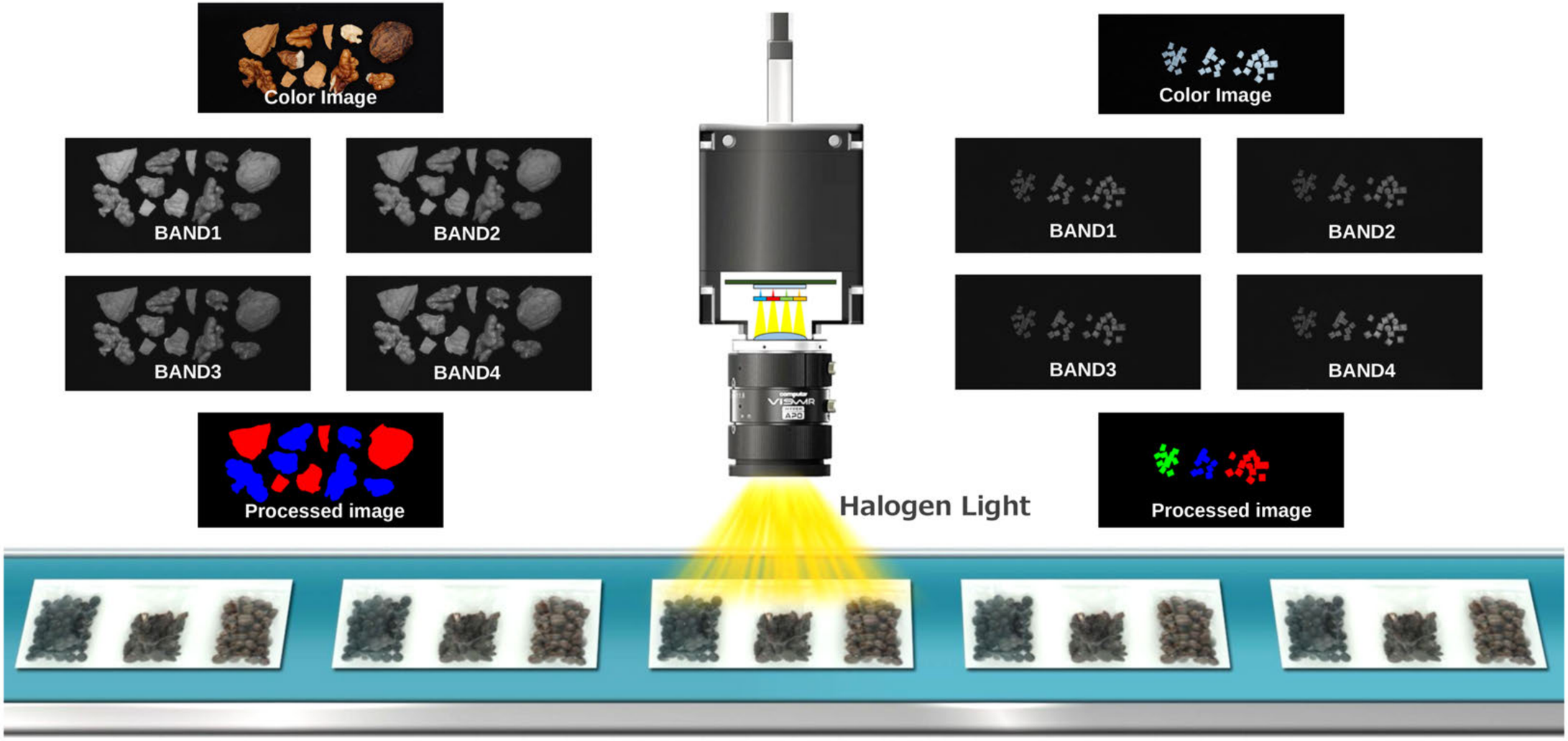
Multi-Band Solution





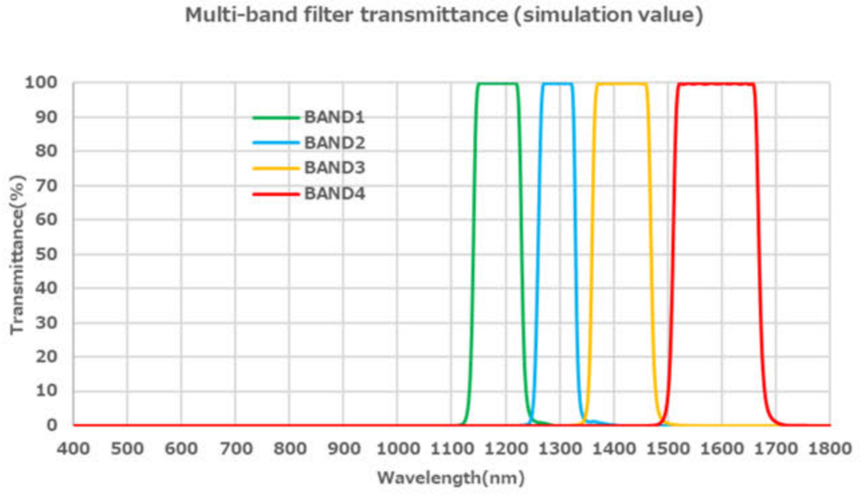
One sensor can capture images in four wavelengths.

Multi-Band Solution



Multi-band filter + Near-infrared 4-Band Spectrograph Camera

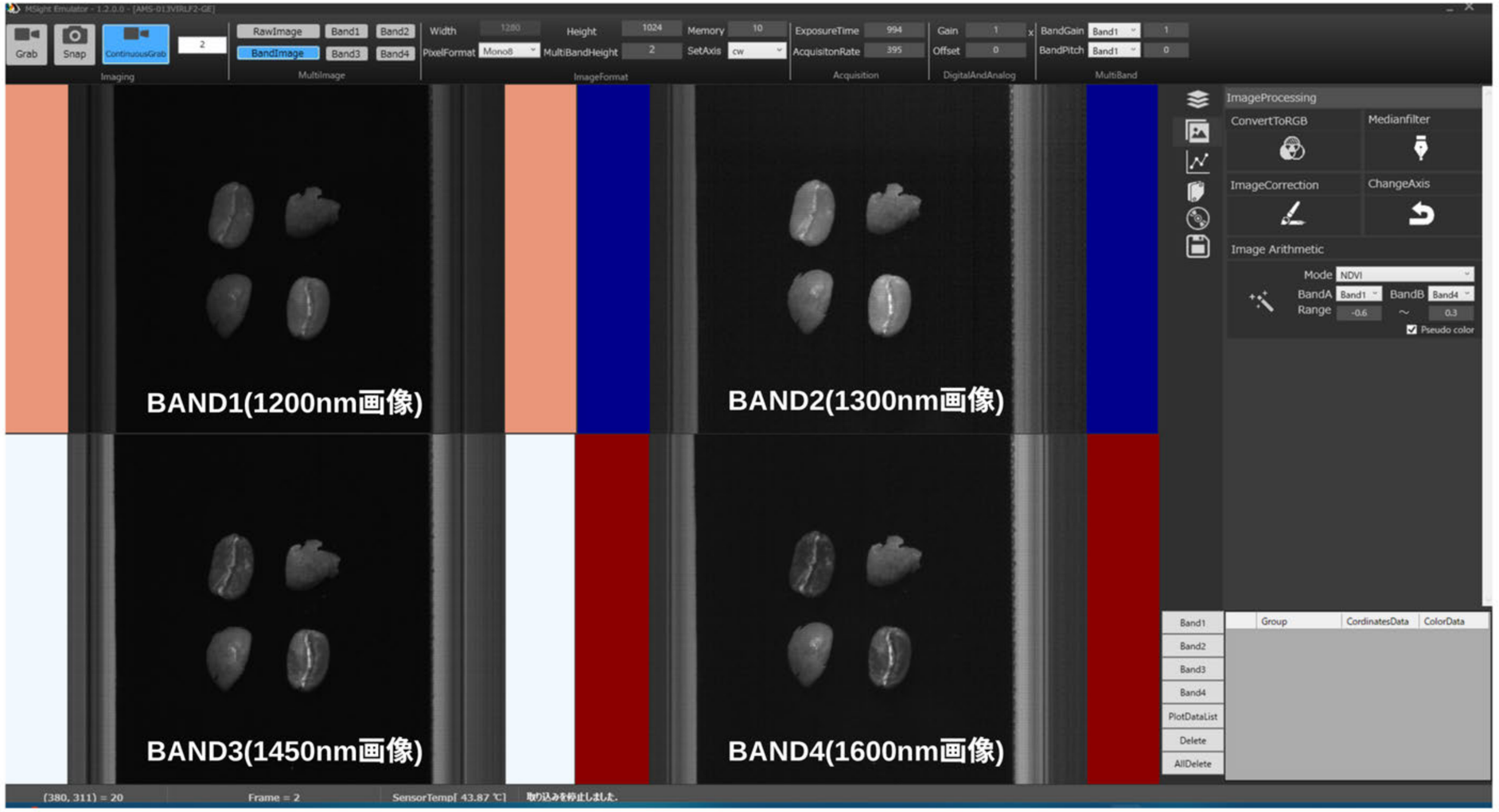
Multi-band filter



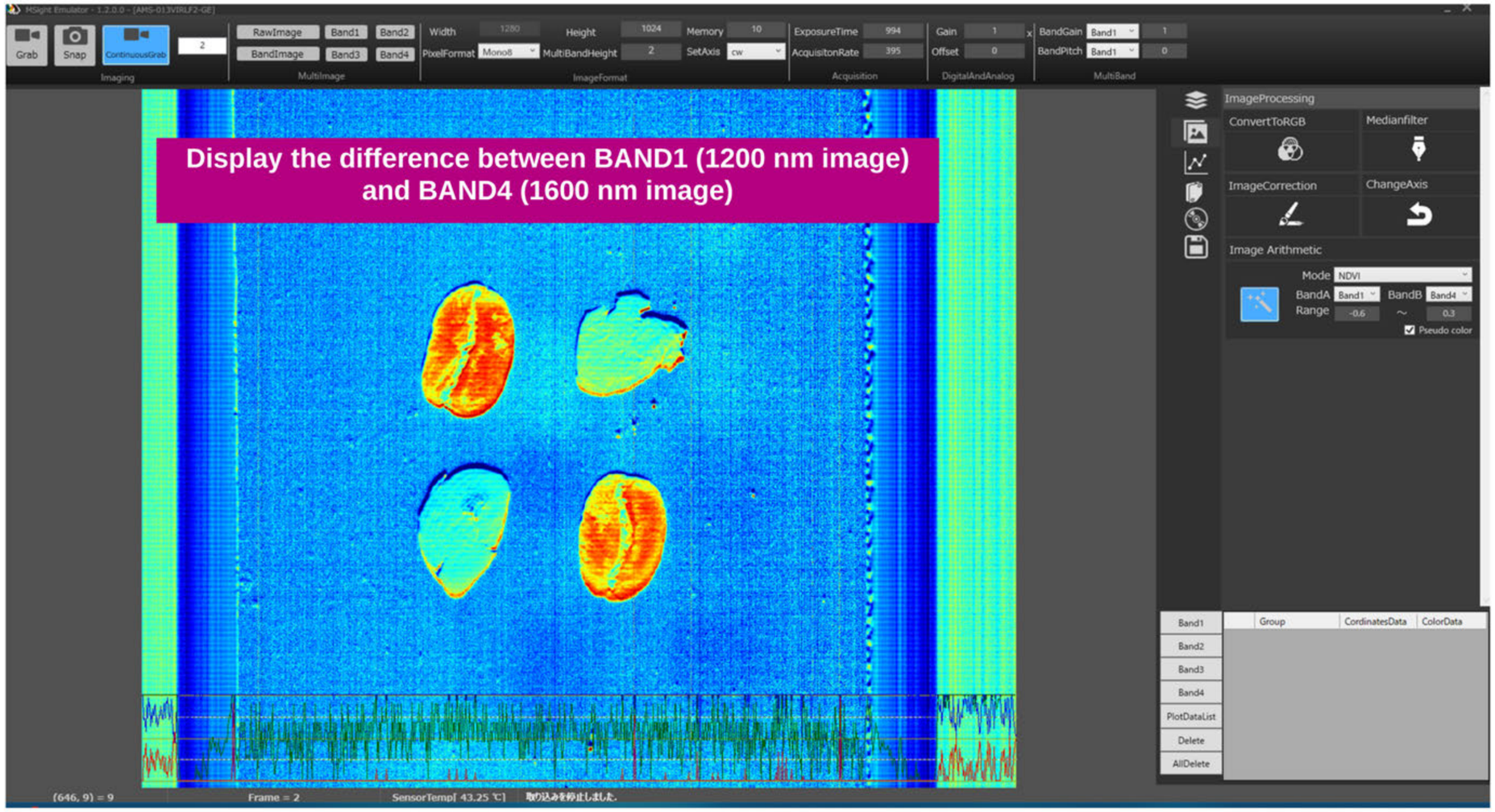
4-band spectrograph camera

Aval Data Web site：https://www.avaldata.co.jp/products/imaging/item/ams-013virlf2

Near-infrared 4-Band Spectrograph Camera



Near-infrared 4-Band Spectrograph Camera

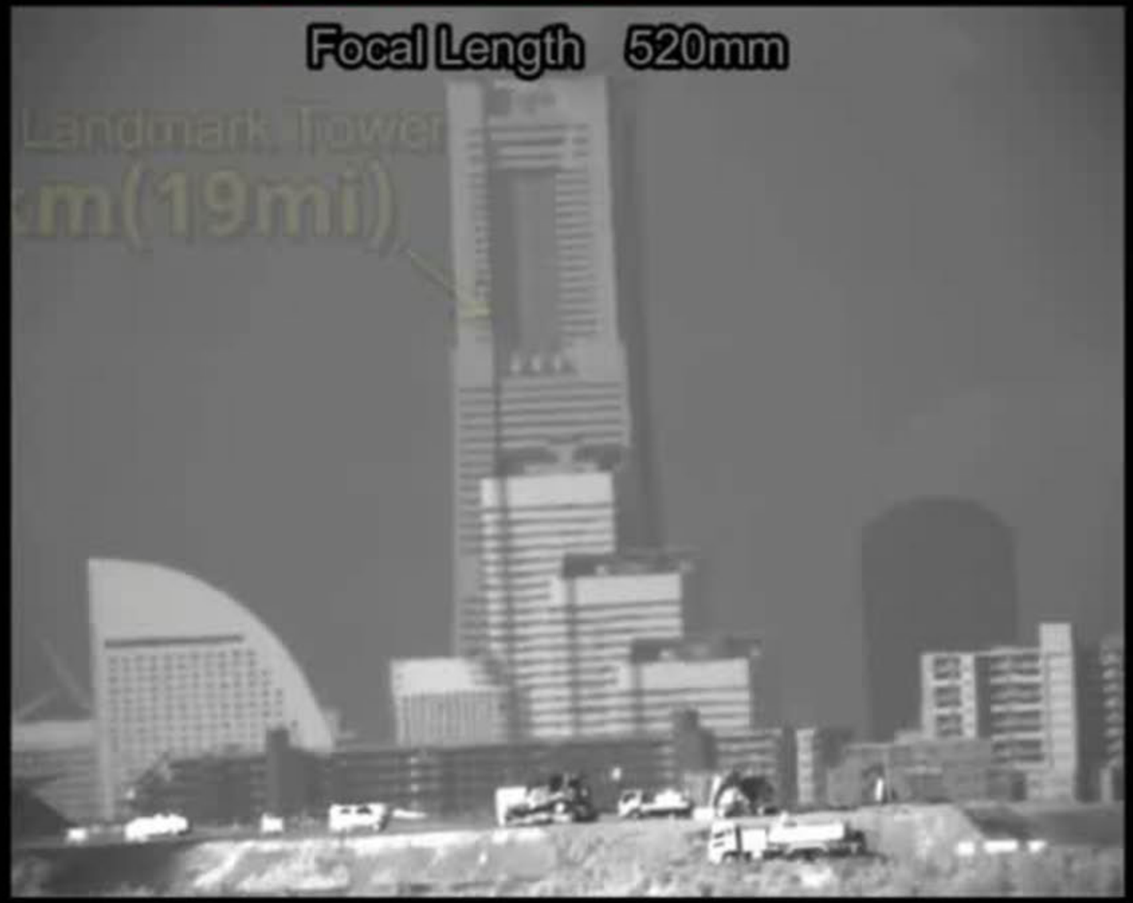


VISIBLE

Standard Lens + CMOS

SWIR

E3Z5247P-MPSW + IMX990



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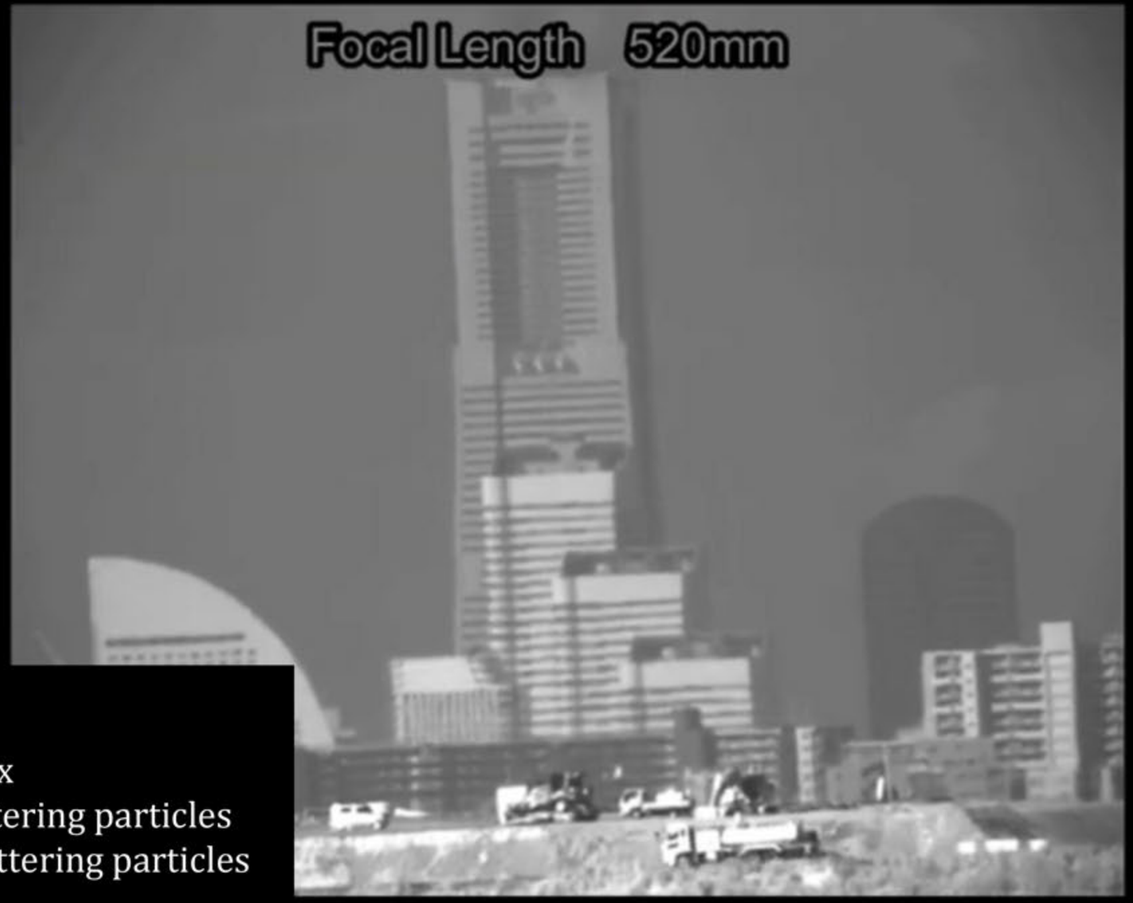
VISIBLE

Standard Lens + CMOS

λ: wavelength
m: refractive index
n: number of scattering particles
d: diameter of scattering particles

SWIR

E3Z5247P-MPSW + IMX990



ViSWIR

HYPER APO

Features

- High-resolution lens designed specifically for the latest Visible+SWIR sensors.(IMX990/991/992/993)
- AR coating technology that maximizes the performance of ViSWIR lenses and SWIR stray light countermeasures.
- Corrects chromatic aberration to the limit at 400 nm to 1700 nm.

ViSWIR Lite

Features

- Broadband AR coating provides high transmittance across all wavelength ranges.
- High cost performance for single-wavelength illumination and narrow-band photography applications.
- Compact and lightweight design

SWIR Reflex Zoom Lens

ViSWIR

HYPER APO

E3Z5247P-MPSW	
Focal length	520-1300mm (Zoom ratio 2.5x)
F-number	F4.7
Format	1/1.8”
Mount	C
Supported wavelengths	400-1700nm
Resolution	1.3MP
Remark	Reflection refraction zoom lens

A zoom lens that suppresses chromatic aberration by utilizing reflective surfaces in long-focus lenses, where chromatic aberration correction is difficult.

CONTACT

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computar@cbcamerica.com