

Infrared optics made out of our characteristic glass

The logo for Nippon Electric Glass, featuring the letters 'Neg' in a bold, blue, sans-serif font. The 'N' is a solid block, while the 'e' and 'g' are stylized with a slight curve and a gap between them.

Nippon Electric Glass

Nippon Electric Glass Overview



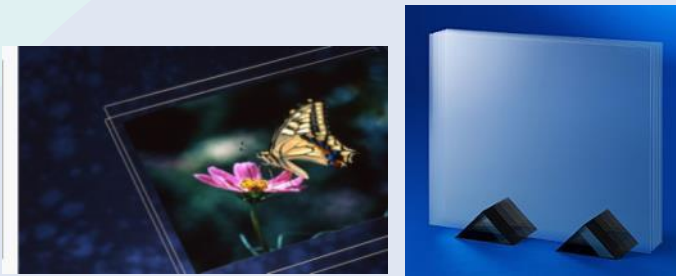
Nippon Electric Glass

Head Office : Otsu, Shiga, Japan
Founded : 1st December 1949
Employees : 6,349 (worldwide)
Sales : USD 2.44 billions
Overseas : Germany, U.K.,
USA,
Malaysia,
China, Korea, Taiwan



Products

For Displays

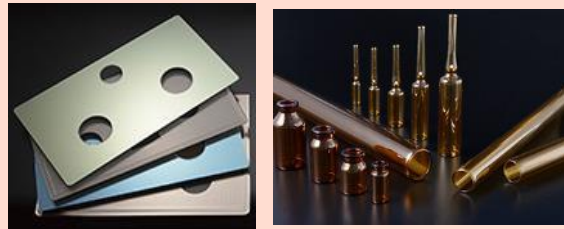


For Automotive

(Glass Fiber for Plastic Reinforcement)



For Home Appliance & Medical



For Electronics

(Including Photonics Related Items)

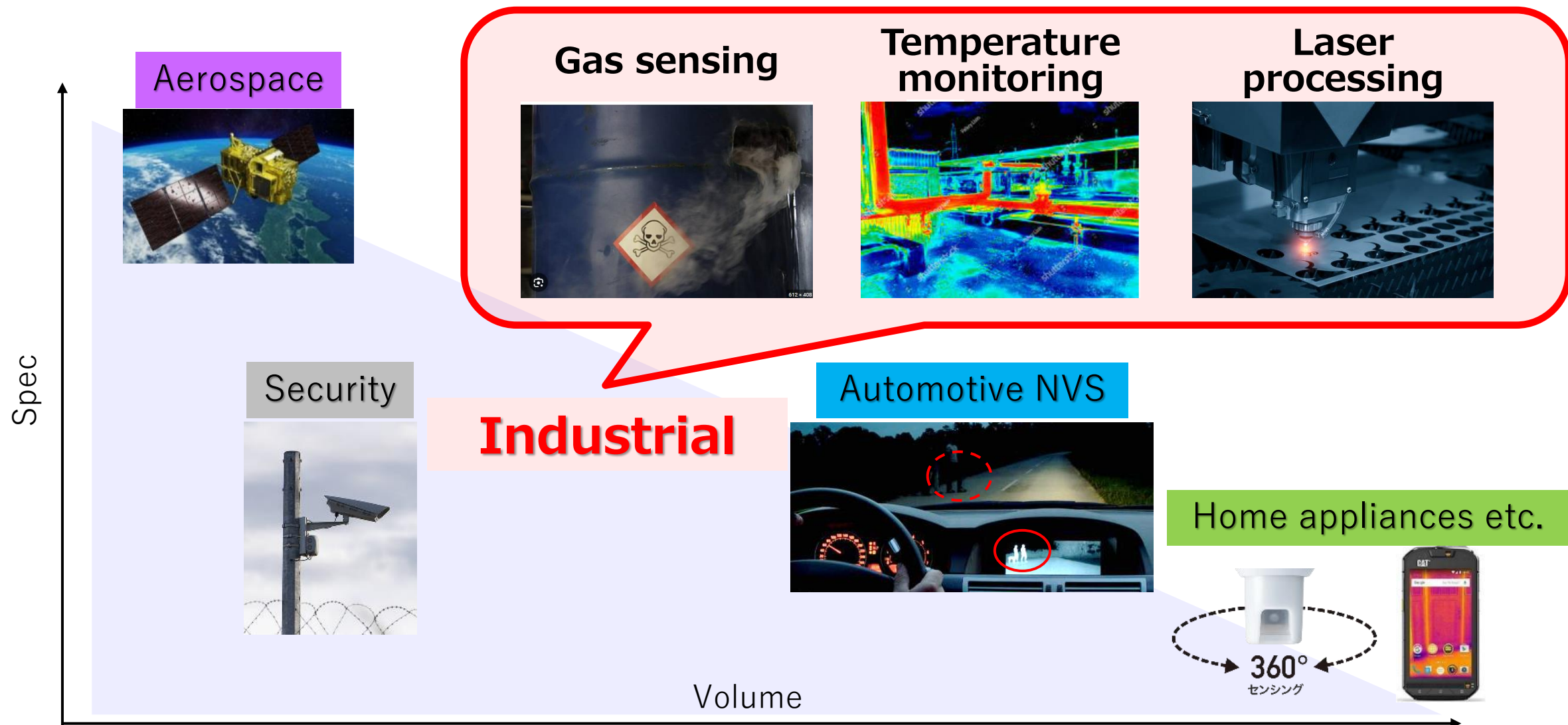


Coating Technologies



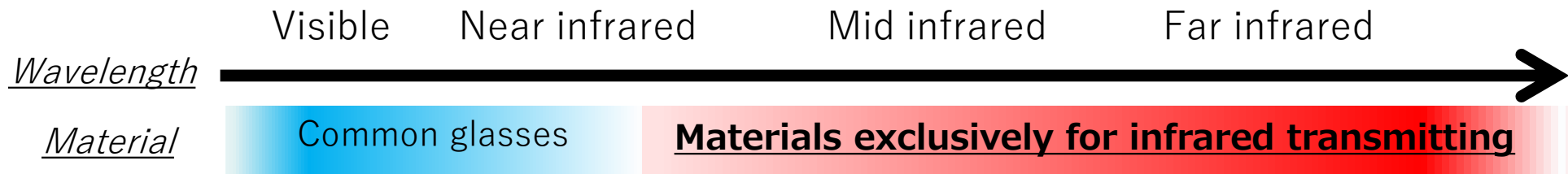
We strive to Build a Brighter Future for the World by Uncovering the Unlimited Possibilities of Glass

Applications of IR light

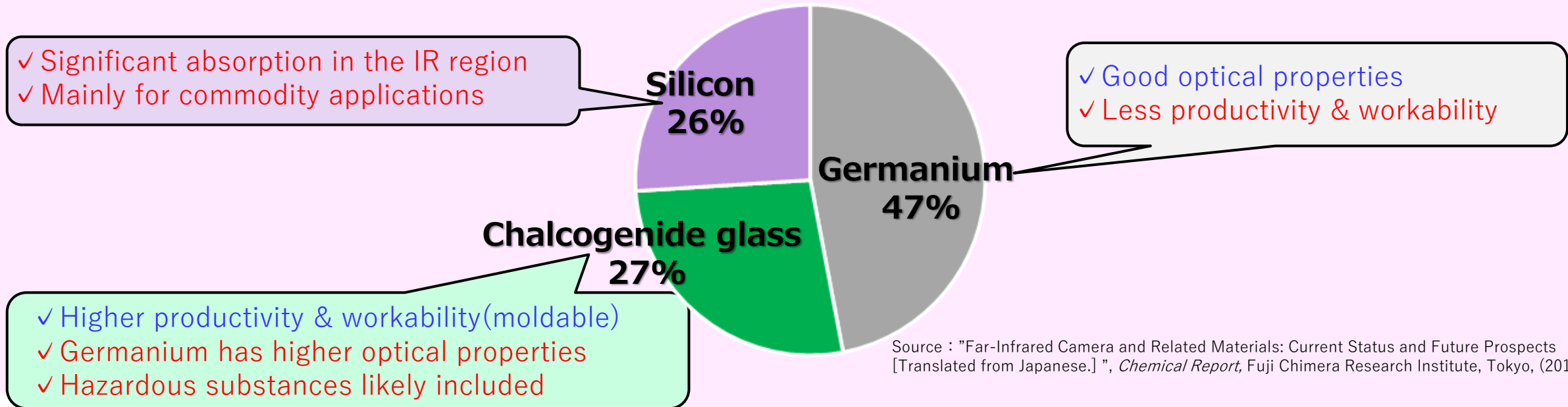


Applications of IR light are expanding to various fields

Materials for IR light



Market distribution of materials in IR lenses



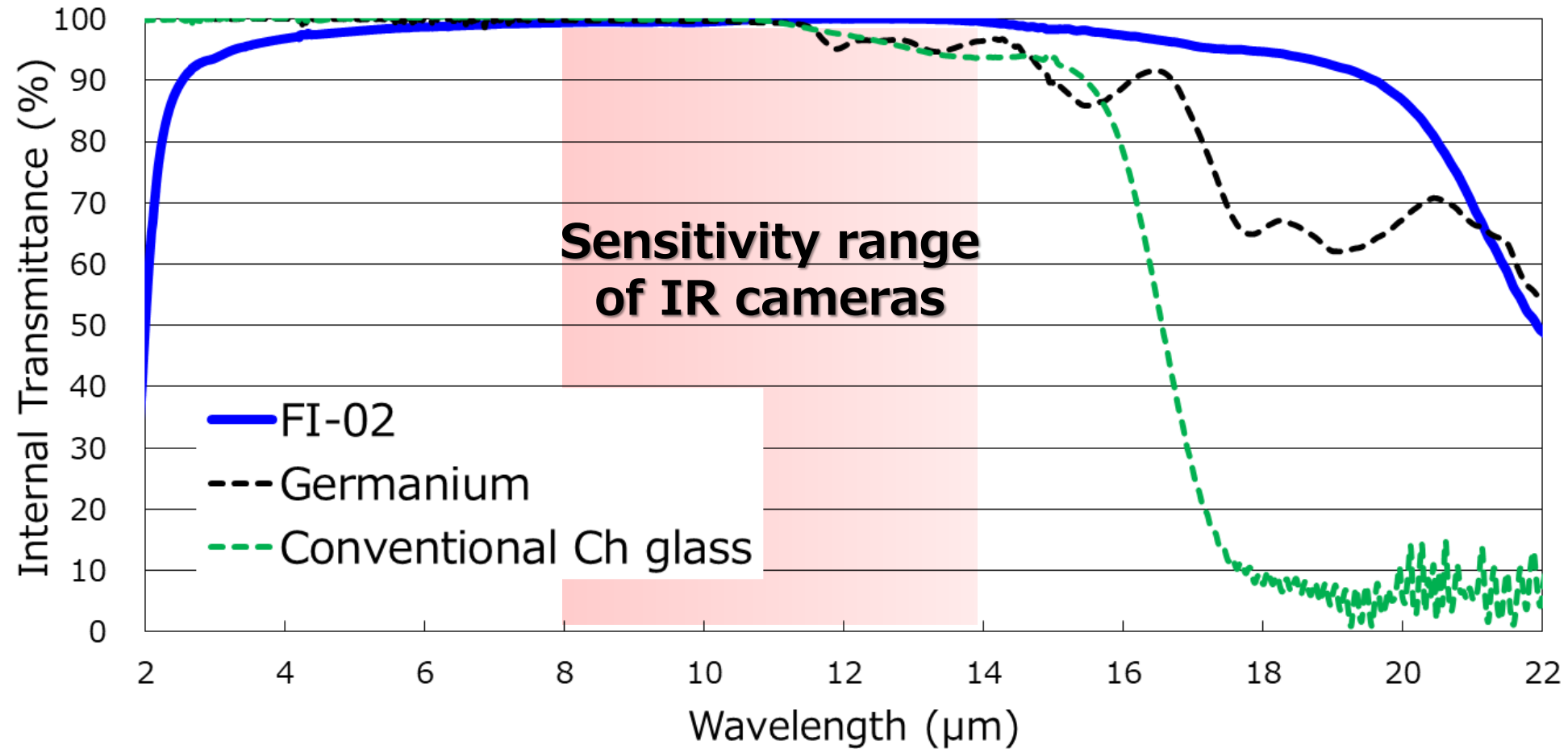
Source : "Far-Infrared Camera and Related Materials: Current Status and Future Prospects [Translated from Japanese.]", *Chemical Report*, Fuji Chimera Research Institute, Tokyo, (2017)

✓A few materials available in IR region
✓Difficult to get all needs together

→ Our unique glass material, FI-02 and its optics become a new option

Material: Transmittance of FI-02

Internal transmittance spectra (sample thickness: 2 mm)



✓The highest transmittance in the sensitivity range of IR cameras

Material: Summary of the FI-02 properties

		FI-02	<u>Germanium</u>	<u>Ch glass</u> (<i>Conventional</i>)
Transmittance		Very Good	Good	Fair
Optical properties	Refractive index @10 μm	3.47	4.00	2.5-2.8
	Dispersion v_{10}	253	942	30-175
	$dn/dT (\times 10^{-6})$	294	396	20-103
Forming by Press molding		Available	Not available	Available
Hazardous substances (As, Se)		None	None	Contained

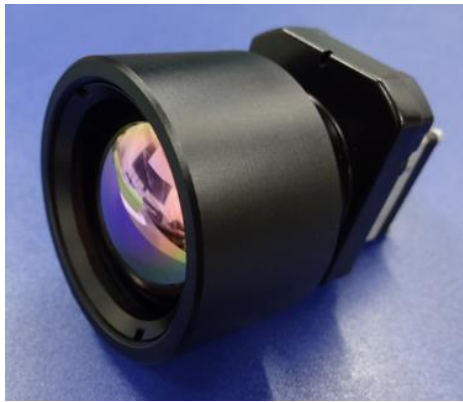
✓Unique properties

✓Already in production and commercialized

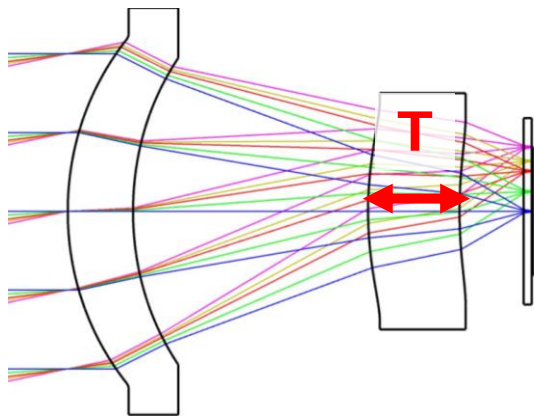
Optics: Lens for IR cameras

Neg lens using FI-02

(FL 24 mm, f/1.0)



Optical design



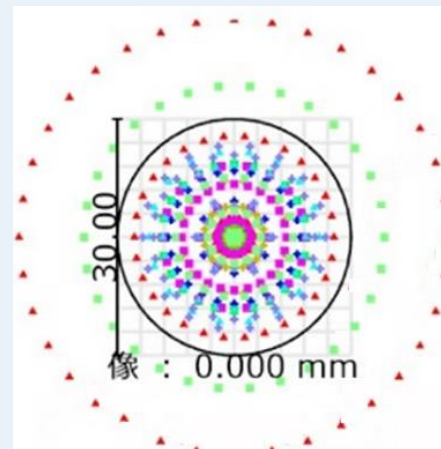
Improve resolution without compromising transmittance

Correlation between T and spot diagram (on axis)

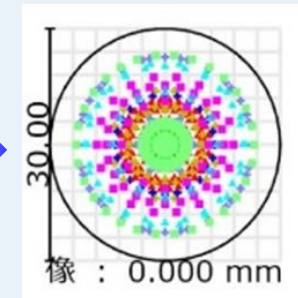
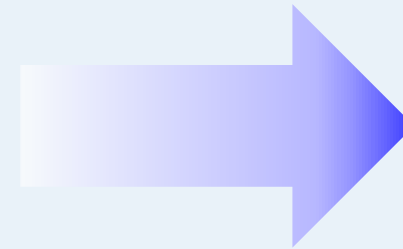
Transmittance loss < 1%

T=2 mm

T=9 mm



RMS radius **10.4 μm**



6.5 μm

✓ High transmittance of FI-02 enables high resolution lens

FIR images (VGA/p12 μ m IR camera)

Neg lens

(Same FL and f-number as the existing lens in the market)



Existing lens in the market



✓FI-02 lens enhanced image quality (Contrast, Resolution)

What can we do for you?

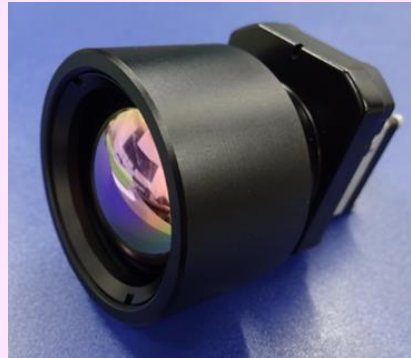
- Enhance the quality of infrared devices by unique material, FI-02
- **Glass blank** is available, but we can offer **optical components** as well

✓ Spectroscopy



Immersion grating prism

✓ Imaging



Lens for IR cameras

✓ Laser



Optics for IR laser

Looking forward to working with you to create innovative products with FI-02

Thank you for your attention!

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