For inquiries about products and applications,

we are waiting for you on our website.

Inquiry form here

www.photonic-lattice.com

Photonic Lattice

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Photron GROUP

2024.4

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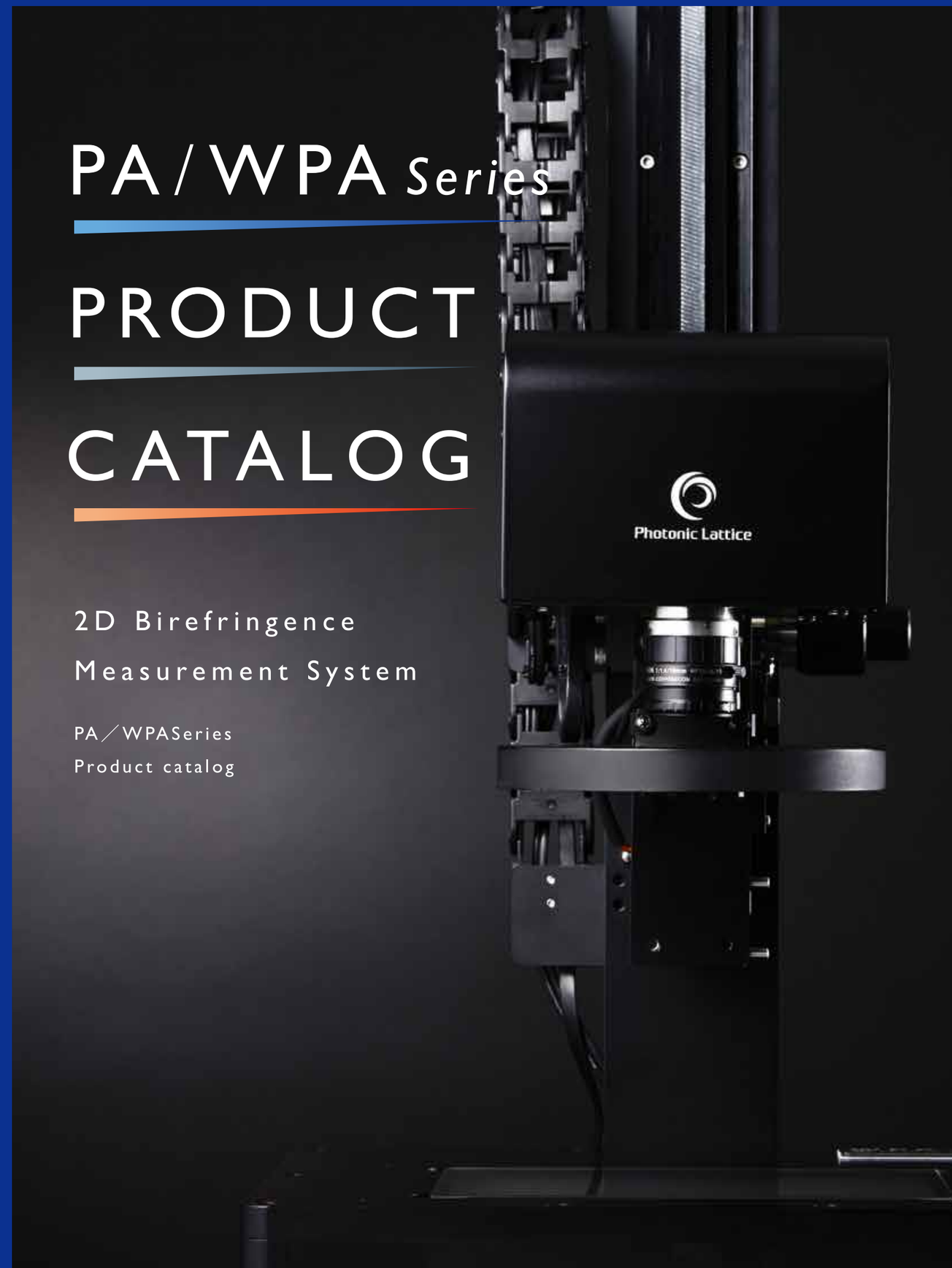
PA/WPA Series PRODUCT CATALOG



2D Birefringence Measurement System

PA／WPASeries

Product catalog

fast birefringence
n of transparent
with various
tools

mproving the quality
onality of
terials

Contents

WPA Series

With a stunning measurement range of 0 ~ 3500nm, by its original use of three wavelengths for birefringence evaluation, this system shines particularly in the field of resins, plastics and optical film products.

01

PA Series

Specialized in low-range 0 ~ 130nm birefringence, this high-resolution system is particularly suited for the evaluation of low-birefringent products, such as glass and lenses.

02

NIR Series

WPA/ PA series of measuring wavelength 850 nm band. It is a powerful tool for quality control and process development such as special window glass and resin cover that have transparent characteristics in near -infrared light that does not transmit visible light.

03

Products list

Product Line up

WPA Series — For the evaluation of resins, plastics, optical film products

PA Series — For the evaluation of low retardation products like glass

NIR Series

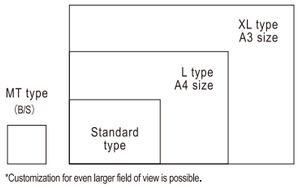
Operation PC

* All products include a dedicated personal computer and software.

*Photo is WPA-300

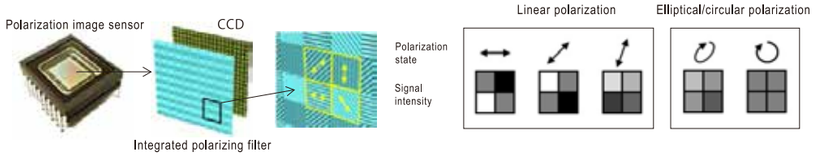
Product name	WPA-300-L For wide range Large type	WPA-300 For wide range Standard type	WPA-200-XL For wide range Extra Large type	WPA-200-L For wide range Karge type	WPA-200 For wide range Standard type	WPA-200-MT For wide range Small type	WPA-micro For wide range Microscope type	PA-300-XL For low range Extra Large type	PA-300-L For low range Large type	PA-300 For low range Standard type	PA-300-MT For low range Small type	PA-micro For low range Microscope type	PA-micro-S For low range Microscope-mount type	WPA-200-NIR For wide range Near-infrared band type	PA-300-NIR For low range Near-infrared band type
Output	Phase shift / retardation (nm), Axis orientation (°),Stress equivalent (Mpa) *As part as "data processing" option							Phase shift / retardation (nm), Axis orientation (°),Stress equivalent (Mpa) *As part as "data processing" option						Phase shift / retardation (nm), Axis orientation (°), Stress equivalent (Mpa) *As part as "data processing" option	
Repeatability	σ < 0.1nm						σ < 1.0nm	σ < 0.1nm				σ < 1.0nm	no guarantee	σ < 1nm	
Operating wavelength	523nm, 543nm, 575nm							520nm						810nm, 850nm, 880nm	850nm
Range	0~3500nm(in the case pure quartz was measured)							0~130nm					no guarantee	0~3500nm (in the case pure quartz was measured)	0~213nm
Resolution	848×680 (≈0.57M) pixels		384 × 288 (≈0.11M) pixels					2056 × 2464 (≈5M) pixels						384 × 288 (≈0.11M) pixels	2056×2464 (≈5M) pixels
Field of View — Standard lens	About36×45mm~ About255×320mm	About36×45mm~ About100×133mm	About218×290mm~ About360×480mm	About33×44mm~ About240×320mm	About27×36mm~ About100×133mm	About33×44mm ※depens on setting condition	About80×110μm~ About2.0×2.7mm (×2,×5,×10,×20,×50)	About242×290mm~ About360×480mm	About37×44mm~ About240×320mm	About30×36mm~ About100×133mm	About37×44mm ※depens on setting condition	About140×170μm~ About3.5×4.2mm (×2,×5,×10,×20,×50)	Depens on microscope	About27×36mm~ About100×133mm	About30×36mm~ About100×133mm
Field of View — Zoom lens	About12×15mm~ About32×40mm	About12×15mm~ About32×40mm	Zoom lens option is not available for this model.	About3.0×4.0mm~ About14.2×19.0mm	About3.0×4.0mm~ About14.2×19.0mm	About4.1×5.5mm~ About11.5×15.3mm	About40×53μm (×100 is optional)	Zoom lens option is not available for this model.	About5.5×6.6mm~ About25×30mm	About5.5×6.6mm~ About25×30mm	About7.0×8.4mm~ About20.0×24.0mm	About70×80μm (×100 is optional)	Depens on microscope	About3.0×4.0mm~ About14.2×19.0mm	About5.5×6.6mm~ About25×30mm
Dimensions(W x D x H) Weight	430×508×Max.1135mm About25kg	270×380×Max.624mm About15kg	650×650×Max.1930mm About47kg	430×487×Max.977mm About23kg	270×337×Max.631mm About13kg	160×215×300mm About4.5kg ※depens on setting condition	270×500×615mm About20kg	650×650×Max.1930mm About46kg	430×487×Max.1166mm About23kg	270×337×Max.631mm About12kg	160×190×316mm About4kg *depens on setting condition	270×500×610mm About18kg	60×70×85mm About0.5kg	270×337×Max.631mm About13kg	270×337×Max.631mm About12kg
Product Contents	Product body(WPA-micro includes microscope) ,Notebook PC,Software(WPA-View),User manual							Product body(PA-micro includes microscope,PA-micro-S dose not include microscope) ,Notebook PC,Software(PA-View),User manual							
Option — Zoom lens	Yes		No	Yes	Yes	Subject to discussion	100x objective lens	No	Yes	Yes	Yes	100x objective lens	No	Yes	Yes
Option — Data processing function	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Option — Field-Of-View (FOV) correction function	Yes		Yes	Yes	Yes	Yes	Subject to discussion	Yes	Yes	Yes	Yes	Subject to discussion	Subject to discussion	Yes	Yes
Option — Lens analysis function	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Option — Real-time analysis function	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Option — Remote control function	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Option — Chromatic dispersion modee	Yes		Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	Yes	No
Option — WPA High retardation	Subject to discussion		Yes	Yes	Yes	Subject to discussion	No	No	No	No	No	No	No	No	No
Option — Lens Measurement Stage	Subject to discussion	Yes	No	Subject to discussion	Yes	Yes	No	No	Subject to discussion	Yes	Yes	No	No	Yes	Yes
Option — Shading cover for PA/WPA	Yes		No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Option — Photoelasticity Measurement	Yes		No	Yes	Yes	No	No	No	No	No	No	No	No	No	No

Maximum field-of-view comparison



*Customization for even larger field of view is possible.

Structure and functions of the polarization image sensor



By comparing the signal intensity of four neighbor pixels, polarization information is obtained instantly, at high density over the whole sensor.

More devices for polarization imaging and measurement

Polarization sensing

Polarization Imaging Camera PI-300/WPI-200

Quantitative 2-D measurement of polarization Stokes parameters over observed

High-speed Polarization Camera CRYSTA

Dynamic visualization of internal stress or structural birefringence in transparents objects.

Mapping-type birefringence measurement

Desktop type KAMAKIRI X-Stage

Desktop system ideal for sampling inspection and R&D of transparent products.

Mapping type KAMAKIRI STS-LS

Full-fledged inline inspection system for full-length quantitative evaluation of film quality.

Large birefringence evaluation in plastic products.

WPA *Series*

By its unique use of multiple wavelengths, WPA systems enable the evaluation of large birefringence over whole 2-D surface. Its high-end version WPA-300 provides 5 times resolution for even more clarity of the results.

Product Line up

WPA-300
For wide range
Standard type

WPA-200-XL
For wide range
Extra large type

WPA-200-L
For wide range
Large type

WPA-200
For wide range
Standard type

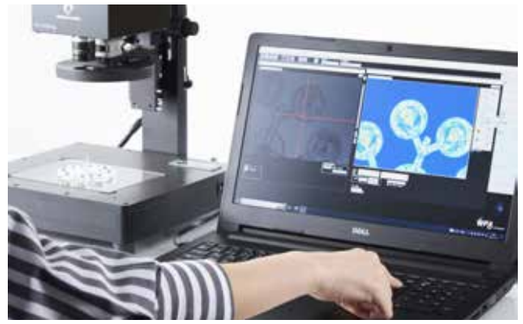
WPA-200-MT
For wide range
Small type

WPA-micro
For wide range
Microscope type

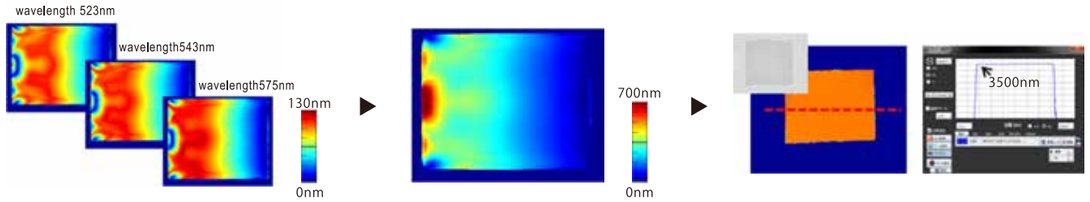
*Photo is WPA-200-L

WPA-300

By multiplying the resolution its parent system WPA-200 by 5, the WPA-300 system enables even clearer results while keeping the same performances. A growing number of small, low retardation details are quantified as objective data.



Large birefringence measurement made possible by multiple-wavelength evaluation



Data measured at three different wavelengths

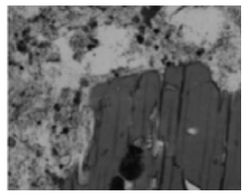
Data merged into one high-retardation data distribution

Example of quartz plate with retardation ～3500nm

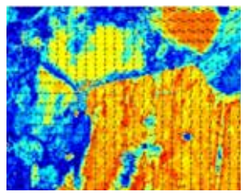
WPA-micro

The microscopy version of our measurement system.
Unlike usual polarized microscopy, it provides quantitative evaluation of the birefringence in the sample, as a powerful tool for analysing the crystallographic structure and orientation of inorganic and organic macromolecules, like spherulites, or even in non-transparent materials, like metals, using the reflection mode. Magnification factors between x2 and x50 areavailable by default, and x100 in option. The microscope can be chosen between two standard models: Nikon or Olympus.

Measurement example of amphibole crystal

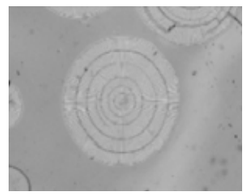


Normal camera image

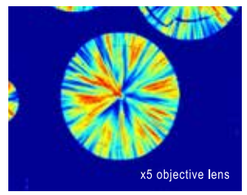


Retardation distribution

Distribution in organic macromolecules



Normal camera image



Retardation distribution

For measurement of low retardation products.

PA *Series*

The measurement wavelength of 520nm and a high resolution of 5 million pixels enable precise measurements of low-distortion targets. Suitable for measurements of glass, wafers, and lenses.

Product Line up

PA-300-XL
For low range
Extra Large type

PA-300-L
For low range
Large type

PA-300
For low range
Standard type

PA-300-MT
For low range
Small type

PA-micro
For low range
Microscope type

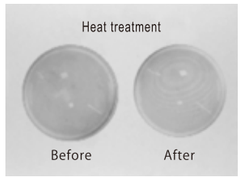
PA-micro-S
For low range
Microscope-mount type

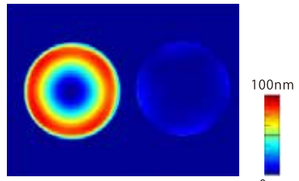
*Photo is PA-300-L

PA-300

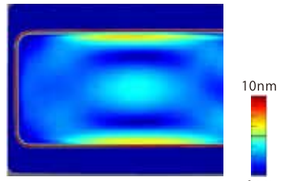
Standard model of the PA series. Its high-resolution of 5 million pixels is perfect for the measurement of low retardation glass and inorganic materials. It allows various applications like evaluating the evolution of the retardation before and after heat treatment in glass lenses, monitoring the internal stress distribution in reinforced glass, or quantifying the amount of residual stress in glass after laser processing.

Retardation in glass lenses before and after heat treatment





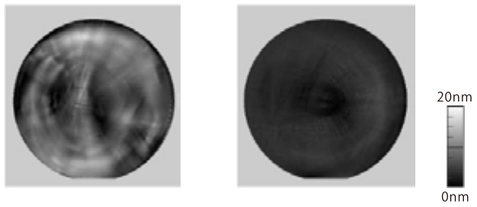
Distribution in <10nm low-retardation glass



PA-300-XL

This oversized version of the PA-300 system can be used for the evaluation of very large samples, up to a size of the equivalent of A3 paper format. Large diameter transparent wafers and automotive glass can be measurement at high speed in about 10 seconds. For even larger sizes, please contact us for further customization.

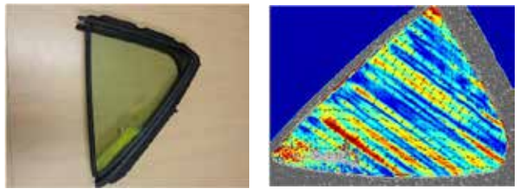
SiC wafer evaluation example (retardation)



Sample A　　Sample B

* Grayscale display. Dedicated wafer measurement stage (option) was used.

Retardation distribution in automotive glass



Exterior view　　Measurement result

For the measurement of birefringence in materials opaque to visible light.

NIR Series

By using light in the near-infrared band at 850 nm, this system allows the characterization of objects opaque at visible light but transparent at this wavelength, such as special window glass and resin covers, for quality control and process development.

Product Line up

WPA-200-NIR
For wide range
Near-infrared band type

PA-300-NIR
For low range
Near-infrared band type

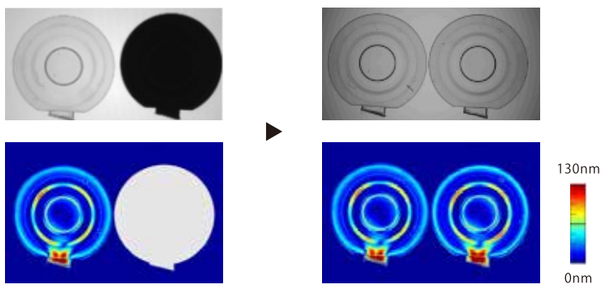
*Photo is PA-300-NIR

*The transparency at 850nm must be greater or equal to about 10 %.

PA-300-NIR/WPA-200-NIR

The PA-300-NIR system uses the 850nm band for high-speed measurement of materials apparently opaque at high resolution (5 million pixels). The WPA-200-NIR uses three wavelengths in the same band to extend the measurement range.

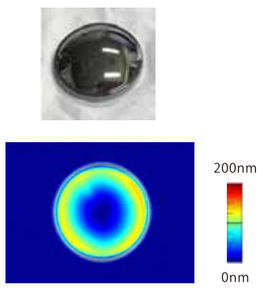
Comparison of lenses transparent (left) and opaque (right) to visible light



Measured with WPA-200

Measured with WPA-200-NIR

Examples of glass transparent in the NIR band



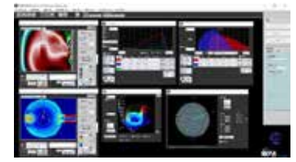
Measured with PA-300-NIR

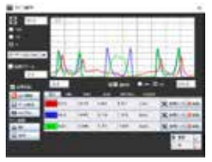
Software PA/WPA-View

Dedicated software with various display & analysis functions

Comparative analysis of retardation data from different samples along/in user-defined lines and areas: numerical value and graph display.

Please visit our website for instructions on how to operate PA/WPA-View.





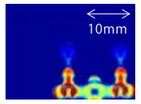
Line analysis

Area analysis

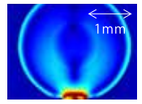
Option Software & Hardware

Various optional objective lenses

According to the measured object, high-magnification zoom lens, narrow-angle lenses, and various microscope-type objective lenses are available.



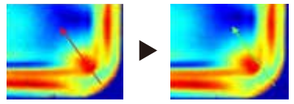
Standard lens



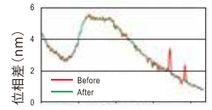
Zoom lens

Data processing function

Measurement data can be processed by a combination of filters selectable in a collection of seven, such as noise removal, high pass / low-pass filter, and inclination correction, etc.



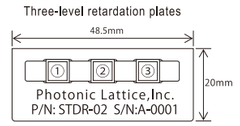
Effect of noise removal filter



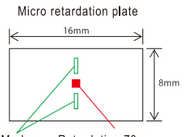
Graph of retardation before and after noise removal

Retardation plates

Phase plate encompassing three different (low/medium/low) reference retardation levels. For microscopy application, single-reference plate is available. To be used as standard sample for daily system inspection etc.



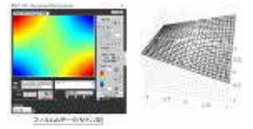
Retardation:①20nm ②40nm ③80nm



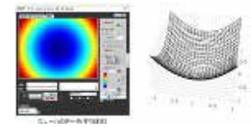
Marker Retardation:70nm

Field of View (FOV) Correction Function

Computative correction of the artifact caused by the angle of view of the system in the peripheric area of samples. Effective when measuring uniform sample, especially when vertical birefringence is present.



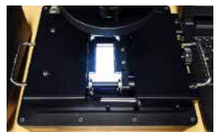
For film



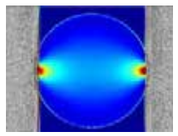
For wafer

Photoelasticity Measurement

Hardware option to evaluate the elasticity constant of solid materials. Combined with WPA, is allows measurement of internal stress in



Optional hardware installed on top of the sample stage



Example of measurement results

Shading cover for PA/WPA

Prevent light pollution from outside environment. Only the measurement device is stored inside, while operation PC can still be used outside.

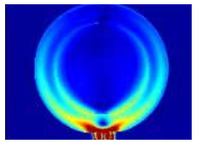
Other Options

☐ Lens analysis function	Automatically Pass/Failure decision, from measurement data of lenses, wafers, etc.
☐ Real-time decision function	Measurement result as well as graphs, Pass/Failure decision etc. are displayed/updated in real time.
☐ Remote control function	Automation option to control the device from outside and integrate it in external system.
☐ WPA High retardation	Special wavelength for high-retardation measurement for larger measurement range.
☐ Chromatic Dispersion Mode	Suppress data artifacts when evaluating complex / thick resin molding products.
☐ Lens Measurement Stage	Reduces fixed-pattern artifact when measuring low-retardation / high-curvature lenses.

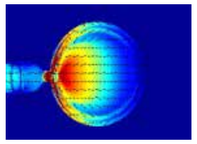
Case.01 Lens

Retardation analysis of glass lenses, resin molded lenses, and assembly lenses is provided. Measurement results can be used to adjust the manufacturing parameters (in the case of injection molding: injection parameters, mold temperature, gate shape, etc.) to minimize distortion and optimize the imaging performances in your lens your products, including VR goggles lenses and Fθ lenses.

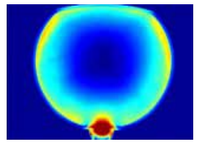
Smartphone lens



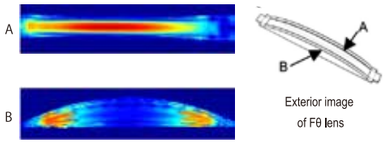
Lens for optical disc pickup



VR lens



Fθ lens

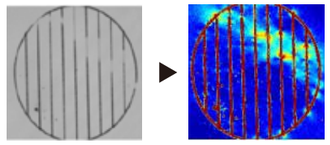


Exterior image of Fθ lens

Case.02 Glass

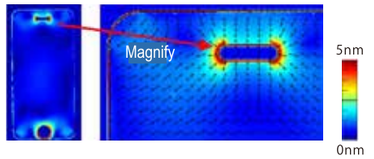
Quantitative evaluation of stress distribution, internal distortion caused by laser processing, and other phenomena in glass, enabling the evaluation of optical performance, such as modulation transfer function (MTF) and transmittance. Monitoring residual stress, that cause cracking, is also important. Additionally, the evaluation of low-retardation materials, such as Through Glass VIA (TGV) substrates is also available.

Internal distortion caused by laser processing

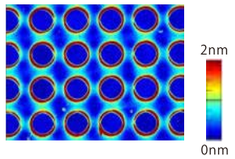


Normal camera image　　Retardation distribution

Smartphone cover glass with drilled holes



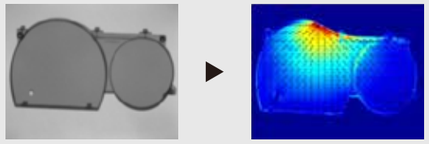
Through Glass VIA (TGV) substrate



Case.03 Resin molding

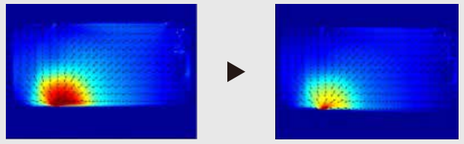
The retardation distribution of products obtained by injection molding is closely linked to the manufacturing parameters used for their fabrication. It reflects for instance the phenomena occurring when separating the product from its mold, or reveals the effect of annealing on residual stress, which can cause chemical cracks during the lifetime of the product.

Car meter cover



Normal camera image　　Retardation distribution

Changes in resin molded products before and after anneal processing

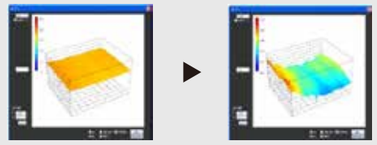


Before annealing　　After annealing

Case.04 Film

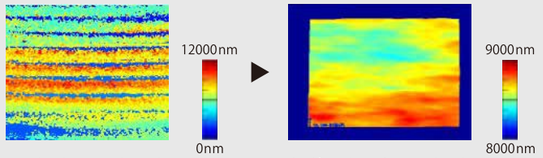
The retardation distribution of transparent films can be easily quantified. Adjusting the display range makes it easy to emphasize and identify small irregularities. Additionally, using the ultra-high retardation option of the WPA system allows accurate measurement of films with retardation values as high as up to 10,000nm.

Identification of small irregularities on the polarized film



0～400nm　　260～300nm

Ultra-high retardation film for LCD display



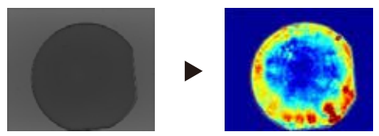
Using the standard system, data jumps appear because retardation value exceeds system upper limit.

By utilizing the WPA High retardation measurement option, it becomes possible to accurately evaluate irregularities.

Case.05 Wafer

Non-destructive measurement of crystal defects and various distortions caused by wafer processing in next-gen semiconductors, like SiC and GaN, through a wide lineup of systems, ranging from micro to macroscopic range.

Full-scale measurement of GaN wafer

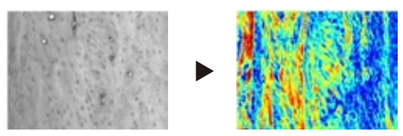


Normal camera image　　Retardation distribution

Case.06 Organic polymer

Fast quantitative evaluation of micro-structure orientation of samples traditionally observed with polarized microscopy, in the bio and medical field, such as collagen and sliced bones.

Measurement example of collagen

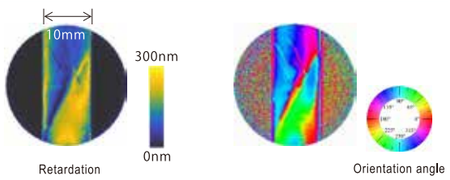


Normal camera image　　Retardation distribution

Case.07 Cellulose Nanofiber

To optimize the property of CNF, such as lightweight, high strength, and high elastic modulus, it is important to evaluate and precisely understand the dispersion state (retardation) and direction (orientation) of the fibers.

Measurement examples of CNF



Retardation　　Orientation angle

Other examples

In addition to the featured measurement examples, there are various other applications, such as fibers, carbon materials, liquid crystals, and more. Even if you are unsure whether your material can be measured or not, please feel free to inquire using the form below.

Inquiry form here
https://photonic-lattice.com/en/inquiry/