Retardation, Birefringence and Internal stress measurement

WPA / PA Series

Photonic Lattice, Inc.

Authorized Distributor
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Email:sales@photonics.com.sg

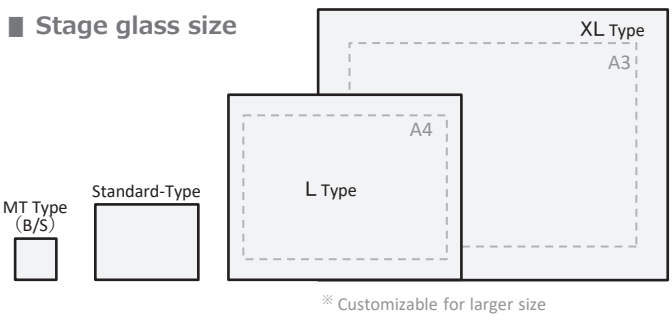
WPA-Series

For resin molding and optical film, and much more.

※PC Desk not included

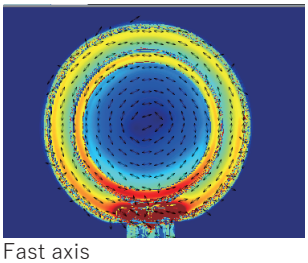
	WPA-200-XL Extra large type	WPA-200-L Large type	WPA-200 Standard type	WPA-200-MT Small type
Output	Phase shift / retardation (nm), Axis orientation(°) , Stress equivalent(MPa)※ ※As part of "data processing" option			
Repeatability	σ < 1 nm			
Measurement wavelength	523, 543, 575 nm			
Retardation range	0 ～ 3500 nm ※in the case of pure quartz sample			
Imaging resolution	Approx. 0.11 M pixels（288×384）			
Measurement area size ■ Standard lens ○ Zoom lens	■ 218×290mm ～ 360×480mm	■ 33×44mm ～ 240×320mm ○ 3.0×4.0mm ～ 14.2×19.0mm	■ 27×36mm ～ 100×133mm ○ 3.0×4.0mm ～ 14.2×19.0mm	■ 33×44mm ※depends on setting conditions when used as separate head ○ 4.1×5.5mm ～ 11.5×15.3mm
Size Weight	650×650×1930mm 47 kg	430×487×977mm 23 kg	270×337×631mm 13 kg	160×215×300mm 4.5 kg (with base station)
Contents of the Product	Main system , PC, Software(WPA-View), Manual			
Options: Zoom Lens	× Not available	● Optional	● Optional	※Contact us
Options: Ultra-high Retardation	● Optional	● Optional	● Optional	※Contact us
Options: Remote Control	● Optional	● Optional	● Optional	- Standard
Options: CD Mode	● Optional	● Optional	● Optional	● Optional
Options: ・Realtime Analysis ・Lens Analysis ・Data Processing ・Field-Of-View Correction	● Optional	● Optional	● Optional	● Optional

■ Stage glass size

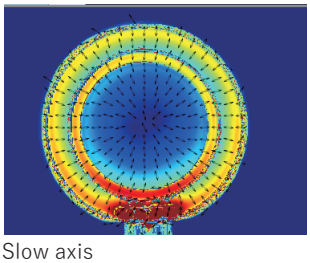


※ Customizable for larger size

■ Both fast axis and slow axis available.



Fast axis



Slow axis

PA-Series

For low retardation samples, glass, and much more.

※PC desk not included

PA-300-XL Extra large type	PA-300-L Large type	PA-300 Standard type	PA-300-MT Small type	PA-micro-S Microscope not included
Phase shift / retardation (nm), Axis orientation(°) , Stress equivalent(Mpa)※ ※As part of “data processing” option				
σ < 1 nm				out of warranty
520 nm				
0 ～ 130 nm				out of warranty
Approx. 5.0 M pixels				
■ 242×290mm ～ 360×480mm	■ 37×44mm ～ 240×320mm ○ 5.5×6.6mm ～ 25×30mm	■ 30×36mm ～ 100×133mm ○ 5.5×6.6mm ～ 25×30mm	■ 37×44mm ※depends on setting conditions when used as separate head ○ 7.0×8.4mm ～ 20.0×24.0mm	Depends on the microscope attached
650×650×1930mm 46 kg	430×487×1166mm 23 kg	270×337×631mm 12 kg	160×190×316mm 4 kg (with base station)	60×70×85mm 0.5kg
Main system 、 (PA-micro-S: microscope not included), PC, Software(PA-View), Manual				
× Not available	● Optional	● Optional	● Optional	× Not available
× Not available	× Not available	× Not available	× Not available	× Not available
● Optional	● Optional	● Optional	- Standard	● Optional
× Not available	× Not available	× Not available	× Not available	× Not available
● Optional	● Optional	● Optional	● Optional	● Optional

CSV data output

Graph data output as csv data for further analysis with spreadsheet software.

Built-in software　　CSV data　　External spreadsheet

New functions in data processing

【Arithmetic filter】
Arithmetic operations +, −, ×, ÷ on measurement result over the whole surface.

【Stress calculator】
Conversion of retardation to stress-equivalent in MPa

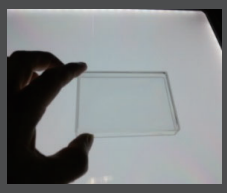
High-speed measurement of the 2-D distribution in transparent objects and films, quantifying their .

Retardation, Birefringence and Internal stress.

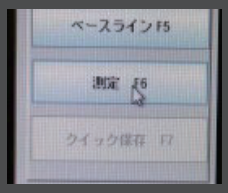
Features of PA/WPA system

Easy operation / high-speed measurement

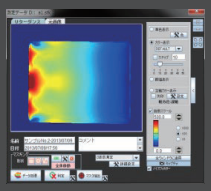
Unique polarization imaging sensor realizes easy and high-speed operation to measure the distribution of the retardation.



Setting of a sample

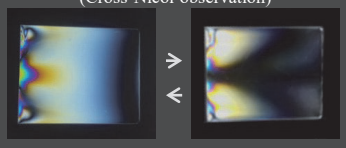


Click of measurement button



Output data in about 10 seconds

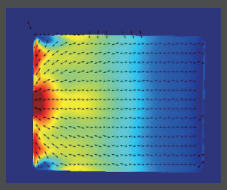
Conventional method
(Cross-Nicol observation)



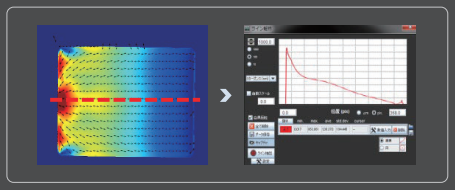
Estimation is difficult because the image changes as the filter rotates.

Various analyzing functions of 2D data

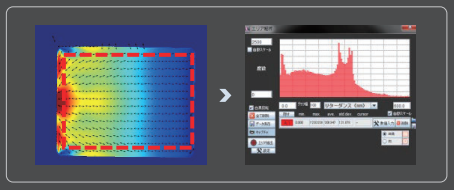
The powerful analyzing function of the 2D data supports an instinctive understanding of the character of the measuring samples.



An example of measured data



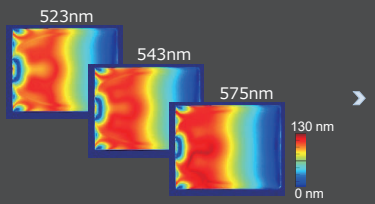
Graph of the retardation along arbitrary line



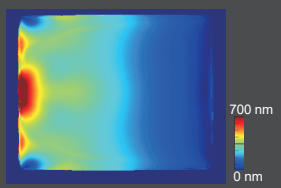
Histogram within arbitrary area

Measurement capability of large Retardation (WPA series)

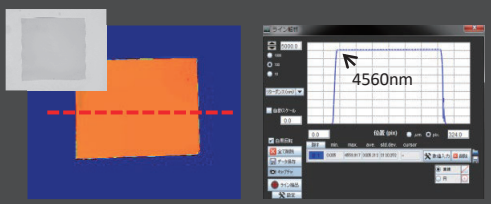
By the calculation of 3 data sets with different wavelengths, WPA system can measure large retardation of a few thous



Data with 3 wavelength



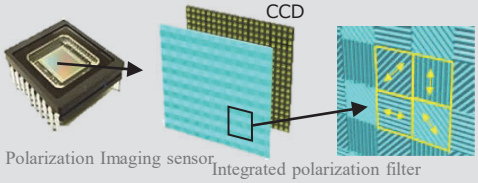
Mixed data of large retardation



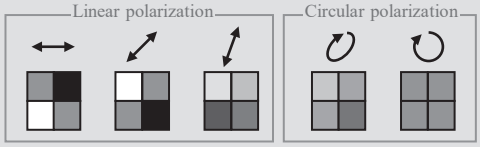
Example data of a quartz plate with large retardation.

Structure and Measurement principle of the polarization imaging sensor

Our original integrated polarization filter is set in front of a CCD.



By calculation of signals of 4 neighboring CCD cells, the data which was obtained with rotating filter traditionally is available instantly.

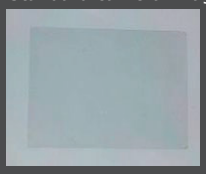


Applications

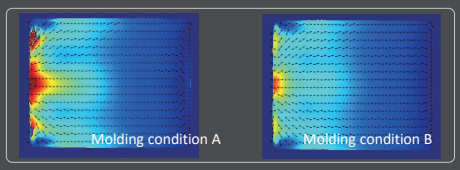
Plastic molding

Changes of the molding conditions are reflected in the retardation distribution, so retardation data become a good indication for process control.

Standard camera image



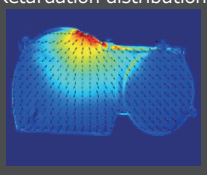
Retardation distribution data



(measured with WPA-200)

Standard camera image

Retardation distribution data

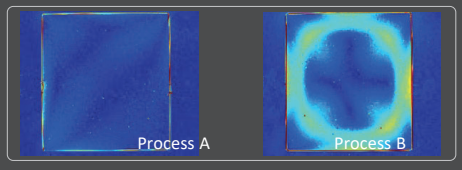


(measured with WPA-200-L)

Glass

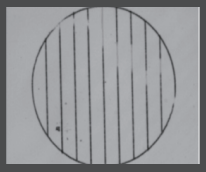
It becomes more and more important to measure the internal-stress of strengthened glass or after laser processing.

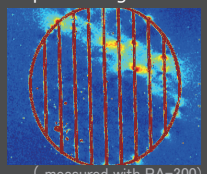
Comparison of glass distortion between different processes



(measured with PA-300-L)

Internal-stress caused by laser processing



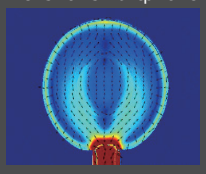


(measured with PA-300)

Lens

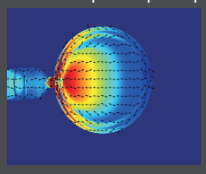
Establishing low-retardation process is necessary because large retardation reduce the resolving power of the final lens.

Lens for smartphone



(measured with WPA-200)

Lens for optical-pickup

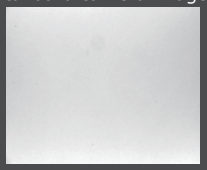


(measured with WPA-200)

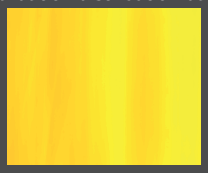
Film

Small unevenness of retardation is detectable easily.

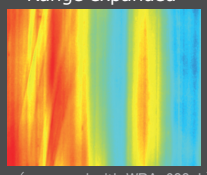
Standard camera image



Retardation distribution data



Range expanded



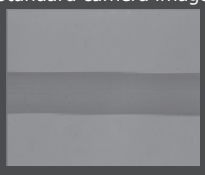
(measured with WPA-200-L)

Transparent tube

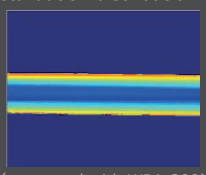
Retardation distribution data of industrial/medical transparent tube is obtained.

Plastic tube

Standard camera image



Retardation distribution data

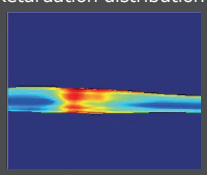


(measured with WPA-200)

Plastic tube (after straining)

Standard camera image

Retardation distribution data

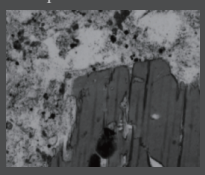


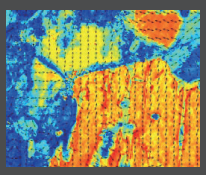
(measured with WPA-200)

Inorganic material

Distribution data of the crystal orientation is obtained easily . Reflection measurement is possible by PA-micro-S.

Amphibole



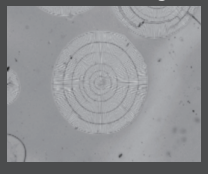


(measured with PA-micro-S)

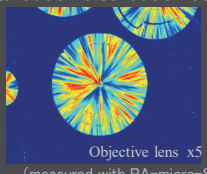
Organic macromolecule

Retardation distribution data is useful for the evaluation of the molecular orientation of organic macromolecule like spherocrystals.

Standard camera image



Retardation distribution data



(measured with PA-micro-S)

« WPA/PA series Optional function lineup »

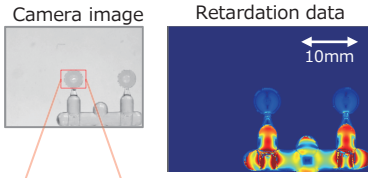
Options	Features
Ultra-high Retardation	For high retardation samples up to about 10,000 nm※.
Real-time Analysis	Retardation data real-time analysis and instant OK/NG decision.
Remote control	Remote control for coupling with external system.
Zoom lens	Higher magnification lens for small samples.
3-level retardation plate	Reference retardation plate (3 levels).
Retardation Plate for Microscopy	Reference retardation plate (microscopic type).
Lens Analysis	Automatic circular area extraction and OK/NG decision.
Data Processing	Software filters (noise reduction, high-pass, low-pass, edge amplification, inclination correction, stress calculator [MPa])
Chromatic Dispersion Mode (CD mode)	Computation of the retardation with a new algorithm robust to errors caused by complicated structure samples that cannot be modeled as simple retarders (thick plastic molded parts, etc.)
Shading Cover (for normal and large types)	Protect the measurement environment from parasite light.
Field-Of-View Correction	Reduction of measurement error caused by the system's large field-of-view.
Lens Measurement Stage	Specialized sample stage allowing reduction of measurement error caused by the curvature of highly curved samples, such as lenses

※ Actual upper limit for quartz crystal sample

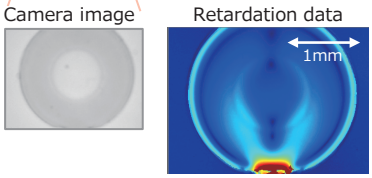
■ Zoom Lens

Suitable for evaluation of small molded samples.

【 Standard lens 】

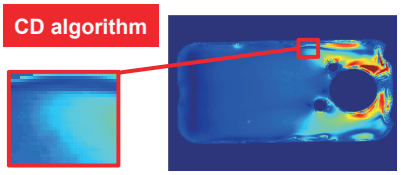


【 Zoom lens 】



■ Chromatic Dispersion (CD) Mode

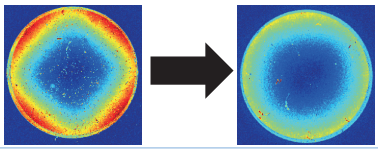
Eliminates data artifacts caused by complex inner structure of some samples while providing highly reproductible data!



■ Lens measurement stage

NEW!

Reduction of fixed pattern error from lens data

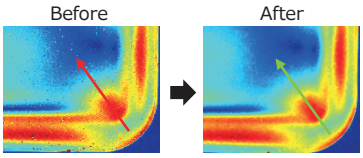


■ Data Processing Option

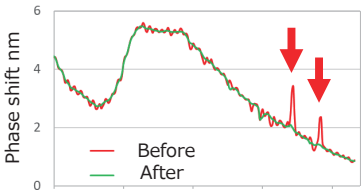
(data example)

Removal of spike-noise due to dust

【 Median filter 】



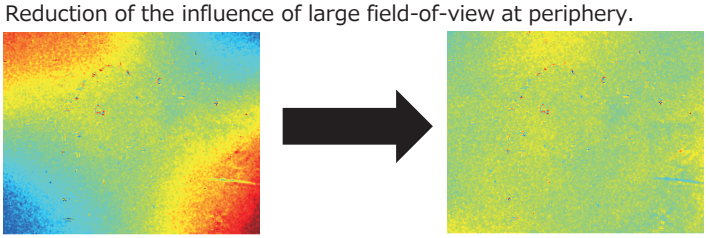
【Before/After】



■ Field-Of-View Correction

NEW!

Reduction of the influence of large field-of-view at periphery.



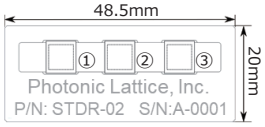
■ Shading Cover (for normal and large type)

NEW!

Cut off undesired parasite light that may affect measurement accuracy.

■ 3-level retardation plate / Retardation plate for microscopy

Reference plate with 3 levels of retardation.



Retardation:
① 10nm、② 40nm、③ 80nm

Microscopy size retardation region.