Polariscopes LSM products
general catalog

Polariscopes
LSM product line-up

High sensitive polariscope by professional optical manufacturer
Strain view,stress direction analysis, quantitative measurement
in a product made from glass or plastics.

Japanese has this kanji word. → What is this word called in English?

歪 (HIZUMI) = strain

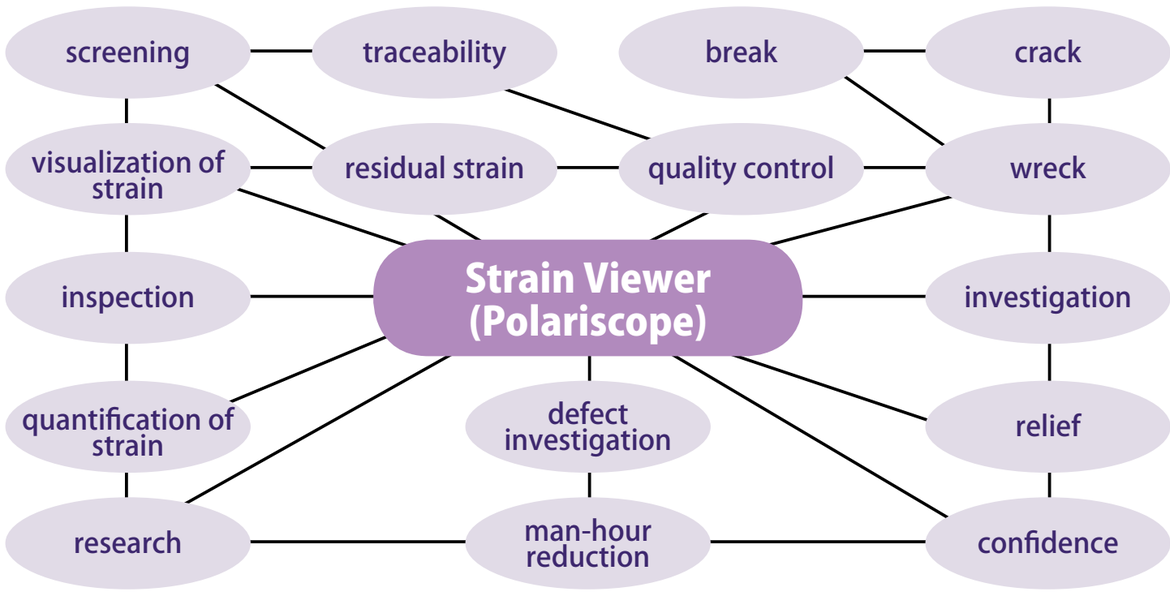
As a word, there are several images for “strain”.
What do you think about right image of "HIZUMI = strain“ ?
The most suitable image is abstracted from a dictionary.

strain: physical pressure [uncountable, countable] the pressure that is put on something when a physical force stretches, pushes, or pulls it (Oxford Advanced Learner's Dictionary 9th edition).

Although strain occurs in metal and wood, LUCEO focuses on strain occurred in transparent body. Following 4 products are major examples of transparent body.

glassware | resin film | plastic product | crystalline material

LSM product family, Strain Viewer (Polariscope), provides solutions for strain in transparent body.



LSM：Initials of Luceo Strain Meter

Inspection method

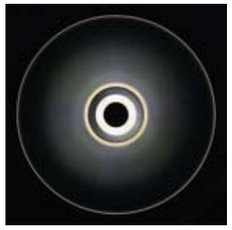
<<< There are 5-ways in 2-types of inspection method for polaricopes >>>

Observational method

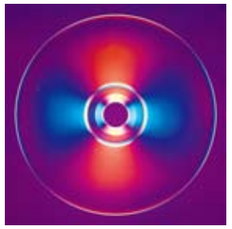
Observe presence/absence, distribution state, feature and direction of strain in transparent body. For example, mold injection product of an optical disk is seen like below pictures according to inspection method.

Crossed Nicols method

Circulaly Polarized method



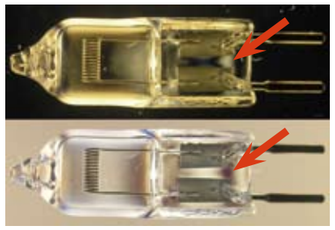
Sensitive Color method



Measurement method

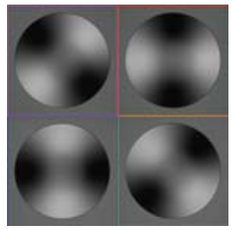
Numerical value and direction of strain are quantified.

Senarmont method



Calculate strain by finding the angle of the darkest portion of the brightest part in a sample as rotating an analyzer.

Rotating Analyzer method



Calculate value and direction of strain by rotating an analyzer at previously defined angles based on change of brightness.

Type of polariscope

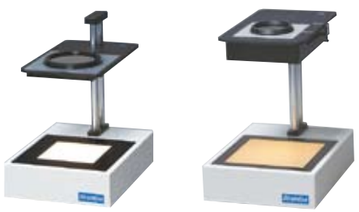
<<< 3-families of polariscopes according to inspection method >>>

Observational method			Measuring method	
Crossed Nicols	Circularly Polarized	Sensitive Color	Senarmont	Rotating Analyzer

StrainEye
< Visual >

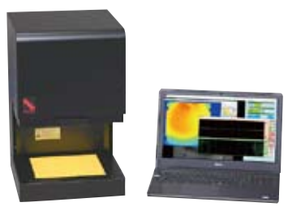
Semiauto Senarmont
< Semi-Automated >

Fullauto StrainEye
< Fully-Automated >



Visual inspection

More precise with PC analyzing



2D whole measurement

StrainEye is a registered brand that means “see strain by an eye” or “an eye to see strain”.

StrainEye < Visual >

LSM-1000LE（Handheld）

Lighting area：Φ 78mm

LSM-1000LE：Crossed Nicols
Sensitive Color
Senarmont

(Inspection method is changeable by replacing a wave plate)

- Suitable for small-sized sample inspection.
- Battery operation available.
- Carriageable with the handle.
- Easy to check edge conditions of large glass.

LSM-2000LE（Portable）

Lighting area：□ 120mm

LSM-2100LE：Crossed Nicols
LSM-2200LE：Circularly Polarized
LSM-2300LE：Sensitive Color

- Tilted lighting area enables to inspect seating in a chair.
- Suitable for small-sized sample inspection.
- 1set/person by reasonable price.

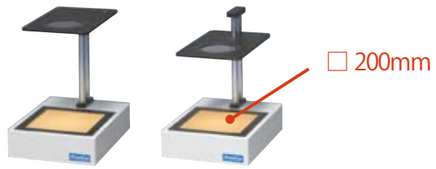
LSM-4000LE family（Medium）

- Select with/without height adjustment of analyzer.

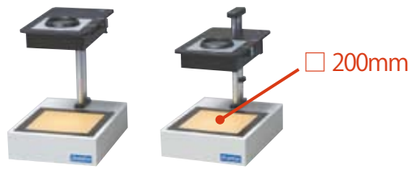
LSM-4*00LE：without height adjustment
LSM-4*01LE：with height adjustment

Lighting area：□ 150mm　Lighting are：□ 200mm

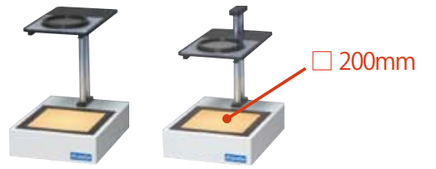
- Suitable for medium-sized sample.
- Standard size among visual inspection models.



LSM-4100LE　LSM-4101LE：Crossed Nicols
LSM-4200LE　LSM-4201LE：Circularly Polarized
LSM-4300LE　LSM-4301LE：Sensitive Color
(Select a model by inspection method)



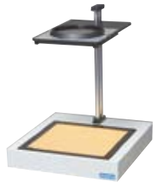
LSM-4410LE　LSM-4411LE：Sensitive Color
Senarmont
(Inspection method is switchable by sliding the lever)



LSM-4400LE　LSM-4401LE：Crossed Nicols
Sensitive Color
Senarmont
(Inspection method is changeable by replacing a wave plate)

LSM-4400B　LSM-4401B：Crossed Nicols
Sensitive Color
Senarmont
(Inspection method is changeable by replacing a wave plate)

LSM-8000LE family（Large）



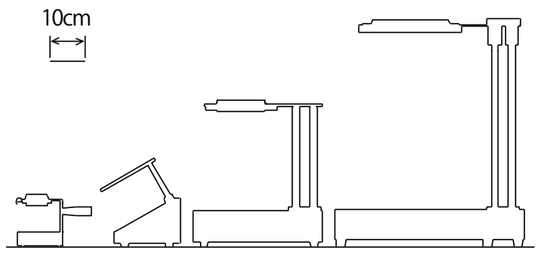
Lighting area：□ 350mm

LSM-8200LE：Circularly Polarized
LSM-8400LE：Crossed Nicols
Sensitive Color
Senarmont

(Inspection method is changeable by replacing a wave plate)

- Suitable for large-sized sample.
- Analyzer height is adjustable.

Device size comparison



Semiauto Semarmont < Semi-Automated >

LSM-7000LE

Image range：176 × 132 ～ 6.9 × 5.2mm

Standard zoom lens is provided.

<inspection method>
Sensitive Color
Senarmont

- Suitable for small ～ medium-sized sample.
- Analyzer height is adjustable.

LSM-7000B

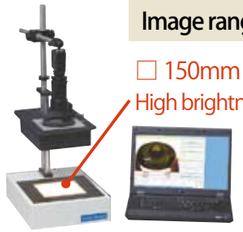


Image range：150 × 112 ～ 6.9 × 5.2mm

Standard zoom lens is provided.

<inspection method>
Sensitive Color
Senarmont

- Suitable for small ～ medium-sized sample with deep colored.
- Analyzer height is adjustable.

LSM-7000BZ

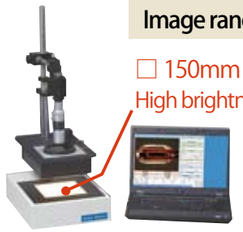


Image range：13.0 × 9.8 ～ 2.0 × 1.5mm

High magnification zoom lens is provided.

<inspection method>
Sensitive Color
Senarmont

- the best for very small-sized sample
- Analyzer height is adjustable.

Fullauto StrainEye < Fully - Automated >

LSM-9000LE

Measurement area：□ 175mm

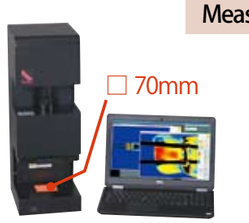
Prime lens is provided.

<inspection method>
Rotating Analyzer method

- Suitable for small ～ medium-sized sample.
- Measurable retardation range：0 ～ 130nm

LSM-9000S

Measurement area：□ 60 ～ 10mm



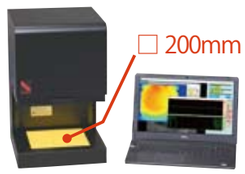
Zoom lens is provided.

<inspection method>
Rotating Analyzer method

- Suitable for small-sized sample.
- Measurable retardation range：0 ～ 130nm

LSM-9000W

Measurement area：□ 175mm



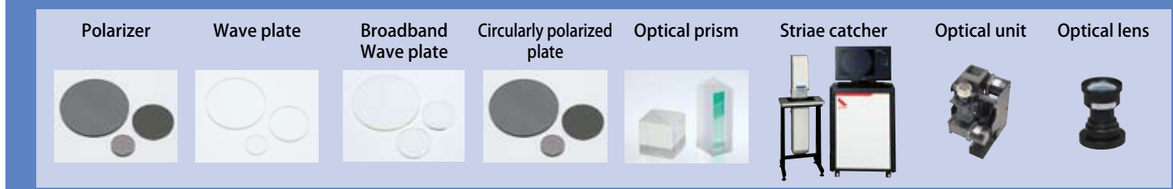
Prime lens is provided.

<inspection method>
Rotating Analyzer method

- Suitable for medium ～ small-sized sample.
- Measurable retardation range：0 ～ 3000nm

LUCEO has been a specialist of optical instruments for over 50years from its establishment.

LUCEO is the pioneer who produces polarizers and wave plates by gluing in-house optical films to optical glass. We provide product portfolio taking advantage of polarization technologies adapting to the changing social needs consistently.



In LUCEO showroom, you can experience demonstrations of inspection and measurement looking closely at our various products.

Polariscope List

Specification list

Polariscopes LSM products Specification list

items		StrainEye												Semiauto Senarmont			Fullauto StrainEye			items	
		Handheld	Portable			Medium						Large (8000)									
		LSM-1000LE	LSM-2100LE	LSM-2200LE	LSM-2300LE	LSM-4100LE LSM-4101LE	LSM-4200LE LSM-4201LE	LSM-4300LE LSM-4301LE	LSM-4400LE LSM-4401LE	LSM-4400B LSM-4401B	LSM-4410LE LSM-4411LE	LSM-8200LE	LSM-8400LE	LSM-7000LE	LSM-7000B	LSM-7000BZ	LSM-9000LE	LSM-9000S	LSM-9000W		
Inspection Method	Crossed Nicols	●	●			●			●				●							Crossed Nicols	Inspection Method
	Circularly Polarized			●			●					●								Circularly Polarized	
	Sensitive Color	●			●			●	●		●		●	●						Sensitive Color	
	Senarmont	●							●		●		●	●						Senarmont	
	Rotating Analyzer																●			Rotating Analyzer	
Retardation Range		Re:0～270nm	–	–	–	–	–	–	Re:0～270nm			–	Re:0～270nm	Re:0～270nm			Re:0～130nm		Re:0～3000nm	Retardation Range	
Repeat Accuracy		–	–	–	–	–	–	–	–	–	–	–	–	Approx.±1.5nm			σ = 1nm		σ < 3nm	Repeat Accuracy	
Measurement Area (mm)		ϕ78	120×120			200×200				150×150	200×200	350×350		MAX:176×132 MIN:6.9×5.2	MAX:150×112 MIN:6.9×5.2	MAX:13.0×9.8 MIN:2.0×1.5	175×175	MAX:60×60 MIN:10×10	175×175	Measurement Area (mm)	
Effective Pixels (Pixel)		–	–	–	–	–	–	–	–	–	–	–	–	640×480			1100×1100			Effective Pixels (Pixel)	
Set Wavelength		Senarmont :540nm	–	–	–	–	–	–	Senarmont :540nm			–	Senarmont :540nm	Senarmont:540nm			590nm		560nm 580nm 600nm	Set Wavelength	
Light Source		High Brightness LED White 3000K	High Brightness LED White 3000K			High Brightness LED White 3000K						High Brightness LED White 3000K		High Brightness LED White 3000K			High Brightness LED			Light Source	
Usable Dimension of Polarizer (mm)		ϕ78	120×120			200×200				150×150 (High Brightness)	200×200	350×350		200×200	150×150 (High Brightness)		200×200	70×70	200×200	Usable Dimension of Polarizer (mm)	
Usable Dimension of Analyzer(AN) (mm)		ϕ54	ϕ84			ϕ110			ϕ114		ϕ80	ϕ200		ϕ80			Built-in			Usable Dimension of Analyzer(AN) (mm)	
AN Height Adjustment						● (Available for LSM-xx01)						●		●						AN Height Adjustment	
Sample Available Height (mm)		70	115			300 65～290			285 55～275		250 25～240	80～500	65～500	25～200		25～90	130	70	130	Sample Available Height (mm)	
Outer Dimension (W×H×Dmm)		96×135×150 (Handle:L=85)	180×245×264			280×375×415			280×375×430			500×550×660		280×375×705			280×340×500	200×280×595	300×355×500	Outer Dimension (W×H×Dmm)	
Weight (Body)		0.7kg	3.4kg			10kg			11kg		12kg	26kg		16kg			15kg	11kg	20kg	Weight (Body)	
Power		DC Input 15-24V 0.8A	DC Input 15-24V 0.8A			100-240VAC 50/60Hz 0.14A				100-240VAC 50/60Hz 0.3A	100-240VAC 50/60Hz 0.14A	100-240VAC 50/60Hz 0.77A		100-240VAC 50/60Hz 0.2A	100-240VAC 50/60Hz 0.3A		100-240VAC 50/60Hz 0.35A	DC Input 24V 1.5A	DC Input 24V 2.2A	Power	
Power Consumption (Body)		15W	15W			14W				30W	14W	77W		20W	30W		35W	38W	55W	Power Consumption (Body)	
Component		Body, (1/4waveplate, Sensitive Color plate)	Body			Body, Cables			Body, Cables, 1/4 wave plate, Sensitive Color plate		Body, Cables	Body,Cables, (8400LE: 1/4 wave plate, Sensitive Color plate)		Body, Computer, USB-Camera, Zoom Lens, Cables			Body, Computer, Cables			Component	
Attachment		AC Adapter, Sample Glass, (Battery Charger)	AC Adapter, Body Cover		AC Adapter, Body Cover, Sample Glass	Body Cover		Body Cover, Sample Glass				Body Cover	Body Cover, Sample Glass	Body Cover, Sample Glass			Body Cover	AC Adapter, Body Cover		Attachment	
Computer OS		–	–	–	–	–	–	–	–	–	–	–		Windows10(64bit) Japanese/English			Windows10(64bit) Japanese/English			Computer OS	

Polariscope LSM product line-up can inspect wide variety of strain in a product made from glass or plastics properly.

■ objects of polariscopes

glassware

large float glass plate, automotive glass, industrial new material glass, optical new material glass, glass wafer, thermister, glass paste
glass tube <variou types of lamps, electronic tube (vacuum tube, gas-enclosing tube), sealing glass tube for electronic component, combustion partition for heating appliance>
laboratory glassware <flask and beaker, test tube and connecting, tubule, analysis component, evaporating dish and watch glass, etc. >
material of optical glass <crystal, quartz, lens glass material, etc.>
optical glass element <optical filter, LD cover glass, ball lens, lens array, lens, prism, V-groove substrate, etc.>
glass container <bottle for beverage, wide-mouth bottle, preservation container, glass, dish, etc.>

plastic(synthetic resin) products

large resin plate, resin film
mold injection resin products <LCD monitor cover, sun visor, resin container, etc.>
resin optical elements <cover glass, lens array, lens, prism, etc.>

*note:Please ask other kind of products without mention of the list. There are some of products that can be inspected by polariscopes.

■ use applications

products	use applications
large float glass plate	inspect belt-like strain at the edge of the glass caused during manufacturing process of float glass
automotive glass	inspect strain caused around metal electrode at bonding to glass
industrial new material glass	inspect strain in new glass at its development phase
optical new material glass	inspect strain in new glass at its development phase
glass wafer	inspect fine processing strain caused during its manufacturing process
thermister	inspect strain caused in contact with metal and glass condition setting for annealing treatment
glass paste	inspect strain caused by shrinkage after dissolution or anchoring
glass tube <variou types of lamps, electronic tube(vacuumtube, gas-enclosing tube) sealingglass tube for electronic component, combustion partition for heating appliance>	inspect strain caused in contact with metal and glass inspect strain caused by influence after high thermal exposure inspect strain caused by thermal history around portion of highly thermal processed condition setting for annealing treatment inspection after annealing process
laboratory glassware < flask and beaker, test tube and connecting tubule, analysis component, evaporating dish and watch glass,etc. >	inspect strain caused by influence after high thermal exposure inspect strain caused by fire process condition setting for annealing treatment inspection after annealing process
material of optical glass <crystal,quartz,lens glass material,etc.>	inspect strain caused in manufacturing process of material condition setting for annealing treatment inspection after annealing process

products	use applications
optical glass element < optical filter,LD cover glass,ball lens,lens array, lens, prism, V-groove substrate >	inspect fine processing strain caused during its manufacturing process inspect strain caused by thermal history at mold press. condition setting for annealing treatment inspection after annealing process inspect strain caused by fitting a thing into a metal frame
glass container < bottle for beverage, wide-mouth bottle, preservation container, glass,dish >	inspect strain caused by forming condition setting for annealing treatment inspection after annealing process
large resin plate	inspect strain caused during manufacturing process of resin plate
resin film	inspect uniformity of strain in film
mold injection resin products < LCD monitor cover, sun visor, resin container, etc. >	inspect residual strain and orientational strain caused by mold injection condition setting for injection speed inspection after annealing process inspect strain caused by fitting a thing into a metal frame
resin optical elements <cover glass,lens array, lens,prism,etc.>	inspect fine processing strain caused during its manufacturing process inspect strain caused by thermal history at mold press condition setting for annealing treatment inspection after annealing process inspect strain caused by fitting a thing into a metal frame

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