

Lumetrics, Inc. Ophthalmic Intellectual Property

CrystalWave

The CrystalWave product is used to measure an intraocular lens in the manufacturing process.

Patent Number	Expiration Date	Title	Description
9,506,837	4/16/2034	Apparatus and method for determining angular error in placement of fiducial marks on a toric intraocular lens	An apparatus for determining the angular error in the placement of fiducial marks on an intraocular lens with respect to the true location of a meridional axis of the intraocular lens
6,130,419	6/25/2019	Fixed mount wavefront sensor	Method to mount a wavefront dissector comprising means for rigidly mounting a wavefront dissector
6,656,373	7/7/2020	Apodized micro-lenses for Hartmann wavefront sensing and method for fabricating desired profiles	Method for fabricating the lenslet arrays
6,819,413	8/29/2023	Method and system for sensing and analyzing a wavefront of an optically transmissive system	A Shack Hartman device for sensing a wavefront of light passed through an optical device
7,078,665	7/9/2023	System and method of wavefront sensing for determining a location of focal spot	A computational method for finding a centroid.
7,122,774	9/19/2025	System and method of wavefront sensing	Method for finding the center of the focal spot in a detector array.
7,335,867	4/21/2026	Method of wavefront sensing by mapping boundaries of a lenslet array onto a grid of pixels	The method for using focal spots in calculating the wavefront.
7,455,407	4/21/2024	System and method of measuring and mapping three dimensional structures	A system for measuring an optical characteristic of an optically transmissive object

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ClearWave Plus

Lumetrics has designed and launched this product that combines the capability of an OptiGauge along with a Wavefront sensor.

Patent Number	Expiration Date	Title	Description
9,019,485	3/31/2033	Apparatus and Method for Evaluation of Optical Elements	Apparatus and method comprising a low coherence interferometer and wave front sensor to measure properties of an optical element, 25 claims
9,341,541	3/31/2033	Apparatus and Method for Evaluation of Optical Elements	Apparatus and method comprising a low coherence interferometer and wave front sensor to measure properties of an optical element, 11 claims
5,596,409A	3/22/2015	Associated dual interferometric measurement method for determining a physical property of an object	Methods for measuring physical properties of an object, such as thickness, group index of refraction, and distance to a surface. The apparatus includes a non-coherent light interferometer and a coherent light interferometer in association so as to share a variable optical path delay element
5,659,392A	3/22/2015	Associated dual interferometric measurement apparatus for determining a physical property of an object	Apparatus for measuring physical properties of an object, such as thickness, group index of refraction, and distance to a surface. The apparatus includes a non-coherent light interferometer and a coherent light interferometer in association so as to share a variable optical path delay element.
6,522,410B1	3/7/2020	Method for processing low coherence interferometry data	Method for eliminating signal due to multiple reflections when measuring highly reflective sample
5,936,720	7/8/2018	Beam characterization of wavefront sensor	An apparatus for characterizing an energy beam comprising a lenslet array for separating the energy beam to a plurality of spots; detection means for converting a pattern of said spots to electronic signals;
6,130,419	6/25/2019	Fixed mount wavefront sensor	Method to mount a wavefront dissector comprising means for rigidly mounting a wavefront dissector relative to an imager at a fixed distance without a relay imaging lens, an intensifier, or any other optical element between said wavefront dissector and said imager.
6,656,373	7/7/2020	Apodized micro-lenses for Hartmann wavefront sensing and method for fabricating desired profiles	Method for fabricating the lenslet arrays.

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6,819,413	8/29/2023	Method and system for sensing and analyzing a wavefront of an optically transmissive system	A Shack Hartman device for sensing a wavefront of light passed through an optical device.
7,078,665	7/9/2023	System and method of wavefront sensing for determining a location of focal spot	A computational Method for finding a centroid.
7,122,774	9/19/2025	System and method of wavefront sensing	Method for finding the center of the focal spot in a detector array.
7,335,867	4/21/2026	Method of wavefront sensing by mapping boundaries of a lenslet array onto a grid of pixels	Method for reconstructing a wavefront from the Shack Hartman gradient data.
7,455,407	4/21/2024	System and method of measuring and mapping three dimensional structures	Method for testing an optically transparent optics using wavefront sensor.
8,118,429	10/28/2028	Systems and methods of phase diversity wavefront sensing	Method measuring an optic that changes power in time.

CLAS-NX

Lumetrics has developed a new Wavefront Camera and control software that combines a current interface with current Windows compatibility.

Patent Number	Expiration Date	Title	Description
9,019,485	3/31/2033	Apparatus and Method for Evaluation of Optical Elements	Apparatus and method comprising a low coherence interferometer and wave front sensor to measure properties of an optical element, 25 claims
9,341,541	3/31/2033	Apparatus and Method for Evaluation of Optical Elements	Apparatus and method comprising a low coherence interferometer and wave front sensor to measure properties of an optical element, 11 claims
5,936,720	7/8/2018	Beam characterization of wavefront sensor	An apparatus for characterizing an energy beam comprising a lenslet array for separating the energy beam to a plurality of spots; detection means for converting a pattern of said spots to electronic signals;
6,130,419	6/25/2019	Fixed mount wavefront sensor	Method to mount a wavefront dissector comprising means for rigidly mounting a wavefront dissector
6,184,974	7/1/2019	Apparatus and method for evaluating a target that is larger than a measuring aperture of a sensor	Method for moving a wavefront sensor in XY direction to evaluate different portions of the optics

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6,376,819	7/7/2020	Sub-lens spatial resolution S-H wavefront sensor	Method for increasing spatial resolution of the wavefront measurement beyond what's given by the lenslet array
6,550,917	10/20/2020	Dynamic range extension techniques for a wavefront sensor including use in ophthalmic measurement	A system for measuring errors in an eye comprising: a projecting optical system which delivers light onto a retina of the eye;
6,624,896	10/18/2020	System and method for metrology of surface flatness and surface nanotopology of materials	A metrology system comprising: a light source; a mechanical assembly positioning a target relative to the light source; a wavefront sensor detecting light from the target to determine metrology of the target; an optical assembly directing light from the light source to the target and from the target to the wavefront sensor
7,078,665	7/9/2023	System and method of wavefront sensing for determining a location of focal spot	A system and computational method for finding a centroid.
7,122,774	9/19/2025	System and method of wavefront sensing	Method of estimating a location of a center of a focal spot on a detector array comprising a plurality of lenslets and a plurality of pixels adapted to receive light from the plurality of lenslets.
7,335,867	4/21/2026	Method of wavefront sensing by mapping boundaries of a lenslet array onto a grid of pixels	Method for using focal spots in calculating the wavefront.
7,455,407	4/21/2024	System and method of measuring and mapping three dimensional structures	A system for measuring an optical characteristic of an optically transmissive object
7,553,022	7/27/2027	System and method of measuring and mapping three dimensional structures	A system, comprising: a projecting optical system adapted to project light onto an object
7,988,292	5/29/2029	System and method of measuring and mapping three dimensional structures	A system, comprising: a projecting optical system adapted to project light onto an object; a pre-correction system adapted to compensate a light beam to be projected onto the object for at least one aberration in the object
8,118,429	10/28/2028	Systems and methods of phase diversity wavefront sensing	A system for measuring an optic that changes power in time.
2016/0252425 A1	3/11/2033	Apparatus and Method for Evaluation of Optical Elements	Continuation of 9,341,541

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Software Copyrights

Registration Number	Registration Date	Title	Description
TX 7-709-705	3-25-2013	Data Collection v 6.0	Collection of data output
TX 7-725-403	4-15-2013	LMMath v 6.0	Math core processing
TX 7-709-713	3-25-2013	Refractive Index Calc.	RI algorithms
TX 7-756-914	6-5-2013	LMIO v 6.0	Input and output Com.
TXu 1-858-065	3-18-2013	Peak Find v 0.9	Peak find algorithms
TXu 1-897-572	6-2-2014	DAC_v5.	Digital to analog conv.
TXu 1-897-574	6-2-2014	Data_var	Collection of operating data
TXu 1-897-576	6-2-2104	MMX_10_GUI	User interface
TXu 1-897-580	6-2-2104	MMX_parameters	Coll. of parameters
TXu 1-897-584	6-2-2104	Parameter_save	Store parameters
TXu 1-897-585	6-2-2014	MyMMXGUI_v17	Operator interaction
TXu 1-897-586	6-2-2014	PyDAQmx_v16	Config. control
TXu 1-897-572	5-12-2015	DAC_v5 Supplement	Supplement
TXu 1-897-586	5-12-2015	pyDAQmx_v16 supp.	Supplement
TX-8-545-690	02-28-2018	OCC 8.0	Optigauge software
TX-8-545-693	03-05-2018	OCC 8.1	OptiGauge software
TX-8-542-941	02-28-2018	CLAS NX	WaveFront software
TX-8-546-939	03-09-2018	ClearWave Plus	Code for OptiGauge and WaveFront
TX-8-542-942	02-28-2018	ClearWave frontend	Contact lens code
TX-8-546-932	03-09-2018	Lumetriscan	Code for scanner
TX-8-547-471	03-09-2018	Coater Monitor	Coating code