I-PHOTONICS

I-Photonics

Vacuum coating systems

CONTENT

ABOUT I-PHOTONICS

I-Photonics has many years experience in working with Ion Beam technology and the Physics of Thin Films. Our team have decades of experience in Research and Development of coatings for all aspects of precision optics, as well as expertise in developing hardware to improve the capability of existing coating technologies. Over the years, we have built a large portfolio of coating equipment and processes within optics and for other industries. This has allowed I-Photonics to provide competitive turn-key equipment and coating solutions to a range of customers worldwide.

Following the demands of the global market we developed: Magnetron Sputtering Technology (MS, RMS, PARMS), Diamond Like Carbon Technology for IR optics (DLC by PECVD), E-Beam Evaporation (PIAD) and Ion Beam Sputtering (IBS, RF IBS) for precision optics.

In order to improve the accuracy and the reliability in optical coatings we developed an automatic optical process control system called OCP Broadband and OCP Singlewave Monitoring. The OCP Singlewave and Broadband allows the user to produce high precision multilayer optical coatings for UV, VIS, NIR, Mid IR ranges with an improved high yield.

The wide range of requests and specifications from customers for unusual and high precision optics, has pushed our team to continuous Research & Development. This has led to the constant improvement of our equipment and techniques, and has defined I-Photonics not just as a coating systems provider, but as a developer of holistic industrial coating solutions.

The accumulated experience of our team in process integration and the methodology of thin film coating has helped I-Photonics to become specialized to provide own “in house” coating services as well. It also positioned I-Photonics as a company which provides ongoing technological support for each customer and shares our knowledge of thin films.

With each customer our aim is to establish long-term cooperation based on our experience and our capacity to continuously improve as a coating solution provider.

MERIDIAN

PLASMA ASSISTED REACTIVE MAGNETRON SPUTTERING (PARMS) SYSTEM

The Meridian is an RF plasma assisted reactive magnetron sputtering system for the high speed deposition of high precision optical coatings for a wide range of applications. Meridian systems produce thin films from a variety of materials with highest accuracy and excellent quality. Our optical monitoring system enables fully automated processes with yields being significantly increased.

Key benefits

Sputter configuration for particle-free coating processes

Sputter up configuration

AC dual magnetron with high yield

Long-life RF plasma sources for pre-cleaning and assisting

Direct on substrate optical monitoring system I-Photonics OCP

Double rotating planetary substrate holder allows mounting of different substrate sizes (200, 250 and 300 mm)

Applications

Ultra narrow bandpass filters

Multi-zone filters

Steep-edge filters

Single and multiple notch filters

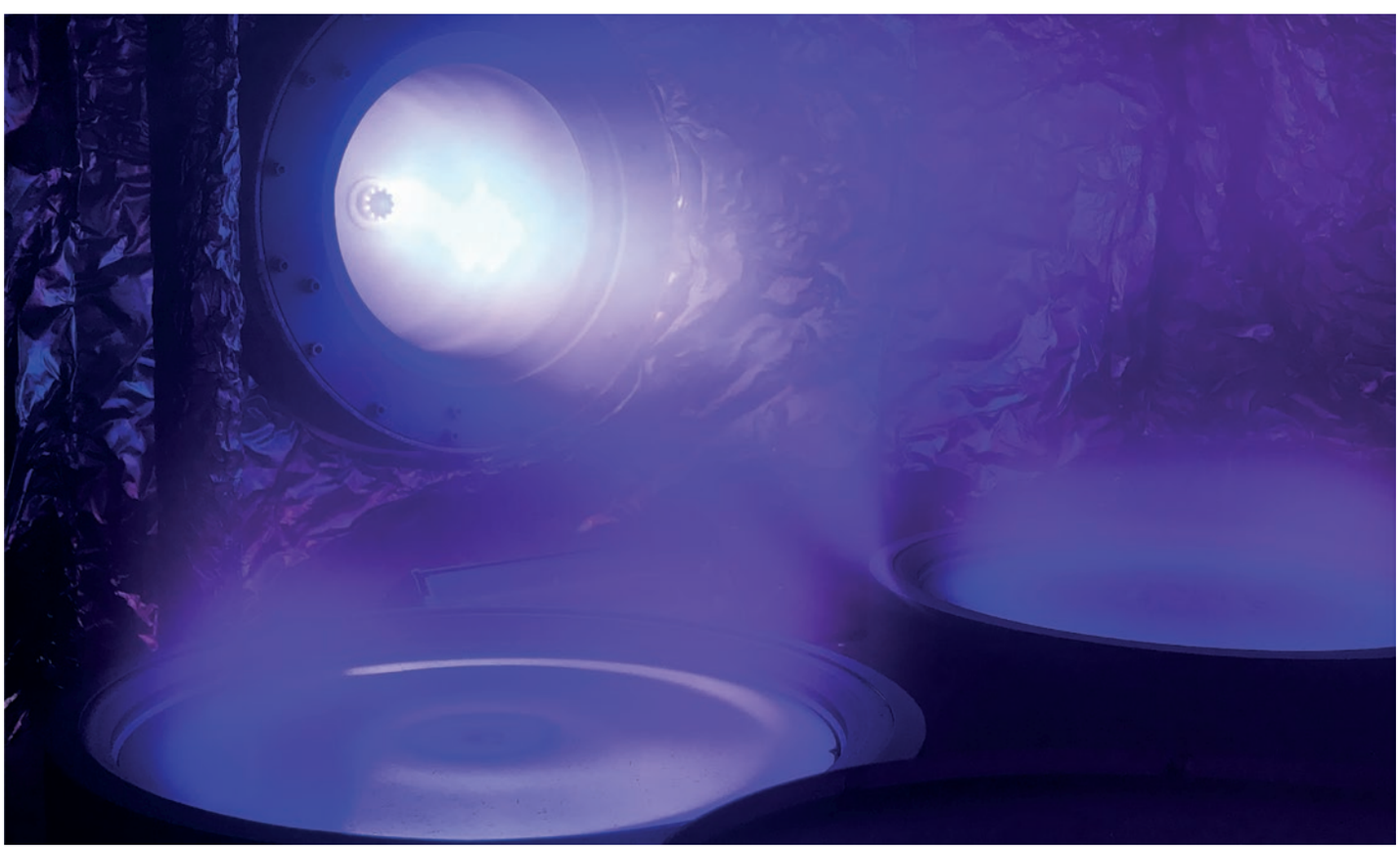
Laser mirrors

Thin-film polarisers

Beam splitters

Technical data

Sputtering source	HY planar circular magnetrons
Assisting source	RF plasma source
Capacity	Dual rotation planetary holder Substrate sizes (200, 250 and 300 mm)
Coating uniformity	<+/-0.2%
Sputtering materials	Ta_2O_5, SiO_2, HfO_2, Al_2O_3, Nb_2O_5
Coating rate	Up to 6 A/sec (material dependent)
Control system	Automatic optical monitoring system I-Photonics OCP
Process temperature	<250 °C
Pumping system	Dry mechanical pump Turbomolecular pumps
Ultimate pressure	8e-4 Pa
Time to reach start process	45 min
Installation area (LxWxH)	3790x3560x2450 mm
Equipment weight	3400 kg



ORTUS

PLASMA ION-ASSISTED DEPOSITION (PIAD) SYSTEM

ORTUS is a family of e-beam evaporation coaters based with Plasma Ion-Assisted Deposition (PIAD). From the compact sized Ortus 700 up to the largest Ortus 1500 our ORTUS coater portfolio can be configurated with a variety of options needed to produce high density IAD under a stable environment.

Our self-developed fully automated optical monitoring system, OCP Singlewave and OCP Broadband, enable real-time optimization of optical coating processes and designs and provide automation of complex filters coatings at highest accuracy and repeatability.

To be used in

Sensors

Optical systems for objectives

Microscopes

Telescopes

Laser optics

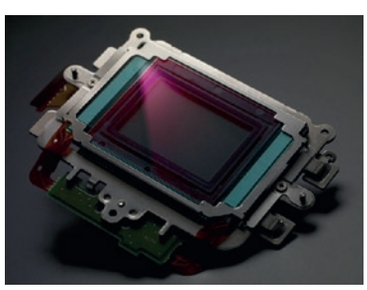
R&D

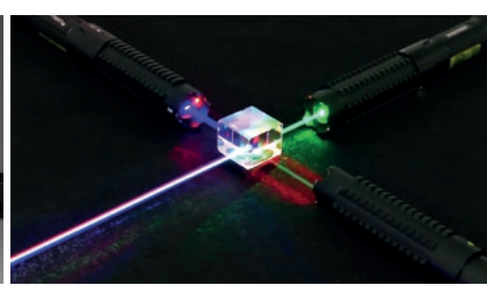
Coatings applications

Visible and infrared optics

Lasers

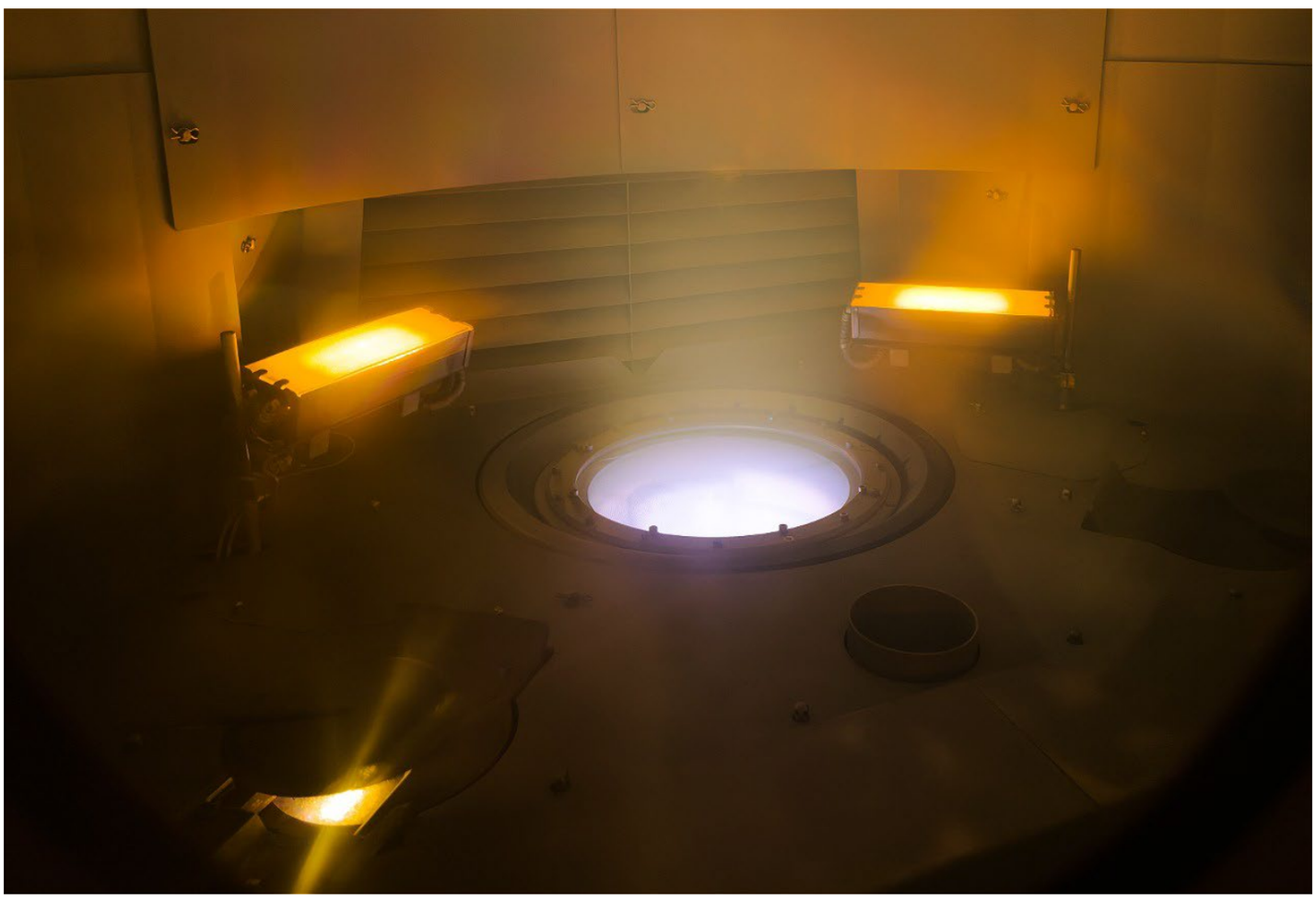
Customized application





Technical data

System		Size	Loading cap. of 1" for reff.	Thickness U% for all loading area	Max single substrate size
Ortus 700	Dome type	620 mm	228	±1.5%	220 mm
	Planetary	3 x 270 mm	132	±1%	250 mm
Ortus 900	Dome type	800 mm	356	±2%	300 mm
	Planetary	4 x 327 mm	284	±1%	327 mm
Ortus 1100	Dome type	995 mm	576	±2%	380 mm
	Planetary	4 x 387 mm	416	±1%	387 mm
Ortus 1500	Dome type	1390 mm	1075	±2%	580 mm
	Planetary	4 x 590 mm	850	±1%	590 mm



LIDIZ

ION BEAM SPUTTERING (IBS) SYSTEM FOR ULTRA-HIGH PRECISION OPTICS

LIDIZ IBS series are the result and embodiment of 50 years' experience in Ion Beam Sputtering (IBS) technology. IBS technology is well known for its extremely low-loss optical coatings. LIDIZ IBS coaters perform depositions of optical coatings for a wide range of applications.

LIDIZ is equipped with a RF grid ion beam sputtering source and an additional RF grid ion beam source for pre-cleaning, surface activation, sputter assist including RF neutralizers.

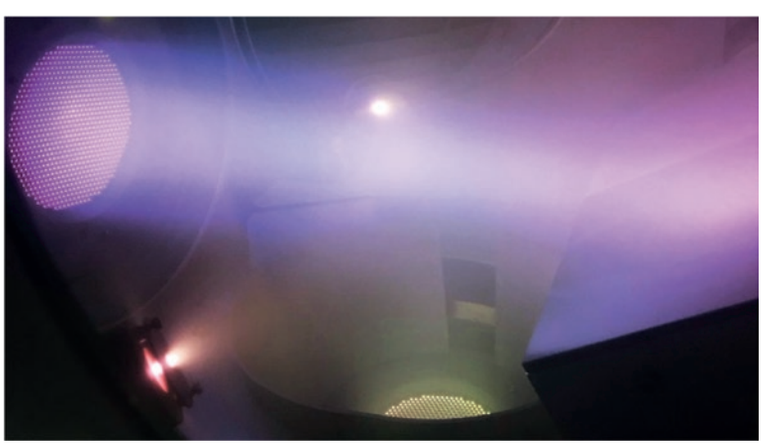
Main features

High-power RF Grid ion beam sputtering

RF Grid ion beam assist source with RF neutralizer

Automatic optical monitoring system OCP

Multiple choice of substrate holders



Film quality

High purity

Low scatter and absorption loss

High laser damage threshold

Low surface roughness

High density

Excellent adhesion

Low humidity sensitivity

Technical data

System	LIDIZ 700	LIDIZ 1100
Installation area	3540×1840×2000 mm (LxWxH)	3490×2730×2460 mm (LxWxH)
Weight	3500 kg	4500 kg
Sputtering source	RF Grid IBS with RF neutralizer	
Assistance source	RF Grid IBS with RF neutralizer	
Substrate holder and coating area	Single disk Ø320 mm (area 700 cm^2) Planetary 4 x Ø210 mm (area 1256 cm^2) Planetary 3 x Ø320 mm (area 2100 cm^2)	Single disk Ø440 mm (area 1520 cm^2) Planetary 7 x Ø210 mm (area 2200 cm^2) Planetary 4 x Ø350 mm (area 3840 cm^2) Other planetary by request
Load lock	For single disk substrate holder	
Coating uniformity	≤±0.25% for planetary 4 x Ø210 mm ≤±0.5% for single disk Ø320 mm ≤±0.5% for planetary 3 x Ø320 mm	≤±0.25% planetary 7 x Ø210 mm ≤±0.5% planetary 4 x Ø350 mm ≤±0.5% for single disk Ø440 mm
Process control system	Automatic optical monitoring system OCP: OCP BroadBand, OCP SingleWave, OCP Duo (BB and SW 2 in 1)	
Substrate materials	glass ceramics, chromatic and achromatic optical glass, quartz, potassium fluoride, sapphire, etc.	
Number of targets, max.	4 pcs.	
Sputtering targets	Ti, Ta, Nb, Zr, Hf, Al, Si, SiO_2 etc.	
Coating rate	Up to 5 Å/sec (depends on the material)	Up to 4 Å/sec (depends on the material)
Substrate temperature during the process (without heater)	<100°C	
Substrate heating system temperature	<250°C	
Substrate heating uniformity	±2°C	
Ultimate pressure	5E-5 Pa	
Time to reach ultimate pressure	12 h	
Base pressure	8E-4 Pa	
Time to reach base pressure	30 min (without load lock) ≤8 min (with load lock)	40 min
Pumping system	Dry mechanical pump & cryogenic pump Turbo molecular pump is optional	

DIAMANTA

VACUUM SYSTEM WITH PECVD TECHNOLOGY

DIAMANTA vacuum system is engineered for the deposition of wear resistant diamond-like carbon (DLC) coatings on silicon and germanium substrates. The DLC coatings are anti-reflective in the IR range in 3-5 μm and 7-14 μm. The deposition method is the chemical deposition of carbon from the gas phase stimulated by plasma of ion beam source.

Coatings applications

IR optic products to be used in the extreme operating conditions, where AR coating is used in combination with DLC coating on the front side of external lenses

Infrared optics

Customized application

To be used in

Night vision devices

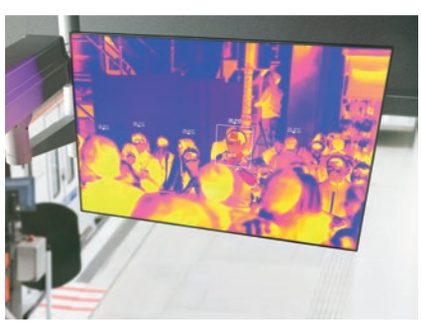
Thermal imagers

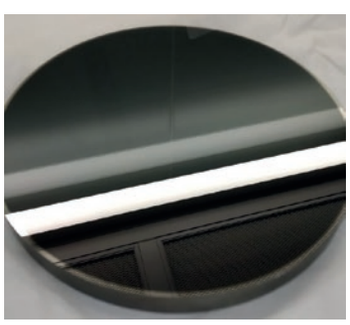
Sensors

Pyrometers

Optical systems for objectives

R&D





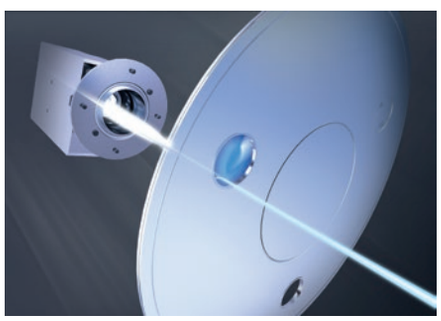
Technical data

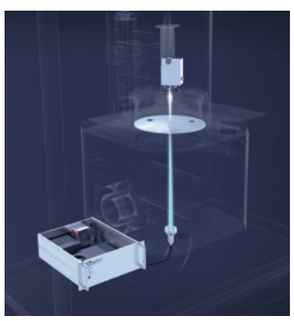
Coating technology	Ion beam PECVD Si and Ge substrates
Deposition area	370x420 mm
Maximum substrate thickness	45 mm
Ultimate pressure in clean chamber, no more than	$4{,}5x10^{-4}$ Pa
Time of ultimate vacuum achievement, no more than	10 h
Time to reach base pressure $3x10^{-3}$ Pa in a clean chamber (from start of high-vacuum pumping and after load-lock gate open)	15 min
Coating thickness uniformity across 330x350 mm^2 area	≤+/-3 %
Weight, maximum	2000 kg
Cycle time of coating deposition for 3-5 μm range	2,5 h
Cycle time of coating deposition for 8-12 μm range	4 h

OCP

ADVANCED OPTICAL MONITORING SYSTEMS

I-Photonics works in the area of precision thin film optical coatings deposition since more than 25 years. The accumulated experience allows us to create optical monitoring systems with unique parameters which help to obtain sophisticated multilayer optical stacks. Our developed monitors are easily to be integrated in hardware and software solutions which provide a fully automatic control over all the types of optical coating deposition for different types of vacuum equipment covering a wide optical range.





Main features

Fully automation of multilayer coatings for high precision optics

Optimization of optical design during coating process to avoid errors (for OCP Broadband only)

System software allows to load coating designs from various coating design programs

Integration to coater monitoring system

High spectral resolution

Various monitor types

Full service support

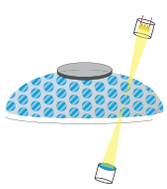
Product family

OCP Broadband
Deposition process monitoring via broadband spectrum measurements and analysis

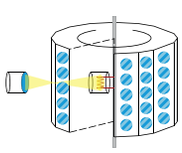
OCP Singlewave
Deposition process monitoring at the selected wavelengths

Monitor types

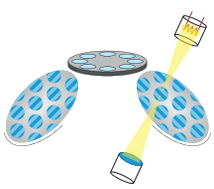
Direct monitor



Intermittent transmission for dome substrate holder

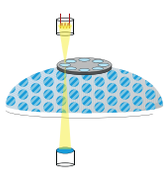


Intermittent transmission for drum substrate holder

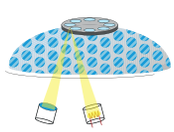


Intermittent transmission for planetary substrate holder

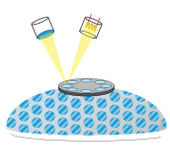
Indirect monitor



Continuous transmission for dome substrate holder



Continuous reflection for dome substrate holder



Continuous backside reflection for dome substrate holder

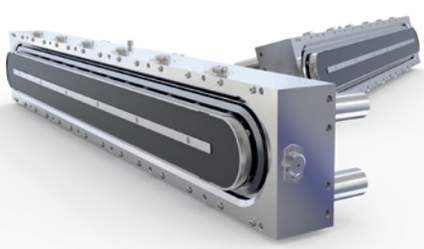
ION SOURCES

RF-plasma sources/gridded ion beam sources

RF plasma sources initiate and sustain dense, low energetic plasmas or mono-energetic ions with high homogeneity in low pressure coaters.

End-hall gridless ion beam sources

End-hall gridless ion beam sources are used in low pressure vacuum systems for assisting the process of films deposition with low-energy ions of inert or reactive gases. They can be applied in processes of ion beam cleaning, reactive ion beam etching, coatings synthesis from gas phase, etc.

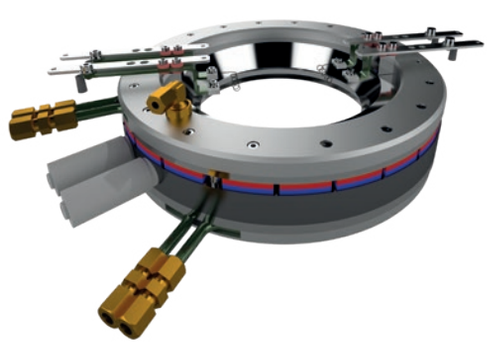


Linear anode layer accelerators

Anode layer accelerators can be used in a variety of vacuum systems (as batch and in-line types) within different technological processes of treating the large-form substrates from 250 mm to 3 m (sometimes more), like cleaning, polishing and activation of the surface, precise ion beam etching, films deposition on the substrate, ion beam assisting while films deposition.

Ring anode layer accelerators

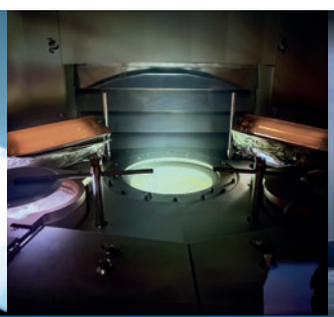
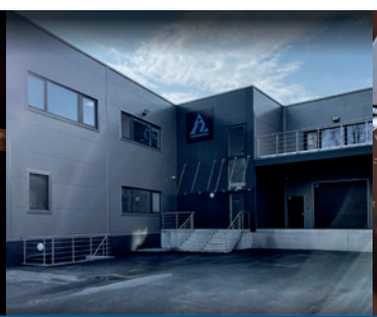
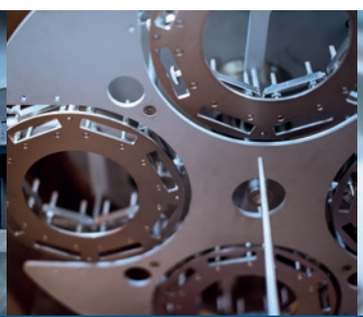
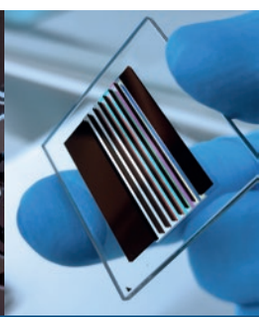
Ring anode layer accelerators applied in a variety of vacuum systems (as batch as in-line types) within different technological processes while working with substrates up to 250 mm, like cleaning, polishing and activation of the surface, precise ion beam etching, films deposition on the substrate, ion beam assisted film depostion.



For notes

For notes

I-PHOTONICS

I-Photonics is one of the world leaders in the development of thin film technologies and the design and manufacture of vacuum coating systems.

Originating from a scientific lab, today the company represents a great team of professionals in the area of physics of surfaces, plasma physics, ion beam source developments and the design and the production of turn key low pressure vacuum coating machines.

Our strength lies in the accurate selection and design of best performing hardware for the specific precision optics coating applications. Our, both active and if needed even pro-active, customer support on coating process questions, requirements and developments bring outstanding value and productivity intelligence to our customer´s production facilities.

We believe that the quality of support to be performed for the customer by training and supervising production specialists and providing production solutions with automatic real time deposition process control is and will be the key for all future precision optical coating business.

We strive to best perform on behalf and this with the highest priority and accuracy.

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