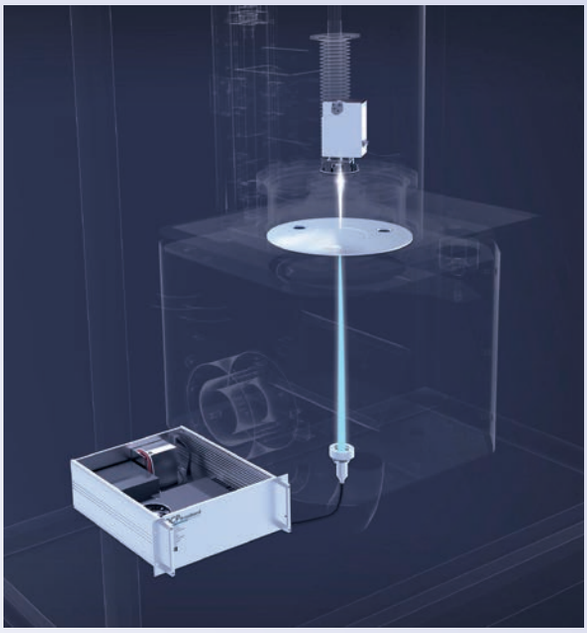
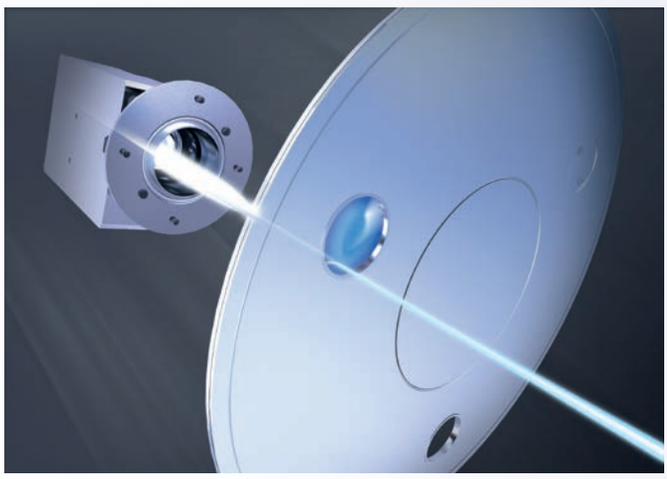
OCP

OPTICAL COATING PROVIDER

Advanced Optical Monitoring Systems

I-Photonics works in the area of precision thin film optical coatings deposition for more than 25 years. Accumulated experience allowed us to create optical monitoring systems with unique parameters which help to obtain sophisticated multilayer optical stacks. Developed monitors are easily integrated hardware and software solution which provides fully automatic control over all the types of optical coatings deposition for different vacuum equipment in wide optical range and with spectral resolution up to 0.5 nm.





PRODUCT FAMILY

OCP BroadBand

Deposition process control via broad band spectrum measurements and analysis

OCP SingleWave

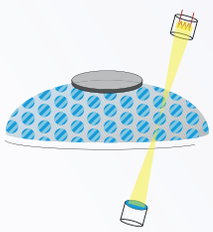
Deposition process control at the predefined wavelength

MAIN FEATURES:

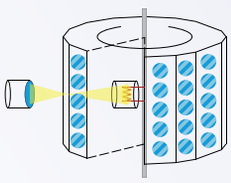
- Fully automation of multilayer coatings for high precision optics
- Optimization of optical design during coating process to avoid errors (for OCP BroadBand only)
- Integration to coater control system
- High spectral resolution
- Various monitor types
- Full service support

MONITOR TYPES:

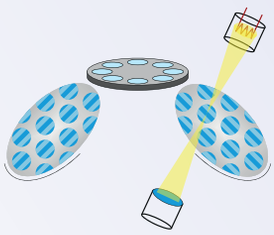
Direct monitor



Intermittent transmission for dome substrate holder

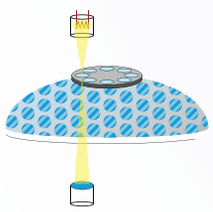


Intermittent transmission for drum substrate holder

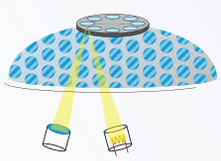


Intermittent transmission for planetary substrate holder

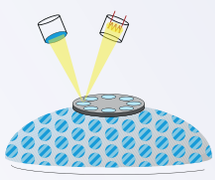
Indirect monitor



Continuous transmission for dome substrate holder



Continuous reflection for dome substrate holder

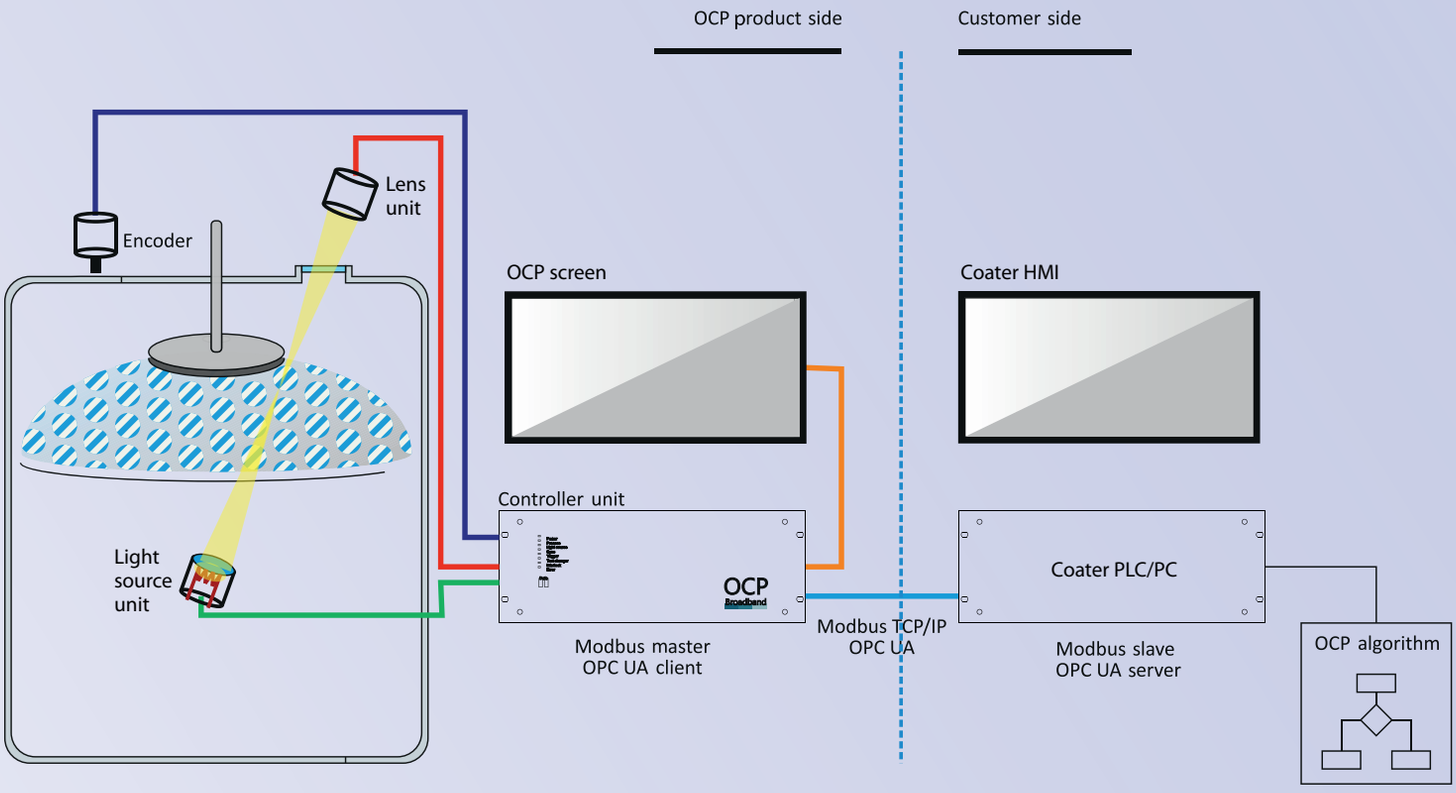


Continuous backside reflection for dome substrate holder

OCP CONFIGURATION CIRCUIT

OCP system is integrated to coater control system to provide fully automation mode with intellectual real-time optimization that controls the current result of coating and in case of deviation from the target recalculates and makes correction to next layers.

*Intellectual real-time optimization is available for OCP BroadBand only.



Supported thin film design software	OptiLayer, IzoSpectra, FilmStar, MS Excel, Essential Macleod,
Data transfer	OPC UA, Modbus TCP/IP

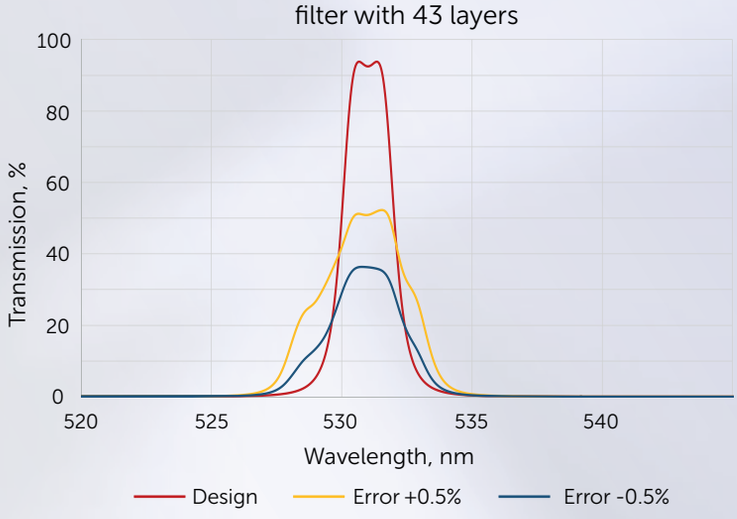
OCP
BroadBand

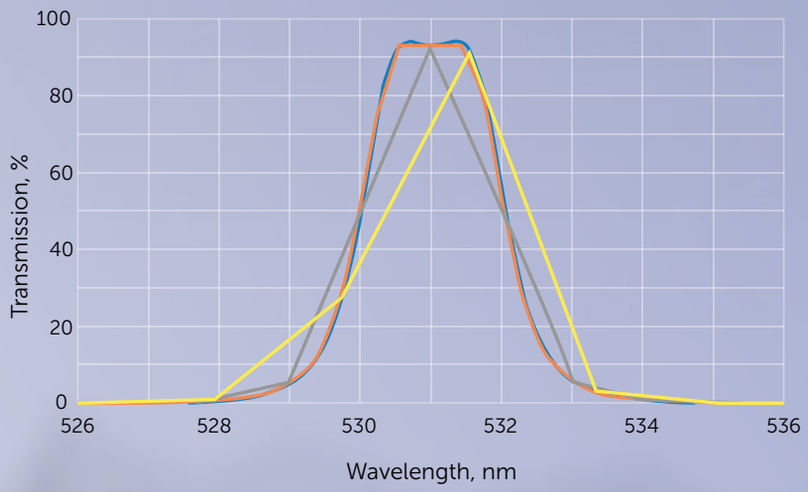
OCP BroadBand provides extended control opportunities for different measurement modes. It supports such modes as transmittance, reflectance and direct monitor on either stationary or rotatable substrate (test glass).

Primary deposition process monitor mode is direct transmission through substrate placed on rotatable substrate holder. Spectrometer measures real coating spectrum throughout the working range after each revolution of substrate holder. Software algorithm analyzes measured spectrum based on the optical design of required coating and computes breakpoint for each layer. Close integration with various PLC and deposition controllers of vacuum equipment makes it possible to realize optical deposition process automatically from the beginning to the end.

System software allows to load coating designs from various coating design programs. Software interface is easy to use and provides full automation of deposition processes. Full automation became possible due to in-situ re-engineering of coating thickness based on layer spectral characteristics and pre-loaded refraction index dispersion. This technique allows to minimize occurring errors.

Calculation of 0.5% layer thickness errors influence on spectral characteristics of 532 nm narrowband filter with 43 layers





Narrow-band spectrum view with different spectrometer resolution

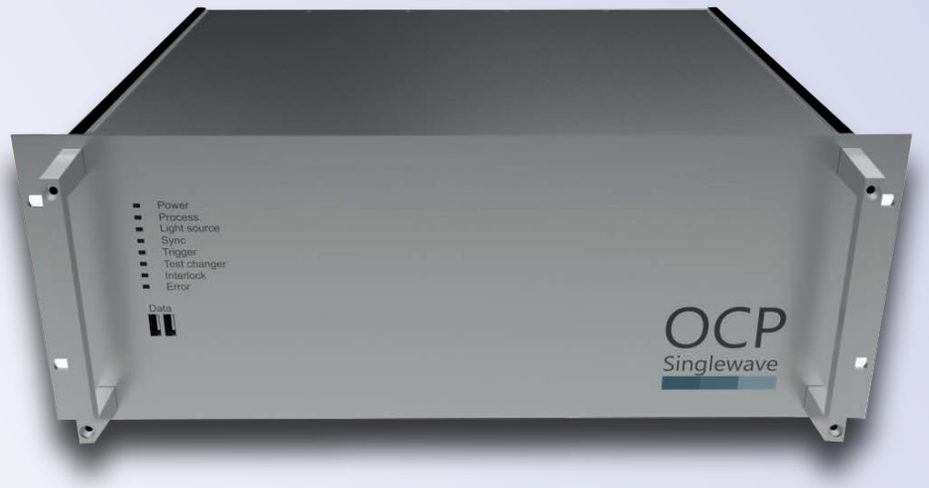
- Resolution 0.1 nm
- Resolution 0.3 nm
- Resolution 0.5 nm
- Resolution 1.0 nm

Depending on sputtering methods and vacuum coaters conception it is impossible to eliminate errors at all. Errors accumulation leads to impossibility of optical design realization. Re-optimization procedure allows to neglect negative errors influence on layers thickness by variation of the residual layer thicknesses and allows to be sure in receiving calculated spectrum after deposition process. High spectral resolution allows to obtain real transmission values and smooth bending of sharp parts of the spectrum that ultimately raises thickness evaluation precision by the software.

TECHNICAL DATA:

Spectral subrange, nm	380-1080	1080-1650	220-380
Spectral resolution, nm	0.5	5.0	0.5
Wavelength accuracy, nm	± 0.2	± 1.0	± 0.2
Wavelength repeatability, nm	± 0.1	± 0.5	± 0.1
Monitor types	Intermittent (direct): transmission continious (indirect): transmission, reflection, backside reflection		
Detector	CMOS (Hamamatsu)		
Light source	DC-stabilized Quartz Tungsten Halogen		Deuterium
Software for thin film design	OptiLayer, IzoSpectra, FilmStar, MS Excel, Essential Macleod		
Data transfer	OPC UA Modbus TCP/IP Other by request		
Test glass changer	8 position test glass changer integrated with 4 position cooled quartz crystal changer		

OCP
SingleWave



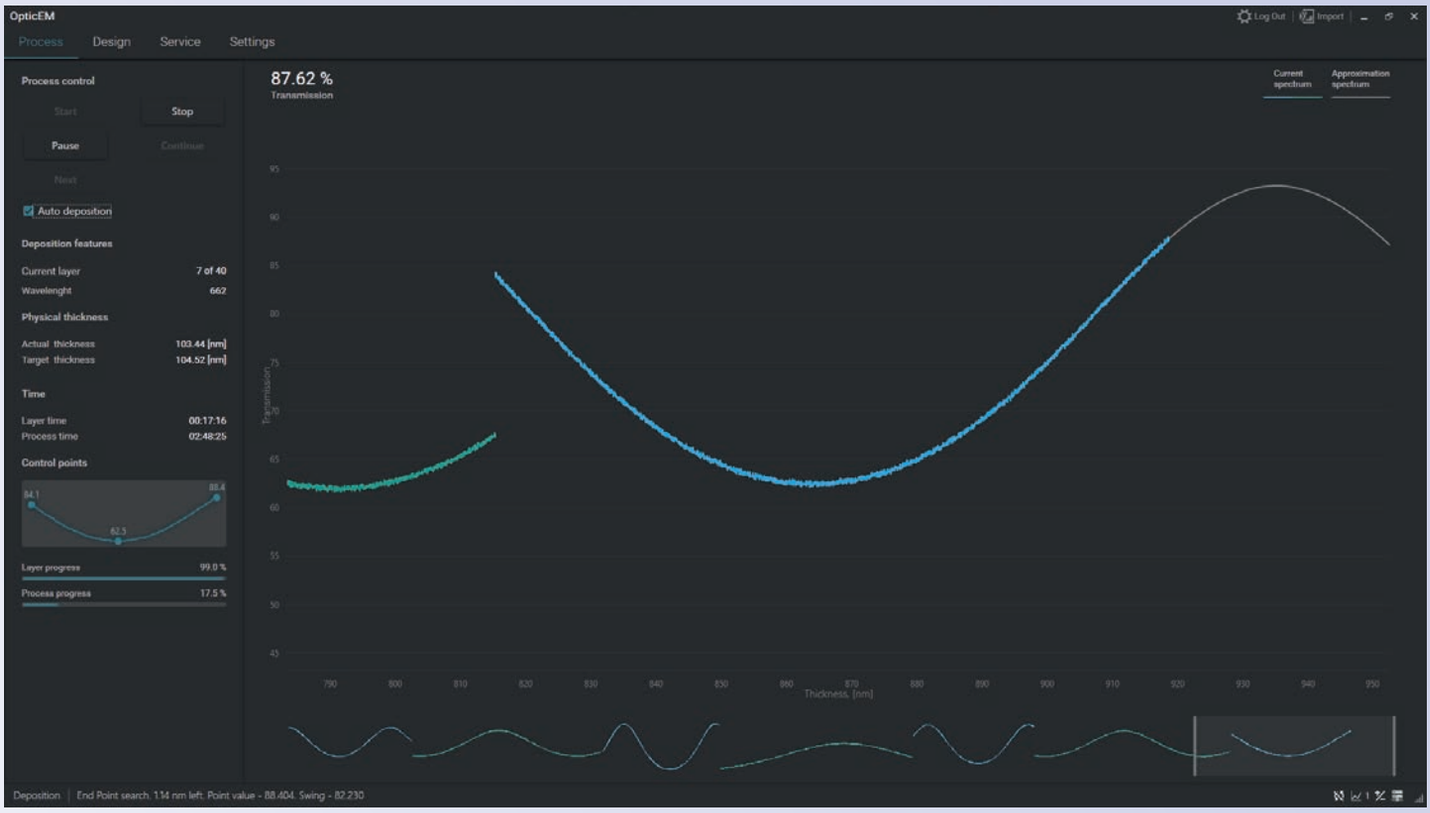
High speed digitizing of the measured data allows to obtain a stable signal even at the minimum measurement times, which makes it possible to monitor the process in equipment with high-speed linear motion of the test glass. Operation with baseline signal calibration avoids any signal changes, not directly connected with the film deposition process on the surface of the object under control. The developed mathematical algorithm allows to approximate measured data with insignificant errors. That makes possible to find stop layer point with hundred of a percent accuracy and send a layer stop signal to the vacuum equipment. This precision allows to carry out deposition process from the beginning to the end automatically. A wide range of options allows you to configure OCP SingleWave in order to satisfy all the requirements of the process.

TECHNICAL DATA:

Spectral subrange, nm	220-380	380-1100	1100-1650	1650-2500
Spectral resolution, nm	0.8	0.8	1.6	3.2
Wavelength accuracy, nm	±0.2	±0.2	±0.4	±0.8
Wavelength repeatability, nm	±0.1	±0.1	±0.2	±0.4
Monitor types	Intermittent (direct): transmission continuous (indirect by test glass): transmission, reflection, backside reflection			
Baseline stability, %	±0.1%/h	±0.1%/h	±0.25%/h	±0.75%/h
Dark noise, %	±0.01@550nm	±0.01@550nm	±0.1@1550nm	±1@2100nm
Stray light, %	0.3@250nm	0.05@550nm	0.1@1550nm	0.1@2100nm
Built-in PC	Yes			
Light source	Deuterium lamp	Halogen lamp (DC-controlled power supply)		
Detector	Si	Si	IGA	IGA
Software for thin film design	OptiLayer, IzoSpectra, FilmStar, MS Excel, Essential Macleod			
Data transfer	OPC UA, Modbus TCP/IP Other by request			
Test glass changer	8 positions test glass changer integrated with 4 position cooled quartz crystal changer			

SOFTWARE AND USER INTERFACE

OCP support the most popular software for optical design creation as Essential Macleod, OptiLayer, TFCalc as well as MS Excel and Text files. Created optical design is uploaded to OCP where it is possible to see coating structure layer by layer.
User friendly interface of OCP software provides all visual information to operate process in automatic or manual mode.



I-Photonics UAB
Parko g. 3, Avizieniai, Vilniaus raj., 14198, Lithuania
Company code: 305907047
VAT number: LT100014457816
E-mail: info@i-photonics.lt
Web:
www.i-photonics.lt
www.i-coatings.lt