

In-Situ Spectroscopic Optical Monitoring/Control System and OES System

Full Spectrum, Real-time Analysis and Control of Reflectance and Transmittance During Thin-Film Deposition Dedicated systems for Large Area Flat - Web Coating - Optical Coating



Multi Point

Single Point

Benefits

- Improve Yields
- Decrease setup time
- Produce more complex and difficult coating structures
- Save coating system time
- •Reduce scrap
- Increase profit

The NVision optical monitoring system is designed for application in the Optical Coating, Web Coating and Large Area Flat substrate markets. Deposition technology specific instruments and software tools allow monitoring and control of coatings in all thin film deposition environments. Deposition technology specific applications built upon standard building blocks of single and multipoint instruments provide market specific tools to allow deposition at peak performance.

Regardless of the market application, the NVision Optical Monitor will allow monitoring of coatings that will reduce cost while increasing the performance of the coating process. Customer specific statistical analysis of a run, a group of runs or even years of data is possible from data stored in the system's data base.

What will it do for me?

	Spectra Capture	
100	~	- 10
80 -		
Intensity 0		Intensity
40 -	/	-
20	/	
0 400	500 600 700	

1		Selected Wavelength = 575	Wavelengths	S Over Time -	Spectromet	er 2	···]
Intensity							
	o 0	1000	2000		4000	 5000	6000

Transmission scan

Trend of one wavelength over time

Applications vs System Compaitblity

In order to reduce deposition cost and increase control of the deposition process this instrument product series is built upon an open SQL data base containing all the run and setup data allowing the user to easily configure the system, run it and access the run data either from the operating computer or from any computer on the network in real time.

The system is capable of measuring the optical properties of deposited films during deposition providing the operator with real time spectrophotometric data of the deposited films. This allows for more accurate layer endpoints in optical coating or much more reliable and traceable coatings on large area substrates. Setup times are reduced by having in situ measurements of optical properties instantly. Because of the excellent long term stability the system is also ideally suited for application in the web coating industry.

	Multi-Point Monitor	Single Point UV / Vis Monitor	^t Single Point IR Monitor
Spectrometers			
UV/Vis HR-200 - 850	yes	yes	no
UV/Vis HR-200 -1100	yes	yes	no
UV/Vis LR-350 -800	yes	yes	no
NIR LR-900-2200	yes	no	yes
Applications			
Flexible Web Applications			
Monitor Transmission	yes	yes	yes
Monitor Reflection	yes	yes	no
Monitor Plasma Emmission	yes	yes	no
Monitor Film Thickness	no	yes	no
Large Area Flat Applicatio	ns		
Monitor Transmission	yes	yes	yes
Monitor Reflection	yes	yes	no
Monitor Plasma Emmission	yes	yes	no
Monitor Film Thickness	no	yes	no
Optical Coating Applicatio	ns		
Monitor Transmission	no	yes	yes
Monitor Reflection	no	yes	yes
Monitor Plasma Emmission	no	yes	no
Monitor Film Thickness	no	yes	no
Cut point control	no	yes	yes

In-Situ Spectroscopic Optical Monitoring System

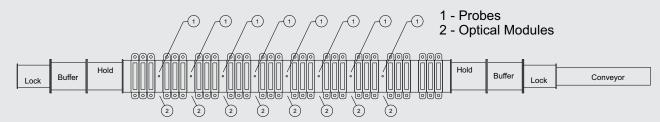
ipecName 1					Name Monitor Name	Contains Spectrometers
Spectrometer Currently Application Sectoral Transmission Setup Integration Time (ms) 5 Scans to Average 12 Calibration Scans to Aver Calibration Scans to Average	Functions	h Calbration kground	Disable Spectrometer Bandpass (9 300 - 700 Direct Resolution Direct (9 5 nm Auto Integration Calculate Integration	✓ Auto Calibration Auto Calibration Parms Start % 200 ∰ End % 200 ∰ Min Bebrasen Cal 1 ∰ % - 100 20 ∰	Monto Name PaskAndSenstNumber Controller Controller 1	Contanto Specthometrin Spechlame 1
Wavelength Setup		Plot nth Weve	Display Trend Color		Controller 1	
Validate and save wavelength entry	550 0 3 <u>λ4</u> 0 0	Graph Displ	Lap		Turn Lamp Off	
MmMax Boundary Disp	Edit Min/Max	Color	Bluminants Ø D65 2 Degrees O D65 10 Degrees C 2 Degrees C 10 Degrees			

Integration	Time (ms)	petromotori		Scan Cou	nt		Auto Calibra	tion Pa	rms
5		Pause	e Scan	217			% - 100	2.0	•
Scans to A	verage	Approximate	e Scan Time (m	is)					
12		60					Minutes Between	1	-
Scale							Calibration	15010	
Horz Min	Hor	z Max		Vert Min	V	ert Max			
200	- 700		-			0000			
380	\$ 780		Reset Horz	0	2	8220	÷ R	leset Ve	ert
380 λ Display	780 Intensity		Reset Horz Color Calco		2	8220	÷ F	Reset Ve	ert
					2	8220	T F	leset Ve	ert
	Intensity	orm Hon if	Color Calco		2	8220	Ŧ	leset Ve	ert
	Intensity	orm Hon if	Color Calco Illuminant:	ulations	2	8220	F	Reset Ve	ert

Master control window controls each spectrometer and displays its tabular data

All the components in the system from spectrometers to digital I/O can be configured from one screen. User defined I/O and spectrometer details are configured from the related tabs.

Typical Coating System Single Channel / Zone Monitor System



Features:

Broadband spectrographic measurement allows the system to display wavelength versus transmission or reflection through the entire visible spectrum many times a second. Trending of calculated color and specific wavelengths allow the operator to control his process with ease. Set points can be configured to notify the operator when the controlled process is moving out of control so corrections can be made prior to loss of product. These same spectrographic measurements reduce the setup time of complex coatings by allowing laboratory quality measurements to be made in the coater during the setup process.

Dual and single beam modes are available for long production runs of many hours.

Automatic calibration and background functions are available for use between measurements of product.

Large easy to view displays provide at a glance understanding of where your process is going. Displays as large as 48" LCD's are available.

Full integration to your coating system is provided with all necessary hardware, fixtures and digital interfaces. Process support is available from our experienced engineers and scientists to ensure maximum system effectiveness.

Specifications

	j IJajõugī Aếcć AĐDĆ	UV/Vis HR-200 -1100	UV/Vis I R-350 -800	NIR LR-900-2200
	Asymmetrical	Asymmetrical	Asymmetrical	Asymmetrical
Spectrometer	crossed Czerny-	crossed Czerny-	crossed Czerny-	crossed Czerny-
Type:	Turner	Turner	Turner	Turner
	42 mm input; 68 mm	42 mm input; 68 mm		
Focal Length:	output	output		
Entrance				
Aperture:	25 μm wide slit	25 μm wide slit	25 μm wide slit	25 μm wide slit
	600 L / mm, Blazed	600 L / mm, Blazed at		
Grating:	at 300 nm	300 nm		100 L / mm
Wavelength				
Range:	200-850 nm	200-1100 nm	400-800 nm	900-2200 nm
Pixel				
Resolution:	0.164 nm / pixel	0.246 nm / pixel	0.439 nm / pixel	2.54 nm / pixel
Optical				
Resolution:	<1.5 nm FWHM	<1.5 nm FWHM	<1.5 nm FWHM	<4.6 nm FWHM
	<0.05% at 600 nm;	<0.05% at 600 nm;		
Stray light:	0.10% at 435 nm	0.10% at 435 nm	n/a	n/a
Signal to noise				>10,000:1 @ 100 ms
ratio:	300:1 (at full signal)	300:1 (at full signal)	1500:1 (at full signal)	integration
Integration				
time:	3 ms - 10 seconds	3 ms - 10 seconds	10µs - 10 seconds	1 ms -2 seconds
A/D resolution:	16 bit	16 bit	14 bit	16 bit
	1300:1 for a single	1300:1 for a single	4600:1 for a single	1000:1 for a single
Dynamic range:	acquisition	acquisition	acquisition	acquisition
	3648 element CCD	3648 element CCD	1024 pixel linear	512 pixel InGaAs
Detector:	array	array	CMOS	linear array
Pixel size:	8 μm x 200 μm	8 μm x 200 μm	7.8 x 125 μm	25 μm x 250 μm
	<.1% F.S. / Hour	<.1% F.S. / Hour	<.1% F.S. / Hour	
Typical Stability:	Single Beam	Single Beam	Single Beam	
Computer to				
OM:	100 meters per leg	100 meters per leg	100 meters per leg	10 meters per leg
Power	100 – 240 VAC, 50-60	100 – 240 VAC, 50-60	100 – 240 VAC, 50-60	100–240 VAC, 50-60
Requirements:	Hz	Hz	Hz	Hz
	Thermally stabilized	Thermally stabilized	Thermally stabilized	Thermally stabilized
	low voltage QH	low voltage QH	low voltage QH	low voltage QH
Light source:	lamp.	lamp.	lamp.	lamp