LASER SYSTEMS & SPECTRAL PRODUCTS

SOLAR Laser Systems • 4 Stebenev lane, Minsk, 220024 BELARUS
fax:.+375(17)2019-940 • phone: +375(17)2019-590 • info@solarls.eu • www.solarls.eu

NanoFlex scanning probe optical confocal microscope data sheet:

№	Characteristic	Quantity value
1	**Functional characteristics**	
1.1	**SPM Spatial Resolution (XY lateral)**	<1 nm
1.2	**SPM Spatial Resolution (Z vertical)**	<0.1 nm
1.3	**SPM Field of View (scanning range), probe scanning**	100x100 μm
1.4	**SPM Field of view (scanning range), sample scanning**	150x150 μm
1.5	**Dynamic range of SPM along the Z axis**	15 μm
1.6	**Residual nonlinearity of the image**	<0.03%
1.7	**Optical spatial resolution in the mode of confocal microscope**	~2/3 λ
1.8	**Field of scanning in the confocal microscope mode**	150x150 μm
1.9	**Dynamic range of the optical image signal**	≥10000
1.10	**Spectral resolution**	
	Grating with 200 lines/ mm	1.45 nm
	Grating with 600 lines / mm	0.45 nm
	Grating with 1200 lines / mm	0.22 nm
1.11	**Spectral range**	
	Grating with 200 lines / mm	330 - 1300 nm
	Grating with 600 lines/ mm	400 - 1200 nm
	Grating with 1200 lines / mm	400 - 870 nm
1.12	**Optical transmission at the operating spectral range in the detection channel, not less than**	≥ 60%
1.13	**S/N ratio at the peak of luminescence spectra** *(for the luminescence signal of the dye with a quantum efficiency not less than 50% at the concentration of 10^{-5} mol / liter and the shift of luminescence line maximum relative to the excitation line maximum not less than 5 nm).*	≥100
1.14	**S/N ratio at the peak of Raman spectra** *(for the Raman signal from the oscillator strength of the benzene molecule at frequency of 607 cm^{-1} and frequency shift not less than 200 cm^{-1})*	≥100000
2	**Scanning Probe Microscope unit**	
2.1	**SPM head**	
2.1.1	Built-in flat XYZ scanner (XYZ stage)	
2.1.1.1	Dynamic range of XYZ scanning / positioning	100x100x15 μm
2.1.1.2	Resonant frequencies of the XY scale	1 kHz
2.1.1.3	Resonant frequencies of the Z scale	7 kHz
2.1.1.4	Residual nonlinearity	≤0.03%
2.1.2	Sensors	
2.1.2.1	Sensor type	Capacitive

2.1.2.2	Method of capacitance measuring	TDC (time to digital convertors)
2.1.2.3	Digital output for a feedback system	RS 485
2.1.2.4	Digital output port for reading data from position sensors by an external device in the digital format	SPI or RS 485.
2.1.3	"Rough supply" (Probe supply to the sample)	
2.1.3.1	Minimal step	1 µm
2.1.3.2	Implementation of the "rough supply"	Stepper motors
2.1.3.3	Number of stepper motors	3
2.2	**Scanning stage**	
2.2.1	Built-in flat XY scanner (XY stage)	
2.2.1.1	Dynamic range of XY scanning / positioning	150x150 µm
2.2.1.2	Resonant frequencies	1 kHz
2.2.1.3	Residual nonlinearity	≤0.03%.
2.2.2	Sensors	
2.2.2.1	Sensor type	Capacitive
2.2.2.2	Bit capacity of the built-in TDC (time-to-digital converter)	24 bit
2.2.3	Unit for "rough" positioning of the sample with dynamic range	5x5 mm
3	**Controller**	
3.1	**General characteristics**	
3.1.1	CPU	32 bit; RISC
3.1.2	PC Interface	USB 2.0
3.1.3	Other interfaces	RS 232, RS485, SYNC I/O
3.2	**High-voltage outlets**	
3.2.1	Voltage	-10..150 V
3.2.2	Noise	< 5 ppm.
3.2.3	Number of channels	3 or 6
3.2.4	Resolution of DAC (digital-analog converters)	18 bit
3.3	**Step motors control unit**	
3.3.1	Number of channels	4/8/12
3.3.2	Power supply	24V, 3A
3.3.3	Microstepping mode support	1/1, ½, ¼, 1/16 step
3.4	**Lock-in amplifier**	
3.4.1	Number of channels	2
3.4.2	Preamplifier gain	1-100
3.4.3	Input voltage range	±10 V
3.4.4	ADC resolution	16 bit
3.4.5	Frequency range of input signals	0-1,2 MHz
3.4.6	Frequency range of the master oscillator	10 Hz – 3 MHz
3.4.7	Output voltage range	10 mV-10 V
3.4.8	Master oscillator stability	< 5 ppm
3.4.9	Additional ADC / DAC channels	
3.4.9.1	Number of input channels	2
3.4.9.2	Voltage Range	±10 V
3.4.9.3	ADC resolution	16 bit
3.4.9.4	Number of output channels	2
3.49.5	Voltage range	±10 V

3.4.9.6	DAC resolution	16 bit
4	**Optical unit**	
4.1	**Pre-monochromator to filter spurious modes of a multi-line laser source**	
4.1.1	Spectral range	400..1064 nm
4.1.2	Spectral resolution	< 1 nm at 488-514 nm
4.1.3	Opening width of the Crossed Output slit	0…1 mm
4.1.4	Accuracy of Crossed Output slit opening	±1 μm
4.2	**Motorized neutral filter to adjust the power of the input laser**	
4.2.1	Tuning range of the optical density	0…4
4.2.2	Number of gradations	256
4.3	**Beam expander / collimator unit**	
4.3.1	Input beam diameter	1 mm
4.3.2	Tuning range of the output beam	3..15 mm
4.4	**Signal photomultiplier unit**	
4.4.1	Positioning	Three-coordinate motorized objective lens with a focal plane
4.4.2	Focal plane	At the crossed slit
4.4.3	Resolution of laser confocal images	~2.3 λ
4.4.4	Photomultiplier control	Fully programmable with a corresponding option in the software
4.5	**Reference photomultiplier unit**	
4.5.1	Tool for normalizing the input laser radiation in relation to the measured useful signals	Photomultiplier
4.5.2	Normalization	Programmed
4.6	**Confocal unit for selecting modes of the excitation laser**	
4.6.1	Filter type	Boundary filters
4.6.2	Half-width of the filter transmission curve recession	3 nm
4.6.3	Angle of incidence onto the filters	5-16°
4.6.4	Ability to measure the line of the secondary spectrum	Up to 80 cm^{-1} from the excitation line
4.6.5	Dichroic splitters of excitation radiation	50/50
4.6.6	Angle of incidence onto dichroic splitters	45°
4.6.7	Ability to measure the line of the secondary spectrum	Up to 5 cm^{-1} from the excitation line
4.7	**Objective**	Three-axis motorized focusing objective
4.8	**Monochromator unit**	
4.8.1	Focal distance	F=284 mm
4.8.2	Spectral range	200-1100 nm
4.8.3	Grating 1	1:1 (mirror)
4.8.4	Grating 2	200 lines / mm (500 nm blaze)
4.8.5	Grating 3	600 lines / mm (600 nm blaze)
4.8.6	Grating 4	1200 lines / mm (600 nm blaze)
4.8.7	Range of the crossed entrance slit	1x1 mm
4.8.8	Accuracy of the crossed entrance slit	1 μm
4.8.9	Output slit range	1 mm
4.8.10	Output slit accuracy	1 μm

4.8.11	Control	All-around automation
4.8.12	Interface	USB 2.0
4.9	**Periscope unit**	
4.9.1	Integration with upright microscope	possible
4.9.2	Integration with inverted microscope	possible
4.10	**CCD**	
4.10.1	Cooling	Buit-in Peltier element
4.10.2	Minimum cooling temperature	-10°C (-90°C optional)
4.10.3	Dark current	2 counts / sec per pixel
4.10.4	Quantum efficiency	95% over the entire spectral range
4.10.5	Spectral range	190-1000 nm
4.10.6	Number of pixels	1024x256
4.10.7	Synchronization	Synchronization Input
4.10.8	Power supply	+5 V
4.10.9	Maximum dissipation power	5 W
4.10.10	Digital Interface	USB 2.0
4.11	**Excitation source**	
4.11.1	Wavelength of excitation radiation	488 nm
4.11.2	Power	10 mW
4.11.3	Type	Single-mode TEM00
4.12	**Vibration protection**	
4.12.1	Type of vibration protection	Passive
4.12.2	Implementation of the vibration protection system	Optical plate
4.12.3	Dimensions of the optical plate, WxDxH	900x1800x200 mm
4.12.4	Cell thread diameter	M6
4.12.5	Cell step	25 mm
5	**Optical microscope**	
5.1	**Type, manufacturer and specifications of the microscope**	Optionally, in accordance with the terms of the specification, either upright or inverted microscope is set
5.2	**Inverted microscope in the basic set**	
5.2.1	Microscope model	Olympus IX71
5.2.2	Microscope type	Inverted
5.2.3	Illumination	
5.2.3.1	Illuminator	Transmitted light illuminator by Keller
5.2.3.2	Lamp	Halogen
5.2.3.3	Lamp voltage	12 V
5.2.3.4	Power	100 W
5.2.4	Focus	
5.2.4.1	Rough adjustment	9 mm stroke
5.2.4.2	Fine adjustment	1 μm step
5.2.5	Turret head	
5.2.5.1	Number of slots	6
5.2.6	Wide-field binocular	F.N. 22 with a built-in centering eyepiece
5.2.7	Condenser	

5.2.7.1	Type	Universal
5.2.7.2	N.A.	0,55
5.2.7.3	W.D.	23,3 mm
5.2.8	Built-in magnification control	1x / 1,6x
5.2.9	Light path selection	2-step switch
5.3	**Upright microscope in the basic set**	
5.3.1	Microscope model	Nikon Eclipse FN1
5.3.2	Microscope type	Upright
5.3.3	Illumination	
5.3.3.1	Illuminator	Lamp unit FN-LH with pre-centering
5.3.3.2	Lamp	Halogen
5.3.3.3	Lamp voltage	12 V
5.3.3.4	Power	100 W
5.3.4	Focus	
5.3.4.1	Rough adjustment	9 mm stroke
5.3.4.2	Fine adjustment	1 µm step
5.3.5	Turret head	
5.3.6	Wide-field binocular	10x, F.N.: 22, 25
5.2.7	Condenser	
5.2.7.1	Type	Universal, revolving type
5.2.7.2	N.A.	0,78
5.2.7.3	W.D.	13 mm
6	**Software and work station**	
6.1	**Main modules (options)**	
6.1.1	SPM units	SPM modules for both scanning devices, dynamic selection of the scan field, number of points
6.1.2	Options of sensor setup and control	Option of setup and control of all the system's sensors: capacitive displacement sensors, scanning head deflectometer
6.1.3	Option of system units support	Software support for all the optical and electronic units of the system
6.2	**Spectral options**	
6.2.1	Possibility of simultaneous collection of spectral and topographical characteristics	Implemented
6.2.2	Spatial scan combined with a record of the entire spectrum with CCD matrix	Complete
6.2.3	Number of points in the spectrum	1024
6.2.4	Number of points in the scanned image	300x300
6.2.5	Range of integration of a spectrum part in the scanning process	Dynamically tunable
6.2.6	Palette referred to a specific part of the spectrum	Dynamic
6.2.7	Record of collected data	A separate file
6.2.8	Possibility of data conversion to other formats	GRAMS, Gwyddion.
6.3	**Operating system**	
6.3.1	Linux	Optional

6.3.2	Windows XP/Vista/7	Basic configuration
6.3.3	Mac OS	Optional
6.4	**Minimum PC configuration**	
6.4.1	CPU	Min 2 GHz
6.4.2	RAM	512 GB
6.4.3	HDD	200 GB
6.4.4	Monitors	2 monitors 20"
7	**Accessories**	
7.1	**Calibration gratings**	
7.1.1	towards Z, X axes	1 pcs
7.1.2	towards Z, X, Y axes	1 pcs
7.2	**Kantilevers**	
7.2.1	of the contact mode	20 pcs
7.2.2	of the non-contact mode	20 pcs