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 microspectrometer 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	Field of view of SPM (scanning range) when scanning probe	100x100 μm
1.4	Field of view of SPM (scanning range) when scanning the sample	150x150 μm
1.5	Dynamic range of SPM to Z	15 μm
1.6	Residual nonlinearity of the image	<0.03%
1.7	Optical spatial resolution in the mode of a confocal microscope	~0.3 λ
1.8	Field of view (scanning range) when confocal mode	150x150 μm
1.9	Dynamic range of the signal optical imaging	≥10000
1.10	Spectral resolution	
	Grating 200 lines/ mm	1.45 nm
	Grating 600 lines / mm	0.45 nm
	Grating 1200 lines / mm	0.22 nm
1.11	Spectral range	
	Grating 200 lines / mm	330 - 1300 nm
	Grating 600 lines/ mm	400 - 1200 nm
	Grating 1200 lines / mm	400 - 870 nm
1.12	Optical transmission device at the wavelengths of the spectral range in the channel detecting no less than	≥ 60%
1.13	Ratio "signal / noise" at the peak of the luminescence spectra *(for the luminescence signal of the dye with a quantum yield of not less than 50% at a concentration of 10.5 mol / liter and the shift of the maximum of the luminescence line relative to the maximum excitation lines not less than 5 nm).*	≥100
1.14	Ratio "signal / noise" at the peak of the Raman spectra *(for the Raman signal from the oscillator strength of the benzene molecule at a frequency of 607 cm^{-1} and the frequency shift of 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 scanning / positioning XYZ	100x100x15 μm
2.1.1.2	Resonant frequencies of XY	1 kHz
2.1.1.3	Resonant frequencies of Z	7 kHz
2.1.1.4	Residual nonlinearity	≤0.03%

2.1.2	Sensors	
2.1.2.1	Sensors type	Capacitance sensor
2.1.2.2	Method of measuring the capacitance	TDC (time to digital convertors)
2.1.2.3	Digital output for a system of digital feedback	RS 485
2.1.2.4	Digital output port in the format for reading data from sensors of an external device in a digital format	SPI or RS 485.
2.1.3	Supply of the probe to the sample ("rough supply")	
2.1.3.1	Minimal step	1 μm
2.1.3.2	Implementation of "rough supply"	Stepper motor
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 scanning / positioning XY	150x150 μm
2.2.1.2	Resonant frequencies of XY	1 kHz
2.2.1.3	Residual nonlinearity	≤0.03%.
2.2.2	Sensors	
2.2.2.1	Sensors type	Capacitance sensor
2.2.2.2	Bit built-in TDC (time-to-digital converters)	24 bit
2.2.3	Dynamic range of the device "rough" positioning of the sample	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 (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 main oscillator	10 Hz – 3 MHz
3.4.7	Output voltage amplitude	10 mV-10 V
3.4.8	Frequency stability	< 5 ppm
3.4.9	Additional channels ADC / DAC	
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 much of a line laser source	
4.1.1	Spectral range	400..800 nm
4.1.2	Spectral resolution	< 1 nm
4.1.3	Range disclosure crossed output slit	0..1 mm
4.1.4	Accuracy of the disclosure of the output slit crossed	±1 μm
4.2	Motorized neutral filter to adjust the power of the input laser	
4.2.1	Range of adjustment of the optical density	0..4
4.2.2	Number of gradations	256
4.3	Expander / collimator beam unit	
4.3.1	Diameter of the input beam	1 mm
4.3.2	Range of adjustment of the output beam	3..15 mm
4.4	Signal photoelectronic multiplier unit	
4.4.1	Positioning	Three coordinate motorized objective lens with a focal plane
4.4.2	Focal plane	At the intersection of the slit
4.4.3	Resolution of laser confocal images	~0.3 λ
4.4.4	Control photoelectronic multiplier	Fully programmable with a corresponding option in the software
4.5	Reference photomultiplier unit	
4.5.1	Tool normalizing the input laser radiation in relation to the measured useful signal	Photomultiplier
4.5.2	Normalization	Programmed
4.6	Confocal unit selection modes of the exciting laser	
4.6.1	Filter type	Boundary filters
4.6.2	Half-width of the recession curve of the transmission filters	3 nm
4.6.3	Angle of incidence on the filters	5-16°
4.6.4	Ability to measure the line of the secondary spectrum	to 80 cm^{-1} from the line excitation
4.6.5	Dichroic splitters exciting radiation	50/50
4.6.6	Angle of incidence on the dichroic splitters	45°
4.6.7	Ability to measure the line of the secondary spectrum	to 5 cm^{-1} from the line excitation
4.7	Objective	Three-axis motorized focusing objective
4.8	Monochromator unit	
4.8.1	Focal distance	F=260 mm
4.8.2	Spectral range	200-1000 nm
4.8.3	Grating 1	1:1 (mirror)
4.8.4	Grating 2	200 lines / mm (blaze 500 nm)
4.8.5	Grating 3	600 lines / mm (blaze 600 nm)
4.8.6	Grating 4	1200 lines / mm (blaze 600 nm)
4.8.7	Range crossed the entrance slit	1x1 mm
4.8.8	Accuracy crossed the entrance slit	1 μm
4.8.9	Range of the output slit	1 mm
4.8.10	Accuracy of the output slit	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	Implement
4.9.2	Integration with inverted microscope	Implement
4.10	CCD	
4.10.1	Cooling	Buid-in Peltier element
4.10.2	Minimum temperature cooling	-90°C
4.10.3	Black current	2 accounts / sec per pixel
4.10.4	Quantum yield	95% over the entire spectral range
4.10.5	Spectral range	400-1000 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 power scattering	5 W
4.10.10	Digital Interface	USB 2.0
4.11	Excitation source	
4.11.1	Wavelength of the exciting 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 system of vibration protection	Optical plate,
4.12.3	Dimensions of the optical plate, WxDxH	900x1800x200 mm
4.12.4	Thread diameter cell	M6
4.12.5	Step cells	25 mm
5	Optical microscope	
5.1	Type, manufacturer and specifications of the microscope	Optionally, in accordance with the terms of the specification set either upright or inverted microscope
5.2	Inverted microscope in the basic equipment	
5.2.1	Brand of microscope	Olympus IX71
5.2.2	Type of microscope	Inverted
5.2.3	Transmitted light illuminator	
5.2.3.1	Illuminator	The illuminator of the transmitted light by Keller
5.2.3.2	Lamp	Halogen
5.2.3.3	Voltage on the lamp	12 V
5.2.3.4	Power	100 W
5.2.4	Focus	
5.2.4.1	Stroke	9 mm
5.2.4.2	Minimum fine focus graduation	1 µm
5.2.5	Revolving nosepiece	
5.2.5.1	Number	6
5.2.6	High eyepoint	F.N. 22
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 changer	1x / 1,6x
5.2.9	Light path selection	2-step
5.3	Upright microscope in the basic equipment	
5.3.1	Brand of microscope	Nikon Eclipse FN1
5.3.2	Type of microscope	Upright
5.3.3	Light illuminator	
5.3.3.1	Illuminator	Lamp unit FN-LH with pre-centering
5.3.3.2	Lamp	Halogen
5.3.3.3	Voltage on the lamp	12 V
5.3.3.4	Power	100 W
5.3.4	Focus	
5.3.4.1	Stroke	9 mm
5.3.4.2	Minimum fine focus graduation	1 μm
5.3.5	Revolving nosepiece	
5.3.6	High eyepoint	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	The main modules (options)	
6.1.1	SPM units	SPM modules on both scanning device, the dynamic range of the scan, number of points
6.1.2	Options settings and control sensors	Option settings, and control of all the system's sensors: capacitive displacement sensors, deflectometer scanning head
6.1.3	Option support units of the system	Software support for all optical and electronic units of the system
6.2	Spectral options	
6.2.1	Possibility of simultaneous spectral and topographical characteristics	Realized
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	1024
6.2.4	Number of spectrum points in the scanned image	300x300
6.2.5	Range of integration part spectrum in the scanning process	Dynamically reconfigurable
6.2.6	Palette refer to a specific part of the spectrum	Dynamic
6.2.7	Record findings	Separate file
6.2.8	Potential of the received data 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	Forward Z, X	1 pcs
7.1.2	Forward Z, X, Y	1 pcs
7.2	Kantilevers and probes	
7.2.1	contact mode	20 pcs
7.2.2	tapping mode	20 pcs