Certus Light

Entry Level Scanning Probe Microscope

Basic Datasheet

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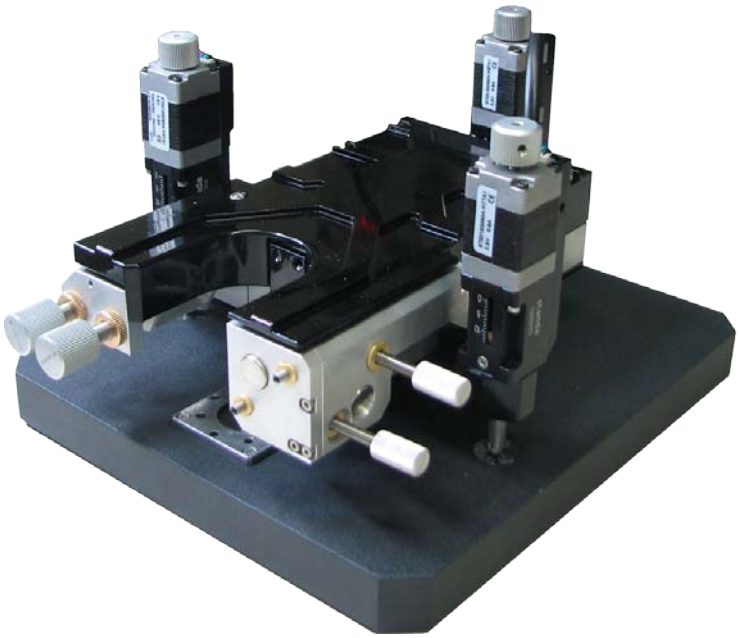


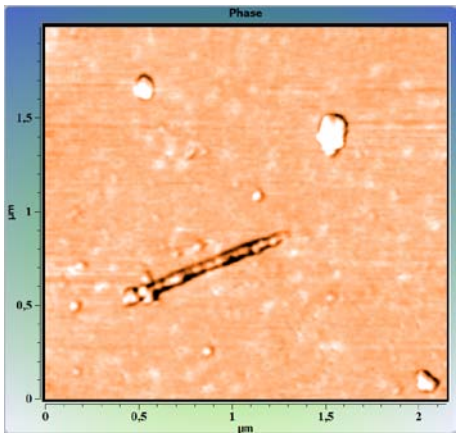
Certus Light system includes:

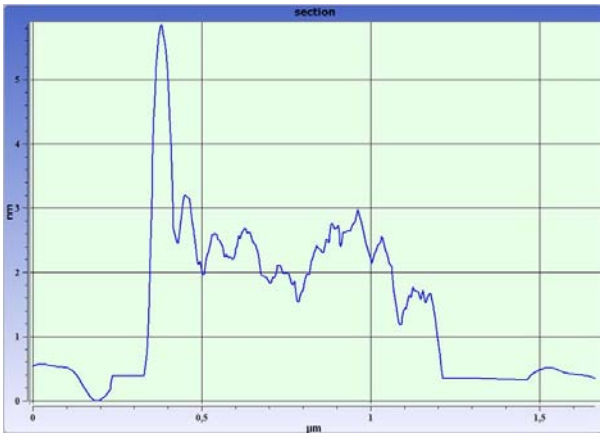
- ► Scanning head Certus;
- ► Digital SPM controller EG-3000;
- ► NSpec software package;
- ► Head approach system with one motorized actuator;
- ► Simple stand for sample and SPM head.

Certus Light features:

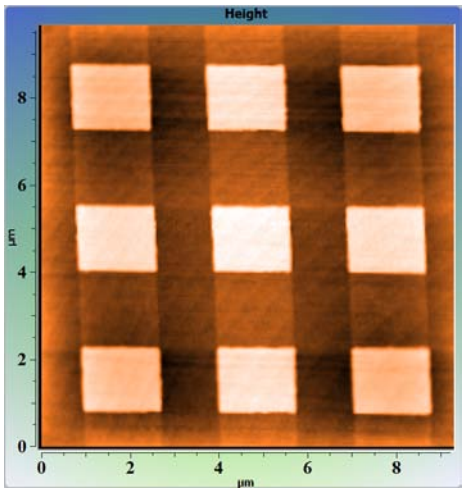
- ► Support of all basic SPM techniques: Atomic Force Microscopy (AFM, contact and non-contact), shear force AFM, force spectroscopy, Scanning Tunneling Microscopy (STM) etc.
- ► Plane-parallel scanning (in X-Y plane) allows imaging with minimal distortion;
- ► Open design of scanning head simplifies observation of the sample and probe at any angle from 0° to 90°;
- ► Certus Light is suitable for installation on the optical microscope (upright or inverted), and can also be modified to Certus Standard, Certus Optic and Centaur.

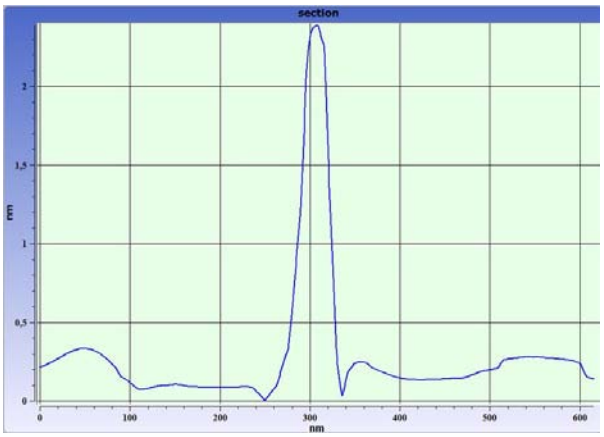
Reasonable price and reliable design of Certus Light make it a valid choice for teaching purposes and time-to-time research tasks. Certus Light could also be interesting for those who have an idea to add SPM functionality to their existing experimental setup.



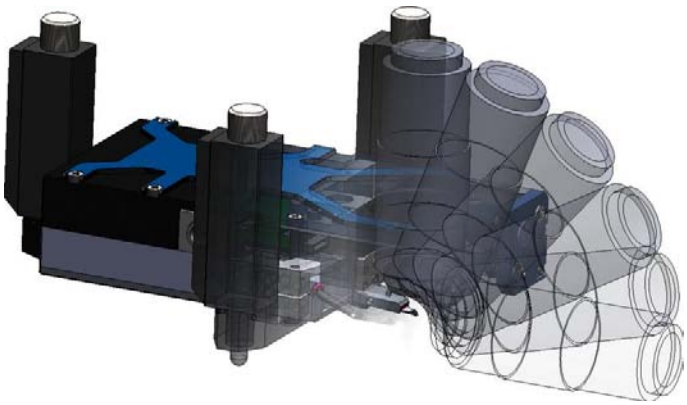


Single-walled nanotube deposited on mica. Image size 2.2x2 mkm. 200x200 points. Phase Image.





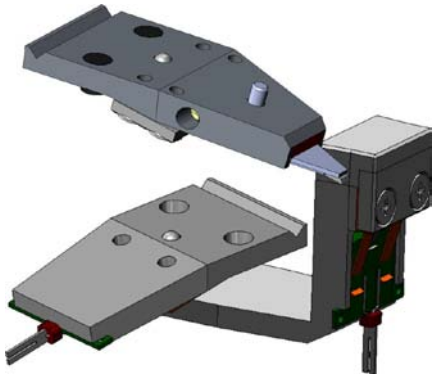
The Si/SiO_2 periodic structure. AFM contact mode. Topography. Image size 9x9 µm, 200x200 points.



Unique “open design” allows you to use external large aperture objectives, illuminators, microscopes condensers, etc. to illuminate the work area, monitor the sample and the probe position, to take stock of radiation in the point of contact of the probe and the sample.

SPM head “Certus” contains several probe holders: for standard cantilevers, for “tuning fork” type SPM probes with horizontal and vertical orientation, for STM tips. Any custom design tip holders may be developed by our R&D team by customer request. One has to change tip holder to change SPM mode.

It is convenient to have several tip holders for use SPM head in cleaned areas, boxes. In this case, only tip holders are being transferred though transition chambers and hatches. You don’t need to move head (SPM microscope).



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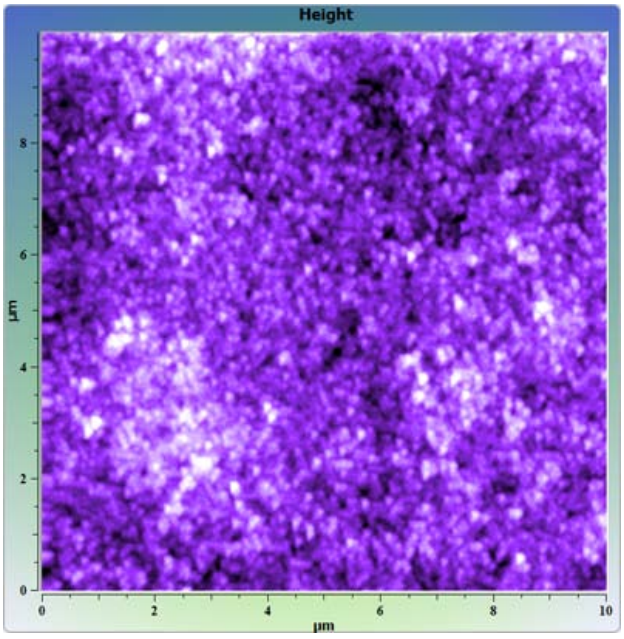
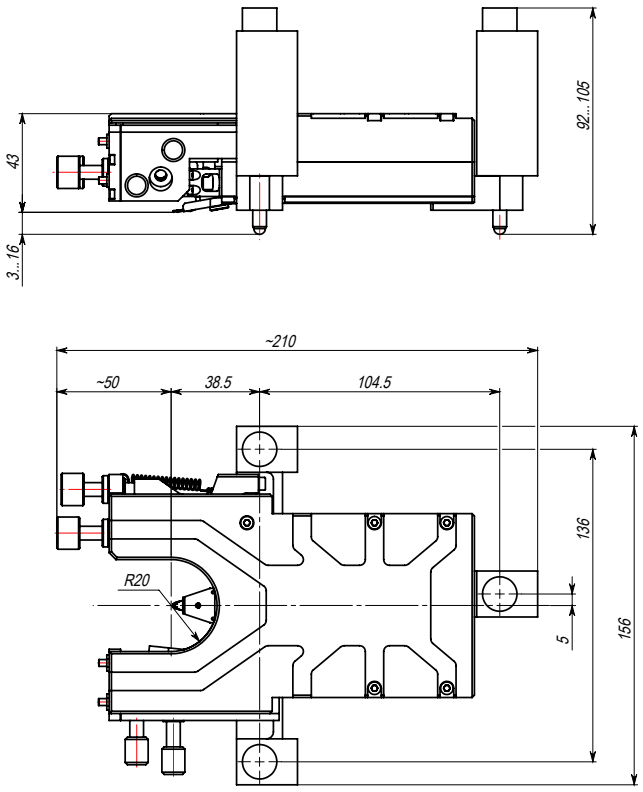
	Main parameters	
1	SPM head	
1.1	Built-in XYZ scanner	
1.1.1	Scanning/positioning XYZ range	100x100x15 µm
1.1.2	XY stage resonant frequency	1 кHz
1.1.3	Z rezonant frequency	7 кHz
1.1.4	SPM resolution (XY lateral)	<1 nm
1.1.5	SPM resolution (Z vertical)	<0.1 nm
1.1.6	Residual nonlinearity	<0.3%
1.2	Displacement sensors	
1.2.1	Sensors type	Capacitance
1.2.2	Measuring principle	Time-to-digital convertion
1.3	Scanning head approach system	
1.3.1	Coarse approach implementation	Stepper motors and precision screws
1.3.2	Stepper motors	1
1.3.3	Precision screws	2
2	Sample positioning	Manual



Latex microspheres deposited on glass surface. Semi-contact mode.
Image size 10x10 µm, 300x300 points. Topography.

Certus Light Head Dimensions:



EG-3000
SPM drive digital controller

►Electronic controller EG-3000 is designed to control SPM or scanning confocal microscope. Controller provides data acquisition from internal sensors and external devices, applies control voltage to scanners piezoelectric actuators. All obtained information is transferring to PC workstation for visualization and processing.

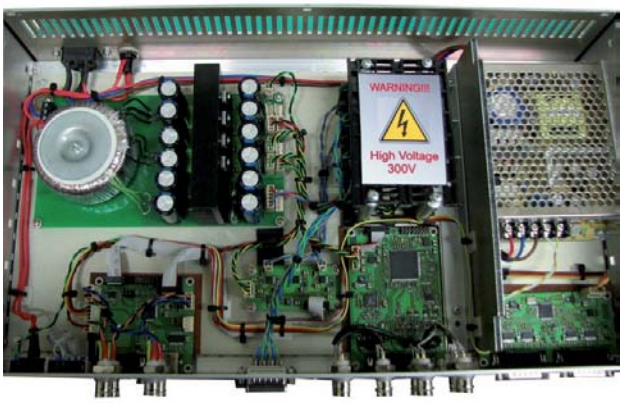
►One of the most important parts of the EG-3000 controller is closed loop feedback system realized by means of 20-bit TDC (Time-to-Digital Convertion) to measure displacement capacitance sensors. Controller is capable to operate 6 channels with feedback simultaneously, which allows to independently scan with tip and sample both.

►Any available system signal can be used for SPM feedback.

►EG-3000 SPM controller contains 2-channel lock-in amplifier to provide resonant SPM techniques, for example non-contact SPM mode. Lock in amplifier includes high stable voltage generator based on digital frequency synthesizer. High speed data processing is implemented using programmable logic (FPGA). This allows to perform high quality lock-in detection up to 1.5 MHz band.

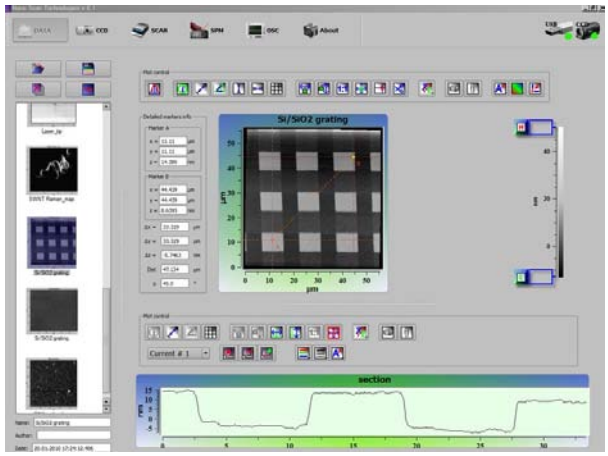
►EG-3000 has multy channel (up to 12) control for stepper motor with micro step option, for example, for adjustment of scanning head (stage).

►Controller has analog inputs and outputs for external equipment connections, synchronization inputs and outputs and USB interface for connection with PC. Controller is managed with NSpec software.



Compatibility:

► Centaur and Centaur HR
► Snotra
► Certus Optic
► Certus Standard
► Certus Light
► Ratis



NSpec – Universal software for all NST devices. Nspec controls all EG-3000 functionality, and all devices connected to controller (SPM Certus, scanning stage Ratis, stepper motors etc.). Software has capability to operate CCD detectors and spectrometers, connected to PC workstation. Multithread core of the program is build with modern crossplatform compiler (GCC4) and interface part based on QT4 toolkit. Software is compatible with all modern versions OS Windows (XP, 2003, Vista, 7). Version for Linux, *BSD or MacOS X available by customer request.

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NSpec features:

- ► Control of SPM head Certus parameters and functions;
- ► Control of scanning with SPM head or Stage;
- ► Full control of Centaur system, including spectrometer and CCD camera;
- ► Stepper motors control;
- ► Basic data processing.

Please note that only basic data processing functions are implemented in NSpec Software. Specialized data processing (such as Gwyddion http://gwyddion.net) software is recommended for more detailed and powerful data processing. Special spectroscopy data processing software (e.g. GRAMS) is recommended for spectral data processing and filtering. NSpec Software has direct data export to ASCII, gwy (gwyddion), spc (GRAMS) formats.

1	Controller	
1.1	General characteristics	
1.1.1	CPU	32 bit; RISC
1.1.2	PC Interface	USB 2.0
1.1.3	Other interfaces	RS 232, RS485, SYNC I/O
1.2	High-voltage outputs	
1.2.1	Voltage	-10..150 V
1.2.2	Noise	< 5 ppm.
1.2.3	Number of channels	3 or 6
1.2.4	Resolution (digital-analog converters)	18 bit
1.3	Stepper motors control unit	
1.3.1	Number of channels	4/8/12
1.3.2	Power supply	24V, 3A
1.3.3	Microstepping mode support	1/1, ½, ¼, 1/16 step
1.4	Lock-in amplifier	
1.4.1	Number of channels	2
1.4.2	Preamplifier gain	1-100
1.4.3	Input voltage range	±10 V
1.4.4	ADC resolution	16 bit
1.4.4	Frequency range of input signals	0-1,2 MHz
1.4.6	Frequency range of main oscillator	10 Hz – 3 MHz
1.4.7	Output voltage amplitude	10 mV-10 V
1.4.8	Frequency stability	< 5 ppm
1.4.9	Additional channels ADC / DAC	
1.4.9.1	Number of input channels	2
1.4.9.2	Voltage Range	±10 V
1.4.9.3	ADC resolution	16 bit
1.4.9.4	Number of output channels	2
1.4.9.5	Voltage range	±10 V
1.4.9.6	DAC resolution	16 bit
2	Minimal PC configuration	
2.1	CPU	Min 2 GHz
2.2	RAM	512 GB
2.3	HDD	200 GB
2.4	Monitors	2 monitors 20``

1	Accessories	
1.1	Lateral calibration of SPM scanners; Detection of lateral and vertical scanner nonlinearity; Detection of angular distortions.	
1.1.1	Grating for 2-D (XY) tip characterization	1 pcs
1.2	Detection of lateral non-linearity, hysteresis, creep, and cross-coupling effects; Determination of the tip aspect ratio; Detection of lateral and vertical scanner nonlinearity; Detection of angular distortions.	
1.2.1	Grating for 3-D (XYZ) tip characterization	1 pcs
1.3	Cantilevers and probes	
1.3.1	Contact mode	20 pcs
1.3.2	Tapping mode	20 pcs
1.4	Other accessories	Optional

NanoScanTechnology
reasoned innovations

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