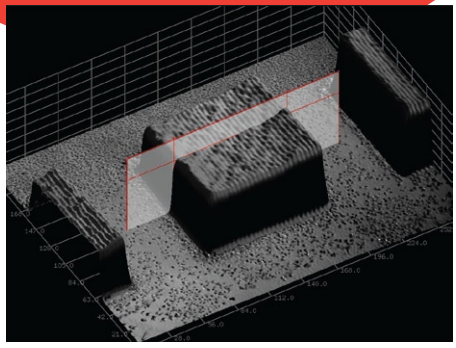
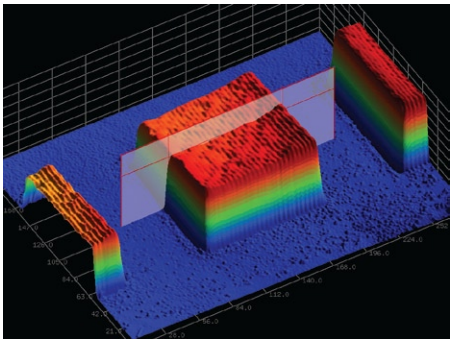
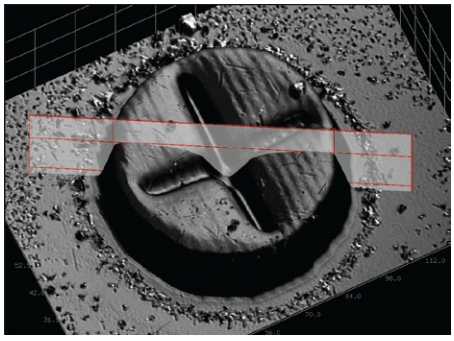
High Speed 3D Confocal Laser Scanning Module

NS-3800







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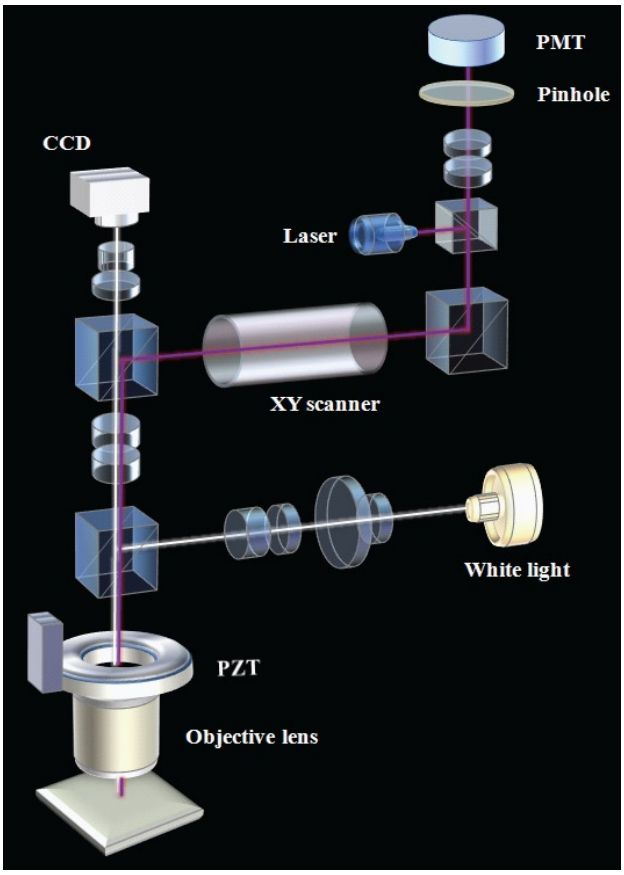
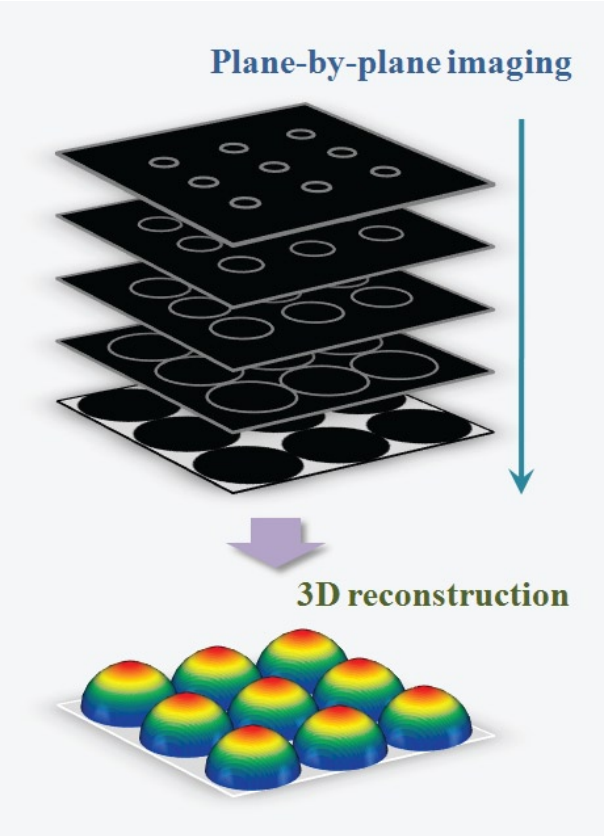
Measurement principle

NS-3800 provides a color CCD image and a laser scanning confocal image at one time.
The height measuring ability comes from the confocal arrangement of a source, a sample, and a detector. By the out-of-focus signal rejection of confocal technique, only the in-focus signal is collected by a photo detector. It gives the optical sectioning ability to confocal microscope NS-3800. The confocal aperture also improves the imaging quality by rejecting the noise outside the focal point.

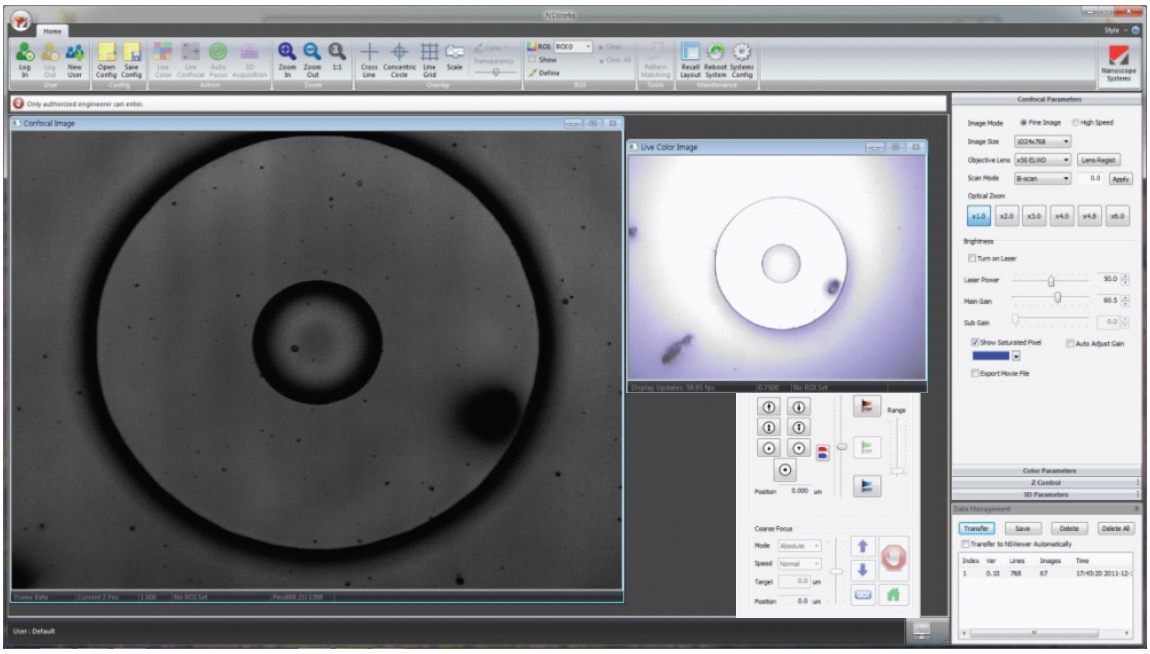




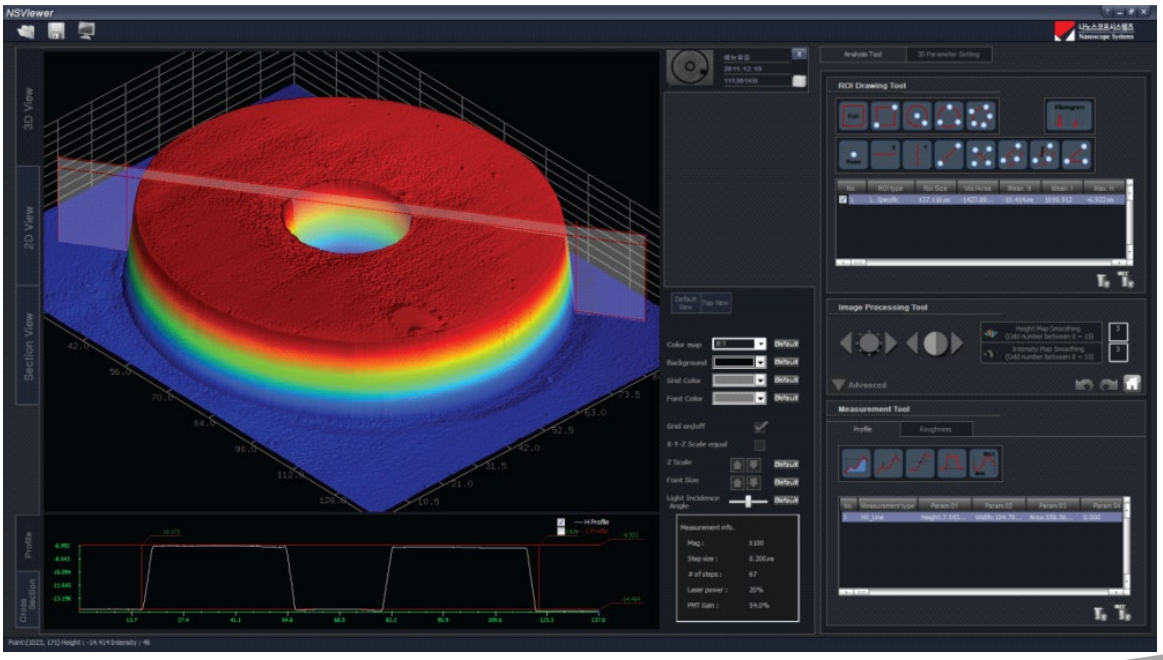
To get the 3D surface profile of the sample, optically sectioned plane-images are collected along the z-axis. As the light intensity becomes its maximum when the sample surface is placed in the focal plane, axial coordinates of sample surface can be directly found.
With a violet laser, a photo-multiplier tube (PMT), and a piezoelectric axial scanner, NS-3800 performs the confocal optical sectioning in a most reliable manner.

User interface software *NSWorks & NSViewer*

- Simple and plain operation even to a first-time user.
- A CCD image, a confocal image, and a main control panel are displayed in one operation window.
- Various adjustable parameters are provided for the advanced application.
- A real-time confocal image provides the immediate feedback from hardware.
- Separated analysis window with the convenient graphical reporting tools.
- The 3D graphical view makes a user easily recognize the microscopic structure of a sample.



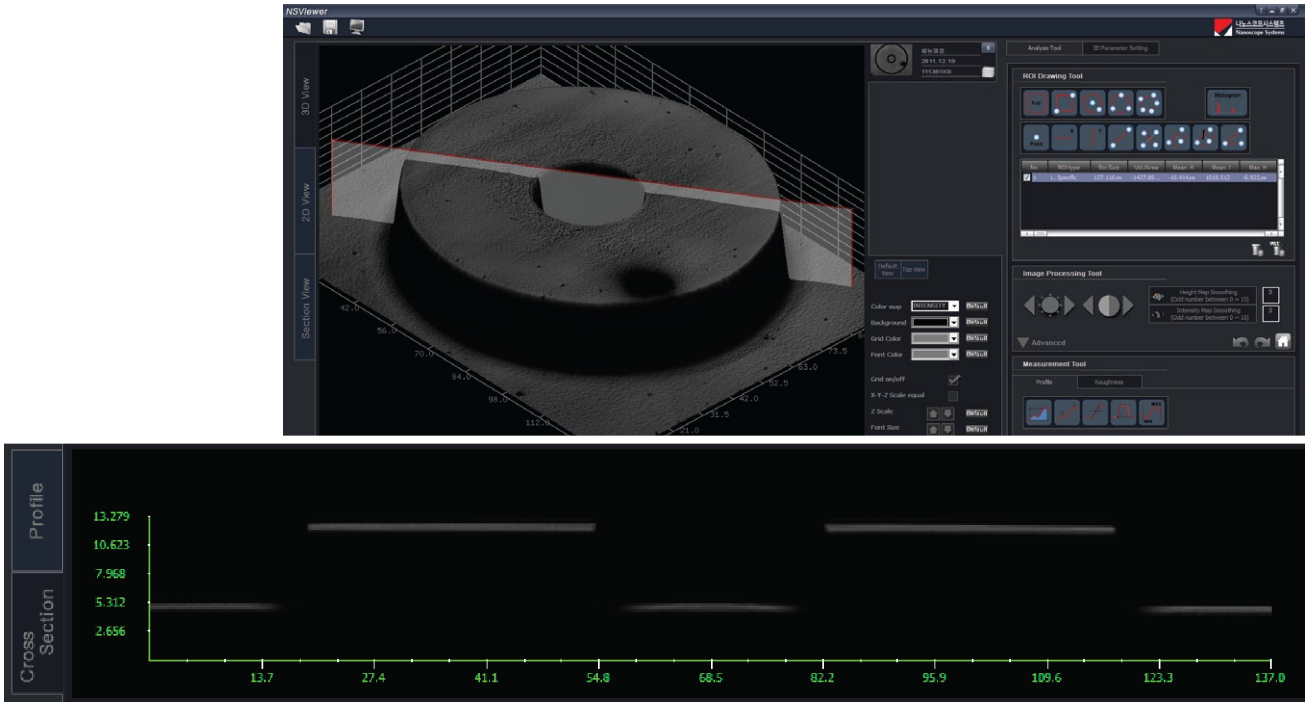
< Operation software *NSWorks* >



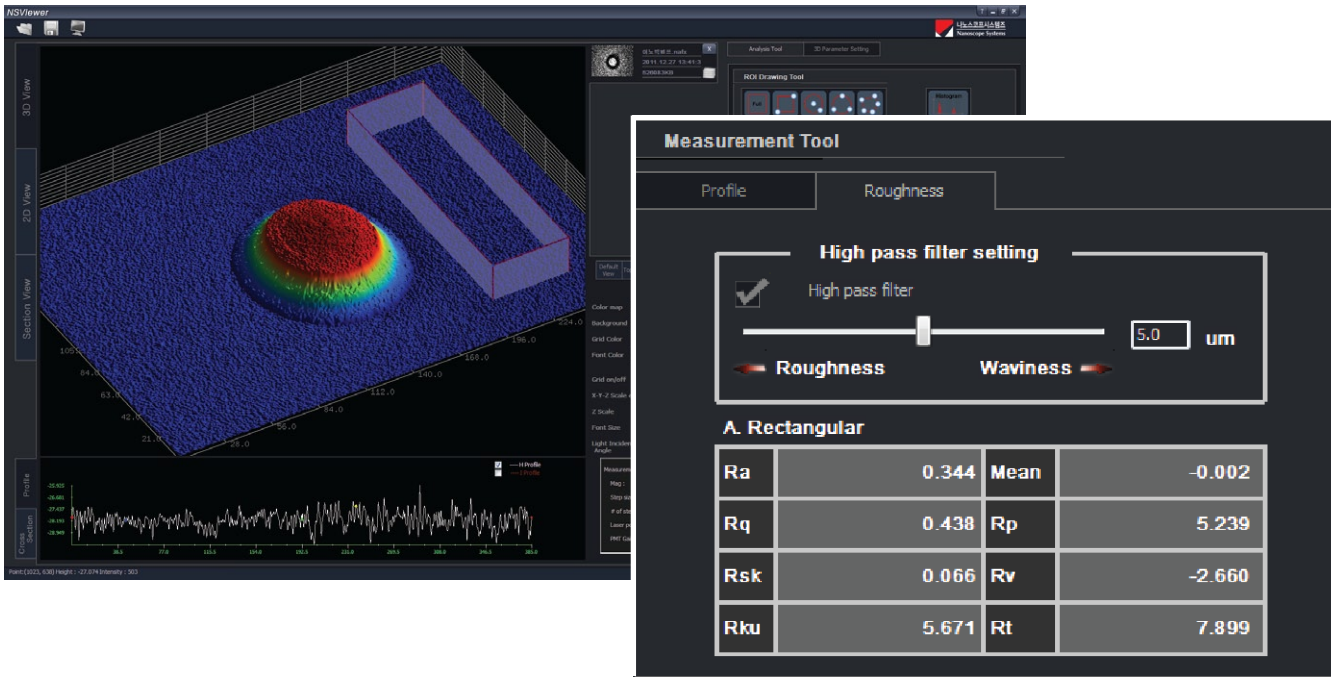
< Analysis software *NSViewer* >

Analysis of measurement

Cross-sectional image is directly converted to the 3D profile data. User can see the raw cross-sectional image in *NSViewer*. The internal structure can be imaged through the semi-transparent surface layers, which is uniquely realized only by confocal microscopy. The analysis of the measured data can be easily performed with various function tools.



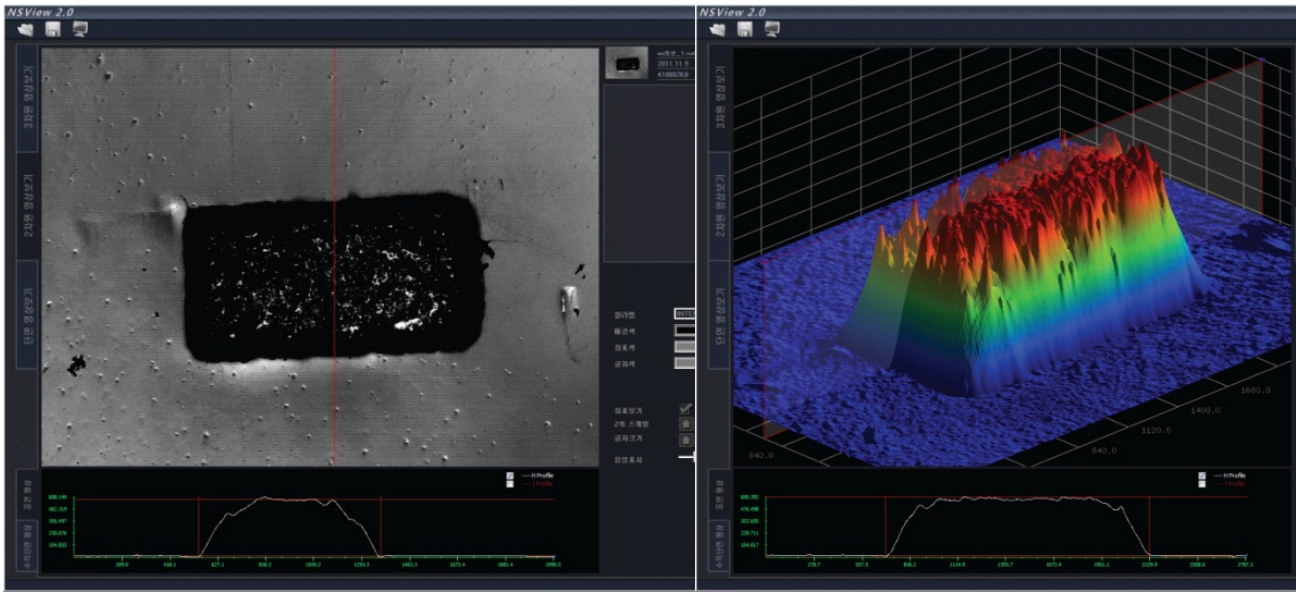
< Cross sectional image display>



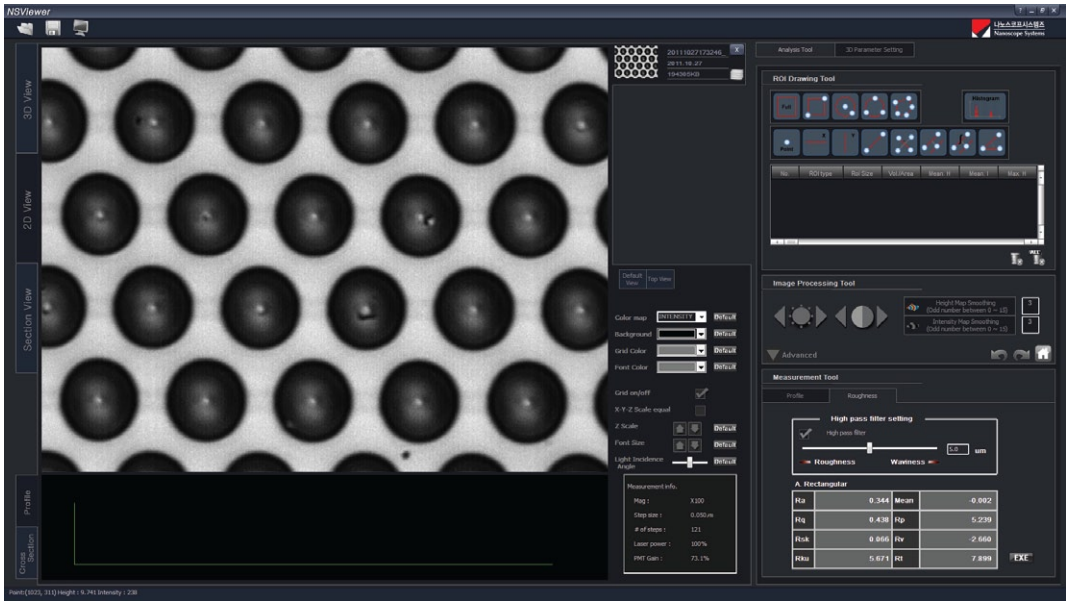
< Roughness measurement for specified ROI (region of interest)>

Most reliable optical 3D measurement

NS-3800 can be used for most kinds of 3D profiling applications. The 3D measurement of NS-3800 is based on the most reliable real-time confocal image definitely superior to the image from other optical technologies.



< Height measurement of the material of very low reflectivity >



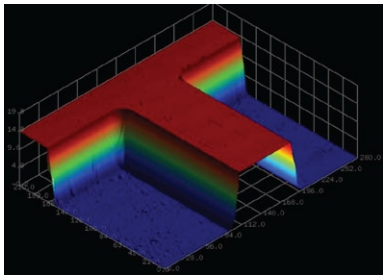
< High contrast image of a patterned sapphire wafer substrate (PSS)>

Application field

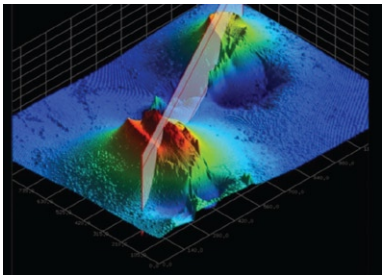
NS-3800 is a promising solution for the measurement of height, width, angle, area, and volume of micro and submicro structures such as

- Semiconductor – IC pattern, bump height, wire loop height, defect inspection, CMP process
- FPD product – Touch panel screen inspection, ITO pattern, LCD column spacer height
- MEMS device – 3D profile of structure, surface roughness, MEMS pattern
- Glass surfaces – Thin film solar cell, solar cell texture, laser pattern
- Material researches – Tooling surface inspection, roughness, crack analysis

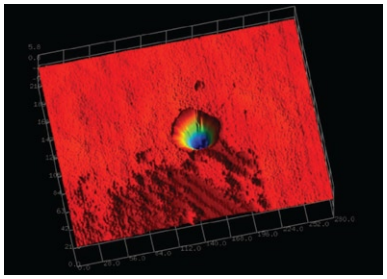
Sample images



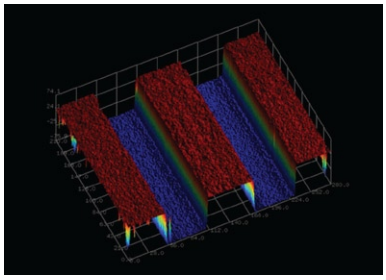
VLSI height standard
FOV : 280 × 210 μm (50×)



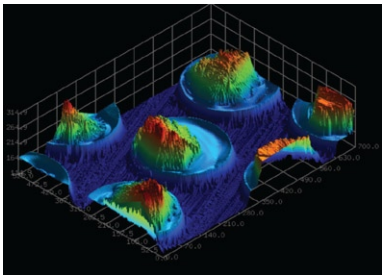
OLED glass protrusion
FOV : 280 × 210 μm (50×)



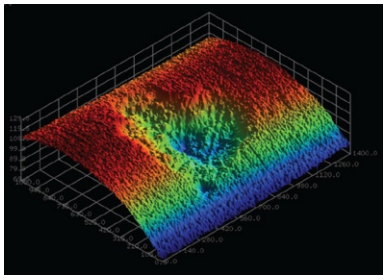
OLED laser processing
FOV : 280 × 210 μm (50×)



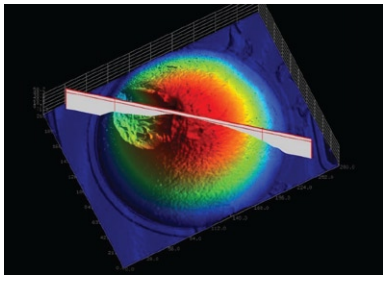
Quartz pattern
FOV : 280 × 210 μm (50×)



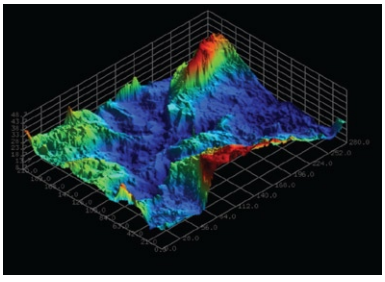
Diamond
FOV : 700 × 525μm (20×)



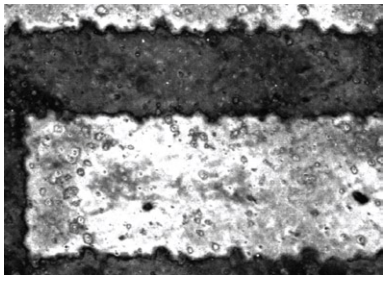
Metal pillar
FOV : 1400 × 1050 μm (10×)



Bump
FOV : 280 × 210 μm (50×)



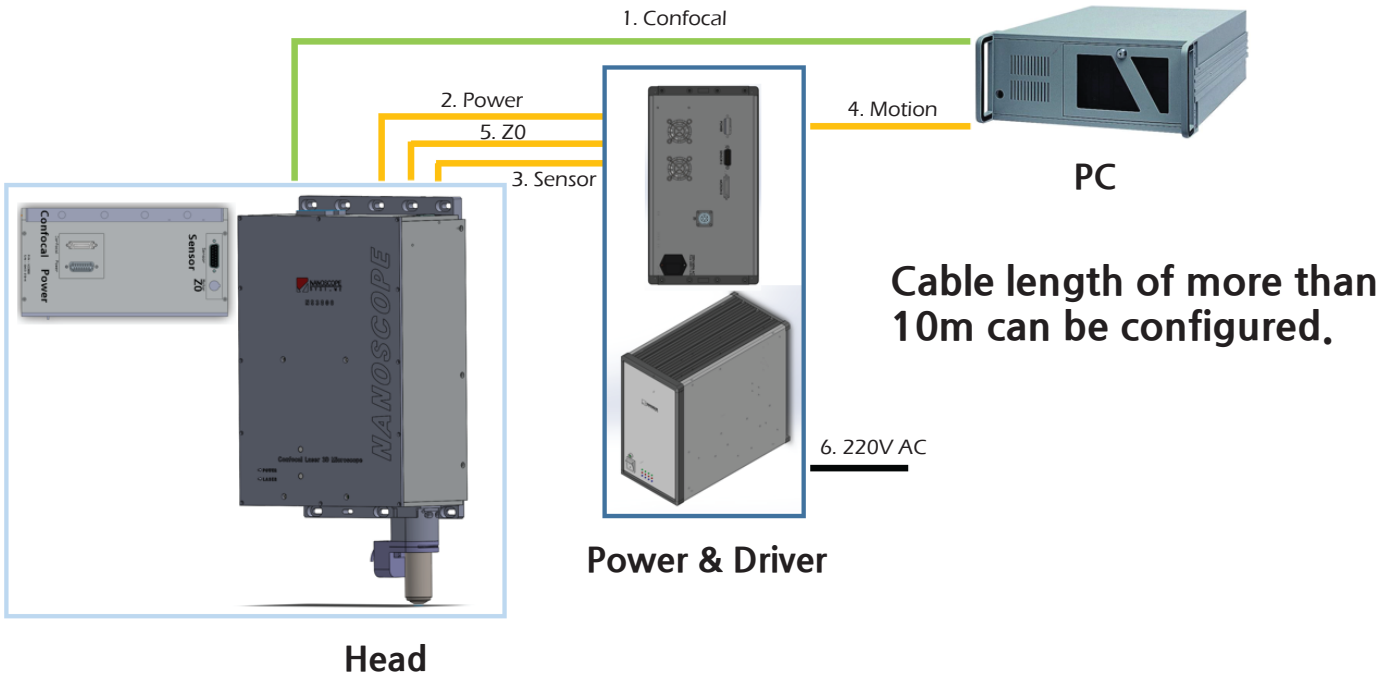
Graphene
FOV : 280 × 210 μm (50×)



ITO pattern
FOV : 1400 × 1050 μm (10×)

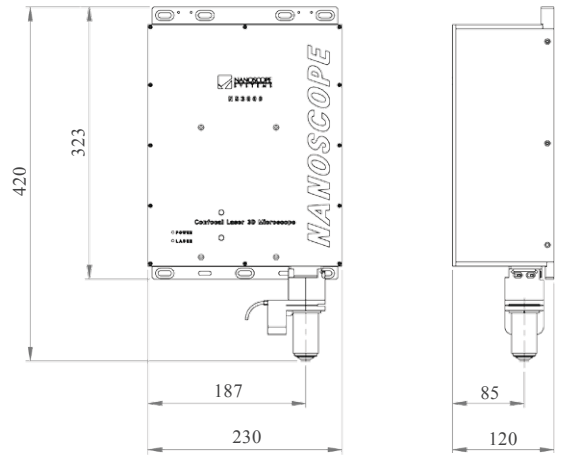
Industrial module application

Easy-to-install, and robust design for industrial equipment provides a good solution to the field applications. Customized design change is available.

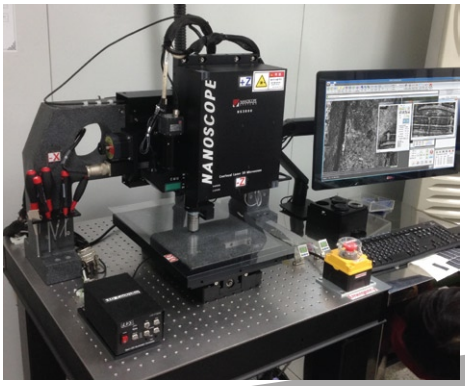


Head dimensions

[Unit : mm]



Installation cases



Specifications

Model	Head module	NS-3800					Remark
	Controller	NS-3500E					
Objective lens magnification		10×	20×	50×	100×	150×	
Observation / Measuring range	Horizontal (H): μm	1400	700	280	140	93	
	Vertical (V): μm	1050	525	210	105	70	
Working distance: mm		16.5	3.1	0.54	0.3	0.2	
Numerical aperture (N.A.)		0.30	0.46	0.80	0.95	0.95	
Optical zoom		×1 to ×6					
Total magnification		178× to 26700×					
Optical system for observation / measurement		Pinhole confocal optical system					
Height measurement	Measuring scan range	*Fine scan : 100 μm (and/or) Long scan : 7 mm* [NS-3800-L]					Note 1
		Fine scan : 400 μm (and/or) Long scan : 10 mm [NS-3800-D]					
		Fine scan : 200 μm (or) Long scan : 10 mm [NS-3800-T]					
	Display resolution	0.001 μm					
	Repeatability σ	0.010 μm					Note 2
Width measurement	Display resolution	0.001 μm					
	Repeatability 3σ	0.02 μm					Note 3
Frame memory	Pixel count	1024×768, 1024×384, 1024×192, 1024×96					
	For confocal image	12 bit					
	For color image	8-bit for RGB each					
	For height measurement	16 bit					
Frame rate	Surface scan	20 Hz to 160 Hz					
	Line scan	~8 kHz					
Auto function		Auto focus					
Laser beam light source for confocal measurement	Wavelength	Violet laser, 405 nm					
	Output	~2 mW					
	Laser Class	Class 3b					
Laser light-receiving element		PMT (photomultiplier tube)					
Data processing unit		Dedicated PC					
Power supply	Power-supply voltage	100 to 240 VAC, 50/60 Hz					
	Current consumption	500 VA max.					
Weight	Microscope	Approx. ~ 8 kg					
	Controller	~8 kg					

Note 1 : *Fine scan* is performed by piezoelectric actuator (PZT).
Dual scan mode by *fine* and *long* scanner is available only for single lens type.
Note 2 : 100 times measurement of standard sample (1μm step height) with 100× / 0.95 objective.
Note 3 : 100 times measurement of standard sample (5μm pitch) with 100× / 0.95 objective.

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