NanoSpec® II

Advanced Tabletop Film Analysis System

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nanometrics specifications NanoSpec® II

Extending the range and performance of the industry proven NanoSpec series, the NanoSpec II introduces a new design with automated sample alignment, fast autofocus and measurement repeatability better than 1Å.

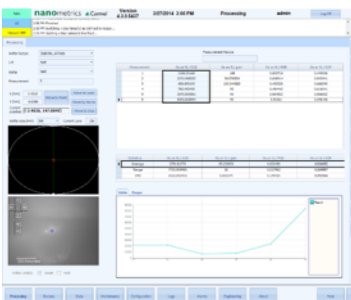
The NanoSpec II SA is incorporated with Nanometrics' powerful re-designed spectroscopic reflectivity analysis software NanoDiffract®, automated wafer handling, image processing for automated pattern alignment and various optical configuration options, making the NanoSpec II automated the most powerful thin film system in its class.

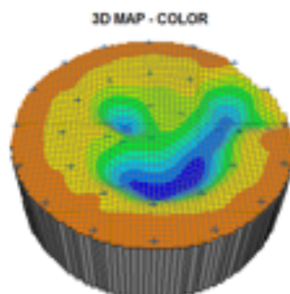
Standard Features

- Wafer Sizes:
  50mm – 200mm
- Stage Control – multiple mouse click options, fully automatic recipe control
- Industrial PC / Windows 7 OS
- Flat panel Monitor
- Operations manual (CD)
- FFT thickness analysis Algorithm
- NanoDiffract® SR analysis with full stack multiple layers and optical constants variation monitoring
- Image Based Processing for automated patterned wafer alignment
- Fully automated wafer handling with up to 3 cassette station

Optional Features

- NanoStandard® film thickness standard wafer
- SECS/GEM automation interface
- NanoDiffract® SR offline analysis station
- Cleanroom operations manual (hard copy)

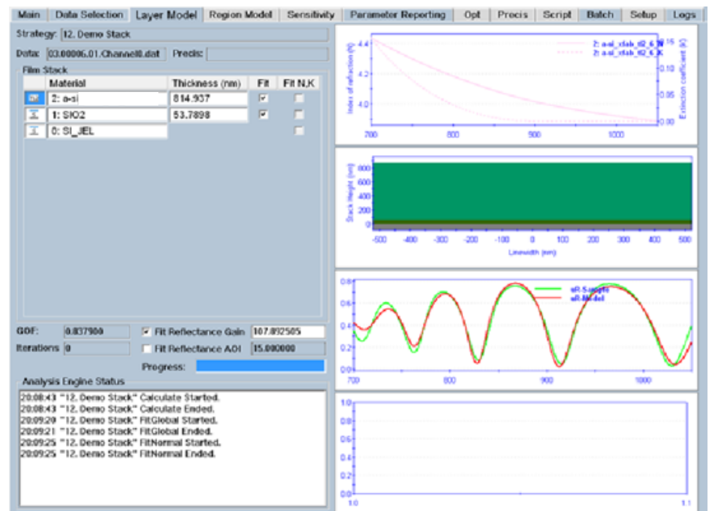




Powerful, yet easy to use

The NanoSpec II is fully compatible to material cards of previous generations of NanoSpec products.

Additionally, many dispersion models created by Woolam® Ellipsometer systems can be imported and



used without conversion.
Powered by NanoDiffract®, the most advanced modeling and analysis engine, even complicated multi layer stack can be easily measured.
An easy to use user interface supporting user level access allows creation of fully automated recipes - including pattern recognition on patterned wafers - as well as manual measurements.

A large variety of optical configuration options make the system providing superior performance on difficult samples such as very thin films (down to 35Å), very thick films (up to 130µm) as well as very rough surfaces.

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	DUV[1]	VIS/NIR[2]	Thick Film[2]
Specification			
Spectral range	200-800nm	450nm-1050nm	500nm-800nm
Thickness range	35Å-20µm	100nm-30µm	500nm-120µm
Spot size options	7µm/14µm	20µm/40µm	20µm/40µm
Dynamic Repeatability/Stability (1-sigma)[4,5,6]			
3.5-10nm	<1.00Å	-	-
10nm-100nm	<0.80Å	-	-
100nm - 500nm	<0.08%	<0.10%	-
500nm - 20µm	<0.05%	<0.10%	<0.05%
20µm - 30µm	-	<0.10%	<0.05%
30µm - 120µm	-	-	<0.05%
Applications			
Typical use cases	NO & ONO, gate oxides, low k & high k, ultra thin films	aSi, pSi, thin EPI, thick oxides	resist, very thick oxides, organic materials
Typical users	R&D, FEOL production	substrate manufacturing, MEMS	Litho, MEMS, bio/organics R&D
Throughput[9]	5pt	9pt	13pt
Typical Throughput	80 wph	55 wph	39 wph

System Matching[8]

Thickness Max. Variation
125 A ±0.5%
1,200 A ±0.2%
10,000 A ±0.2%

Accuracy[7]

±5 Å for 100 – 200 Å
±0.5% for 300 Å – 1 µm
±0.2% for 1µm – 150µm

Reflectance[4]

248 nm ± 0.50% (DUV)
365 nm ± 0.50% (DUV)
633 nm ± 0.50%

1) NanoSpec II standard configuration for film applications.
2) Feature currently under development, extended lead time may occur
3) Film thickness range assumes oxide on silicon. Ranges for other films may vary. Please contact Nanometrics' Applications Engineering for additional information.
4) All tests are performed using NanoStandard wafers with tool situated on an anti-vibration table. NanoStandard wafers are NIST-traceable film thickness standards consisting of six pads of different oxide thicknesses on silicon.
5) dynamic repeatability is the standard deviation of 30 readings at one site including moving the wafer and refocusing between measurements.
6) long term stability is the standard deviation consisting of one measurement per cycle, unloading and reloading the NanoStandard wafer between cycles, two times a day for a period of three days.
7) Accuracy is the difference between the measured thickness based on the average of 30 repeat measurements and the NanoStandard nominal value.
8) System matching is the difference between the mean of 30 thickness measurements, each taken on separate systems on the same wafer measuring the same site. Both systems must be under identical cleanroom operating conditions.
9) Throughput assessment based on the following setup: 1000Å SiO_2 on Si 150mm wafer with 5mm edge exclusion and standard focus first site. Different setup might be required to achieve repeatability/stability spec.

Specifications subject to change without notice. NanoStandard wafers are NIST-traceable film thickness standards consisting of six pads of different oxide thicknesses on silicon.

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Sample Applications

R&D	High-k dielectrics development	The Nanospec II allows monitoring of n&k values using a large variety of dispersion models. This is ideal for fast & easy process setup or R&D work
	low-k dielectrics development	
	Thin metal & alloy's	
LED	Buffer layer thickness such as ZnO, CdS	A large group of applications people with specialized knowledge to an industry are able to characterize and setup material files for advanced materials
	Filter Layer stacks	Nanometrics advanced modelling engine allows stable and fast multi-layer measurements and various options for lookup models and BEMA models
Solar	CdS layer	Thickness & n&k changes can be tracked safely. Recipes can be transferred to the TSM inline solar monitor
	ZnO, SiN_x, SiO_2	Buffer layer monitoring and recipe exchange to the TSM inline solar monitor
	Dielectrica such as SiO2, SiNx	The Nanospec II allows monitoring of n&k values using a large variety of dispersion models. This is ideal for fast & easy process setup or R&D work
MEMS / substrates	aSi/pSi	Amorphous/Polycrystalline Si, enriched Si layers
	Resist/thick films	Thick Oxide layers, large thickness resist layers
	Rough layers	Roughness on multilayer or single layer stacks

Facilities

Dimensions	710 W x 510 H x 615 D (mm) (not including monitor, keyboard or mouse)
Weight	~40 kg (uncrated) (not including monitor, keyboard or mouse)
Electrical	Single phase, power consumption 100~240V (pre-configured), 1000 VA min.50/60 Hz
Vacuum	11.5 l/min at 240 mbar absolute. Vacuum is required for wafer hold-down.
Temperature	18° - 25° C (64° - 77° F)
Relative Humidity	30 - 50% (non-condensing)
Vibration	≤ 125 µg RMS @ 45 Hz ≤ 700 µg RMS @ 50 – 60 Hz ≤ 1,250 µg RMS @ 100 – 120 Hz *(An anti-vibration table is recommended to achieve optimal specification performance)*

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