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DATASHEET

Nexsa G2 Surface Analysis System

Fast travel to definitive surface analysis

As a materials researcher, you need a surface analysis system that quickly and efficiently provides high-quality, accurate data collection so you can understand the composition of surfaces, thin films, and interfaces.

The new Thermo Scientific™ Nexsa™ G2 Surface Analysis System is a fully automated XPS system that integrates multiple techniques to deliver holistic insights so you can advance your analysis of microelectronics, ultra-thin films, and nanotechnologies.

Efficient workflows with co-incident, multi-technique spectroscopy

The Nexsa G2 System is designed to meet the requirements of a busy research laboratory or a shared-use facility. The instrumentation and software are engineered to make complex experiments easy to perform, without compromising on performance. The Nexsa G2 System has fully automated system control for all acquisition modes and sample operations, ensuring that the time from sample loading to obtaining results is kept to a minimum.

XPS without compromise

The Nexsa G2 System has a newly designed X-ray source, efficient electron optics, and fast signal detection to deliver excellent XPS sensitivity and resolution. The X-ray spot size, which defines the analysis area, can be varied in five-micron steps from 10 µm to 400 µm. This means that the analysis area can be tailored to the feature of interest, maximizing the XPS signal. The Nexsa G2 System also includes our patented dual-beam charge compensation system, which makes the analysis of insulators simple, irrespective of whether they are smooth, a powder, or a fiber.

Go beyond the surface

Not everything of interest is located at the surface of a material. Understanding how a sample's chemistry changes into the bulk or determining if the chemistry is as expected at the interface of layers is measured by XPS in a depth profiling experiment.

Key benefits

Fast, efficient XPS: Quick sample pump-down times, a unique sample viewing system, and high sensitivity for all analysis areas ensure that superb quality data is produced even for the most challenging samples.

Co-incident additional spectroscopies: Obtain the maximum information from the features of interest on each sample by using the additional optional analytical techniques: ion scattering spectroscopy, reflected electron energy loss spectroscopy, UV photoelectron spectroscopy, and Raman spectroscopy.

Optimal depth profiling: Investigate sub-surface and interface chemistry with either a standard ion source or MAGCIS, the monatomic and gas cluster ion source.

Fully featured software: The latest version of the Thermo Scientific Avantage Data System is included, with everything needed for data collection and analysis included, plus new functionality to import data into Thermo Scientific Maps™ Software for correlation with electron microscopy images.

***In situ* sample processing:** Heat samples under software control using the NX heater stage or use the bias sample module for charge/discharge studies.

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The Nexsa G2 System is configured with either a high-performance monatomic ion source or MAGCIS, the monatomic and gas cluster ion source. Both sources are automatically configured by the system, ensuring reproducible etch rates. The standard ion source is suitable for inorganic materials, while MAGCIS opens the possibility of investigating a wider range of samples, including polymers, biomaterials, and 2D materials such as graphene.

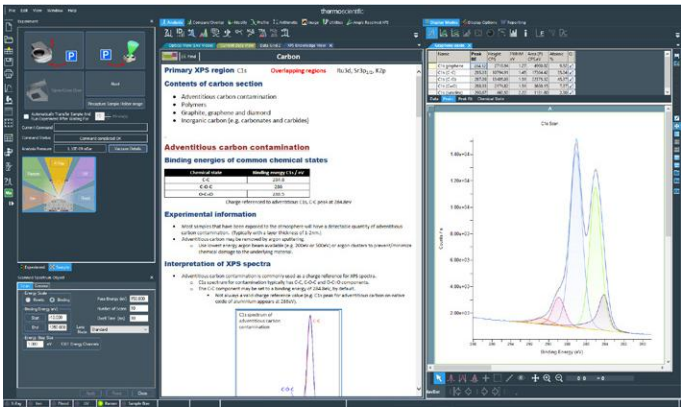
Co-incident spectroscopy options

The Nexsa G2 System has options for complementary analysis techniques for you to gain further insights from samples. Traditional surface analysis techniques, such as ion scattering spectroscopy (ISS), reflected electron energy loss spectroscopy (REELS), and UV photoelectron spectroscopy (UPS), can be added, and uniquely molecular spectroscopy can also be included using the Thermo Scientific iXR™ Raman Spectrometer. Whether you are attempting to increase your understanding of the electronic properties of semiconductors or the structure of carbon nanotubes, the Nexsa G2 System's range of analytical techniques will deliver the data you need.

Samples

The Nexsa G2 System has a large sample holder with a modular design to accommodate specimens 60x60 mm and up to 20 mm thick. Rotating sample holders are included for azimuthal or compucentric rotation during depth profiling, which improves layer resolution. Additional sample plates for powder samples and fiber samples are also supplied.

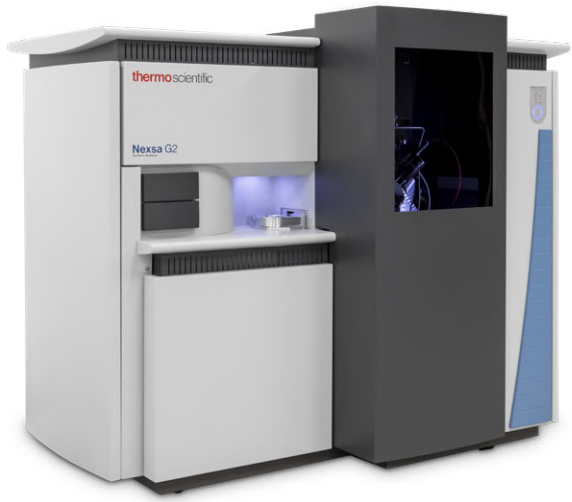
In addition, optional sample holders are available to expand experimental possibilities. Use a tilting sample holder for angle-dependent XPS studies to investigate ultra-thin film samples. Use a vacuum transfer module to move air-sensitive samples from a glove box to the instrument without exposure to the atmosphere. Use the newly designed bias sample holder to apply low voltages to samples for measuring work functions or performing charge/discharge studies. The new NX heater sample holder enables samples to be heated under full computer control within experiments.



Avantage Software for surface analysis.

Software

As with all Thermo Scientific surface analysis instruments, the Nexsa G2 System is controlled by the Avantage Data System, which offers full instrument control, data acquisition, data processing, and data reporting. Once the samples are loaded in the instrument, everything is controlled from the Avantage Data System, meaning that the instrument can be run remotely or that collaborators can join an operator at the instrument through desktop sharing or web-conferencing.



Nexsa G2 Surface Analysis System.

The Avantage Data System also includes automated routines for instrument calibration, using the standard samples that are always available in the instrument. The Avantage Data System is now compatible with Maps™ Software. Using the Avantage Data System with Maps Software means that data from the Nexsa G2 System can be correlated with electron microscopy imaging, allowing features to be identified using one instrument. And their positions can exported to the other for further investigation.

Technical highlights

Micro-focused, monochromated Al K-alpha X-ray source

- Computer controlled quartz crystal monochromator
- Software adjustable spot size
  - Maximum spot size 400 µm
  - Minimum spot size 10 µm
- Motorized, water cooled anode with 24 positions

Electron optics and analyzer

- Electrostatic objective lens
- Full 180° hemispherical, mu-metal shielded analyzer
- Continuously selectable pass energy 1–400 eV
- 128-channel, signature-corrected, position-sensitive detector
- Automatic energy scale and transmission function calibration

Optional analytical techniques

- Bi-polar analyzer power supply and helium gas input for ion source for ISS
- UV source for UPS
- High voltage upgrade to electron flood source for REELS
- iXR Raman Spectrometer for co-incident molecular spectroscopy

Charge compensation system
- Patented dual-beam electron and ion source
- Beam energy for charge compensation 0–5 eV

Ion source
- EX06 ion source
  - Differentially pumped source with floating drift tube
  - Beam energy range 200–4,000 eV
- MAGCIS ion source
  - Differentially pumped source with floating drift tube and patented dual gas injection system
  - Monatomic beam energy: 500–4,000 eV
  - Cluster beam energy: 2,000–8,000 eV
  - Cluster size range: 75–2,000 atoms

Sample viewing system
- High-performance system for precise alignment of analysis position.
  - Three optical alignment views are always available:
    - Platter View: Automatically records image of the sample holder in the load-lock; used to navigate between the samples mounted on the holder.
    - Patented Reflex Optics View: Live, high-magnification view of the analysis position for alignment of features on the sample with the analysis position.
    - Height Setting View: Live, high-magnification view of the analysis position; used to ensure that the sample is at the correct working distance from the photoelectron transfer lens.
  - Two types of sample illumination are provided:
    - Off-Axis: Used for samples with rough surfaces
    - On-Axis: Used for smooth or highly reflective samples
  - Integrated XPS SnapMap capability for using XPS images for sample alignment

Software
- Avantage Data System
  - XPS data acquisition (including spectra, SAXPS, line scans, XPS images, depth profiles)
  - Wide range of XPS data processing capabilities
  - Full control of vacuum system and sample handling
  - Export data to Maps Software and other software packages
  - Calibration and alignment of sources, analyzer, and detector

Sample holders
- Maximum sample dimensions 60x60x20 mm
- Standard supplied sample kit
  - Two multi-specimen mounting plates
  - One mounting plate for powder samples
  - One mounting plate for fiber samples
  - Three rotation holders
  - One mounting plate for use in combination with a rotation holder
  - Sample carrier base
- Optional sample holders
  - Tilt holder for ARXPS
  - 4-point sample bias holder
  - NX heater sample holder
  - Vacuum transfer module
  - SEM stub sample plate

Standard Nexsa G2 sample holder.

Stage
- High-precision, automated specimen stage with internal stepper motors, including a set of standard samples, apertures, and knife edges built into the stage for calibration and alignment
  - Calibration samples: Cu foil, Ag foil, Au foil
  - Phosphorescent sample for X-ray spot alignment
  - Cu knife edge and TEM grid for X-ray spot size measurement
  - Apertures for ion beam alignment and focusing

Vacuum system
- Ni-Fe CNC-machined analysis chamber
- Pumping
  - 260 l.s-1 turbomolecular pump for analysis chamber
  - 260 l.s-1 turbomolecular pump for load-lock chamber
  - 67 l.s-1 turbomolecular pump for differential pumping of MAGCIS, flood gun, and UV source (when MAGCIS is selected)
  - Rotary vane backing pump or dry backing pump
  - Software-controlled titanium sublimation pump in analysis chamber
- Gauging
  - Compact, full-range gauge for analysis chamber
  - Compact, full-range gauge for load-lock chamber
  - Pirani gauge for backing pump
- Software-controlled, hardware-interlocked integral bake-out for automated system preparation after service

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Installation requirements

- Power
  - Voltage: 220–240 V
  - Frequency: 50 / 60 Hz
- Environment
  - Room temperature: 15–30°C with maximum change of ±1°C
  - Heat dissipation
    - Normal operating conditions: 1 kW
    - During bake-out: 2.6 kW
  - Humidity: <65%
  - Static magnetic fields: <50 µT (500 mG) peak in any direction
  - Time-varying magnetic fields: <2 µT (20 mG) peak-to-peak in any direction in the frequency range 0.1 Hz to 400 kHz
  - Time-varying electric fields: <3 V/m peak-to-peak in any direction in the frequency range 80 to 1,000 MHz
- Dimensions
  - System dimensions: width 1,216 mm, length 1,786 mm, height 1,607 mm
  - Minimum door width required: 1,500 mm
- Weight
  - The floor should be able to support 875 kg
- Services
  - Water supply of 3 l.min-1 at 4.5 bar with an inlet temperature of 15–20°C
  - Compressed air supply with a pressure of 4.5 bar
  - Dry nitrogen is used to vent the load-lock and must be supplied at a pressure of 0.5–1 bar
  - High-purity argon (>99.998 %) is required for ion etching. Pressure required is dependent on the system ion source:
    - EX06: maximum 2 bar
    - MAGCIS: maximum 10 bar
  - High-purity helium (>99.998 %) is required for the optional UPS and ISS techniques. Maximum inlet pressure required is 1.5 bar

Nexsa G2 animation

Duration 1:33

Find out more at **thermofisher.com/nexsa**

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