

GDA 150 HR & 650 HR

Glow discharge analyzer for bulk and depth profile analysis

Company Profile



SPECTRUMA is one of the most important producers of high-tech analysis equipments in the market. Operating since 1982, our highly skilled team of experts is remarkably experienced in development, production and service with a background of 35 years within the field of glow-discharge spectrometry.

Priorities lie with both customer service and engineering and production of instruments. SPECTRUMA steadily improves its cooperation with its customers by understanding itself as equal partners in the field of spectral analysis.

SPECTRUMA sets up new standards in the field of instrumental analysis by continuous cooperation

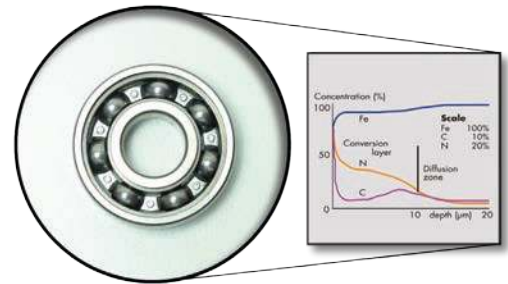
with partners from various industries. SPECTRUMA provides advanced technology “Made in Germany” and offers an extensive worldwide customer support.

These factors made our company the most important initiator of the market. Furthermore, SPECTRUMA also has an exceptional know-how in the application fields like material engineering, foundry, heat treatment, galvanic inspection and surface engineering. These accomplishments have been certified according to ISO 9001 endorsing the customer-oriented development of SPECTRUMA.

Sample Applications

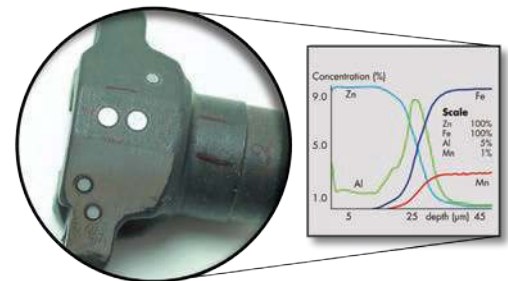
Thermochemical treatments

Determine the thickness of a layer and concentration profile of all elements with respect to depth. Quantify and/or qualify surface contamination, inclusions and phase ratios



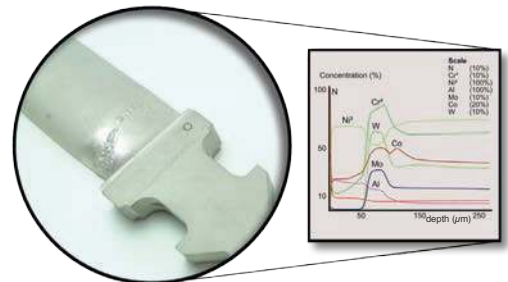
Coated sheets

Complete characterization of the coating layer with respect to chemical composition, thickness and element distribution. Analyze non-conductive coatings such as varnishes and paints with the RF source



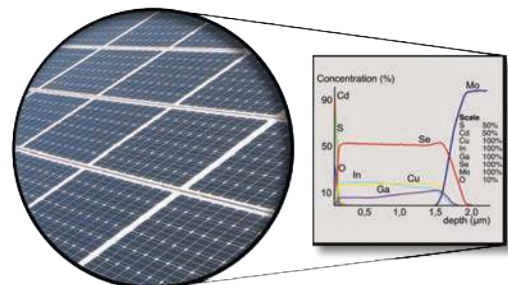
Hard-phase coatings

Compound layer development can be determined by rapid analysis of the chemical composition. Other important material aspects such as depth penetration of the treatment process are possible



Thin films

Determination of elemental distribution in the coating of thin film solar cells



Chemical composition

Precise determination of chemical material composition. High reproducibility of analyses. Quick analysis < 60 s. Determination of all elements from H up to U from 100 % down to the ppm level



GDA 150 HR



The GDA 150 HR is a robust CCD spectrometer created for elemental depth profile analysis and bulk analysis in the sector of production. It allows an optimized spectral resolution and sensitivity that is suited for users requiring both precision and flexibility in their applications. SPECTRUMA created this high resolution CCD optics to offer performance equal to PMT detectors and enhanced the analytical capabilities of the GDA 150 HR into new heights.

Almost unlimited amounts of analytical CCD channels can be added to any given method because of the unique function of the CCD detector. This flexibility allows one to quickly determine the composition and thickness of technical coatings.

The GDA 150 HR can analyze coatings ranging from 100 nm to 200 μm , with a relative depth resolution of 5 % - 10 %. The linearity of calibration curves is given for most matrices. The detection limits are from 0.1 ppm up to 50 ppm.

The GDA 150 HR is equipped with a newly developed glow discharge excitation source which permits sputtering diameters of 8 mm to 1 mm.

The universal sample unit (USU) can be used for the analysis of non-flat or very small samples that would not seal with the normal O-ring. The GDA 150 HR is designed for all electrically conductive matrices.

GDA 650 HR

The GDA 650 HR is a next level CCD glow discharge analyzer. Most recent state-of-the-art CCD technology has been used for its development. With this technology, the GDA 650 HR provides almost photomultiplier performance with the flexibility of a high resolution CCD spectrometer.

For companies that need high levels of precision and flexibility in their applications the GDA 650 HR represents the ideal solution. Due to the unique function of the CCD detector, an almost unlimited amount of analytical CCD channels can be added to any given method. This flexibility permits the fast determination of the composition and thickness of technical coatings. Almost all elements may be determined simultaneously. The GDA 650 HR has been primarily developed to analyze coatings up to a depth of 200 μm , with a depth resolution of 50 nm at the surface and 5 % – 10 % relative in deeper regions.

Furthermore, the GDA 650 HR is also capable of bulk analysis providing superior linearity of calibration curves for complex matrices. The detection limits are 0.1 ppm at most.

Using the optional universal sample unit (USU), the GDA 650 HR is also able to analyze very small and non-flat samples which could not be sealed with an O-ring normally.

The equipped radio frequency (RF) excitation source can be used to analyze non-conductive materials. Thanks to this radio frequency glow discharge lamp, the GDA 650 HR is unsurpassed in analyzing insulating materials such as ceramics, glass and paint layers, using the standard lamp set or a specially designed version of the universal sample unit. The GDA 650 HR is upgraded with a newly developed external plasma ignition that enables extremely low excitation conditions.

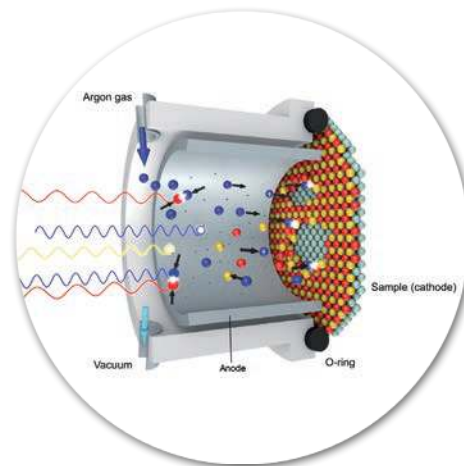
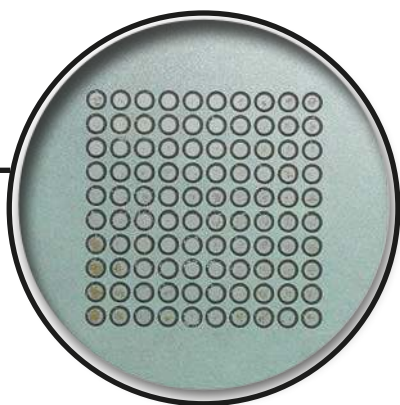


Technical Data

Excitation source

The excitation source permits anode diameters ranging between 1 mm and 8 mm with optimum stability and reproducibility.

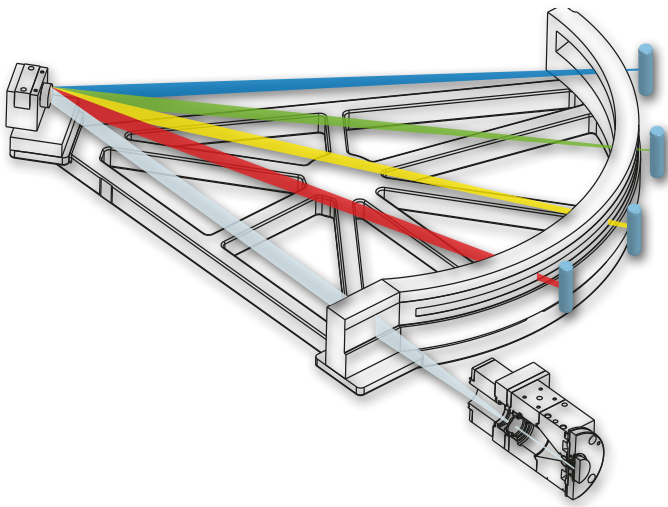
- High-performance direct sample cooling device. Used for thermally sensitive samples and the analysis of very thin foils. Stainless steel foils with a thickness of 50 μm can be analyzed directly
- Optimized argon injection in the sample area for low detection limits and extremely high resolution in depth profiling analysis.
- Special automatic cleaning function for maximum measuring precision
- Maximum sample thickness 45 mm, minimum sample thickness 0.05 mm in standard configuration
- DC source, fully programmable in the range of up to 1500 V, and up to 250 mA
- Only GDA 750 HR: RF fully programmable up to 150 W, U, I monitor, real plasma regulation, pulsed plasma operation
- External plasma ignition enables extremely low excitation conditions and is intended for analysis of sensitive materials
- Optional: Auto-sampling unit for automated analysis of up to 100 samples



Optics

- High spectral resolution typically less than 20 pm (FWHM)
- Usable wavelength range from 119 nm to 800 nm
- Paschen-Runge mounting with Rowland circle diameter of 750 mm
- Holographic master grating with 2400 lines/mm
- Single exit slit mask with all element channels pre-assigned
- 63 PMT channels simultaneously determinable in the standard configuration. 16 PMTs in an optional 400 mm optics. The maximum number of PMTs is expandable
- Facilitated lens cleaning
- Optimized high-voltage supply for photomultipliers with a dynamic measuring range of 10^6 , almost no need to change PMT setting
- Automatically adjustable sensitivity of the PMTs
- Optional: High-performance CCD spectrometer with spectral ranges from 200 nm to 800 nm. Optical resolution of minimum 0.02 nm (FWHM) depending on configuration. The CCD spectrometer can be operated simultaneously to the 750 mm polychromator
- Virtually unlimited number of CCD element channels simultaneously determinable
- Optional: Monochromator with a spectral range of up to 1500 nm. Up to three different gratings can be installed which are individually selectable during runtime

Technical Data



Vacuum System - GDA 650 HR

- Dry-running pump to avoid C-H contaminations from the pump
- Stainless-steel tubing in the whole system. Indispensable for trace element analysis, in particular for nitrogen
- Single pump design for both the GDS source and the optics chamber with a noise level < 50 dB
- Optional: Turbo molecular pump for quick evacuation and best degassing performance of the GDS source

Vacuum System - GDA 150 HR

- Stainless-steel tubing in the whole system. Indispensable for trace element analysis, in particular for nitrogen
- Single pump design for both the GDS source and the optics chamber with a noise level < 50 dB
- Safety valve inside the rotary vane pump prevents unintentional ventilation in the case of a power failure
- Optional: Turbo molecular pump for quick evacuation and best degassing performance of the GDS source
- Optional: The rotary vane pump may be replaced by a dry-running pump to avoid C-H contaminations from the pump





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