DITEE
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DITEE SWORD 500

Inductively Coupled Plasma Optical Emission Spectrometer (ICP-OES)

— Reliable Elemental Analysis —

DITEE Scientific

Since 1960

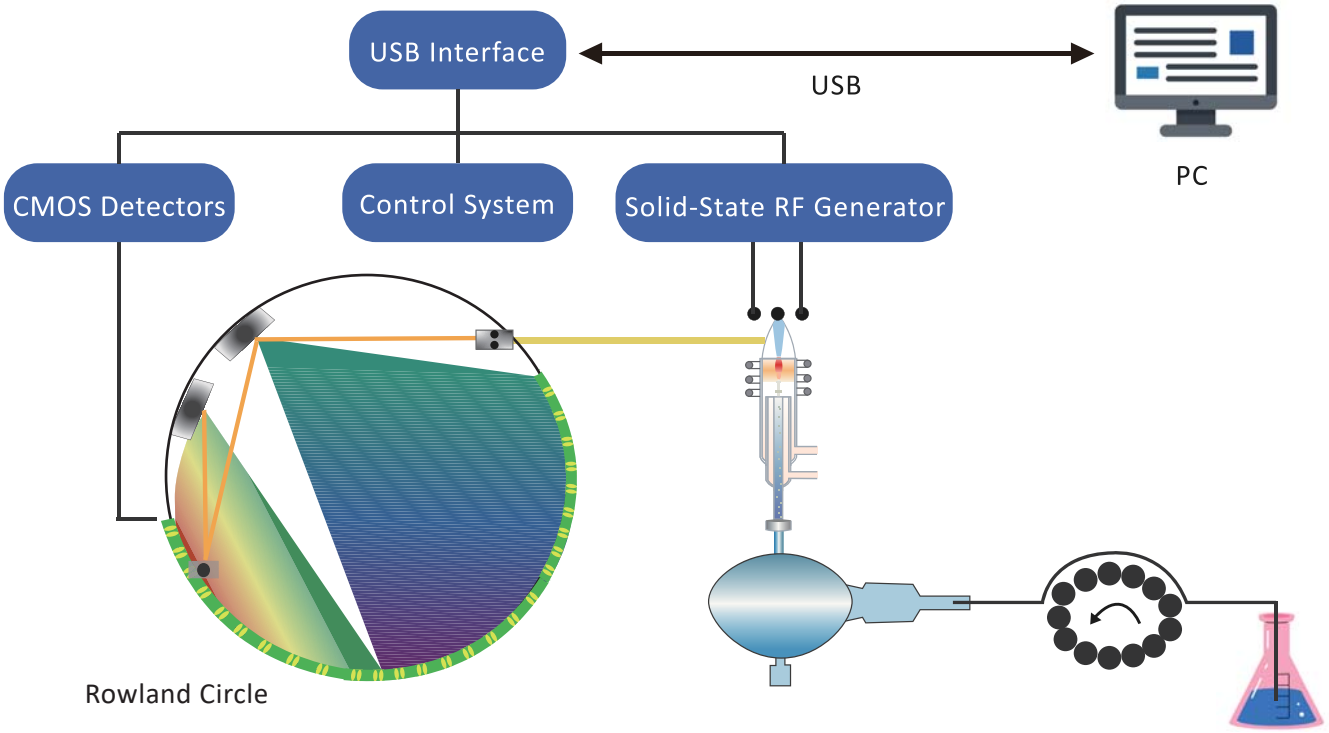
Inherited from the first generation of spectrometer experts in China

The DITEE SWORD 500 Inductively Coupled Plasma Optical Emission Spectrometer (ICP-OES) is the result of the continuous efforts in research and development by the spectroscopy experts at the Guangdong Academy of Sciences (GDAS) for over 60 years. This advanced instrument is equipped with a Rowland Circle optical system designed to minimize matrix interference, along with cutting-edge CMOS detectors for full-spectrum collection. It offers excellent stability, low limit of detection, rapid analysis, and low operating costs.

The DITEE SWORD 500 can be optionally equipped with a laser ablation solid sampling system, offering a unique and cost-effective LA-ICP (Laser Ablation Inductively Coupled Plasma) spectrometer.

The DITEE SWORD 500 ICP-OES is widely used for sample analysis across various application fields, including new energy, nuclear industry, metallurgy, rare earth and magnetic materials, geology, environment, petroleum, new chemical materials, agriculture, food, healthcare, biology, marine, and water quality. This instrument can quickly and accurately detect approximately 70 elements, ranging from trace to major concentrations.

Working Principle



Core Advantages

Superior Performance

- Excellent spectral resolution and optical detection capabilities
- Reliable wavelength stability
- Stable power output from the plasma generator ensures accurate detection results

Extremely Low Operating Costs

- No need to blow away the frost, ready to use when powered on

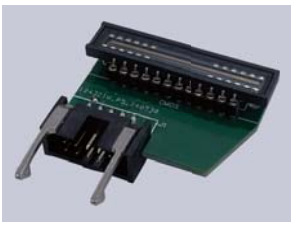
Lower Environmental Requirements

- Built-in optical chamber temperature control system, patented built-in cooling system, suitable for various industrial usage environment requirements

Major Innovative Technologies

Full First-Order Spectral Line Rowland Chamber

- The 2700 L/mm ruled Rowland grating utilizes first-order spectral lines for measurement, thereby eliminating interference from higher-order spectral lines
- Single-stage spectroscopy and imaging eliminate the need for prism-based secondary dispersion and multiple mirrors, significantly reducing light energy loss

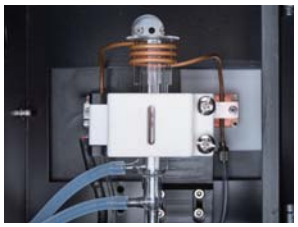


High Signal-to-Noise Ratio Linear Array CMOS Detectors

- Cutting-edge linear array CMOS detectors exhibits excellent sensitivity in the vacuum ultraviolet range (below 200 nm) and delivers a high signal-to-noise ratio without requiring refrigeration

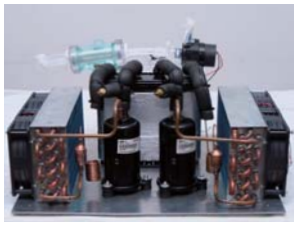
Auto-Tuning Plasma

- Continuously adjustable power
- Power is automatically tuned based on load conditions to maintain stable output
- Integrated automatic temperature and flame monitoring



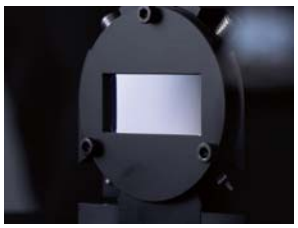
Vertical Torch, Radially Viewed

- Minimize sample deposition, crystallization, and blockage, thereby greatly improving the carrying capacity of high matrix samples



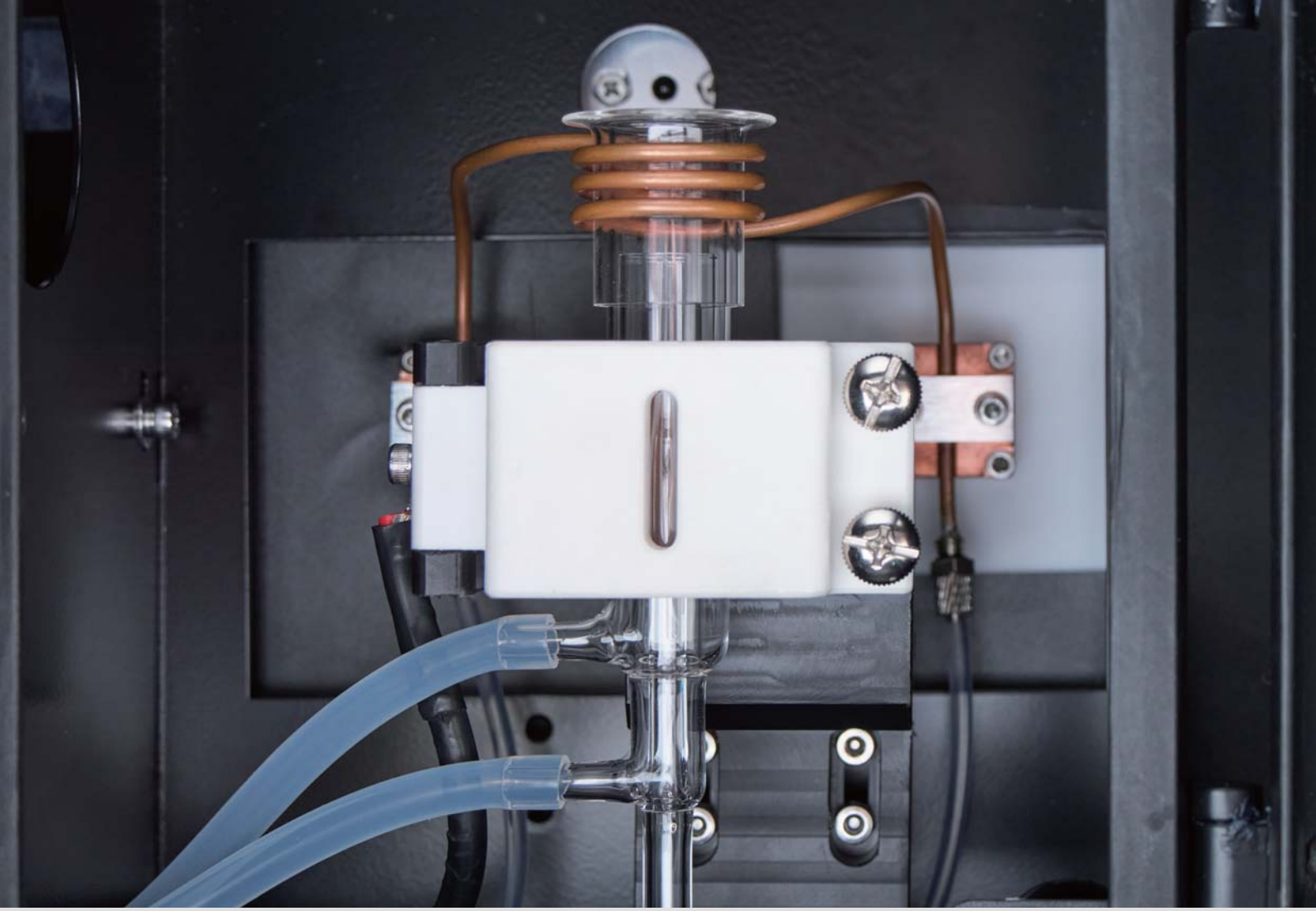
Patented Built-in Cooling Solution

- The built-in industrial coolant circulation system offers heat dissipation efficiency significantly higher than that of air cooling systems, minimizing the risk of system failures due to cooling issues
- The integrated closed design removes the need for external chillers and water changes, effectively preventing problems such as scale buildup, algae growth, and freezing



35℃ Constant Temperature Optical System

- Fully sealed light chamber eliminates the need for high-flow argon gas purging
- Employs cutting-edge linear array CMOS detectors to achieve high signal-to-noise ratios without refrigeration, ensuring a frost-free operation without the need for argon gas blowing
- The integrated optical system features an automatic temperature control device that maintains a constant temperature of 35℃, minimizing the requirements on external environmental conditions and ensuring stable detection in varying ambient temperatures

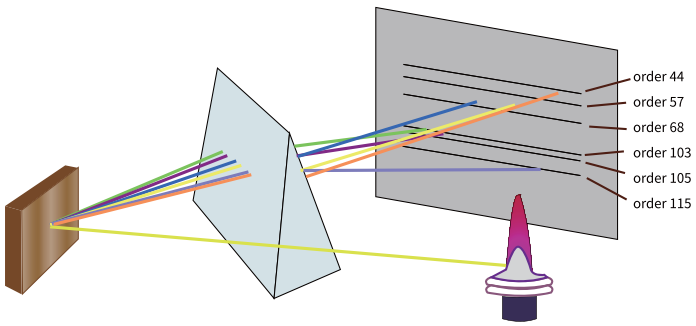


Technical Specifications

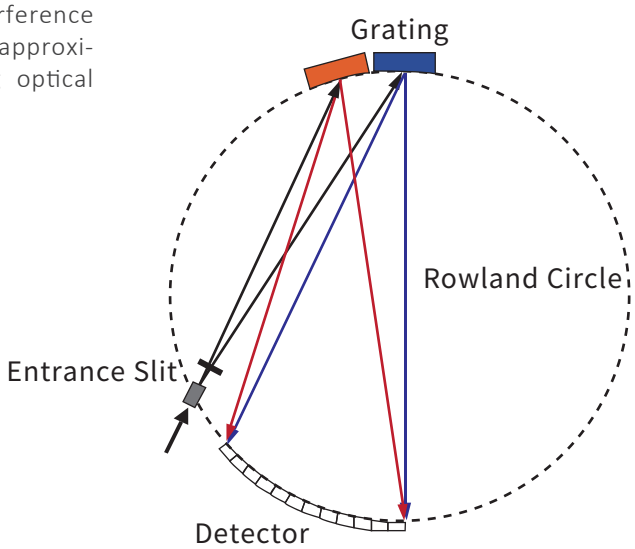
- Paschen-Runge, Rowland Circle optical structure, thermally stabilized to 35°C ± 0.5°C
- Rowland Circle focal length: 500 mm; holographic concave grating: 2700L/mm
- Optical resolution: 0.006nm (Constant)
- Wavelength range: 175-870nm
- 24 pieces of high-performance CCD detectors, 2048 pixels per array
- Vertical torch, radically viewed
- Dynamic range: $>10^9$
- Stability: Repeatability RSD≤0.5%(1mg/L)(n=10)
  Short-term stability RSD≤0.5% (500×LOD)
  Long-term stability RSD≤1.0% (500×LOD)

Optical System

- 500mm focal length Rowland Circle, maximum spectral resolution of 0.006nm (constant)
- The optical design eliminates multi-level spectrum interference from the sample matrix, reducing matrix interference by approximately 70 times compared to common echelle grating optical systems (using iron-based samples as an example)



Echelle Grating Optical System

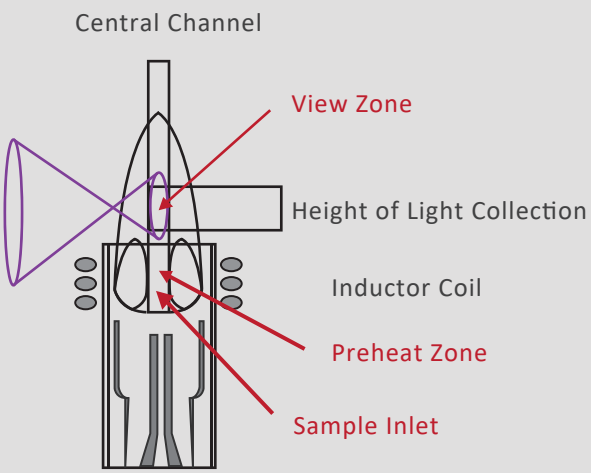


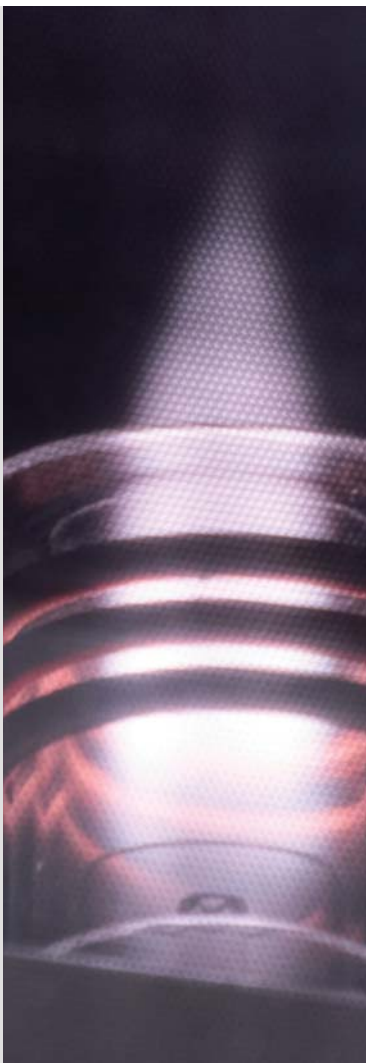
Rowland Circle Optical System

Plasma

Advantages of vertical torch, radially viewed:

- No torch burnout
- Reduced matrix interference
- Decreased sample system rinse time
- Lower experimental costs
- Faster analysis speed
- Wide detection concentration range: from percent concentrations to sub-ppb





Plasma Generator

Features of the plasma generator:

- Externally excited all-solid-state RF generator
- Frequency: 27.12 MHz
- Power: 750-1500 W
- Power stability: <0.1%
- Patented built-in cooling system
- Fully automatic control with continuously adjustable power
- Power feedback self-tuning and temperature protection functions

Sample Injection System

- Three-channel peristaltic pump: 0-70 rpm, continuously adjustable
- All gas flows controlled by software

  *Mass flow meters and solenoid valves for gas distribution control
  *Continuously adjustable cooling gas, auxiliary gas, and nebulizer gas
  *Optional separate oxygen or additional gas flow controllers
  *Software displays gas flow rates

- Optional laser ablation solid sampling system (LA-ICP spectroscopy), offering the industry's only low-cost LA-ICP solution

  *No additional water cooling or power drive equipment required

  *Utilizes a 1064nm diode-pumped pulsed laser with an adjustable operating frequency of 1-10Hz, offering excellent energy stability and a 10 times higher energy utilization efficiency compared to UV lasers

  *Suitable for various solid samples, including alloys, ores, soils, polymers, electrode materials, and more

About DITEE Scientific

DITEE Scientific was established in 2020, and is an innovative technology enterprise integrating R&D, production, sales, and maintenance. The research experts at DITEE Scientific come from the Guangdong Academy of Sciences and have been engaged in the development of spectroscopic instruments since the 1960s. Currently, DITEE Scientific is equipped with a team of professionals who have long been involved in the R&D of analytical instruments, instrument production, and analytical applications. We possess strong problem-solving capabilities and are committed to meeting the ever-changing customer demands in the market, striving to create high-quality products and services.

Research and Development History

In the 1960s, the first generation of domestic spectroscopy experts start their research at the Guangdong Academy of Sciences.

Since 2020, several key patents based on atomic emission spectroscopy have been obtained.

In 2014, started research of OA800 Oil Analysis Spectrometer (RDE-OES).

In 2015, the Guangdong Provincial Department of Finance support the research of RDE-OES.

In 2018, the demo of the RDE-OES passed third-party testing.

In 2020, DITEE Scientific established.

In 2023, obtained the certification for high-tech enterprises.

In 2024, launched the ICP-OES and the MP-AES.

Quality Management System Certification: ISO 9001: 2015, NOA2208630

Environmental Management System Certification: ISO 14001: 2015, NOA2208629

Occupational Health and Safety Management System Certification: ISO 45001: 2018, NOA2208628

Professional technical support and excellent after-sales service

Users need to ensure that the instruments operate normally at all times.

DITEE Scientific has a team of experienced engineers who provide performance assurance service plans for every instrument. Professional engineers offer high-value customized services to ensure the normal operation and prolong the lifespan of the instruments, including but not limited to preventive maintenance, application method establishment, professional consulting, and customized training.

DITEE Scientific provides users with lifelong services for spare parts, consumables, repair and maintenance, and technical support.

www.rogetscientific.com

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