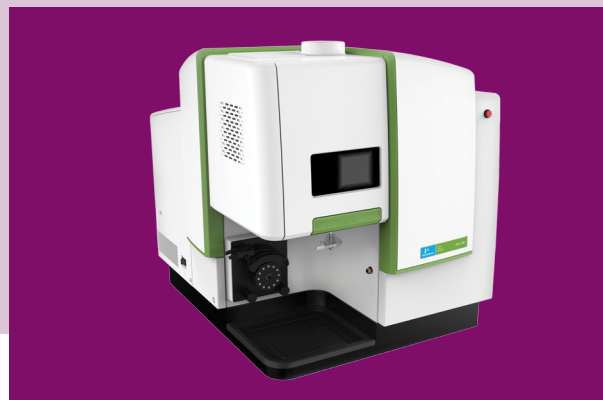


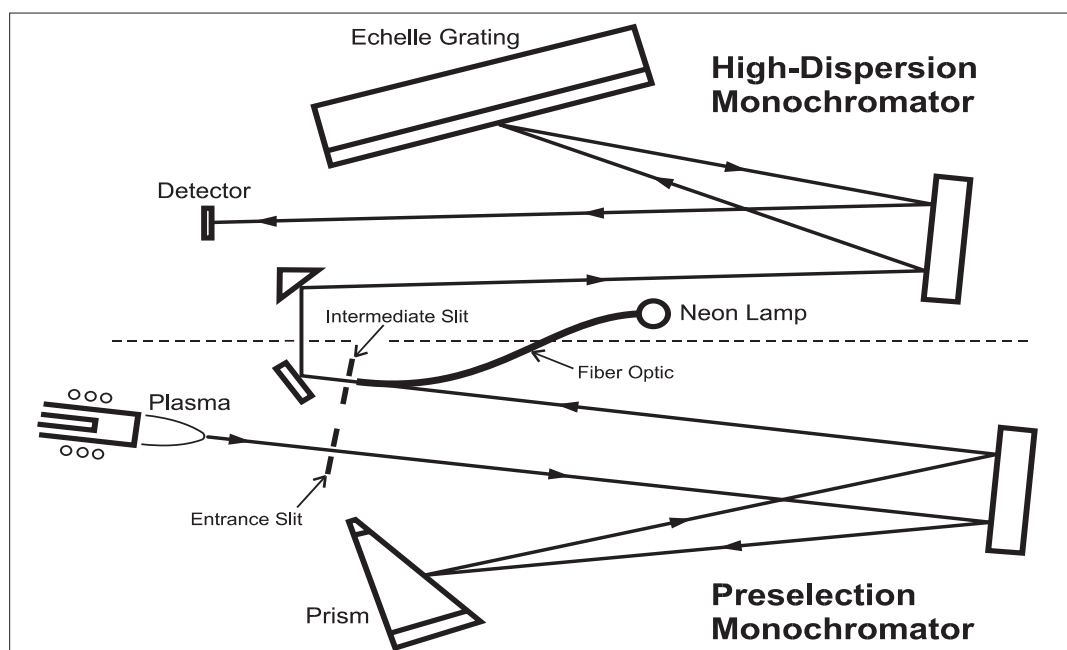
The Avio 200 ICP-OES: A Unique Double-Monochromator Optical System



Introduction

PerkinElmer's Avio™ 200 ICP-OES gains its outstanding analytical performance from its novel optical system, including a unique double monochromator, dual backside-illuminated charge-coupled device (DBI-CCD) detector, real-time Dynamic Wavelength Stabilization™, and automatic dual viewing of the plasma torch. It's the combination of these innovative components that provides the Avio 200 ICP-OES with:

- Exceptional analytical speed
- Excellent spectral resolution
- Reduced spectral interferences
- High analytical flexibility
- Maximum light throughput
- Smallest footprint



The Avio 200 ICP-OES spectrometer's unique double monochromator.

Exceptional analytical speed

The unique CCD design concept of the Avio 200 ICP-OES yields an instrument of unparalleled analytical performance. The unique CCD design allows analysis speeds and productivity not available in sequential ICP spectrometers.

This is possible with the Avio 200 ICP-OES because the two dispersing elements (the prism and the grating) typically are rotated less than ± 2 degrees to access any wavelength in the operating range. This small range of rotation and simultaneous scanning of both components using high-speed, precision stepper motors yields extremely high scanning speeds while maintaining exceptional wavelength accuracy. The Avio 200 ICP-OES can accurately travel the extremes of its wavelength range, 165-900 nm, in less than three seconds.

Preselection monochromator

The Avio 200 ICP-OES uses a unique double monochromator to obtain fast simultaneous spectral acquisition, excellent resolution and high optical throughput. The first, or pre-monochromator, uses a CaF₂ prism with excellent UV transmission characteristics to disperse a single order of light. The pre-monochromator acts as a highly effective "filter," passing only a limited section of the spectrum, which contains the analyte wavelength, to the intermediate slit. The intermediate slit is the exit slit of the pre-monochromator and the entrance slit for a high-resolution echelle monochromator. The advantages of this approach, relative to conventionally designed, high-resolution echelle monochromators, are superior light throughput and reduced complexity.

High-dispersion Echelle monochromator

The second monochromator is a high-dispersion system based on an echelle grating. The high performance echelle grating disperses the narrow spectral region provided by the pre-monochromator into its individual wavelengths, the image of which is optically matched to the custom-designed solid-state detector. This monochromator provides high dispersion using a large, high-efficiency echelle grating. It also provides excellent resolution with a compact focal length (0.3 m). By preselecting the spectral range that enters the second monochromator, there is no need to use the echelle grating in a cross-dispersed mode, eliminating the need for a larger, expensive array detector as used in simultaneous ICPs.

Minimized spectral interferences

Traditional sequential systems achieved high resolution through the use of multiple overlapping orders. Invariably, this approach presents problems since peaks from multiple wavelengths can appear in the analytical window, and peak identification problems occur. Analytical reliability and productivity can suffer.

With the Avio 200 double-monochromator system, only the required analytical spectrum of interest is passed to the high-dispersion Echelle monochromator. This "filtering" effect minimizes order overlap and ghost peaks, and combined with extensive baffling and masking of all reflective surfaces, reduces stray light to exceptionally low levels for enhanced analytical performance.

Smallest footprint, maximum light throughput

Since the order separation is carried out externally, i.e., prior to the echelle monochromator, the usable slit height is limited only by aberrations. Therefore, the Avio 200 ICP-OES can work with much larger slit heights than conventional systems, significantly increasing light throughput. This maximized light throughput and the high resolution provided by the short focal-length (0.3 m) echelle monochromator allows the Avio 200 ICP-OES to be the smallest instrument with no sacrifice in performance. The compact monochromator design also provides much higher thermal stability. In addition, the exceptional wavelength stability of the Avio 200 is a benefit from PerkinElmer's use of Dynamic Wavelength Stabilization, using a reference spectrum from a low-pressure neon discharge lamp to correct for any residual spectral shifts.

Simultaneous background correction

The Avio 200 ICP-OES simultaneously measures a wavelength range around the analytical wavelength(s). Background correction points can be freely selected within these ranges. No time-wasting peak search routine is required. Background correction readings are made at the same time as analyte measurements, which significantly improves analytical accuracy, precision and detection limits. The analytical performance achieved on the Avio 200 ICP-OES is unmatched.