The iHR550 imaging spectrometer from HORIBA Scientific is simply the most versatile spectrometer on the market with no compromise among imaging, spectroscopy, and adaptability. The iHR550 utilizes a unique patented asymmetric design, which provides superior image quality and minimizes unwanted optical aberrations common to symmetric and crossed-Czerny Turner designs. For unrestricted flexibility, the iHR550 allows the user to take full advantage of the instrument by having two entrance and two exit ports for enhanced measurement capabilities.

Virtually No Astigmatism
When spatial resolution is needed, optical aberrations and—more precisely—astigmatism limits the imaging capabilities of the spectrometer. In a multi-track spectroscopy setup, where high spatial resolution is needed, astigmatism leads to a “bow-tie” effect, in which the image of each fiber blurs in the vertical direction towards the edge of the CCD. The iHR550 spectrometer minimizes astigmatism and delivers a sharp image of each fiber across the entire focal plane, as shown in Figure 1.

Negligible Crosstalk
To assess the degree of crosstalk between fibers, it is necessary to perform a horizontal bin of the full image. In a poorly designed spectrometer with a high degree of astigmatism, the signal between fibers begins to overlap, preventing clear separation between the fibers. The design of the iHR550 minimizes crosstalk between channels and improves contrast ratio. Figure 2 (next page) shows that the iHR550 image quality provides distinct peak separation.

The iHR550 is the most suitable imaging spectrometer solution for:
- Multi-track spectroscopy with tens of fibers imaged at once
- Direct coupling for microscopy and 2D imaging
- Hyperspectral imaging for Raman and luminescence applications
- UV-Vis, near-IR and mid-IR spectroscopy with multiple array or single-channel detectors

Figure 1. Image of a broadband quartz tungsten-halogen spectrum recorded with nineteen 200 μm fibers using the 1× imaging adapter with an iHR550 spectrometer, 1200 gr/mm grating blazed at 500 nm, and 1024×256 open-electrode CCD.
Preservation of the focal plane image
Figure 3 shows the image of each fiber as it is moved across the focal plane. Again, the effect of astigmatism is minimal, allowing a sharp image across the 30 × 12 mm focal plane.

Preservation of spectral intensity
Vertical binning of the full image shows that the intensity is preserved across the chip. As shown in Figure 4, the iHR550 produces sharp spectral lines and constant intensity across the entire focal plane. Only 3.5% variation in intensity is observed between the center of the sensor and the edges.

Flexible Design
The iHR550 can be configured with multiple entrance and exit ports, and has the capability to mount multiple detectors, including two array detectors at once. This is the ideal scenario for the user who would like to expand wavelength-sensitivity beyond the visible. Our InGaAs linear arrays and Si CCDs can be mounted simultaneously to give a total range of sensitivity from 200 nm to 2200 nm. In addition, wavelength sensitivity can be extended even further through the use of various single-channel detectors up to 20 µm. If experimental requirements change in the future, the iHR550 can adapt with a wide variety of available options for input coupling and large catalog of detectors.
**Microspectroscopy**

In addition to being the most suitable spectrometer for spectroscopy applications, the iHR550 imaging spectrometer offers outstanding performance when used for microspectroscopy. The iHR550 interfaces seamlessly with most commercially available microscopes as depicted in Figure 6 (top) on an inverted microscope for Raman spectroscopy. Imaging of the sample may be recorded with the microscope’s witness camera or through the spectrometer itself, eliminating the need for an additional camera. Figure 6 (bottom) shows the image of *Convallaria* cells recorded with a grating tuned to zero-order in the iHR550. The resulting image is crisp and clear, showing the capillary structure within the cells.

**Selected accessories for iHR:**

- **AFW-IHR-UVIS**  
  iHR550 Internal Filter Wheel, 6 × 25.4 mm (1") filter positions
- **AFW-C6PM**  
  External Filter Wheel, 6 × 25.4 mm (1") filter positions
- **22-FSA**  
  Filter Slide, 3 × 25.4 mm (1") filter positions
- **ACH-C**  
  Optical chopper for use with IR detectors and lock-in amplifiers
- **AFO-XY**  
  xy-adjustable Fiber-Optic Adapter for 10 mm and ¼" ferrules
- **220F**  
  Lens-based fiber-optic interface
- **ASC-VIS**  
  SampleMax Sample Compartment
- **ASC-UV**  
  SampleMax Sample Compartment optimized for UV
- **DPM-HW**  
  UV-VIS Photomultiplier Tube and Housing
- **DSS Detectors**  
  Solid-state detectors including Si, Ge, InGaAs, PbS, PbSe, and HgCdTe
- **1427C**  
  Solid-State Detector Interface
- **CSW-SYNERJY**  
  Data-acquisition software
- **Multichannel detectors**  
  CCD cameras available in a large variety of formats and linear InGaAs arrays
- **220M**  
  Direct-coupled lens-based microscope interface
- **LSH**  
  Lamp Source Housings, quartz tungsten-halogen and deuterium
- **FL-1039A**  
  450 W Xe light source
**iHR550 Features**

- Up to four ports (two entrance and two exit)
- Kinematic turret with easy access hatch
- High-speed USB and additional hub port
- Purge port for UV and near-IR
- Easy CCD focus and alignment with external locking mechanism
- Choice of CCD or exit slit on either exit port
- Fast scanning capability: up to 160 nm/s
- Powerful SynerJY™ software for Windows®
- Optional internal filter wheel
- Choice of 2 mm slits for high resolution or 7 mm slits for high throughput

**iHR550 Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focal length (mm)</td>
<td>550 mm</td>
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<tr>
<td>Aperture</td>
<td>f/6.4</td>
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<tr>
<td>Grating size</td>
<td>76 mm × 76 mm</td>
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<tr>
<td>Number of gratings</td>
<td>three, on-axis</td>
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<tr>
<td>Flat field size</td>
<td>30 mm × 12 mm</td>
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<tr>
<td>Resolution</td>
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<td>Wavelength accuracy</td>
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<tr>
<td>Repeatability</td>
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<tr>
<td>Spectral dispersion</td>
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<tr>
<td>Magnification</td>
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<tr>
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<tr>
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<tr>
<td>Step size</td>
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<td>Length</td>
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<td>Width</td>
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<tr>
<td>Height</td>
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<tr>
<td>Computer interface</td>
<td>High-speed USB</td>
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</tbody>
</table>

1. All specifications given for 1200 gr/mm grating at 435 nm and subject to change without notice.
2. Stray light measured at 1 nm from 514 nm laser with HORIBA Scientific holographic gratings.

www.horiba.com/scientific
info.sci@horiba.com