Hyperspectral Imaging in Microscopy

Hyperspectral imaging offers substantial benefits for microscopists in the life sciences field, allowing for the:

- Concurrent imaging and localization of a large number of targets
- Simplification of multiplexed imaging by utilizing a single excitation source with multiple fluorophores which are identified via their spectral signature
- Tracking of the localized microenvironment of fluorophores by means of imaging of Stokes shift distributions across regions in a sample

Benefits of HinaLea’s 4200M Microscope System

HinaLea’s 4200M Microscope System offers significant benefits over existing multi/hyperspectral microscopy systems.

Full Spectrum Coverage: Current multispectral microscopy cameras offer a limited number of spectral channels, with a reduced spatial resolution. This is a direct consequence of their architecture which uses a color filter array (CFA) on a focal-plane imaging array. Other grating-based hyperspectral microscopy cameras require mechanical scanning of the sample and are therefore expensive and require periodic calibrations. The HinaLea 4200M Microscope System is the only staring hyperspectral microscopy system on the market which can scan the whole VIS-NIR system with high spatial and spectral resolutions at an affordable price.

Wavelength Selectivity: One of the unique attributes of the HinaLea 4200M Microscope System is its wavelength selectivity. In many microscopy imaging applications, a subset of spectral bands can be selected from the hyperspectral data-cube to maximize the information retrieved from each scan. Typically, this subset is dependent on the set of dyes used as well as on the type of sample being interrogated. Since multispectral cameras as well as grating-based hyperspectral scanning cameras have their spectral bands “hard-wired”, either by a CFA or by a grating coupled to a focal-plane array, the benefit of determining this subset of bands is lost. A complete data-cube must be retrieved, or a complete mosaicked multispectral image must be processed, regardless of how few bands are really needed. The HinaLea 4200M Microscope System can be programmed to scan only a subset of wavelengths and thereby scans can be shorter and generate smaller data sets – all beneficial for the user, especially in high-throughput applications.
**HinaLea 4200M Microscope System**  
**Technical Specifications**

### Mechanical
- **Dimensions (LxWxH)**: 230mm x 120mm x 200 mm
- **Weight**: 1.4 kg (optical head only)

### Electrical
- **Input Voltage**: 18 VDC (optical head only)
- **Data Interfaces**: USB 3.0 and 2

### Environmental
- **Operating Temperature (Non-condensing)**: 20°C ± 5°C
- **Storage Temperature (Non-condensing)**: 0°C to 40°C (32°F to 104°F)
- **Humidity (Non-condensing)**: 65% maximum

### Scan Performance
- **Sensor Spatial Resolution**: 2.3 MP with demosaicing
- **Dynamic Range**: User selectable 8 or 16 bit
- **Spectral Range**: 400 – 1,000 nm
- **Max Number of Spectral Bands**: 300 nominal, 600 maximum
- **Spectral Resolution**: 4 nm (FWHM)

*+ RGGB sensor; effective monochromatic equivalent 588,544 pixels without demosaicing*

The application software features easy and fast data cube capture and intuitive image classification/segmentation as part of a suite of powerful spectral image exploration tools.

**Sample Image:** On the left is a maximum frame image (false colored green) of the lung cancer tissue collected with the HinaLea hyperspectral microscope system under 10X magnification with quartz tungsten halogen lamp illumination. Pixel groupings are similar spectral profiles (false colored), and cluster centers can be considered the endmembers or representative spectra.

![Sample Image](image-url)