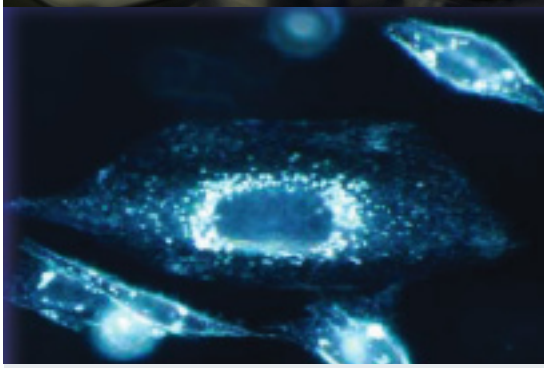
Application Note

Microscopy
Hyperspectral Imaging



For applications such as tracking and classification of cellular drug absorption and delivery or quantifying the presence of tagged nanobeads within tissue samples, hyperspectral imaging represents a valuable extension of traditional research techniques that can utilize existing optical microscopes available within the laboratory.

With research samples positioned along the microscope stage, spectral imaging yields critical analytical information with the addition of a hyperspectral sensor attached with a C-mount adapter of the exit port of the microscope.

With the microscope stage moving the sample area in a “push-broom” manner, hyperspectral imaging simultaneously yields precise information for all wavelengths across the complete spectral range of the sensor. With the creation of the hyperspectral datacube, a data set that includes all of the spatial and spectral information within the field of view, researchers are able to more thoroughly evaluate and interrogate microscopic structures and greatly enhance knowledge of the spectral composition of these samples.

Key advantages of hyperspectral microscopy include:

- Derive the spectral signature for every point within the scanned field of view for material classification
- Discrete color measurement and image rendering of tagged nanoparticles
- Color render the image scene based on an established library of known spectral signatures or disease conditions
- Identify and evaluate features based on fluorescence characteristics
- Generate wavelength-specific criteria for screening the presence of nanobeads and structures of interest

Cellular Spectroscopy

Disease Diagnosis

Drug Discovery

Fluorescence

Nanobead & Nanoparticle Research

Headwall's award-winning Hyperspec™ imaging spectrometer family is built on a totally reflective concentric, f/2.0 optical design and optimized for imaging in harsh environments. All Hyperspec™ instruments are based on Headwall's patented aberration-corrected, imaging design which feature the company's "original", high efficiency holographic gratings or diamond-turned diffraction gratings. To achieve very low stray light and high signal-to-noise performance, no prism or transmissive optics are used within the spectrometer. With Headwall's unique ability to design and fabricate the diffractive optics, each fully integrated Hyperspec™ imaging sensor is manufactured with application-specific, spectral and spatial imaging performance.

Headwall Photonics offers the broadest range of spectral imaging instrumentation for demanding applications.

Hyperspectral Sensors	Spectral Range
Hyperspec® VIS	380 - 825 nm
Hyperspec® VNIR	400 - 1000 nm
Hyperspec® Extended VNIR	600 - 1600 nm
Hyperspec® NIR	900 - 1700 nm
Hyperspec® SWIR	1000 - 2500 nm
Micro-Hyperspec™ VNIR	400 - 1000 nm
Micro-Hyperspec™ NIR	900 - 1700 nm
High Efficiency Hyperspec® NIR	900 - 1700 nm
High Efficiency Hyperspec® SWIR	1000 - 2500 nm

Information on UV, MWIR, and LWIR Hyperspec® sensors are available upon request.

Raman Imaging Instruments

Raman Explorer™ 260 nm
Raman Explorer™ 532 nm
Raman Explorer™ 785nm
Raman Explorer™ 830 nm
Raman Explorer™ 1064 nm

Raman Discovery™ 532 nm
Raman Discovery™ 785 nm

About Headwall Photonics:

Headwall Photonics is the leading designer and manufacturer of imaging spectrometers and spectral instrumentation for industrial, commercial, and government markets. Headwall's high performance spectrometers, spectral engines, and holographic diffraction gratings have been selected by OEM and end-user customers around the world for use in critical application environments. As a pioneer in the development of innovative spectrographs and imaging spectrometers based on optical technologies, Headwall enjoys a market leadership position through the design and manufacture of patented spectral instrumentation that is customized for application-specific performance. Headwall Photonics was formed in 2003 as the result of a management buy-out from Agilent Technologies. **For more information please call 978.353.4100 or email us at Information@HeadwallPhotonics.com.**

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