Polytec

Application Note

Food Safety & Quality
Hyperspectral Imaging

The utilization of hyperspectral imaging for the in-line inspection of poultry, fruits, vegetables, and specialty crops holds exceptional potential for not only increasing the quality and safety of food products but also offers a significant financial return for food processors by increasing the throughput and yield of processing centers.

While machine vision technology has been a standard approach to many food inspection and safety applications, hyperspectral imaging offers the incremental benefit of analyzing the chemical composition of food products both for in-line inspection and in the laboratory thereby significantly increasing production yields. Food products can be analyzed with hyperspectral sensing for disease conditions, ripeness, tenderness, grading, or contamination.

When Hyperspec™ imaging sensors are deployed early in the inspection process, food products can be segregated and sorted according to pre-established criteria and routed efficiently along the production line. Optimized for in-line processing, the Hyperspec instruments are fully-capable of processing at very high speeds based on spectral regions and wavelengths of interest.

Key advantages of hyperspectral imaging for equipment manufacturers & food producers include:

- Derive the spectral signature for every point within the field of view for material classification
- Color render the image within the field of view based on an established library of known spectral signatures
- For high volume production, generate wavelength-specific criteria for high speed quality control over the production process line.

Headwall Photonics is a US Department of Agriculture CRADA research and development partner

Agricultural Research

Crop Management

Disease Detection

High Speed, In-Line Inspection

Precision Agrilculture

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.

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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