Application Note

Antiquities, Artwork & Document Analysis
Hyperspectral Imaging

As a non-destructive imaging technique, hyperspectral imaging sensors have proven an essential and critical technology enabler to enhance research and understanding of a wide range of artifacts and artwork.

As an easily deployable imaging instrument, hyperspectral imaging has been used to reveal secrets of famous documents such as the Dead Sea Scrolls as well as archeological artifacts such as pottery shards (ostracons) that are the oldest known representation of Hebrew writing.

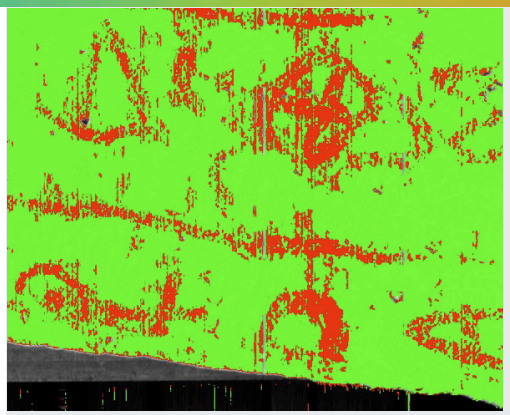
Hyperspectral imagers offer researchers and scientists unique advantages:

- Forensic analysis & validation of documents and artifacts
- Discover "original intent" elements & authenticity
- Identify regions for restoration
- Assess original coloring and pigmentation
- Enhance faded or hidden attributes

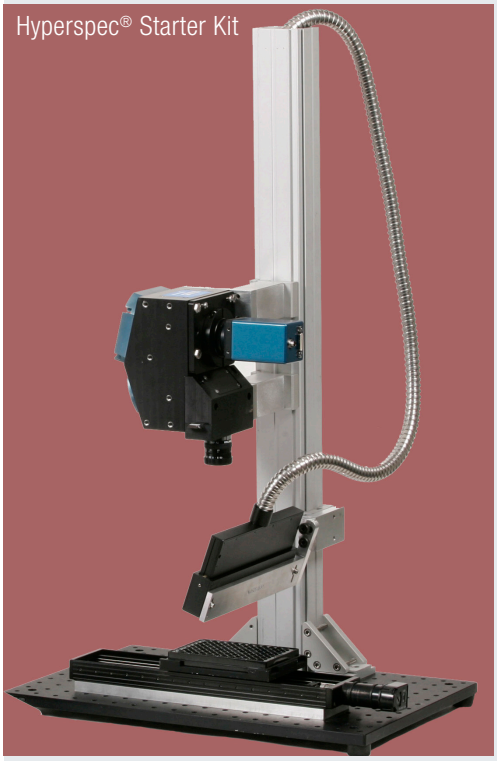
Since no preparation of the document or artifact is necessary, this non-destructive spectral technique is invaluable for a wide range of historical research and forensic science analysis. Within the field of view of the Hyperspec® sensor, hyperspectral imaging simultaneously yields precise information 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, research teams are able to more thoroughly evaluate documents and other crime scene evidence that will greatly enhance knowledge of the spectral composition and uniqueness of these samples.

Headwall's Hyperspec Starter Kit represents a complete, turnkey solution so that you can put hyperspectral sensing to work for you. The Starter kit comprises gantry, moving stage, lighting, hyperspectral sensor, and complete software integration.

Application-Specific Solutions For Critical Environments



Writing from a 3,000 year old ostracon artifact analyzed with Hyperspec SWIR instrument



Archeological Research

Document Examination & Verification

Artifact Analysis

Inspection of Paintings & Artwork

PRECISION DOCUMENT ANALYSIS

Spectral imaging for research and forensic analysis of artwork and documents are most commonly deployed in the visible-near infrared spectral region (380-1000 nm) and the shortwave infrared region (900-2500 nm). As deployed by forensic scientists or museum research staff, Headwall's hyperspectral instruments are configurable solutions designed to non-destructively analyze the world's rarest artwork and antiquities. The Hyperspec® are utilized within a laboratory or in situ to further enhance analysis.

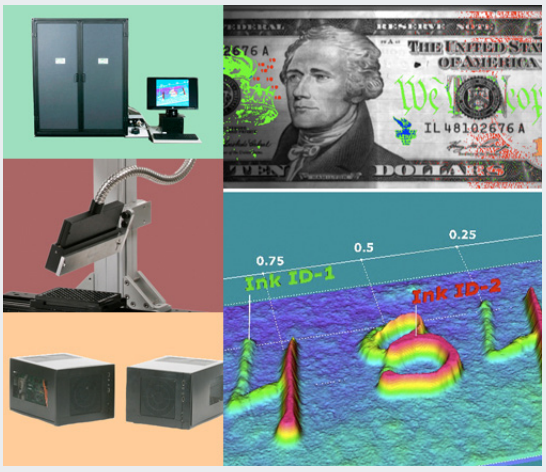
At left, a 3,000 year old ostracon artifact from Elah Fortress site is analyzed at Headwall facility by researchers from Israeli Antiquities Authority

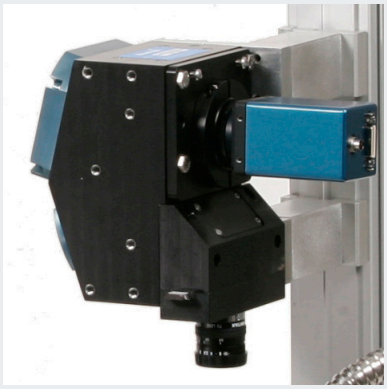
Headwall Photonics offers the broadest range of spectral imaging instrumentation for demanding applications.

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

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

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'S

Hyperspec® Starter Kit

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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