

Value of Handheld FTIR Spectroscopy in Art Conservation



**Innovative Spectrometers From Agilent Technologies - for the
Analysis of Fine Art, Sculpture and Historical Objects**

Graham_Miller@agilent.com

The introduction of handheld mid infrared spectrometers has brought with it unique yet complimentary non destructive test capabilities for molecular analysis

Non-destructive, non-contact characterization and analysis of rare objects- in the lab, in the field:

- Paintings, papers, documents and manuscripts, historical photographs, statuary, architecture, tapestries, tiles, mosaics, wood, pottery
- Identity of natural and synthetic organic and inorganic pigments, colorants and dyes, siccative oils/binders, lacquers, resins, coatings, adhesives, fibers etc
- Color analysis and identification of pigments, paints and dyes
- Effect of aging including damage caused by UV, thermal and environmental pollution
- Cleaning and restoration support efforts of rare and historical objects
- Identifying counterfeits and/or determining if objects have been restored



We take the value of Spectroscopy to the sample for the non-destructive analysis of high value objects



The dual nature Agilent's Handheld FTIRs

For Lab & Field Work duality

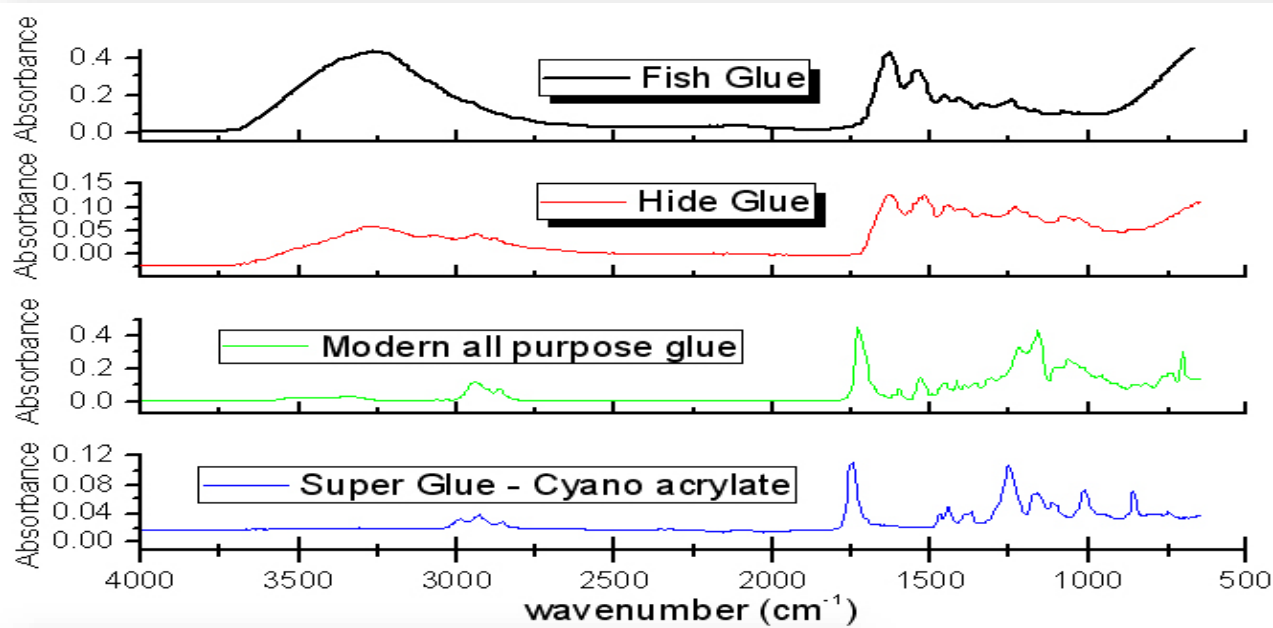
- **4100, 4200 and 4300 Handheld FTIR**
- Well proven
- Laboratory performance in and out of the lab
- Non Destructive testing of all surfaces and materials
- Compact and robust
- Used in any orientation and on curved surfaces
- Rapid evaluation of materials and large surfaces
- Stand option allowing in lab use
- Diffuse reflection and spherical ATR sampling interchangeable interfaces
- Microlab Software



Application examples



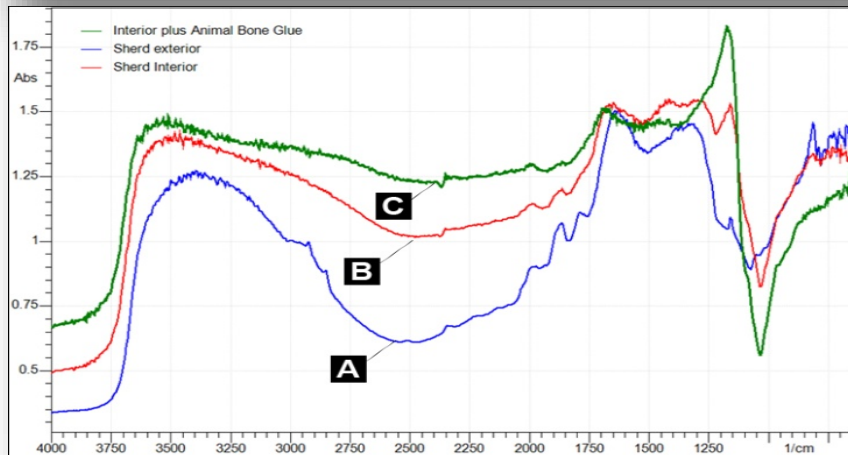
Authenticity and identity of an ancient glue pot



FTIR analysis can determine if tell-tale chemicals are present that indicate recent repair of object and also determine how the object was used.

Case Study:

- The FTIR spectra of modern glues and ancient glues are quite different. Repairs made to objects using synthetic glues are a clear indicator of recent repair.
- By searching for chemical residues on a shard of pottery, investigators proved that the object was part of an ancient glue pot.



Analysis of large objects – Temple doors and paint degradation

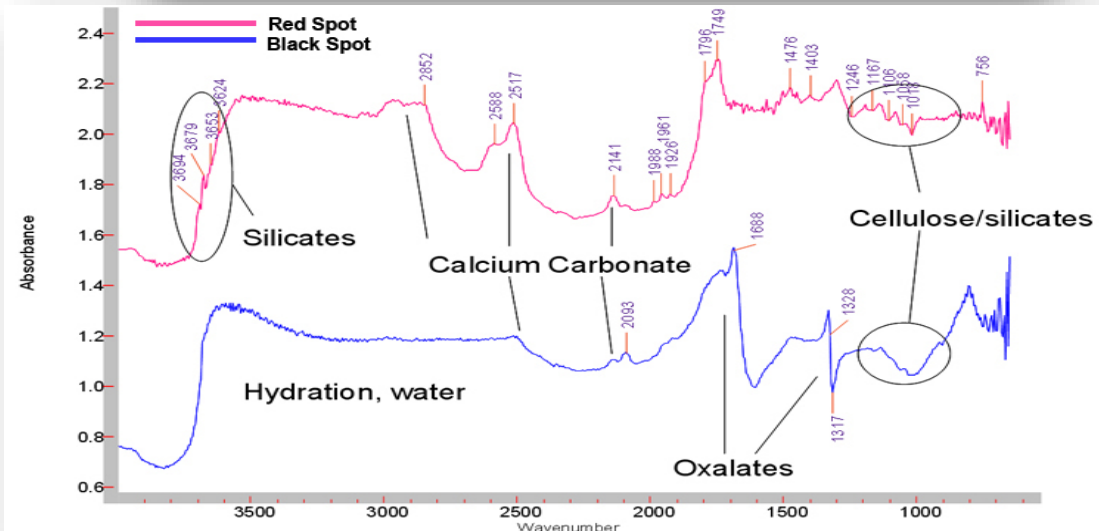


For objects that are too large or otherwise immobile, employing spectrometers at site is ideal

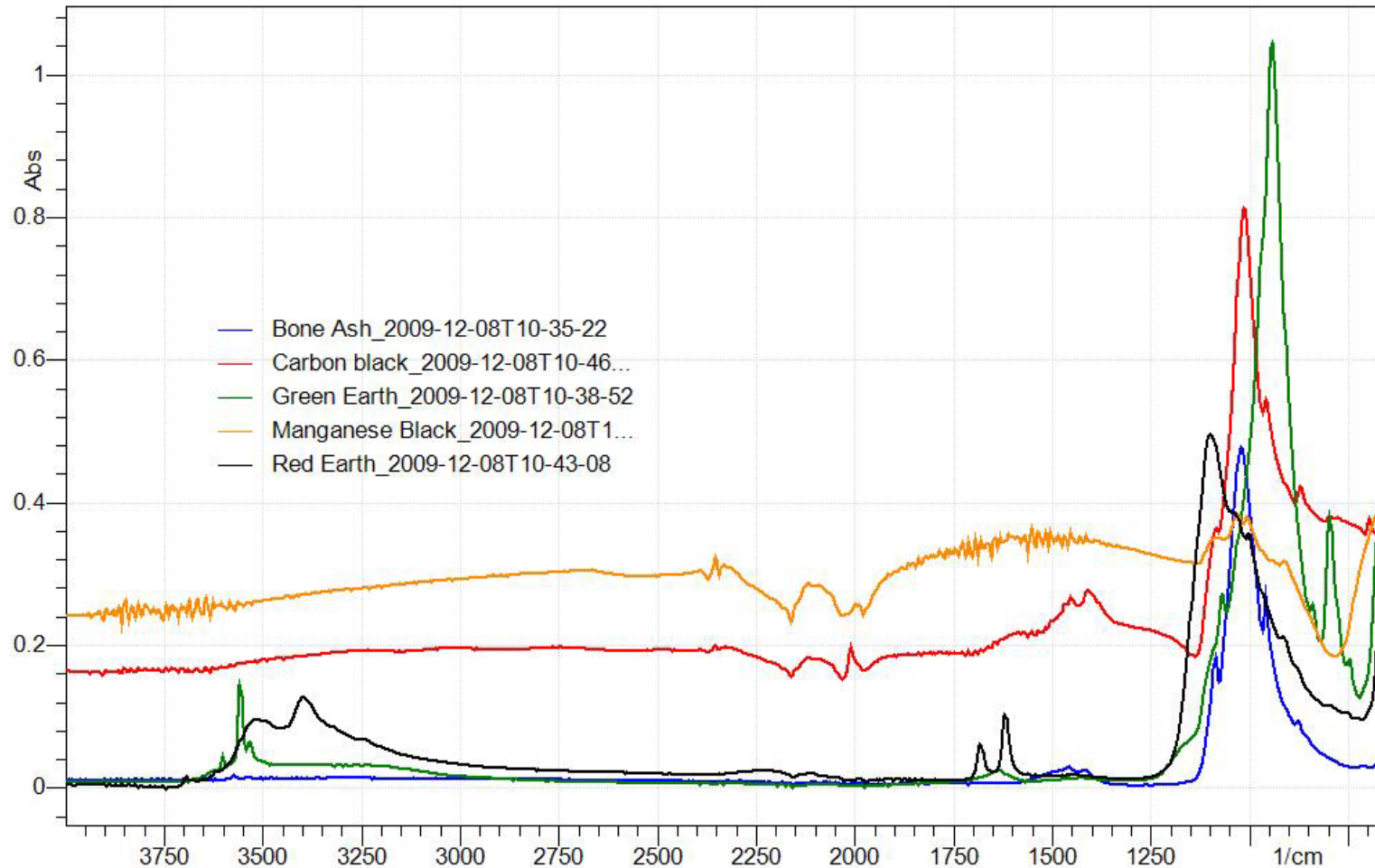
Case Study:

Beigins Chao-Tian Temple Doors were investigated by 4100 Exoscan FTIR with diffuse reflectance sampling attachment.

Different areas of painted doors show different levels of oxalate presence, which is indicative of algae and fungi attack on paint

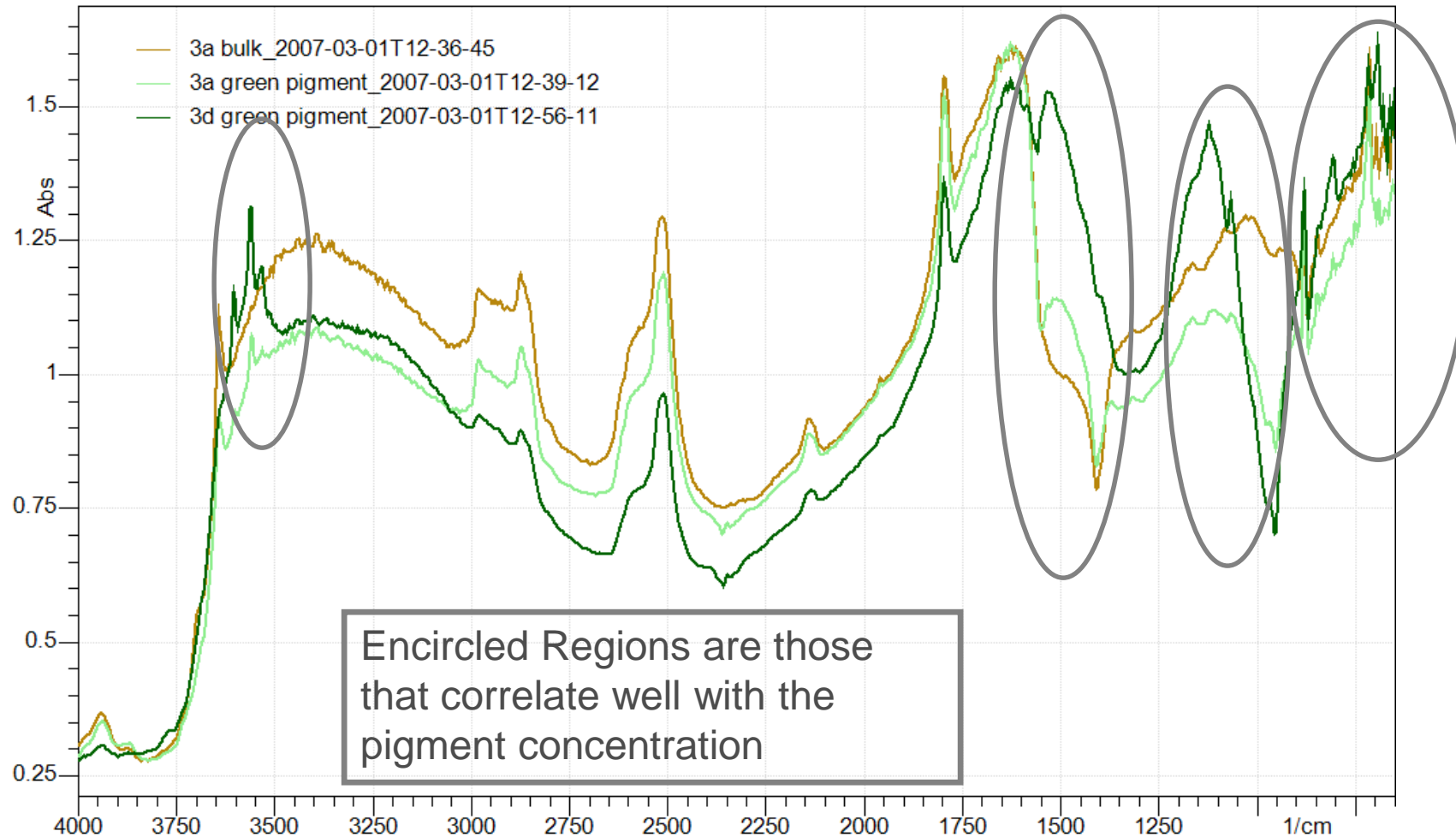


Analysis of Ancient pigments non destructively using Diamond ATR



Clear discrimination between materials as would be expected from Mid Infrared analysis

Classification of ancient pigments from mosaic tiles using Diffuse Reflectance



Interesting paper published in Analytical methods

The screenshot shows a Windows Internet Explorer browser window displaying the article page for 'Analytical Methods'. The address bar shows the URL: <http://pubs.rsc.org/en/Content/ArticleLanding/2015/AY/C4AY02006E#divAbstract>. The browser's Favorites bar includes links like 'Browse - Content Spark', 'Suggested Sites', 'Web Slice Gallery', 'Agilent Remote Access Se...', 'group CRM Users in Glob...', 'Home - CAG Manager Re...', and 'materials Non Destructive...'. The page itself has a blue header with the journal title 'Analytical Methods' and 'Issue 6, 2015'. Below the header, there's a section for the paper: 'Portable diffuse reflectance infrared Fourier transform (DRIFT) technique for the non-invasive identification of canvas ground: IR spectra reference collection' by M. Manfredi, E. Barberis, A. Rava, E. Robotti, F. Gosetti, and E. Marengo. The paper's DOI is 10.1039/C4AY02006E, and it was received on 26 Aug 2014 and accepted on 21 Nov 2014. The page also features a sidebar with 'Search Articles By' and a list of authors. The main content area shows the abstract, which discusses the method for preparing paintings and the non-destructive investigation of the preparation used to make a canvas.

Portable diffuse reflectance infrared Fourier transform (DRIFT) technique for the non-invasive identification of canvas ground: IR spectra reference collection

M. Manfredi,^{*,a} E. Barberis,^b A. Rava,^b E. Robotti,^a F. Gosetti,^a and E. Marengo^a

Anal. Methods, 2015, 7, 2313-2322
DOI: 10.1039/C4AY02006E
Received 26 Aug 2014, Accepted 21 Nov 2014
First published online 14 Jan 2015

The method for preparing paintings varies from artist to artist. The non-destructive investigation of the preparation used to make a canvas is very important both for restoration and authentication purposes. A portable diffuse reflectance infrared Fourier transform (DRIFT) method for the non-

Summary

Agilent Handheld Spectrometers for Art Conservation



Exceptional flexibility to meet application requirements

- Provides chemical molecular information
- Complementary to existing handheld techniques

Agilent 4100, 4200 and 4300 spectrometers are designed to be truly portable FTIR

- No compromise performance in and out of laboratory
- Use in any orientation, no tripod required
- Compact and rugged



Please visit our website to download this presentation and access links to the application notes discussed or to be kept in the loop when we have new application notes posted!

Visit: <https://www.chem.agilent.com/en-US/promotions/Pages/artconservation.aspx>