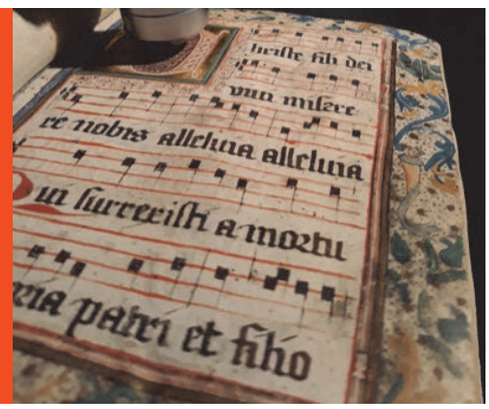
THE UNIVERSITY OF SYDNEY

Sydney Analytical Vibrational Spectroscopy Facility

Scientific services for cultural heritage and archaeology



A hub for science for cultural heritage and archaeology

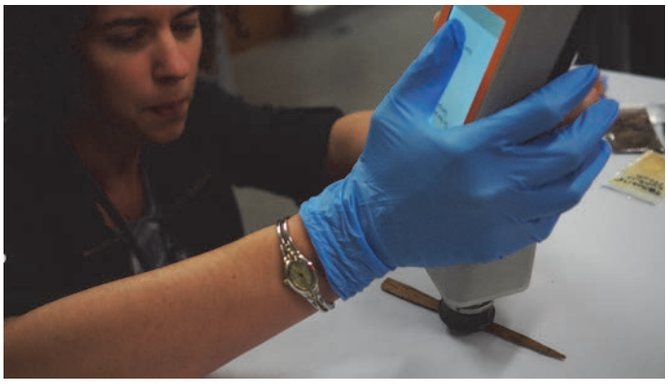
The use of analytical chemistry in cultural heritage and archaeology is a powerful means of investigating a wide array of important issues through the analysis of materials from the biological to inorganic.

Commonly investigated materials include:

- pigments, binders, inks and paints
- varnishes
- residues
- textiles and manuscripts
- ceramics, glazes and glass
- bone, ivory and teeth
- plaster
- photographic films.

Materials analyses can provide insight into:

- best conservation practice
- dating and provenance determination
- degradation processes
- fraud identification.



Sydney Analytical have a variety of portable equipment that can be taken to site for non-destructive analysis:

- Raman Spectrometers
- NIR Spectrometers
- FTIR Spectrometers– ATR and Reflectance
- X-ray Fluorescence Spectrometers.

Case study I: Gristhorpe Man and the 'mistletoe berries'

In 1834 in a tumulus at Gristhorpe, North Yorkshire, UK, an intact coffin fashioned from a hollowed-out oak tree trunk was found to contain a well-preserved skeleton stained black from the oak tannins, wrapped in an animal skin and buried with a range of grave artefacts. Several mysterious small spherical objects were also discovered underneath the skeleton and initially believed to be 'mistletoe berries' associated with ancient burial customs.

Interpretation of Raman data together with microscopic analysis led to the conclusion that the small spheres were urinary stones, which was in agreement with archaeological dietary evidence and stable isotope analysis of bone collagen of Gristhorpe Man.

Skeletal remains of Gristhorpe Man (Rotunda Museum, Scarborough, North Yorks., UK); (inset) The 'berries' were found underneath the skeleton in the coffin base.

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Sydney Analytical Vibrational Spectroscopy Facility

Sydney Analytical provides travel-ready portable equipment for on-site non-destructive analysis

Case study II: A unique 17th century bodice

This bodice from the Museo del Traje, Madrid, is believed to be the only example of its type in the world, dated to c. 1660 and is believed to be French or English in origin. Visual inspection of the bodice revealed external dirt, perspiration marks, broken metallic threads and small regions of frayed fabric. A suite of anaytical techniques (Raman and IR spectroscopy, SEM, EDX and PLM) were used to reveal information on its conservation state to allow for appropriate measures for restoration.

- The bodice was made from silk, cotton, linen, wool and whale bone was used in the corset.
- Wool was blended with cotton or silk threads.
- Raman spectroscopic analysis showed that the yellow colour on the silk was the result of aging, not fabric dying.
- Raman and IR spectroscopy revealed that there was no significant degradation of the various fibre types identified.
- Fibre morphology was analysed using SEM and PLM providing information about manufacturing techniques.

17th century bodice from the Museo del Traje, Madrid.

Who we are

Sydney Analytical is a multidisciplinary facility supporting research excellence across the University of Sydney. We offer open access to the University's flagship instruments for material, chemical and biological analysis, as well as expert guidance, enabling innovation and high impact research outcomes.

Included in the range of instrumentation held by Sydney Analytical are modern and non-destructive analytical techniques that enable new insights to be gained from items in museum and art gallery collections, as well as archaeological and palaeontological artefacts.

Contactless NIR analysis of pigments on the cedar coffin of the woman Mer-Neith-it-es; 26th Dynasty (664 BC to 525 BC, Saite Period); Saqqara, Lower Egypt (NMR.29.1-2) Nicholson Museum, the University of Sydney

Contact us

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Our state-of-the-art infrastructure supports research and industry development in fields such as museum and cultural studies, conservation and archaeology.

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