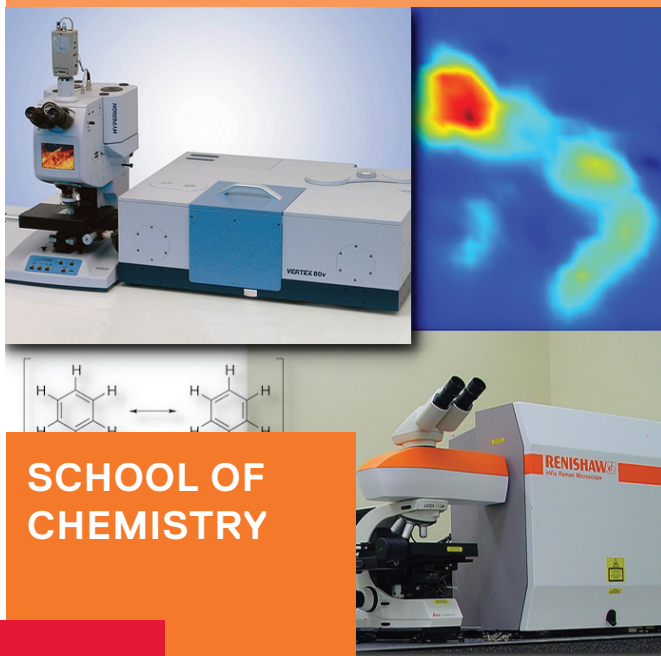


# VIBRATIONAL SPECTROSCOPY FACILITY



SCHOOL OF CHEMISTRY



THE UNIVERSITY OF SYDNEY

The Vibrational Spectroscopy Facility is a research centre of the School of Chemistry, University of Sydney, which provides state-of-the-art instrumentation and services available to the University of Sydney, as well as publicly funded agencies, industrial clients and international scientists.

## LOCATION

UNIVERSITY OF SYDNEY  
MADSEN BUILDING (F09)  
EASTERN AVE  
Level 2 - Rooms 256-260

## SERVICES AVAILABLE

- Training provided to allow users to operate independently
- Samples submitted for analysis by Facility staff
- Consulting

For further information including Facility charges please visit the website.

## FURTHER INFORMATION

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The research interests of the Vibrational Spectroscopy Facility users are diverse and applications include: nanotechnology, materials science, art and archaeology, polymer science, pharmaceuticals, environmental, forensic science, mineralogy, gemmology and life sciences.

Samples generally require little to no sample preparation (where possible), and are typically analysed in the form of liquids, powders, solids, and thin films. An array of substrates are available for specialised experiments, e.g. biological cells can be grown on silicon nitride windows allowing analysis with multiple spectroscopic techniques.

A selection of some of the samples that have been studied at the Vibrational Spectroscopy Facility include:

- Micro-organisms
- Polymers
- Biological tissues
- Minerals
- Proteins
- Single cultured cells
- Fullerenes
- Archaeological glasses
- Carbon films
- Teeth and bone

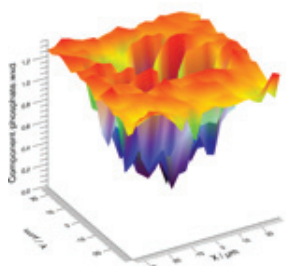
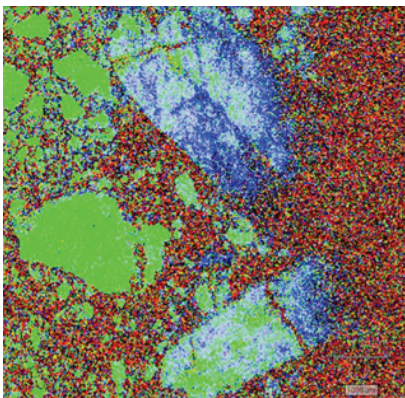
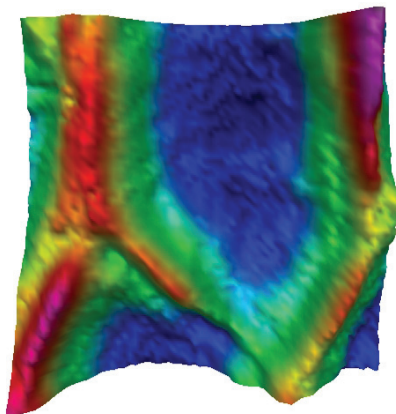
## COURSES AND TRAINING

A 3 day introductory course that examines the theoretical and practical aspects of vibrational spectroscopy is held twice a year.

This course covers:

- Fundamentals of Vibrational Spectroscopy
- Introduction to Spectrometers
- Data Manipulation
- Sampling Techniques for Infrared and Raman Spectroscopy
- Applications of Vibrational Spectroscopy
- Specialised Techniques
- Multivariate statistical analysis

The course is structured to have lectures in the morning followed by an afternoon session in the laboratory. Participants will be made familiar with the different instruments and accessories in the Vibrational Spectroscopy Facility and learn basic operating procedures.



FTIR image of an onion, showing the distribution of cellulose (top), StreamLine™ Raman map of a fulgurite (natural glass) showing the distribution of shocked (blue) and unshocked (green) quartz (middle), Raman point-map showing the distribution of phosphorus in bone (bottom).

## INSTRUMENTATION

### Bruker IFS66v FTIR Spectrometer:

- The instrument allows for collection of spectra over the NIR, MIR and FIR ranges ( $15000$  to  $50\text{ cm}^{-1}$ ).
- Sampling accessories include: diffuse reflectance, photoacoustic, attenuated total reflection and grazing angle.

### Bruker Tensor 27 FTIR Spectrometer with HTS-XT (High Throughput Screening eXTension):

- The HTS-XT module enables high throughput screening of 96-well microplates in transmission mode over the MIR spectral range.
- A robotic arm transfers microplates to the spectrometer for measurement allowing the instrument to operate unattended 24/7.

### Renishaw Raman inVia Reflex Microscope:

- A highly automated microscope allows point spectroscopy and mapping (point-by-point and rapid).
- StreamLine™ Plus is a rapid mapping technique  $\sim 200\times$  faster than traditional point-by-point mapping allowing large (mm) sample areas to be investigated.
- The instrument is coupled to a Scanning Electron Microscope (SEM) that allows a sample to be simultaneously analysed by SEM and Raman spectroscopy.
- Excitation wavelengths: 488, 514, 633, 785 and 830 nm.

### Bruker Vertex 80V FTIR Spectrometer + Hyperion 3000 Microscope

- The Hyperion microscope is equipped with a MCT detector for point spectroscopy and mapping and a focal plane array (FPA) for imaging.
- Specialised microscopic objectives include: ATR and grazing angle, both of which can be used for mapping and imaging.

### Bruker MultiRAM FT-Raman Spectrometer:

- The instrument allows for samples to be analysed in either a macro, micro or high-throughput mode.
- The microscope is equipped with a motorised sample stage for mapping and offers a  $8\text{ }\mu\text{m}$  spatial resolution.
- 1064 nm (Nd:YAG diode pumped laser) Spectral Range:  $3600 - 50\text{ cm}^{-1}$ .
- $90^\circ$  and  $180^\circ$  sampling geometry.

### Bruker RFS100 FT-Raman Spectrometer:

- Samples can be analysed either in macro or microscopic mode.
- Stokes ( $3500$  to  $50\text{ cm}^{-1}$ ) and Anti-Stokes ( $-100$  to  $-2000\text{ cm}^{-1}$ ) spectra can be collected.
- $90^\circ$  and  $180^\circ$  sampling geometry.

### Renishaw Raman Systems 2000 Spectrometer:

- This system can collect point spectra and a motorised stage allows mapping to be performed with  $1-5\text{ }\mu\text{m}$  spatial resolution.
- Excitation wavelengths: 488, 514, 532, 567 and 647 nm.

### Jobin-Yvon U1000 Raman Spectrometer:

- This system is suitable for high spectral resolution and high stray light rejection applications.
- Argon and Krypton ion lasers provide a multitude of excitation wavelengths from the red ( $752\text{ nm}$ ) through to the ultraviolet ( $351\text{ nm}$ ). This choice of excitation lines allows for resonance Raman spectroscopic studies.

### Universal Sampling Accessories

#### Temperature Controlled Stage:

- Temp. Range:  $-196^\circ\text{C}$  to  $600^\circ\text{C}$  (Manual or Computer controlled)
- Sample size: up to  $22\text{ mm}$  diam. and  $1.5\text{ mm}$  thickness

## FOR MORE INFORMATION CONTACT

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