

# Foram™

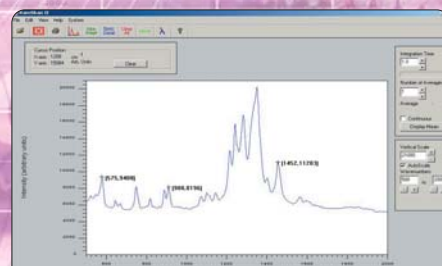
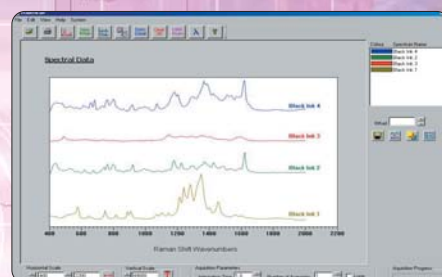
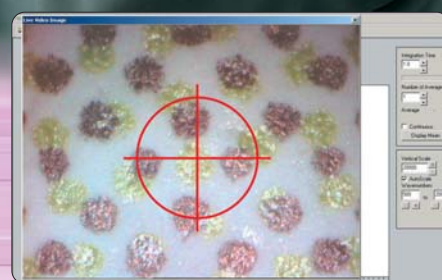
RAMAN SPECTROSCOPY

foster+freeman



## Foram™... a range of Raman spectrometers with integral video microscopes

- Raman spectral analysis takes less than a minute
- Video imaging with X Y translation stage for precise sample alignment
- Choice of 532, 685 and 785nm laser wavelengths
- Increased sample sensitivity with the application of SERRS



Raman spectra exhibit numerous features that are specific to molecular structure and provide valuable "fingerprints" for comparing and differentiating materials; their examination provides a valuable technique for evaluating materials of forensic value including drugs and explosives.

### Advantages:

- non-destructive
- fast, in situ examination
- minimal technical training
- effective on samples as small as 5 microns
- simple peak-to-peak correlation technique for matching spectra
- database facilities for identifying unknown substances

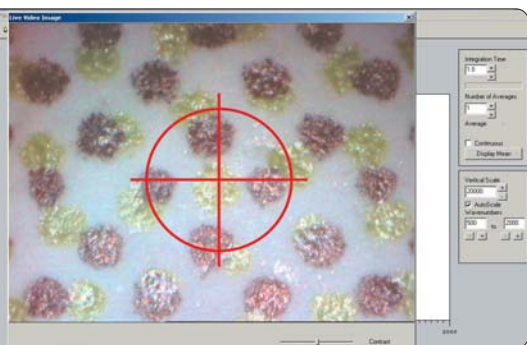
### Powerful processing functions

Powerful signal processing functions such as signal integration and averaging enhance the naturally low intensity of Raman emissions to ensure accurate and reproducible spectra. Other functions include baseline correction to remove background fluorescence and peak labelling for easy-to-read printouts

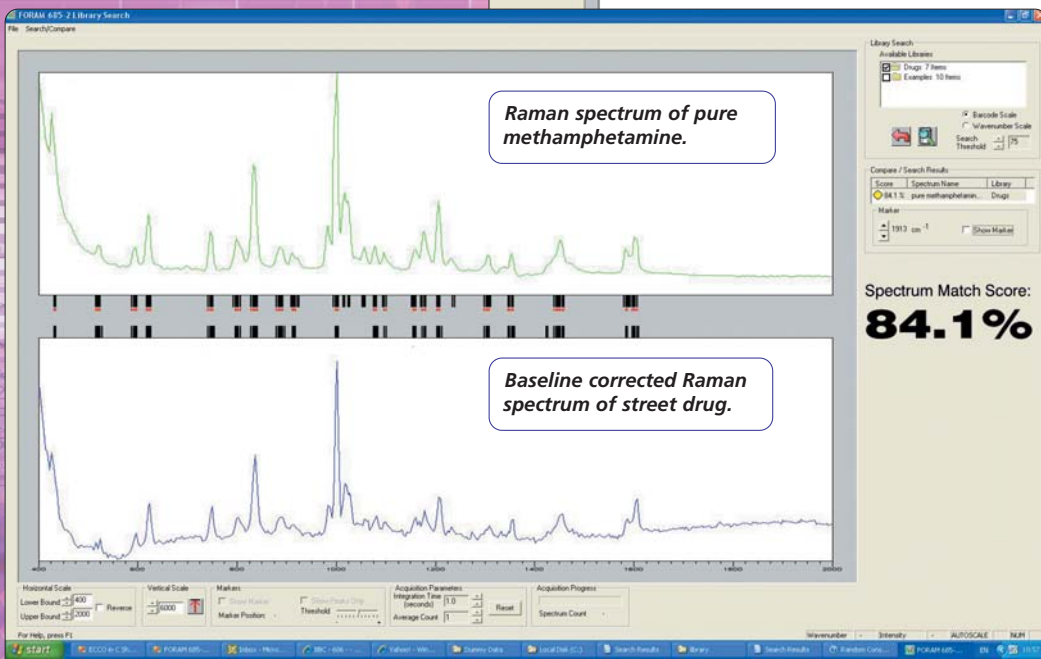
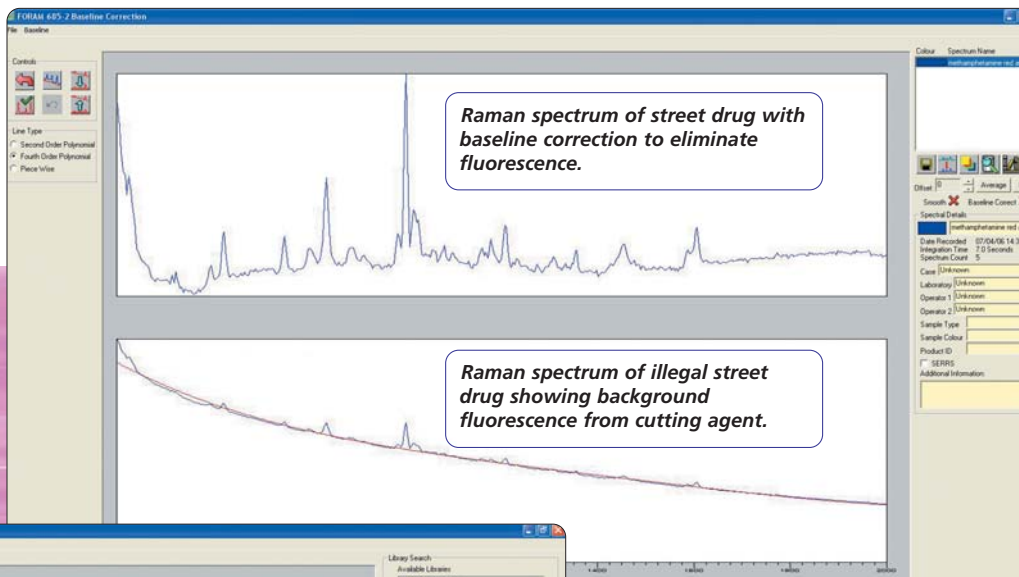
As well as making visual comparisons of spectra the operator can use an automatic peak-to-peak correlator, a program that identifies the peaks in two pre-selected spectra and determines the significance of their match. This provides a simple numeric measure of the degree of similarity of two spectra that ignores interference from background fluorescence and noise - ideal for comparing large numbers of spectra and for database search and match enquiries.



A range of lenses provides on screen magnification of up to x600 on a 22" monitor.



Video microscopy assists the selection of samples as small as 5 microns.



Spectra of methamphetamine and the street drug are compared automatically using peak-to-peak correlation giving a match score of 84.1%..



Raman spectroscopy is a powerful technique for document examination and ranks with infrared fluorescence and absorption for effectiveness and convenience of use. Together, the Foram™ and Foster & Freeman's VSC™6000, provide exceptional discriminatory power in the examination of inks.

## Video microscopy

The Foram™ has a large, A4 size, XY translation stage with fine spatial adjustment to allow the operator to align the laser probe on to a sample as small as 5 microns. Sample selection is assisted by the use of an integral video microscope with a rotating turret that can be fitted with up to four objective lenses to provide on-screen magnification of up to x440 on a 22" monitor. The ability to select small samples enables the operator to examine individual pigment particles or paper fibres for instance. To protect samples from laser damage, the Foram™ is fitted with a low power laser probe with an intensity control that permits operation as low as 10% of maximum output. Operation at low laser intensity is compensated for by signal integration to provide measurable Raman spectra.

## Technical features

The Foram™ is designed to make Raman spectroscopy reliable and easy, features include:

- External cavity laser for maximum wavelength stability.
- Low laser power for sample protection.
- Choice of laser wavelengths - 532, 685 and 785nm.
- A4 size XY translation stage
- Integral video microscope providing up to x600 magnification for sample selection.
- Minimum sample size of 5 microns diameter.
- Standard PC operation.

## Software features

Foram™ is supplied with a comprehensive software package that provides:

- Easy to use on-screen menus.
- Multiple spectral displays for visual comparison.
- Advanced signal processing for maximum sensitivity.
- Automatic spectral comparisons using peak-to-peak correlation.
- Data archiving with search and match facilities.

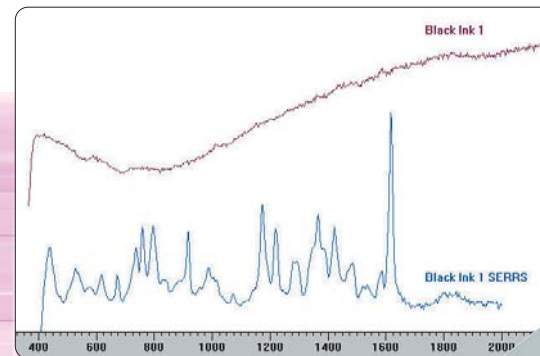
## SERRS - surface enhanced resonant Raman scattering

As well as standard Raman spectroscopy, Foram™ will perform surface enhanced resonant Raman spectroscopy (SERRS). The SERRS technique which is only effective with the Foram™685 and Foram™785 is an important advance in Raman spectroscopy as it quenches fluorescence and raises the intensity of Raman emissions. It is particularly effective in the examination of dyes and pigments where fluorescence is commonly encountered. Although SERRS involves the application of reagents to the document, the treatment is invisible and restricted to one or two square millimetres of the ink's surface. As with standard Raman spectroscopy, examinations are carried out, in situ without the need to remove ink from the document.

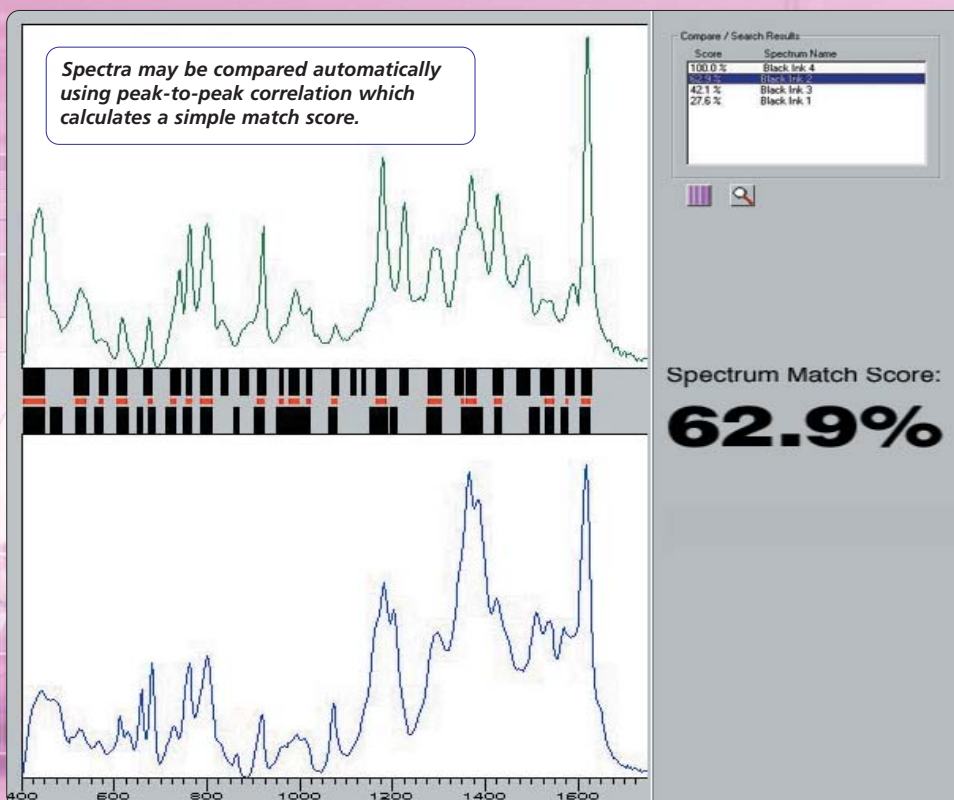


SERRS reagents are applied with a pipette to a 1 to 2mm<sup>2</sup> area of the sample.

Spectrum of a black ink boosted by the SERRS technique.



The Foram™ has a precision X-Y translation stage for accurate laser alignment.



# Foram<sup>TM</sup> specifications

**Laser probe:** 532, 685 and 785nm, external cavity stabilised diode laser.

**Laser power controls:** Provides operation at 10%, 25% and 100% of maximum power.

**Video microscope:** Colour CCD.  
Rotating objective lens turret (*4 lens capacity*).  
20x, 10x and 5x objective lenses supplied as standard.  
Focus adjustment.  
A4 size XY translation stage with  $\pm 2$ mm of adjustment on both axes.

**Detector:** CCD array, thermoelectrically cooled.

**Spectrometer range:** 400 to 2000 wavenumbers.

**Spectral resolution:** 8 wavenumbers.

**Computer:** Please consult your Sales Office for the current specification.

**Software:** Operating system.  
Signal processing software including:  
● Signal integration.  
● Background (*fluorescence*) removal.  
● Spectral comparison.  
Casework reporting system with data archive.  
Instrument calibration.  
Software updates for 2 years.

**Safety Classification:** Class 3R laser product.

**Accessories:** SERRS\* kit including:  
● Gold colloid.  
● Poly-l-lysine solution, 0.01%.  
● Pipette plus disposable tips.

*\*The SERRS technique is not effective with the Foram<sup>TM</sup>532*



*Foster & Freeman Ltd reserve the right to alter the specification of the Foram<sup>TM</sup> or any accessories without prior notice.*

## After Sales Support

Foster & Freeman's excellent product engineering is supported with full after sales support including advice, training and maintenance.

For more information on our world-wide services please contact your nearest Sales Office.



Appointed Agent:

foster+freeman

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