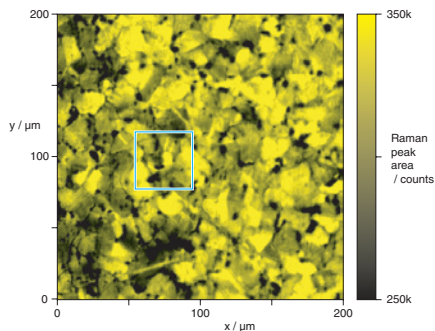


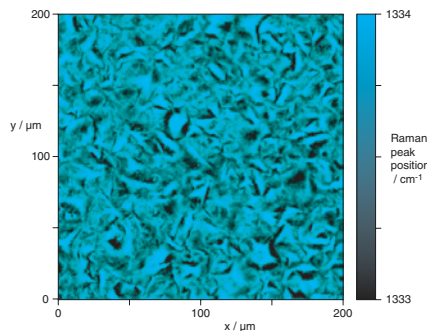
## StreamLine: Rapid Raman imaging of diamond films

I.P. Hayward, M.J. Bloomfield, T. Smith, G.A. Evans.

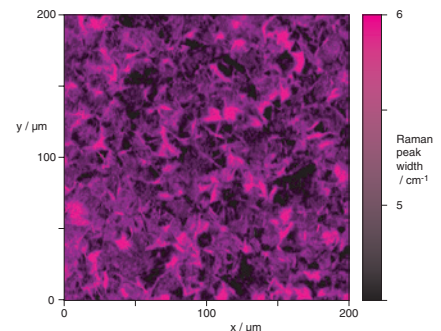
Renishaw plc, Old Town, Wotton-under-Edge, GL12 7DW UK



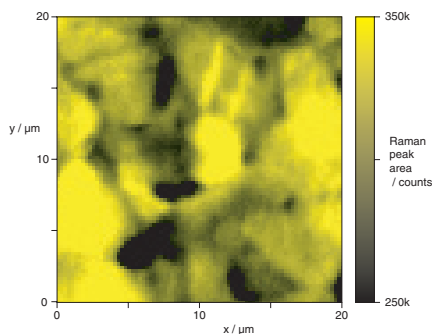
**Figure 1**  
Diamond peak area,  
reveals sample homogeneity.



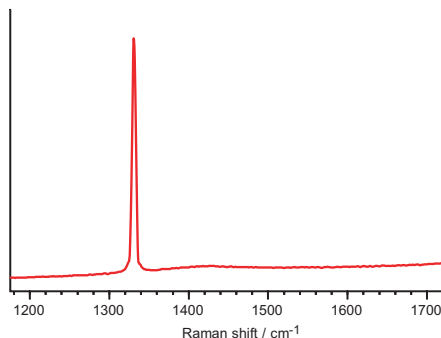
**Figure 2**  
Diamond peak position,  
indicates stress levels.



**Figure 3**  
Diamond peak width,  
indicates quality and stress  
inhomogeneity.



**Figure 4**  
Close up of the region  
indicated by the square in  
Figure 1, showing the high  
spatial resolution of the data.



**Figure 5**  
Spectrum taken from the  
dataset, from the bright grain in  
the centre of Figure 4.

Conditions	
Imaged area	200 μm × 200 μm
Data point spacing	0.5 μm × 0.5 μm
Total number of spectra	161,201 (401 × 401)
Total time	94 minutes
Average data interval	35 ms per spectrum
Excitation wavelength	532 nm
Laser power	200 mW

**StreamLine™ Raman images of the polished surface of a high quality microwave CVD diamond film. All 161,201 spectra acquired in 94 minutes total.**

Raman spectroscopy is one of the most widely used techniques for the analysis of diamond films:

- Can determine chemical composition and stress levels
- Sub-μm spatial resolution
- Non-destructive

Can be used to create images:

- Acquire spectra from an array of positions
- Process them to reveal the parameter of interest
- Create image

Point-by-point mapping:

- Most common Raman imaging technique
- Spectra are collected sequentially from a large number of single points in a raster pattern.
- Slow

StreamLine:

- New method
- Collects data in parallel rather than in series.
- Gives drastically shorter total acquisition times, without sacrificing data quality

Equipment: Renishaw inVia Raman microscope with:

- Renishaw CCD array detector
- 532 nm laser
- Motorised mapping stage with Renishaw encoders
- Renishaw MSC10 motor controller; enables synchronisation between charge movement on detector and movement of sample



inVia Reflex Raman microscope